Contents

Treatment Effects of Exercise Intervention/Prescription on NCDs.

Hanson Huang Sen-Fang

Tzu Chi University, Clinical Exercise Physiology Society, Taiwan, E-mail:hanson@gms.tcu.edu.tw

Introduction

Physical inactivity has been predicted as the biggest public health problem of the 21st century (Blair, 2009). In contrast, physical activity has been demonstrated as primary prevention against at least 35 chronic diseases and conditions (Booth, Roberts, & Laye, 2012). Moreover, exercise has been recommended to prescribe as medicine for 26 different diseases (Pedersen, & Saltin, 2015). The physiology and molecular biology of exercise suggest that exercise activates multiple signaling pathways of major health importance (Pedersen, 2019). Protein, peptide, microRNA or metabolites collectively termed "exerkines" released from skeletal muscle, adipose tissues and others organs during/after exercise exerts autocrine, paracrine or endocrine actions have been proposed as acute responses and chronic adaptations to exercise or physical activity, and enhance physiological structures and functions in proximal and distant organs in human body, subsequently improve health level and protect against or treat NCDs (Safdar, Saleem, & Tarnopolsky, 2016). In this presentation, scientific evidences, mainly systemic reviews and meta-analysis studies, emerged from recent clinical trials involved exercise interventions and specific exercise prescriptions resulted in promising effects on symptoms and positive physiological conditions in patients with NCDs such as cardiovascular diseases, cancers, T2DM and other diseases will be summarized.

Effects of clinical exercise on patients with cardiovascular diseases

A meta-analysis included 19 clinical trials with 339274 participants, study results indicated exercise and many drug interventions are often potentially similar in terms of their mortality benefits in the secondary prevention of coronary heart disease, rehabilitation after stroke, and prevention of diabetes (Naci & Ioannidis, 2013). A total of 63 studies with 14,486 (coronary heart disease, CHD) participants included in a meta-analysis, study results demonstrated exercise-based cardiac rehabilitation reduces cardiovascular mortality and hospital admissions and improvements in quality of life (Anderson, et al., 2016). Another 5 random-control trials (RCTs) on exercise with 245 patients with heart failure with preserved ejection fraction (HFpEF) and 8 RCTs on cardiovascular drugs with 1080 patients included in meta-analysis, study results revealed exercise training is a therapeutic option to improve functional capacity and quality of life in HFpEF patients (Fikuta et al., 2016). Twenty-one studies involving 736 participants with cardiac diseases included in a meta-analysis, study results showed HIIT improves aerobic capacity more effectively than does continuous endurance exercise in cardiac patients (Xie et al., 2017). Thirty-eight articles describing RCTs with a total of 2089 patients with CVD were included, pooling results revealed that aerobic exercise and resistance exercise significantly decreased aortic systolic pressure, and resistance exercise significantly decreased aortic diastolic pressure. Aerobic exercise significantly decreased augmentation index based on 24-week exercise duration and patients aged 50±60 years. Aerobic exercise significantly improved carotid-femoral pulse wave velocity, cardiac output and left ventricular ejection fraction. Combined exercise significantly improved central arterial stiffness (Zhang et al., 2018).

Effects of clinical exercise on patients with cancer

Across 26 studies of breast, colorectal, and prostate cancer patients, a 37% reduction was seen in risk of cancer specific mortality, comparing the most versus the least active patients. Risks of recurrence or recurrence/cancer-specific death (combined outcome) were also reduced based on fewer studies (Friedenreich et al., 2016). Based on 11 meta-analyses (included 91 studies, over 68,000 cancer patients), study results revealed superior levels of exercise following a cancer diagnosis were associated with a 28%–44% reduced risk of cancer-specific mortality, a 21%–35% lower risk of cancer recurrence, and a 25%–48% decreased risk of all-cause mortality (Cormie et al., 2017). Another meta-analysis collected 113 studies with 11525 participants (78% female), study results showed exercise and psychological interventions are effective for reducing cancer-related fatigue (CRF) during and after cancer treatment, and exercise interventions are significantly better than the available pharmaceutical options (Mustian et al., 2017). Sixty five eligible articles reported a total of 140 independent meta-analyses were included, results showed the beneficial effect of exercise was statistically significant in 104/140 (75%) meta-analyses. And, most effect sizes were moderate for cardiovascular fitness and muscle strength and small for cancer-related fatigue, health-related quality of life and depression (Fuller et al., 2018). Included 4 randomized controlled trials (breast cancer, n=2; prostate cancer, n=2) with 163 cancer survivors in a meta-analysis, study results confirmed aerobic exercise training improved peak exercise oxygen uuptake and vascular endothelial function in cancer survivors (Beaudry et al., 2018). Physical exercises and their reduction of cancer-related symptoms such as bone loss and disease, muscle and fat mass imbalance, cachexia, peripheral neuropathy, lymphedema, pain, fatigue, sleep disorder, depression, anxiety, quality of life and self-esteem had been summarized (Ferioli et al., 2018). Recently, recommended process for targeted exercise prescription for cancer patients also has been well-designed (Hayes et al., 2019).

Effects of clinical exercise on patients with Type 2 diabetes

Meta-analysis included 27 studies with 1372 participants, 737 exercise and 635 from control groups. Study results indicated exercise at higher intensity may offer superior fitness benefits and longer program duration will optimize reductions in HbA1C% (Grace, et al., 2017). Seven studies were included in a systematic review (64 prediabetes and 120 T2D patients) and five with T2D were meta-analyzed. Study results showed HIIT promoted significantly VO_2max, functional capacity compared to moderate intensity continuous training. No differences were found between two modalities of exercises considering the outcomes HbA1c, systolic and diastolic blood pressure, total cholesterol, HDL and LDL cholesterol, triglycerides, BMI, and waist-to-hip ratio (De Nardi et al., 2018). Another 82 studies included in meta-analysis, study results showed that aerobic, resistance and combination exercise training were effective modes in improving insulin sensitivity in obese and T2D patients (Garcia, & Bajpeyi, 2019). Thirteen human studies were included in systematic review, results confirmed different exercise intervention modalities and exercise types such as aerobics, resistance training, HIIT seemed equally effective in improving cardiac structure and function in T2D patients (Verboven et al., 2019).

Effects of clinical exercise on patients with other diseases

Total 93 trials, involving 105 endurance, 29 dynamic resistance, 14 combined, and 5 isometric resistance groups with 5223 participants included in a meta-analysis, study results demonstrated systolic BP (SBP) and diastolic BP (DBP) were reduced after endurance, dynamic resistance and isometric resistance and combined training (not SBP) (Cornelissen & Smart et al., 2013). A total 54 trials were eligible (20 pharmacology, 34 exercise) with 9806 participants with knee osteoarthritis. Study results indicated no statistically significant difference between pharmacological and exercise interventions (Henriksen et al., 2016).

Another study contained 23 studies with 24 aerobic and 7 resistance exercise protocols for the summary of exercise protocols and twelve articles included 13 aerobic and 4 resistance exercise protocols for the comparative analysis. Study results showed both aerobic and resistance exercise improved hepatic steatosis in nonalcoholic fatty liver disease patients (Hashida et al., 2017). Ten articles with more than 1700 patients were included in a meta-analysis, study results revealed exercise training improves exercise tolerance and health-related quality of life in patients with very severe chronic obstructive pulmonary disease (Paneroni et al., 2017). Included 12 RCTs in review and 11 RCTs for further qualitative analysis, study results indicated a significant improvement in small arterial stiffness, exercise tolerance and quality of life in kidney transplant recipients (Chen, Gao, & Li, 2019).

Summary

Global human being faces unprecedented and dramatic threat wave of non-communicable diseases. Based on summarized studies, strong evidence exists that clinical structured exercise training programs have beneficial effects in many people with various NCDs. Treatment effects of clinically well-designed exercise prescriptions on patients with cardiovascular diseases, cancer, type 2 DM and others are effective and promising. Health providers includes physicians, nurses, physical therapist and other health professionals worldwide should be urged to adopt the progressing scientific evidence on exercise as a medicine to treat not only CVD, cancers, T2DM, but almost every chronic disease.

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Cost-Benefits Ratio of Exercise Intervention/Prescription On NCDs

Siew Qui Hen

Exercise Medicine Therapist, Perak, Malaysia, E-mail:siewhenry@yahoo.com

Burden and Socio-economic Impacts of NCDs[1]

NCDs kill 41 million people each year, equivalent to 71% of all deaths globally. Each year, 15 million people die from a NCD between the ages of 30 and 69 years; over 85% of these "premature" deaths occur in low- and middle-income countries, these are the productive group of people. Cardiovascular diseases account for most NCD deaths, or 17.9 million people annually, followed by cancers (9.0 million), respiratory diseases (3.9million), and diabetes (1.6 million).
NCDs threaten progress towards the 2030 Agenda for Sustainable Development. Poverty is closely linked with NCDs. The rapid rise in NCDs is predicted to impede poverty reduction initiatives in low-income countries. In low-resource settings, health-care costs for NCDs quickly drain household resources. The exorbitant costs of NCDs, including often lengthy and expensive treatment and loss of breadwinners, force millions of people into poverty annually and stifle development.
In 2011, WHO developed a global monitoring framework (GMF) to enable global tracking of progress in preventing and controlling major NCDs and their key risk factors. One of the GMF targets is a 10% relative reduction in prevalence of insufficient physical activity. However, 5 interventions proposed to reduce prevalence of NCDs which included Tobacco tax increase, Aspirin therapy for AMI, Salt reduction, Hypertension management and Secondary prevention of cardiovascular disease. Noted that Exercise or Physical Activity is not included in any of the 5 intervention.

Management of NCDs

Generally, NCDs is managed simply by lifestyle modification (dietary changes, physical activity / exercise) and also via the pharmacological approach (medicinal). The medicinal approach links to the concerns of iatrogenic risks. The Pharmaceutical Service Division, Ministry of Health Malaysia has made a publication on Malaysian Statistics on Medicines 2011-2014 and found that there was a significant increase in the usage or prescription of medicine pertaining to NCDs. The top 4 medications are drugs used in treating NCDs. Drug expenditure makes up a sizeable portion of overall healthcare expenditure. The expenditure for pharmaceuticals in the Ministry of Health (MOH) has grown almost 3-fold within 10 years (MOH annual drug spending increased from RM 808 million to RM 2.38 billion in the year 2004 in the year 2014.)[2]

Other impacts of NCDs

Patients' loss of work/ productivity is another factor seen in NCDs patients and their family members too. An Electronic time survey in Community clinics in Malaysia (E-Masa) was introduced to evaluate quality of delivered health care service, where waiting time of the patients are recorded from the time they register in the clinic counter and followed through until they get their medicine. A simple data collection was done from one of a community health Clinic in Kuala Kangsar District, Perak, with a mean time of 1 hour and 30 minutes. Older folks requiring family members to send them to clinics and waiting for them, inadvertently taking leave on parents' clinic appointment days. Besides time being one of the major factors, unspoken stresses too harbored

among family with NCDs patients. The need for special meal restriction (low salt, low fat food), special care (involving other caretakers), and other social issues (family tension) adds on to the NCDs burden.

'Best Buys' and Other Recommended Interventions For the Prevention and Control Of Noncommunicable Disease Updated 2017[3]

The above publication addresses Physical Inactivity by suggesting Effective Intervention with Cost Effectiveness Analysis (CEA) of either more than or less than $100 per DALY averted in Low to Middle Income Countries with some of the recommendations are like implementing community wide public education and awareness campaign for physical activity, providing physical activity counselling and referral as part of routine primary health care services through the use of a brief intervention and also providing convenient and safe access to quality open space and adequate infrastructure to support walking and cycling…etc.

Conclusion

Multiple papers have shown that interventions to address NCDs all around the world mainly Low to middle income countries are seen to cost effective and life-saving as well as yielding a positive return on investment from a cost-benefit perspective. Should exercise prescription be adopted as one of the main intervention combatting NCDs, being undoubtedly very affordable and feasible, this would assuredly save many lives per year with a minimal expenditure of the Ministry of Health's annual budget. Let us henceforth commence exercise prescription!

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Cardiometabolic Benefits of Exercise Training in Metabolic Syndrome

Jatuporn Phoemsapthawee

Department of Sports Science and Health, Faculty of Sports Science, Kasetsart University, Nakhon Pathom, Thailand, E-mail: jatuporn.w@ku.th

Metabolic syndrome (MetS) is characterized by at least three of five clinical findings: (1) elevated blood pressure (systolic blood pressure (SBP) ≥130 mmHg or diastolic blood pressure (DBP) ≥85 mmHg); (2) elevated serum triglycerides (TG) (≥150 mg dL^{-1}); (3) low serum high-density lipoprotein (HDL) (<40 mg dL^{-1} in males and <50 mg dL^{-1} in females); (4) insulin resistance (fasting plasma glucose (FBG) ≥100 mg dL^{-1}); and (5) abdominal obesity. More than 20% of the world's population is estimated to meet the diagnostic criteria for MetS. Furthermore, the prevalence of the MetS in the Asia-Pacific population in 2017 was 12-37%. In Thailand, the estimated prevalence of MetS is 15.3% in men and 14.6% in women. Numerous clinical trials have shown that MetS is a significant risk factor for cardiovascular disease (CVD), type 2 diabetes mellitus (DM), and all cause mortality. Thus, the primary goals of treating MetS are prevention of type 2 DM and cardiovascular events.

Abdominal (visceral) obesity is a major risk factor for poor cardiometabolic health and an underlying cause of MetS; yet it is also modifiable. Visceral fat deposits are associated with the development of adipose cells enlargement and dysfunction or 'sick fat'. Dysfunctional adipose tissue secretes pro-inflammatory biomarkers that could contribute to the development of type 2 DM, dyslipidemia and CVD. Abdominal obesity occurs not only in overweight or obesity individuals, but also in normal-weight, metabolically obese individuals. This is due to the presence of excessive visceral fat deposits. One study found that 23.5% of normal weight individuals were metabolically abnormal while 51.3% and 31.7% of overweight or obese, respectively were metabolically healthy. Moreover, low physical activity has been shown to be an independent correlate in the clustering of cardiometabolic factors in the normal-weight individuals, while high physical activity has correlated with zero or only one cardiometabolic abnormality in the overweight or obese individuals.

Abdominal adiposity is a reversible condition and its reduction can have excellent effects in diminishing cardiovascular and MetS risks. Although weight loss remains fundamental to the management of MetS, there is growing evidence that regular exercise reduces abdominal fat deposits significantly, independent of weight loss. It is also recognized that reducing abdominal fat deposits is more important than the reduction of overall body weight or BMI in treating MetS. Moreover, regular exercise also improves metabolic profiles (FBG and HDL-c levels), cardiovascular health, and reduces the risk of type 2 DM even without weight loss. This point is important given that a focus on exercise training for fitness rather than weight reduction is meaningful for both healthcare professionals and individuals with MetS. Nevertheless, with increasing weight loss there is also a corresponding increase in health benefits.

Regular physical activity (PA) has a role in preventing or reversing of MetS. The severity of related abnormalities (waist circumference (WC), FBG, SBP, DBP, and TG) in individuals with MetS can be improved with regular PA. The risk of progressing to type 2 DM is reduced by 29–68%. This

improvement may exceed the benefits of current diabetes medications. Leisure-time activity was found to be linearly and inversely associated with a risk of developing MetS and vigorous-intensity activity alone or a combination of both moderate- and vigorous-intensity activity was associated with a lower risk of MetS. The American College of Sports Medicine (ACSM) recommends 150–250 min of moderate-intensity exercise per week as optimal but other authors have suggested between 30 and 60 minutes per day. There is a consensus that performing 3000 steps (~30 min of activity) per day over and above normal activities is sufficient for improvements in health status but perhaps not optimal according to the ACSM recommendations.

A systematic review and meta-analysis in patients with MetS has reported that aerobic exercise provides a range of improvements in clinical outcomes related to body composition, cardiovascular health and metabolic profile. Meanwhile, combined aerobic and resistance exercise training provides a reduction only in TG. Nevertheless, combined exercise training improves cardiorespiratory fitness and blood pressure (BP) and eventually improves the overall risk profile for patients with MetS. Despite its benefit, combined exercise training seems to be fewer tremendous compared to aerobic exercise alone. Resistance exercise training can also benefit patients with MetS via development of lean tissue. The lean mass plays an important role to avoid the hyperinsulinaemia which predisposes individuals to type 2 DM. This suggests that resistance exercise program which develops lean mass is necessary in the treatment or the prevention of MetS.

In terms of exercise intensity and duration, there are no sufficient data to define the optimal exercise intensity and duration for individual patients with MetS. However, it has been suggested that exercise training with longer duration and higher frequency is more effective in reducing systemic inflammation in patients with type 2 DM. Currently, another idea based on shorter duration and higher intensity of exercise training is widely accepted. Recent findings has suggested that high-intensity interval training (HIIT) programs are effective in reducing MetS. Moreover, the HITT programs have high adherence rates. Hence incorporating HIIT programs into daily life is less disruptive. This is important because it can lead to long-term lifestyle modification.

Not only exercise training (aerobic, resistance or combined) but also the dietary modification can improve metabolic risk factors (FBG, lipid profiles, BP and WC) in patients with MetS. The lifestyle modification, exercise training combined with dietary modification, can be even more effective if carried out for more than 12 weeks. This might be an ideal solution but it has to emphasize the need of long-term lifestyle modification.

To promote adherence, it has been suggested additional activity be incorporated very gradually into an exercise bout, e.g., an increase of as little as 5 min daily. However, the exercise program still needs to be adjusted to the individual whilst aiming to deliver optimal effects. A systematic review was conducted to assess the effectiveness of technology to promote PA in patients with type 2 DM. It has been found that the use of technology-based interventions, such as mobile phone applications, texts and email support, also improves exercise compliance.

In conclusion, exercise training produces beneficial changes in body composition, cardiovascular and metabolic outcomes in patients with MetS. In spite of these benefits, the optimal duration and intensity of exercise for individual patients remains to be determined. One of the major challenges in using programs of exercise to improve health status is to promote and maintain adherence in

overweight or obese individuals who have been inactive for many years. The use of technology-based interventions shows promising results for improving exercise compliance.

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Social Aspects of Exercise - The Importance of the Global Fitness and Health Club Industry

Hanna Vehmas

Faculty of Sport and Health Sciences, University of Jyväskylä, Finland, E-mail:hanna.m.vehmas@jyu.fi

Nowadays, participation in fitness is an integral part of contemporary lifestyle as for millions of people around the world fitness has become a common practice in the daily life. The global fitness and health club industry is considered to be one of the largest providers of exercise opportunities (IHRSA, 2018). It has been also shown that fitness is one of the most significant business fields within the commercial sport sector (Laine & Vehmas, 2017).

Keeping fit has become a fundamental goal for people willing to take care of their body, with a consequent increase in consumption of goods and services in the fitness and wellness industry. Fitness has become a universal model of the usefulness of bodies in line with the process of globalization as it includes features of the societies where it is exercised, yet at the same time illustrates the synthesis of the existing cultures by producing a homogenous cultural experience (e.g. Houlihan, 2016). The influence of the Eastern physical culture and the holistic body view, together with the rationale of profit-making, Western beauty ideals and the influence of media serve as examples of the globalization of fitness.

This paper is based on a book project (Scheerder, Vehmas and Helsen, 2019) that outlines the significance of the fitness industry in fifteen European countries, including Bulgaria, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Norway, Spain, Switzerland, The Netherlands, together with Flanders in Belgium and England in the United Kingdom. In these countries fitness activities are defined as urban phenomena that usually take place in a constructed sporting environment, i.e. a fitness center or health club. It appears, that most fitness offerings take place in cities, towns and other urban centers, and as a consequence, the more rural the environment, the fewer the supply of fitness is proportionally.

Fitness engagement is associated with higher socio-economic backgrounds of the individuals, and thus with individual's ability to pay, even though the range of fitness supply covers nowadays from low-cost facilities to exclusive boutique studios. In many countries, especially in those that suffer most from economic downturns, citizens' ability to pay even for the least expensive membership fees of the fitness centers seem to have become an obstacle for participation.

Women tend to be more active fitness participants than men. This supports the trend of fitness being transformed from weight lifting to holistic health centers. The gender differences can be also explained by the offerings of the fitness clubs, which are promoted especially to female consumers. However, in societies where the family roles are still more traditional in keeping females at home, the likelihood of women to associate themselves in outside home leisure activities may be smaller.

Fitness seems to be most popular among young adults. This is an obvious finding as appreciation of good looks and appearance together with freedom of leisure choices are of importance especially to young consumers. However, with the ageing of the population together with the idea of

approaching fitness (again) with the physical emphasis (‘*exercise as medicine*’), and as a means to obtain and maintain good muscle strength and functional capacity, fitness industry is predicted to have an increasing significance also among elderly citizens.

Contemporary societies have lost many of the traditional sources of social unity, and thus fitness can be seen as one important channel to provide community spirit and sense of belonging to its members. In addition to the number physical benefits of regular fitness participation, this presentation introduces fitness as a *´linqua franca`*, a common language of sport participants that unites individuals within different cultures and societies.

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Exercise Prescription in Clinical Settings

Mandy Zhang

Changi General Hospital, Singapore, E-mail:Mandy_Zhang@cgh.com.sg

Exercise promotion is not a new concept. Hippocrates once said, 'If we could give every individual the right amount of nourishment and exercise, not too little and not too much, we would have found the safest way to health'. Yet, exercise is not routinely prescribed by clinicians. Clinicians are often obsessed with patients' weight reduction and BMI measurement more than increasing physical activities.

Various brief physical activity vital sign tools have been used to assess physical activity. One of the most commonly administered is the Physical Activity Vital Sign (PAVS), which assesses the average time spent exercising by multiplying responses on 2 self-reported questions: 1) ''On average, how many days per week do you engage in moderate to strenuous exercise?'' and 2) ''On average, how many minutes per day do you engage in exercise at this level?'' The responses are multiplied to display minutes per day of moderate or strenuous exercise. This tool is administered in less than 30 seconds and can be conveniently integrated into a large healthcare system with minimum disruption to patient flow and productivity. Implementation of PAVS increased physical activity habits and resulted in greater weight loss and reduction in HbA1c levels in diabetic patients. This talk will also discuss the Exercise is Medicine (EIM) solution by incorporating three clinician modules- Healthcare systems, Community resources and Active health technology, necessary to establish physical activity as a standard in healthcare.

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“Exercise Clinic Implementation”: Smart Partnership between UniShams, MS New Symphony Exercise Clinic and Ministry of Health Malaysia

Omar bin Mihat

Kulliyyah Perubatan dan Sains Kesihatan, Universiti Islam Antarabangsa Sultan Abdul Halim Muadzam Shah (UniSHAMS), 09300, Kuala Ketil, Baling, Kedah, E-mail:dromarmihat@gmail.com

Malaysia needs healthy citizens to ensure the country's economic development effort. Although the Ministry of Health has taken various measures to prevent the disease from NCD early 1990s again, unfortunately the number of Malaysians who have NCD risk factors such as obesity and NCDs diseases such as diabetes and hypertension continues to increase. If the NCD disease prevention activities were strengthened, the number of Malaysians with NCD will continue to rise.

Through the program "Exercise for Treatment", clients who have risk factors for NCDs, which are identified by the Medical Officer and , will be referred to "Exercise Therepist - ET". Priority will be given to those in the category of 'borderline' eg prediabetic / Prehypertension. "Exercise Therepist - ET" will provide treatment for prescription of a scheduled program of physical activity and specific to an individual based on an assessment carried out by the coaches on the individual. Exercise Therepist - ET This in turn will implement a program of physical activity and exercise, as well as regular monitoring, and refer back to client medical officer to assess the effectiveness of the intervention program after a certain period of time.

Therefore, to extend service coverage program "Exercise for Treatment", especially for individuals who are diagnosed with "pre-diabetes" or "pre-hypertension", an initiative was introduced in which proposed a smart partnership between UniSHAMS, Asia College and the Ministry of Health of the following agrrements.

UniSHAMS has provided a place (space) to create "Exercise Clinic" as well as provide a place to conduct training for health staff and volunteers KOSPEN involved in the project "Exercise Clinic" Asian College of Exercise Medicine has involved in the supply and provide appropriate equipment for the implementation of the project "Exercise Clinic". Some of the basic equipment needed to support physical activity and exercise in the form of "aerobic": Besides, Asian College of Exercise Medicine has placed two graduate diploma as Therepist Exercise ..

The Ministry of Health provides laboratory services for blood sugar checks. Clients who have "pre-diabetes" or "pre-hypertension" will be referred to the Medical Officer of Health Clinic Kuala Ketil (about 1 km from UniSHAMS) go through a screening process to determine the suitability of the following Project "Exercise Clinic" and so on referred to the exercise Therepist - ET placed in "exercise clinic in UniSHAMS.

Work Process Standard (Standard Operating Procedures or SOPs) have been developed together UniSHAMS, Asia College and the Ministry of Health to launch a selection of clients, a reference to "Exercise Clinic" and monitoring by the medical officer, In terms of health risks, the client is referred to the Project "Exercise Clinic" is of low risk, that is the individual who is suffering from a "pre-diabetes" or "pre-hypertension", did not suffer from other chronic patients and has been

approved in accordance by the medical officer. Reference clients for intervention in the project "Exercise Clinic" is also based on the consent and permission (consent) of the client.

Exercise and Musculoskeletal Conditions

István Berkes, Syed Rehan Iftikhar Bukhari

University of Physical Education, Budapest, Hungary, E-mail:berkesdr@gmail.com

Learning Objectives:

The objectives of this lecture are to learn the pharmacological and non-pharmacological treatment options, mainly focusing on the significance of exercise in the management of musculoskeletal conditions (MSCs), and to understand the evidences and controversies concerning the management of MSCs.

Musculoskeletal Conditions:

Musculoskeletal conditions (MSCs) are the group of disorders which mainly affect the bones, joints, muscles and spine; including autoimmune conditions. They are typically characterised by pain, decreased mobility and restricted functional ability; reducing patient's attribute to work and participate in social roles with associated negative impacts on mental health and wellbeing. MSCs are proved to be the leading cause of disability worldwide causing a significant health issued, and hence broadens the overall social cost.

The MSCs can be divided into three main categories:

1. Painful musculoskeletal conditions such as **Osteoarthritis**
2. Fragility fractures and **Osteoporosis**
3. Inflammatory conditions such as **Rheumatoid Arthritis**

Role of Exercise in MSCs:

Exercise plays a very important role in the prevention as well as management of MSCs. Multiple aspects of musculoskeletal health, including patient's physical and mental health can be improved by a comprehensive exercise program, including cardiorespiratory, resistance, flexibility, and neuromotor exercises. From childhood to older adults, weight bearing endurance activities are highly recommended in order to improve bone health; including jumping and resistance exercises. In older adults, the risk of fall is very important thing to combat, for which balance exercises are very crucial to administer in the exercise program. It is found that thoses people who have sedentary lifestyle, are more likely to face MSCs than the active individuals. Hence it is very important to include short bouts of physical activity, standing, and daily walking activities in the daily activity plan of individuals with sedentary lifestyle. Physical activity plays the most important role in bone health, as it inceases the bone strength, and hence reduces the risk of fragility fracture. Level of fitness and the incidence of MSCs are inversely proportional to each other.

There are two main goals of MSCs treatment; alleviation of pain and improvement of functional status. The management of MSCs is now more focused on the interventions that improve tolerance for functional activity and overall quality of life, rather than the traditional approach of pain control. The main interventions for the patients with moderate to severe MCDs, are the exercises mainly targeting activities for weight management, strength training, water-based exercises, self-

management and patient education. After proper assessment, exercises should be planned based on the individual needs of patient. To maintain and increase ROM in the joints, stretching exercises generally form part of an overall exercise program in MCDs management. Researchers have found that instead of independent home exercises, supervised group or individual exercise is proved to be more beneficial. Assistive aids such as a cane, knee brace, and foot orthoses can help to improve physical functionality in some patients.

Latest clinical researches have proved that exercise have significant positive effects on pain, physical function, quality of life and work related outcomes for the patients having acute or chronic MSCs, but there is still need of proper scientific evidence regarding optimal content or delivery of exercise in each case. Researchers have a concluded that exercise alone is not enough to treat MCDs, instead very complex health care is needed that should include both pharmacological and non-pharmacological interventions.

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Contemporary Review: Does Regular Exercise Lead to Oxidative Stress?

Chen Chee Keong

Exercise and Sports Science Programme, School of Health Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan, Malaysia, E-mail:ckchen@usm.my

Participation in regular exercise has been advocated for the general public to prolong life and reduce mortality rate (Blair et al., 1995; Lee et al., 2012). Exercise increases substrate utilisation by the working muscles and the use of oxygen to produce energy via the oxidative pathway. This increase in oxygen consumption combined with the activation of specific metabolic pathways during and after exercise can lead to the formation of reactive oxygen species (ROS) (Davies et al., 1982; Cooper et al., 2002; Lee et al., 2002; Vollard et al., 2005; Kakanis et al. 2010). ROS are also known as free radicals. A free radical is defined as any atom, molecule or fragment of a molecule consisting one or more unpaired electrons in their outer valence (Dröge, 2002). Free radicals are also generated during normal cellular function and are part of the natural physiological process of all living beings (Valko et al, 2007; Ye et al., 2017). Oxidative stress due to a high concentration of ROS causes molecular damage to cellular structures, with consequent impairment of tissue or organ functions (Dröge, 2002). Thus, oxidative stress has been associated with the development of aging and degenerative disorders such as arthritis, autoimmune disorders, cardiovascular and neurodegenerative diseases, inflammation and certain cancers (Kaneko et al., 2013; Kaffe et al., 2015; Sharma et al., 2016; Lan et al., 2018; Phull et al., 2017)

Mitochondria are vulnerable to oxidative damage and are central to the theory of aging (Garcia-Mesa et al., 2016). Aging is characterised by a progressive decline in cellular function and physical fitness together with increased risk of age-associated diseases, such as sarcopenia in skeletal muscle (Kong et al., 2014). Therefore, in order to maintain a good level of physical well-being, it is proposed to counteract the adverse effects induced by oxidative stress with strategies such as consuming adequate amount of antioxidants or participation in regular exercise. The ability of exercise to improve the activities of key antioxidant enzymes is one of the most important adaptions in the modification of ROS. In addition, an increase in mitochondrial volume in response to endurance training results in a relatively lower oxidative load, which may attenuate the generation of ROS (Moller et al., 1996). There is also adequate evidence to suggest that increased ROS production plays a vital role in both homeostasis and the adaptive response to exercise (Powers et al., 2011). In other words, elevated production of ROS may not pose a risk to the health of the exercisers but rather initiates a signaling adaptation response to exercise to enhance the antioxidant defense which will offer protection from the deleterious effects of free radicals (Nunes-Silva & Freitas-Lima, 2015).

In a recent study, Bouzid et al. (2018) reported that physical activity improves antioxidant defenses and lowers lipid peroxidation levels in both adult and aged individuals. Elderly physically active individuals have been shown to possess antioxidant activity and lipid peroxidation levels similar to young sedentary subjects, demonstrating the importance of regular physical activity to decelerate the aging-associated impairment process. Knez et al. (2007) have reported that Ironman athletes had a significantly higher antioxidant enzyme compared with well-matched controls. These data confirm that a high-volume of exercise is associated with elevated antioxidant defences against oxidative damage and that training status may influence the magnitude of adaptation of these

defences. Therefore, despite the high-volume energy expenditure, this population of athletes may not be at a greater risk of oxidative stress-related diseases. Other studies have also shown that after Ironman triathlons, well-trained athletes have a large decline in DNA damage for about three weeks post-race. These researchers believes that this is attributed to the upregulation of repair mechanisms and enhanced endogenous antioxidative systems (Reichhold et al., 2008; Reichhold et al., 2009; Wagner et al., 2010).

Moderate endurance and strength training can also significantly reduce oxidative stress and increases the antioxidant defenses. (Radak et al., 2005; Radak et al., 2008; Cakir-Atabek et al., 2010; Campbell et al., 2010; Majerczak et al., 2010). Athletes with the highest training volumes, experience, and fitness often have higher antioxidant levels and lower levels of oxidative stress compared to their sedentary counterparts (Mena et al., 1991; Margaritis et al.,1997; Knez et al., 2007). Exercise and increased physical activity have been shown to upregulate the antioxidant defense such as superoxide dismutase, catalase and total antioxidant capacity (Marciniak et al., 2009; Berzosa et al., 2011; Cebula et al., 2017).Thus, moderate exercise and an active lifestyle have been demonstrated to be useful not only in the prevention of oxidative stress, but also in the primary and secondary protection from cardiovascular disorders, type II diabetes, metabolic syndrome and neurodegenerative diseases like Alzheimer's disease (Baltaci et al., 2016).

In summary, chronic exposure to high levels of ROS can exhaust the enzymatic and non-enzymatic antioxidant system and leads to impaired cellular function and necrosis. Hence, it was postulated that excessive physical exercise may be detrimental to untrained individuals. However, there is sufficient evidence to indicate that moderate and progressive exercise allows the cells to more easily detoxify ROS. Participation in regular exercise causes an adaptive response that results in higher levels of endogenous antioxidant status and accumulate lower levels of ROS than those who are sedentary. Hence, regular participation in exercise at a moderate intensity will lead to an enhanced antioxidant status that will offer protection against potentially harmful effects of oxidative stress.

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False Myths on Exercise

Dusan Hamar

Faculty of Physical Education and Sport, Comenius University, Svobodovo nabr. 9, Bratislava, Slovakia, E-mail:dusan.hamar@uniba.sk

Not only great part of lay public, but also many fitness enthusiasts and instructors still believe in various exercise related misconceptions and false myths. The aim of the presentation is to briefly elucidate the most relevant of these fallacies.

Spot reduction of subcutaneous fat

Desired loss of fat polsters on belly or other „critical" part of the body is one of the most frequent motivation for exercise. In order to achieve such a goal people tend to load predominantly muscles close to critical areas. However, hormonally mediated mobilisation of fat from its depos is not related to their proximity to exercising muscle. Good examples are the tennis players, which have the same subcutaneous fat on hypertrophied dominat forearms as on contralateral extremites.

Fat burning exercise intensity

It is well established fact that with increasing exercise intensity there is more or less proportional decreases of percentage of fat utilisation. As consequence, while increasing energy demand, fat utilisation rises only up to intensity between 50 and 60 % of VO2max. Further increase of intensity, despite rise of energy demand, leads to substantial reduction of fat unlisation. So such an optimal intensity for fat utilisation („fat burning zone") is largely recommended for enhancement of fat loss. However, such a work rate is usually lower that the one suitable for most efficient improvement of cardiorespiratory fitness. In addition the exercise must be longer in order to achieve comparable energy expenditure. In fact, higher amount of fat burned during exercise itself is of dubious benefit, as during recovery less energy from food consumed is needed to replenish relatively untouched glycogen stores and more remains available for replenishment of body at. No benefit of „fat burning intenisty" in comparison to higher intensity exercise in terms of long term loss of body fat has been shown by studies in caloric chambers. The most critical factor for body weight control is is the total amount of energy utilised, not the type of substrate used for its production.

Regular exercise without reduction of body has no health effect

Not seeing desired body weight reduction after few weeks of regular exercie is for many people an argument to give their exercise program. This is totaly wrong concept because no change of body weight might due increase of muscle mass masking decrease of body fat. More importantly regular exercise improves physical fitness, which, even without body weight reduction, is associated with significant lower risk of mortality.

Resistance exercise elicits excessive and potentially dangerous blood pressure response.

Cardiovascular risks due to blood pressure increase during strength exercise remain the main objection against resistance exercise. However, evidence accumulated over the last decade has shown that blood pressure reaches dangerously high values only under special circumstances.

These include resistance exercise performed with extreme weights, i.e. those close to 1RM involving large muscle groups. On the other hand, pressure response to exercise with moderate weights (up to 70 % of 1RM) in sets of 10 to 12 repetitions, does not differ substantially from the one occurring during common forms of aerobic exercise. Slightly more pronounced increase of diastolic pressure, while lifting weights, is considered to be a positive feature, as such a response is fostering coronary perfusion taking place exclusively in the diastolic phase of the heart cycle. In fact, there are several studies involving hundreds of older volunteers in supervised research settings not reporting any occurrence of stroke or myocardial infarction. Excluding high-risk patients (in similar way as in aerobic exercise programmes) and sticking to recommendations to avoid potentially risky blood pressure response, resistance exercise can be employed as a reasonably safe form of physical activity.

Resistance exercise increases resting blood pressure and may lead to hypertension.

Another traditional belief, namely that resistance exercise increases resting blood pressure, has been based more on the simple assumption of long term persistence of acute response rather than solid scientific evidence. Contrary to these false concepts, some studies have even shown positive effects, i.e. reduction of resting blood pressure as a consequence of systematic resistance training. This is clearly reflected in the major meta-analytic paper on this topic, which concludes with the statement: „there is a slight, however, significant tendency to resting blood pressure reduction".

Resistance exercise is of no value for body weight reduction.

Though the metabolic demand of a resistance exercise session is rather moderate (corresponding to easy walking), it leads to a slight elevation of energy consumption lasting for several hours after exertion. Resting metabolic rate is also enhanced by the increase of muscle mass occurring after several months of resistance training. Adding resistance training to aerobic exercise program may therefore promote weight reduction and more favourable body composition.

Resistance exercise is associated with excessively high risk of musculoskeletal injuries.

As with any physical activity, resistance exercise involves some risk of musculoskeletal injuries. However, their frequency, both acute and overuse, in properly administrated resistance exercise programs, is rather low. In one study, carried out by Pollock, only 2.2 musculoskeletal injuries per 1000 exercise hours were reported. In addition, most of them were minor, so the subjects affected were able to resume the program after skipping only a few sessions.

Resistance training is an unsuitable physical activity for children.

All the concerns related to resistance training in children and adolescents, namely the high risk of acute or chronic injuries, impairment of growth, damage of growth plates of long bones and a lack of training response, have proved to be of limited validity. All the negative aspects may come in play, as with any other sport activity, only if training is carried out in incorrect way (excessive volume and intensity, incorrect technique and lack of professional supervision). Nowadays, there is solid evidence that strength training in children and adolescents, when properly structured with regard to frequency, mode (type of lifting), intensity, and duration, and performed under supervision of a properly educated professional, can not only increase strength and power, but also reduce the incidence of sport related injuries, and affect positively the bone structure.

Lactic acid is cause of muscle soreness

It has been demonstrated that lactic acid does not play a role as a cause of muscle soreness. Its sympotoms occurs with substantial delay (24-48 hours) after blood lactate increase, which values normalise within an hour. In addition muscle soreness may occur even after low intensity exercise without any increase of blood lactae. The real mechanism of delayed muscle soreness are the healing processes of microdamage of muscle cells due to involvement of hight intensity (usually eccentric) contractions.

The Efficacy and Effectiveness of Exercise Interventions in Women Diagnosed with Breast Cancer: A Journey through Four Meta-Analyses

Ian Lahart

University of Wolverhampton, E-mail:I.Lahart@wlv.ac.uk

An abundance of epidemiological research supports the idea that exercise (defined as: "a potential disruption to homeostasis by muscle activity that is either exclusively or in combination, concentric, isometric or eccentric", Winter & Fowler, 2009) reduce the risk of early death due to breast cancer and potentially reduce the changes of cancer recurrence in women diagnosed with breast cancer. These observational studies, however, cannot distinguish causal associations from indirect or spurious ones (Grimes & Schulz, 2002). Due in part to an inability to measure or a lack of control (and probably awareness) of key confounding variables that may influence the association between exercise and premature cancer-related death. Similarly, it is often difficult to rule out reverse causation in epidemiological research. For example, the association between higher exercise levels and better health could result from exercise causing better health, but also better health allowing people to exercise more. Generally, to establish a causal effect of an intervention well-designed and executed randomised controlled trials (RCT) are necessary.

To date, no randomised controlled trial has investigated the causal association between exercise and breast cancer outcomes. There are however, many RCTs in exercise oncology that have investigated the effects of exercise interventions on outcomes thought to influence risk of early cancer death or cancer recurrence (e.g., body fat, cardiorespiratory fitness, and biomarkers) and outcomes related to patient well-being, function, and the side effects of cancer treatment [e.g., health-related quality of life (HRQoL), muscular strength, fatigue, and depressive symptoms] (Furmaniak, Menig, & Markes, 2016; Groen, van Harten, & Vallance, 2018; Lahart, Metsios, Nevill, & Carmichael, 2018; Turner et al., 2018). Researchers have sought to establish the efficacy (effects under ideal circumstances, e.g., supervised exercise) and effectiveness (effects under usual circumstances of healthcare practice, e.g., home-based exercise) of exercise at various stages of a cancer patients' treatment journey. Dr Jesper F. Christensen will cover the role of exercise in cancer prehabilitation in his talk, so in my talk I will examine the evidence for exercise during cancer therapy (chemotherapy or radiotherapy) and post-treatment into survivorship.

In my talk I will review four meta-analyses of RCTs (Furmaniak et al., 2016; Groen et al., 2018; Lahart et al., 2018; Turner et al., 2018) to address five key questions:

1. What are the effects of exercise in women undergoing adjuvant therapy for breast cancer?
2. What are the effects of exercise in women who have completed adjuvant therapy for breast cancer?
3. Can interventions improve exercise levels and exercise tolerance in physically inactive adults diagnosed with cancer?
4. Can distance-based behaviour change interventions lead to increases in exercise levels?
5. Can the evidence be trusted?

To answer the first question, we will review Furmaniak and colleagues' (2016) Cochrane Collaboration meta-analysis, which includes 32 studies with 2,626 women diagnosed with breast cancer. Another Cochrane Collaboration review of 63 studies including 5,761 women with breast cancer who had completed adjuvant therapy, will provide an answer for question two (Lahart et al.

2018). Two meta-analyses (Groen et al., 2018; Turner et al., 2018) will provide insight to whether interventions can induce exercise behaviour change (questions 3 and 4). Specifically, Turner et al. (2018) assessed the effects of interventions (23 studies) designed to promote exercise behaviour in 1,372 people living sedentary lifestyles before and after cancer therapy (87% were women with breast cancer), whereas, Groen and colleagues (2018) investigated the effects of home-based exercise interventions on exercise levels in 29 studies including 5,218 adults diagnosed with cancer (45% breast cancer). Finally, question five will be answered by summarising the risk of bias assessments in the four studies, and the GRADE assessed quality of evidence in the three Cochrane collaboration reviews (Furmaniak et al., 2016; Lahart et al., 2018; Turner et al., 2018).

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Exercise and Healthy Ageing- Too Old To Care or Old Enough To Act?

Michael Chia

National Institute of Education, Nanyang Technological University, Singapore, E-mail:michael.chia@nie.edu.sg

Advances in medicine and access to these advances have increased human lifespan or human longevity. Reviews of the literature on human ageing provide evidence that exercise can increase years to life and increase the life to years (i.e. increase longevity and the quality of living). In adults with and without disease, regular physical activity reduces all-cause mortality by 30% (including death caused by cancers), reduces the risk of falls and injuries from falls, slows cognitive decline and reduces risk of depression. Some Asian data show that in the elderly, a daily step count of >8000 and >4000, respectively improves physical health and mental health. ACSM guidelines for physical activity and exercise for the elderly (>65 years) stipulate 20 minutes of aerobic type physical activity of moderate intensity 3 times a week, resistance exercise of 10-15 repetitions for 2-3 sets and flexibility exercises for 10 minutes twice a week. Balance exercises 3 times a week complete the ACSM guidelines for those who are at risk of falls. Some data in 2017 show that Singapore has the highest longevity in the world at 84.8 years but the number of years lived with ill health is 10.6 years. This keynote foregrounds the Singaporean approach in addressing the issues of societal ageing using a multipronged approach and the role played by enhancing community physical activity and exercise. Exercise is sweet medicine, have you had your dose today?

Topic Adverse Events (Death, Cardiac Events and Hospitalization) Associated with Clinical Exercise Intervention on Heart Failure Patients

Hashbullah Ismail

Health, Wellness and Human Performance, Industry, Community, Alumni & Entrepreneurship Network (ICAEN Office), Level 20, Tower 2, Engineering Complex, Universiti Teknologi MARA (UiTM), E-mail:hashbull@yahoo.com

Background

Intuitively higher exercise intensity is considered higher risk for serious events, but the intensity may be the primary stimulus for physical adaptation. We sought to establish if aerobic exercise training intensity produces different effect sizes for adherence, event, mortality and hospitalization rates in heart failure.

Methods

We conducted a MEDLINE search (1985 to Dec 31, 2012), for exercise based rehabilitation trials in heart failure,. Seventy three studies were included, producing 75 intervention groups; eight (10.6%) were high-, 38 (50.6%) vigorous-, 24 (32%) moderate- and five (6.7%) low- intensity groups, providing a total of 3,245 exercising subjects and 2,612 control subjects. Total patient-hours of exercise training reported were 122,645 hours. We examined study withdrawal, deaths, adverse events and hospitalizations.

Results

All of the studies in the high and low intensity groups reported adverse events (deaths, hospitalization and cardiovascular events. All but 6 studies (12%) reported these data in the vigorous intensity studies; in the moderate intensity studies all but 4 studies (15%) reported events.

There was a significantly lower withdrawal ratio in the high intensity training versus control groups (log rank $x^2 = 5.73$, $p<0.05$). There were no significant differences (log rank $x^2 = 2.02$, $p>0.05$) for death, or (log rank $x^2 = 0.23$, $p>0.05$) for cardiac events in high intensity studies. There were no hospital admissions in the high intensity training groups and no deaths were reported, from any of the high intensity exercise groups; however, there were two deaths in the non-exercise control groups. There was no significant difference between vigorous intensity training and control groups for exercise withdrawal (110 in exercise versus 109 in control arms, log rank $x^2 = 0.47$, $p>0.05$). There was no significant difference for death between exercise and control arms (205 versus 221 respectively, log rank $x^2 = 3.83$, $p>0.05$). There was no significant difference in cardiac events between the training and control arms, 7 subjects experienced events compared to 5 in the control groups (log rank $x^2 = 0.01$, $p>0.05$). There was a significantly lower rate of hospitalization in the vigorous intensity training groups 739 in exercise versus 771 for control arms, (log rank $x^2 = 13.31$, $p<0.05$). The relative risk of hospitalization was 13.5% lower in the vigorous intensity exercise versus control relative risk (RR) 0.86 (95% CI 0.80, 0.95, P=0.001). The composite end point of death or hospitalization yielded a RR of 0.86 (95%CI 0.79 to 0.94, P=0.001). There were 45 patient withdrawals in moderate exercise groups compared to 30 in control groups withdrawal (log rank $x^2 = 0.06$, $p>0.05$). There were no deaths in the exercise training group and 3 deaths in control groups from the moderate intensity training studies ($x^2 = 2.62$,

p>0.05). There was one cardiac event from exercise groups in the moderate intensity training studies versus four in control groups (log rank $x^2 = 2.81$, p>0.05). There was no significant difference between moderate intensity training (39 exercise versus 37 controls) hospital admissions (log rank $x^2 = 3.48$, p>0.05). There was no significant difference between low intensity training 34 withdrawals versus 24 in control groups for withdrawal ($x^2 = 0.83$, p>0.05). There were 3 deaths in exercise versus two in controls for low intensity studies (log rank $x^2 = 0.01$, p>0.05). Both exercise and control groups each reported one cardiac event ($x^2 = 0.41$, p>0.05). No hospital admissions were reported in low intensity exercise compared to three in control groups (log rank $x^2 = 1.56$, p>0.05).

Conclusion

Overall, there were no serious adverse events from included exercise participants. In 122,645 patient-hours of training, not one death was directly attributable to exercise.

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Exercise Prescription – The Misunderstood Entity

Su Fen Yew

Malaysian Physiotherapy Association, Malaysia, E-mail:suyew58@yahoo.com

"Simply prescribing exercise, in a generic sense, to a patient is insufficient guidance and is unlikely to achieve the desired outcomes," (Tammy Hoffmann, march 2016) and he further claims "Unless clinicians can access sufficient details about exercise interventions to prescribe them, they either guess at how to use them or do not use them at all."

Exercise prescription is defined as the specific plan of exercise that is designed for a specific need and purpose for the client or patient after thorough assessment analysis and interpretation of needs.

Prescribing exercises is not giving out a recipe of exercises. Every individual is unique and special and therefore prescription of exercises requires a detailed and careful planning.

Assessment of clients needs to be done before prescription. Assessment can be laboratory base, which can be expensive and not easily available or field based which everyone can use depending on the circumstances and availability.
Exercise prescription should be developed with careful consideration for the individual's health status, medical history, risk factor profile, the patient's strength and flexibility, any medical conditions that may exist, pathologies present, behavioral characteristics and capabilities, goals and availability of exercise facilities. The intervention goal is to close the gap between current abilities and the desired goal or capacity

Exercise prescription can be for the fit healthy individuals and also the patients with disease. Correct prescription is necessary for 2 main reasons that is safety of patients and to achieve the rehabilitation objectives.

There are many available methodologies to help exercise prescription which have been validated and evidence based and these methodologies has also enable us to use as a bench mark for monitoring progress and success of treatment using exercise, for progression of rehabilitation and home care plan. For the different body systems there various methodologies available and can be applied.

The FITT VP model is the most commonly use model for exercise prescription for apparently healthy adults. Whilst many will use maximal oxygen uptake to gauge cardiorespiratory fitness in the lab whereas in the filed based assessment 6MWT or ISWT has been equally proven as one of the popular tools and gives a good indication of exercise tolerance and helps guide initial exercise prescription especially for walking prescription. To mention a few validated tools used to guide physiotherapist in exercise prescription are RPE using Modified Borg scale, MHR, HRR, 1RM, Overloading and many more.

1RM is the maximal weight that the subject can lift for 1 repetition and 10 RM also a tool which can be used for strength prescription. The Oxford scale of grade1 to 5 is commonly used by physiotherapists internationally to manually assess muscle strength. Medical Research Council

Manual Muscle Testing scale is very much like Oxford Scale used for grading muscle power. METS is also used for work intensity training.

The general principles_for exercise prescription should always include the mode, intensity, duration, and frequency of exercise, volume and the rate of progression of the patient's physical activity. In summary the principle of specificity, individualization, progression and overload applies.

The BREC and Women Health

Wang, Shu-Fang

Chinese Lactation Consultant Association, E-mail:taiwanbbking@gmail.com

Parenting is an important process for many women. Ensuring the health of children and a bright future development are the desire of most mothers. The simple act of breastfeeding has numerous health advantages to both mothers and their babies: in terms of Non-Communicable Diseases (NCDs) prevention and the better social achievement. World Health Organization (2015) recommends that exclusive breastfeeding (no formula, juice, or water) for at least the first six months, followed by appropriate addition of complementary foods and continued breastfeeding up to two years of age or older. These are the best investments for human future. To reach this golden dream of "healthy next generation", a mother will spend at least 54,000 minutes of time in maintaining a good feeding posture of attachment. This is a time-consuming and exhausting life process. Based on Wang's (2008) proposal of the B theory of breastfeeding- the "Baby-Breast-Brain-Backup axis", identified how women's perceptions impact on brain feedback and prompt oxytocin reflex. Furthermore, Wang (2018) suggested that to initiate the BREC for the new family might facilitate women's health. BREC means Breastfeeding Relaxation Exercise Coaching; which includes Breathing with Mindfulness, Reflection with Healing touch, & Self-dialogue, Exercises and Compression with I.L.U, Acupuncture points.

First, the breathing with mindfulness is a practice of self-awareness. By training the brain, individual's feelings and reactive behaviors toward certain things can be changed. Tang et.al (2015) indicated that the brain has an amazing ability to rewire itself called neuroplasticity. Researches revealed that applying the breathing exercise of mindfulness daily, one could expect to face, accept and cope with the frustration better. Jon Kabat-Zinn, the founding father of mindfulness-based stress reduction, emphasized that the spirit of mindfulness is "paying attention of breathing in a particular way: in the present moment and nonjudgmentally." Reflection through Healing touch & Self-dialogue is the second part of BREC. Everyone has the power of healing energy, including the changes in physical, emotional, mental and spiritual levels. People can pass the supportive energy to others simply by the conscious contact. Four postures of healing touch are well-matched with the self-dialogue guiding at the same time. They are peace in mind, embrace, blooming heart, and pray. Exercise not only promotes the circulation and strengthens the core muscles, Febbraio (2017) has demonstrated that besides protein, exercise also promotes the secretion of peptides and nucleic acids, collectively called as "exerkines". In general, exercise strengthen the healthy effect, by way of releasing both myokines, and exerkines in order to produce systemic effects and ultimately applying the protective and beneficial effects to human bodies. To protect the GOOD women who play multiple roles from the damages of rotator cuff tendonitis or frozen shoulders and carpal tunnel syndrome, the relaxation exercises of the neck, head, shoulders, arms, wrists, and hands are especially important for establishing a healthy women lifestyles. During a woman's reproductive life cycle, breast tissue continuously grows, shrinks, and remodels in a highly regulated fashion. When this process breaks down, growth becomes abnormal. Venugopalan, et.al (2012) have found that squeeze breasts with the compressive force can actually turn malignant breast cells into highly organized ones and prevent them from turning into cancer cells. Traditional Chinese medicine considers that; ST16 and 18, SP17 and 18, and CV17 are

acupoints related to lactating women's' health. By performing the I.L.U. Healing Touch on these four acupoints of the breasts provide the lactating women more ways to relieve her discomfort caused by breast engorgement, plugged ducts, and mastitis. Furthermore, it empowers the breastfeeding women's bodies' inner wisdom.

Everyone needs BREC, breath-centered, self-reflection, exercises and squeezing breasts can support, protect and promote women's health.

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Complementary and Alternative Methods to Improve Mental Health

Lim Boon Hooi

University of Malaya, Kuala Lumpur, Malaysia, E-mail:lboonhooi62@gmail.com

The WHO constitution states: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." An important implication of this definition is that mental health is more than just the absence of mental disorders or disabilities.
Mental health is a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community.

But in modern society, mental illness is a major concern, because it is one of the leading causes of years lived with disability globally (Whiteford et al., 2015). Furthermore, the World Health Organization (WHO) reported that the total number of people with mental illness exceeded 300 million in 2015 (World Health Organization. Depression and Other Common Mental Disorders: Global Health Estimates. Geneva: WHO, 2017). WHO estimates that between 35% and 50% of people with severe mental health problems in developed countries, and 76 – 85% in developing countries, receive no treatment.

In recent years, increasingly robust evidence suggests that exercise is not only necessary for the maintenance of good mental health, but it can be used to treat even chronic mental illness. On the treatment side, exercise appears to be as good as existing pharmacological interventions across a range of conditions, such as mild to moderate depression, dementia, and anxiety, and even reduces cognitive issues in schizophrenia.

Another non-mainstream treatment used to maintain good mental health is the complementary and alternative approaches. Complementary and alternative approaches is the treatments that are used along with standard medical treatments but are not considered to be standard treatments or mainstream. One example is using acupuncture to help lessen some side effects of cancer treatment. Alternative treatment is treatments that are used instead of standard medical treatments. One example is using a special diet to treat cancer instead of anticancer drugs that are prescribed by an oncologist.

It has been observed that use of herbal supplements, acupuncture, and mind-body techniques such as the use of biofeedback, meditation, deep breathing, massage, Yoga, Tai Chi, Qi Gong and music are quite common among those with psychiatric disorders. Mind and body practices include a large and diverse group of procedures or techniques administered or taught by a trained practitioner or teacher. According to the 2017 National Health Interview Survey (NHIS), the popularity of yoga has grown dramatically in recent years, from 9.5 percent of U.S. adults practicing yoga in 2012 to 14.3 percent in 2017. The 2017 NHIS also showed that the use of meditation increased more than threefold from 4.1 percent in 2012 to 14.2 percent in 2017.

Another potential of mind and body practices is the music therapists practice in mental health settings, there remains a need. According to the American Music Therapy Association (AMTA,

2010) almost 19% of members practise in the area of mental health. Given the substantial number of music therapists practising within this area it is timely to reflect upon the opportunities for the music therapy profession to develop greater expertise within the specialist area of mental health recovery.

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Lower Limb Micro-Instabilities: Predisposing Factors For Osteoarthritis That Are Corrigible By Exercise

[1,2]Ádám Uhlár, [3]Bence Marschall, [1,2,3]Zsombor Lacza

[1]Institute of Sports and Health Sciences, University of Physical Education, Budapest Hungary
[2]OrthoSera LLC, Budapest, Hungary, [3]Semmelweis University, Inst. Clinical Experimental Research, Budapest, Hungary, E-mail:adam.uhlar@tf.hu, marschall.bence@gmail.com, lacza.zsombor@tf.hu

Knee osteoarthritis is a debilitating disease affecting about every other person in their lifetime. The nature of the disease follows a slowly degenerative pattern, i.e. starts with minimal symptoms such as pain on loading at mid-life and then slowly worsens until definitive care is necessary. The predisposing factors for osteoarthritis are well known and recent development in treatment measures calls for a more precise patient selection protocol that can dramatically improve the efficacy in the chosen patient sub-population, while avoids unnecessary treatments and costs in those patients who would not benefit from the treatment. This approach needs precise evaluation of the predisposing factors that would allow targeted treatments. In case of knee osteoarthritis, micro-instabilities such as increased dynamic Q angle are well-known predisposing factors of early onset and faster progression. Specifically, the dynamic valgus position of the knee during flexion under loading (running, jumping) puts extra stress on the anterior cruciate ligament and the patellofemoral compartment. As the condition develops into degenerative osteoarthritis it leads to meniscus tears. This condition can be diagnosed with adequate precision through optical modalities. We have performed dynamic Q angle measurements on 250 recreational runners and 96 professional ballet dancers of both sexes. The subjects were asked to perform a one-leg squat until the flexion of the loaded knee was 120-90 degrees and the medio-lateral angle was measured with an optical motion capture software. The results showed a wide range of Q-angle distribution with a median falling in the valgus range (Male ballet dancer: Right -5.7 ± 11.0, Left 7.9 ± 6.9*, Female ballet dancer: Right 2.4 ± 10.7, Left 11.4 ± 9.2*, Male runner: Right 7.8 ± 12.3, Left 7.5 ± 11.3, Female Runner: Right 12.0 ± 10.2, Left 11.1 ± 9.5 average ± SD, positive values represent valgus and negative are varus deviations, * represents $p<0.05$ versus contralateral side). Interestingly, while the recreational runners did not show a left-right difference, both male and female professional dancers did have a significant deviation towards a more pronounced valgus in the left knee. Observation of their daily practice routines confirmed that although they focus on performing each jump and squat with both left and right legs, all of them performs the spins while standing on the left foot and spinning to the right, which applies a repetitive rotational stress to the left knee – this probably results in micro instabilities that is also manifest in the higher valgus angle. However, the knee is part of the kinematic chain of the lower limb and compensates for the Trendelenburg-position of the hip or the overpronation of the foot and those should also be measured in parallel in order to make a clear picture of the rotational instabilities of the lower limb. We have set out to design such a system and preliminary data show that capturing time-series data sets from the hip and knee angles and the pressure changes on the foot sole can reveal the relative contribution of each joint to the deviation in dynamic Q angles. Based on this data set we have created an algorithm of proposed exercises to compensate for the measured dynamic instabilities.

The Fitness Quotient

Edgar Michael T. Eufemio

Cardinal Santos Medical Center, Greenhills North, San Juan, E-mail:gareufemio@gmail.com

We have all heard about how the ***intelligence quotient*** (IQ) and the ***emotional quotient*** (EQ) can be used as predictors of educational attainment, career and income. There should also be an examination that can assess an individual's physical condition and actually narrow down the list of athletes who may, one day, achieve world-class status. ***A fitness quotient. FQ***!

Together with my partners, friends and staff, I attempted to design such a trial - the *Peak Form* FQ Test.

The first step was to list **THE CHARACTERISTICS OF AN IDEAL TEST**. It must:

1) measure the different components of fitness
2) be standardized to height and weight
3) have a numerical scoring system
4) be reproducible
5) be able to compare results
6) use functional movements
7) be finished in a short period

THE COMPONENTS WE WANTED TO MEASURE:

1) strength
2) explosiveness
3) speed
4) agility
5) coordination
6) balance
7) flexibility
8) endurance
9) recovery
10) mental

The next task was to come up with the stations. Since we started out with ten aspects, we decided on ten posts, each with a mean score of ten points. A total of 100 will mean a participant is average. One can score more or less than ten, depending on how they perform in each stop.

Other investigations have been designed to measure overall fitness. Criticisms are that they either have too many stations (23), too few (3) or use arbitrary formulas to calculate the scores. More importantly, they used the same conditions for everybody, whatever the height or weight. In addition, not all components are analyzed. We took all of these into consideration when we came up with our challenge.

THE STATIONS

1) **Vertical Rope Pull** – pulling a weight which is a percentage of your body weight over a distance that is a percentage of your height
2) **Box Jump** – jumping on and going down from a box which is a percentage of your height
3) **Suspension Cable Push Up** – doing push ups at an angle based on the size of your shoe
4) **Balance Board** – keeping your balance on a board while moving medicine balls that are a percentage of your body weight alternatingly from both sides, from containers that are a percentage of your height
5) **Horizontal Rope Pull** – pulling a weight which is a percentage of your body weight
6) **Gang Plank** – walking on a plank whose length and width are a percentage of your height while carrying kettlebells that are a percentage of your body weight
7) **Sand Bag Throw** – throwing sand bags that are a percentage of your body weight
8) **Cone Run** – placing and taking tennis balls from cones (these are positioned at distances that are a percentage of your height)
9) **Sit Up Shot** – taking medicine balls (that are a percentage of your body weight) from a rack, doing a sit up and then shooting the balls in receptacles
10) **Ball Up, Ball Down** – taking medicine balls (that are a percentage of your body weight) up and down platforms that are positioned on the floor and at your shoulder level

BASIS FOR THE SCORING SYSTEM

A pre-test was done and the highest and the lowest 25% of scores per station were eliminated. The mean of the remaining 50% was then obtained (we kept tabs of the top and bottom numbers of the surviving 50%). Point equivalents based on the above figures are then added or subtracted for each repetition above or below the mean.

The participant with the highest total score is crowned the fittest athlete, similar to being the valedictorian. The top marks per station AND component will also be noted, like being best in Math or English.

Once all the figures are in, we will be able to classify them into categories ranging from elite to very poor.

WHY DO WE NEED A FITNESS QUOTIENT TEST?

1) Individuals may check their fitness levels before and after starting an exercise schedule.
2) Different workout routines can now be pitted head-to-head to settle, once and for all, who can produce the best results.
3) We can now start asking who scored well in explosiveness, agility, coordination or balance. Certainly, there are sports and events that have positions that need those elements highlighted.
4) We can backtrack and find out which stations elite athletes excelled in and determine if there are any trends. They can now truly serve as prognosticators for what is yet to come.
5) Grade School and High School students who perform well in this test may now be placed in a training pool where more specialized training will be made available to them.

Role of Exercise Therapy in Common Musculoskeletal Conditions

Syed Rehan Iftikhar Bukhari

GC University Faisalabad, Pakistan, E-mail:dr.syedrehan@gmail.com

Learning Objectives:

The objectives of this lecture are to understand the role of exercise therapy in the management of common musculoskeletal conditions (MSCs) including **Osteoarthritis** and **Osteoporosis**; and to learn the specific exercise therapy protocols for the said conditions.

Osteoarthritis:

Osteoarthritis (OA) is the most common form of arthritis and the leading cause of chronic disability among older people.

Role of Exercise:

Exercise is proved to be highly effective in alleviating pain and improving the patient's physical performance. The exercise program should focus each patient's individual goals.

Exercise Recommendations:

Aerobics: Cycling or Treadmill walking is performed up to 10 minutes with the patient achieving Level 13 of the Borg Perceived Exertion rate within 2 minutes of activity.

Strengthening: Strengthening exercises are performed for 3 sets of 10 repetitions with a 3 second hold, and will be discontinued if patient reports an increase in pain $\geq$ 2 points on NPRS.

Stretching: Dosage should be 2 minutes stretch per muscle group with 20-60 sec hold times.

Neuromuscular control: To be performed for 6 minutes of total exercise, 2 minutes each exercise. Patient may do 3 different exercises or repeat any exercise more than once.

Osteoporosis:

Osteoporosis is a musculoskeletal disease that causes bones to become thin, weak and easy to break, due to decreased bone mineral density.

Role of Exercise: The following exercises are recommended for osteoporotic patients:

Weight-bearing exercises: Exercises such as walking or hopping are important to maintain or improve bone density in the patients with osteoporosis.

Flexibility and strengthening exercises: These can help improve the individual's overall physical function and postural control, and ultimately reduce the risk of falls.

Postural exercises: Postural exercises can prevent structural changes that often accompany osteoporosis, such as thoracic kyphosis.

Exercise Recommendations:

An exercise program for people with osteoporosis should specifically target posture, balance, gait, coordination, and hip and trunk stabilization rather than general aerobic fitness.

Warm-Up: 10- to 15-minute warm-up may be started with gentle ROM exercises for the major joints and ended with walking in order to achieve HR of between 110 and 125 b/min.

Workout: It includes strengthening and stretching exercises, postural corrections, and exercises to improve balance and coordination. Duration should be 30-40 minutes/session.

Relaxation: The last 5 to 10 minutes may be devoted to relaxation techniques such as deep breathing, progressive muscle tensing and relaxing exercises.

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Exercise as a Drug: The Emblematic Case of Low Back Pain

Angelo Manenti

European Medical Association, E-mail:a.manenti@csmitalia.it

You have back pain. Well, don't feel alone. Whether it is a pain in the neck or above the buttocks, it affects eight out of ten people from childhood upwards.

Not only that: in 90% of cases the disorder reappears in the course of life. However, the serious causes of back pain are very rare (less than one case out of 300) .: so it doesn't make sense to panic. However, the serious causes of back pain are very rare (less than one case out of 300) .: so it doesn't make sense to panic. This of course does not know you. Because you have a problem, which for a few days can be almost incapacitating. So: you have a bad back, what are you doing? Go to the pharmacy and buy a counter medicine? Consult the primary care physician? Book a visit to the orthopedist? Run to the emergency room? The first step is to think about your pain and try to describe it. The pharmacist will ask you, the doctor will ask you: where does it hurt?

BACK PAIN
It is rare, representing 10% of back pain. The 12 thoracic or dorsal vertebrae, most of which articulate the ribs and insert a few bundles of the diaphragm, the essential muscle for breathing, are affected. The painful area is between the shoulder blades, perhaps extends to the ribs, but disappears with a bit of rest. Probably there is a problem of posture at the origin. An over-the-counter drug reduces discomfort. And taking correct positions in everyday life will resolve back pain. - pain does not pass. It is necessary to undergo a medical examination. To rule out that at the origin of back pain there is a major pathology (such as osteoporosis, tumor, spondyloarthritis, internal lesions, spondylodiscitis) diagnostic tests must be performed.

BACK PAIN It is the most common form of back pain and concerns the area between the five lumbar vertebrae and the sacral firsts. The frequency of this disorder is greater in women and increases with age. - you are stuck, you have the so-called blow of the witch, a kind of beating directed against the lower part of the back. Go to bed and stay for a day or two. An over-the-counter drug buffers the emergency, but it's best if you ask for a home visit from the doctor, who can prescribe you a specific cure. - pain extends to the leg. This symptom indicates that the sciatic nerve is involved. A painkiller helps you on the spot, but it is essential that you have a medical examination. - you have a dull pain that accompanies you almost always and sometimes sudden acute episodes. Yours is a chronic low back pain: do not stop at the over-the-counter medication, go to the doctor and take measures for long-term care.

WHICH SPECIALIST? When to go to a physiatrist, orthopedist or neurosurgeon? You can always choose it first, but certainly when the general practitioner advises you. Deciding which one is the most appropriate specialist is not entirely standardizable.

- PHYSIATRIST He is a doctor who after graduation specialized in physical medicine and rehabilitation and takes care of movement disorders. Generally speaking, when the pain results from a muscular tension, from a supervening disability p is of chronic type it can be indicated to turn to the physiatrist. He will assess the functional condition of the patient and prepare the rehabilitation project, which will be carried out through the intervention of a physiotherapist and,

when indicated, with the use of physical therapies such as postural gymnastics and tens, together with the intake of some drugs , like muscle relaxants. If there is involvement of the nervous system the physiatrist can prescribe products (neurotropic supplements) that help the functional recovery of the nerve.

The ORTHOPEDIC The specialist, who can move in the same way as a physiatrist (but with a more surgical and functional approach), deals with situations in which pain results from a problem with bone structures, including traumatology. And the herniated disc? The number of orthopedic surgeons involved in spine surgery has decreased significantly and is generally concentrated in specific dedicated departments.

NEUROSURGEON In the event that the instrumental investigations reveal that the problem affects a nerve, a nerve root and in any case areas close to the spinal cord, it is preferable to contact a neurosurgeon, who will be able to operate or indicate an alternative therapy, for example by referring the patient to a physiatrist .

The ALGOLOGO
In severe cases of cornic disease, refractory to all treatments, the algologist, the pain therapy specialist, can be used. In addition to attempting the pharmacological route, it may indicate methods ranging from hypnosis to cutting-edge interventions.

EXAMS
Depending on the symptoms reported, the general practitioner or specialist may prescribe one of the following instrumental analyzes.

- RADIOGRAPHY (or slab in upright position)
It is recommended when the pain could be due to alterations of the spine. This is a technique that uses X-rays and allows the visualization of bone structures. It is useful for analyzing the presence of alterations at the level of the spine (curves of the spine, relationships between vertebrae, deviations, imbalances of the pelvis, presence of arthrosis) and must be performed standing up, leaning on a simple slab. It has no particular contraindications, except for pregnant women. It is a painless and short-term exam that does not require anesthesia and can be performed in the hospital or in specialist clinics, paying a ticket and presenting the doctor's request (basic or specialist).

- NUCLEAR MAGNETIC RESONANCE (RMN)
It is useful if the symptoms indicate the possibility of the presence of a hernia or nerve involvement, for example because the pain extends to one leg. The patient lies on a couch that is introduced into a cylindrical chamber. It does not require anesthesia (sedation is only required in specific cases, for example claustrophobia) and can last from 20 to 75 minutes. The technique uses magnetic fields and allows you to clearly see vertebrae, discs, muscles, blood vessels and ligaments. It is contraindicated in the presence of ferromagnetic material such as pacemakers, neurostimulators, intracranial metal preparations, vascular clips and various types of prosthesis (orthopedic, orthodontic appliances, crystalline prostheses and prostheses with electronic circuits): in these cases CT is preferred. To perform it, it is sufficient to present yourself with the prescription of the family doctor or specialist, at a hospital or specialist clinic (paying a ticket).

- TAC (computerized axial tomography)
It is prescribed in cases where it is necessary to better analyze the bones, for example after a trauma, or if an MRI cannot be performed. It lasts a few minutes and does not require anesthesia: it is sufficient to lie down on a bed that is slid through a piece of equipment. X-rays are made to pass perpendicularly to the back to obtain a photographic image of the spine. It is less sensitive than MRI, but gives more information in case of major trauma. The most modern technologies do not present any particular contraindication, except for pregnant women. The CT scan can be performed in the hospital or in multi-specialist laboratories (paying a ticket), upon the request of the request by the primary care physician or specialist.

ELECTROMYOGRAPHY Needle electrodes are inserted into the skin of hands or feet to measure nerve activity and integrity. The examination, which can cause some discomfort, lasts about 10 minutes and does not require anesthesia. It is prescribed when nerve damage is suspected or when the extent of a neuropathy is to be assessed. Moreover, it allows to monitor the progression of the disorder before a possible surgical intervention and to evaluate the recovery of nerve function in the post-surgical phase. It is contraindicated in cases of severe coagulopathies (such as haemophilia and thrombocytopenia), during systemic anticoagulant therapies, in patients particularly susceptible to systemic infections and in subjects who must undergo muscle biopsy. It can be performed, upon presentation of the prescription of the general practitioner or specialist (physiatrist, orthopedist, neurosurgeon) in the hospital or at a multi-specialist clinic, paying a ticket.

CARE: During the acute phase, the painful part can be warmed up, which helps to relax the muscles: all the remedies are fine, from the sweater to the warm bath, to the bags of gel sold in the pharmacy. If you suffer from myalgia, you can take a bench analgesic.

- WRONG POSTURE The simple expression "back pain" indicates a set of disorders that can originate from very different body structures, but all united by the fact of being in relationship with the vertebral column, including the musculature. Just your stiffening can give rise to a contracture which, if not properly treated, causes neck pain, back pain or low back pain, if not all three problems together. The disorder may be due to the habit of assuming incorrect positions that force the muscles to overwork. The resulting fatigue can cause pain. Furthermore, there may be an abnormal strain of the spine, from which the reflexes that lead to muscle contraction start. From this view, given different activities, they predict muscular back pain: ironing, watching television, using a computer and, more generally, sitting at a desk for a long time, driving, lifting weights.

Symptoms: The sensation you feel is that of a perennial extremely painful cramp along the muscle bundles of the back. Care: During the acute phase of pain it is advisable to avoid stress and reduce symptoms with anti-inflammatory drugs and, possibly, cortisone and muscle relaxants. Furthermore the physiatrist can prescribe physical therapies (such as tens and massages) and physiokinesis therapy.

TRAUMA When acute, back pain can be caused by traumas of even modest intensity that can be suffered during everyday life, for example by lifting a weight, falling, in the gym. The musculature stiffens, giving rise to a headache due to contracture.

FLICK The trauma that typically causes this disorder is a tamponade in the car, during which the neck is abruptly hyper-extended and hyper-extended, with consequent possible injuries to muscles, ligaments, intervertebral discs, vertebrae, nerves or blood vessels. In milder cases this corresponds to sprains and bruises, but it is possible to get ligaments, herniated discs and vertebral fractures.

Symptoms: the pain appears only after a few hours and worsens progressively to limit the movements of the neck and to extend also to the arms. To these discomforts can be added headache, vascular imbalances, difficulty swallowing, nausea, vomiting, fatigue, dizziness, skidding, insomnia, emotional and psychological disorders. This happens because the normal blood flow in the vertebral arteries becomes irregular due to the compression of the vessels. In severe whiplash disorders can also be caused by a trauma of the organ of balance. It is the case of cupololithiasis, a curable situation in which the detachment of small pebbles normally attached to the walls of the cochlea, an internal structure to the ear, occurs. Diagnosis: Therefore, even if the symptoms do not appear immediately, after the trauma it is advisable to always consult a doctor or the emergency room. To diagnose the extent of the damage, x-rays can be taken or, in more serious cases, the doctor can decide for CT.

Cure: in some cases the use of an orthopedic collar is prescribed which, supporting the cervical spine, will protect it from inappropriate movements and allow muscle relaxation. Non-steroidal anti-inflammatory drugs or corticosteroids are indicated in the acute phase of pain. Muscle relaxants are also useful for loosening the muscles. Later, instrumental therapies such as tens, ultrasounds, iontophoresis and radar therapy can be recommended. Massages can also help relax muscles and eliminate pain. Postural gymnastics, acupressure and shiatsu are good, as long as they are practiced by experts.

FURTHER INFORMATION: PERCUTANEOUS NEUROTOMY If the whiplash does not pass after drugs and physiotherapy, a further possibility comes from a sophisticated technique called "percutaneous radiofrequency neurotomy" which allows to deactivate a small nerve, often involved in chronic neck problems. It is performed by introducing 3 needles, with extreme precision, for a depth of about 2 cm, at the height of the vertebrae that generate the pain. Equipment connected to the needles then produces heat on the nerve that leads to the painful stimulus, deactivating it. This lasts about a quarter of an hour, in day hospital and under local anesthesia. This procedure should only be performed by highly qualified personnel in appropriately equipped pain therapy departments. The intervention leads to the complete elimination of pain in 70% of cases, for one or two years. After this period the procedure is repeatable. The operation cannot be performed under the age of 15. Neurotomy is also indicated in cases of chronic arthritis pain, intervertebral disc or ligament disorders, or major muscle problems.

FALLS

Trauma such as falls on the coccyx can cause low back pain. The fall can lead to fractures or microlesions that are not visible by radiography, or the release of a hernia (pain extended to the legs). Even when there is no damage of this type, the body reacts to pain with a contraction of the musculature: this increases the disorder and can create difficulties in moving the trunk.
Care: rest and appropriate drug therapy are recommended, followed by physiotherapy and physical therapy.

LUMBAR HERNIA

Lumbar hernia covers the lower part of the spine. It is more common between the ages of 30 and 50, especially in males.
Causes: alongside genetic causes, lumbar hernias may be due to trauma or strain and to incorrect posture. In addition, overweight and inactivity are risk factors.

Symptoms: at first a pain appears in the lower back (lumbago), which then extends to the posterior aspect of the leg, even up to the plant or to the back of the foot (lumbosciatalgia), or to the anterior

part of the thigh (lombocruralgia). Pain increases with movement, protracted position, coughing, sneezing and defecation, while decreasing lying down with bent legs. Other symptoms are pins and needles, lack of sensitivity and strength and alteration of reflexes. Diagnosis: the specialist can diagnose sciatica using the Laségue maneuver, in which the patient is made to lie on his back and his extended leg is raised: in the presence of a hernia this test will cause pain. To diagnose a lumbocruralgia, however, the patient is made to lie down on his belly and his leg is raised, flexing his knee (Wassermann test). If symptoms do not diminish within six weeks, radiological investigations, CT or MRI are recommended. Electromyography can be used to check the health of the nerve. Cures: in acute forms, NSAIDs and cortisone-based. If the hernia is not expelled it will tend to resolve itself over time. Pain relieved, lumbar traction, massage, gymnastics, electrical stimulation, physiotherapy. In case of need for intervention, traditional microdiscectomy, endoscopic or percutaneous techniques.

STRESS

There is good and bad stress. The body is constantly subjected to pressure, the c.d. "Stressors" (a grief, an overload of work, a move, a sentimental disappointment, etc.). The body reacts by releasing a series of hormones and neurotransmitters, such as adrenaline (which accelerates the heart, tightens the muscles and activates the mind) and cortisol. In these cases we speak of "eustress" or good stress. The problem comes when an extraordinary situation, or that should be limited to a short period, becomes chronic: in these cases there is a pathological evolution of stress. The most common causes are serious events (mourning, dismissal, family conflicts, illness, etc.), radical changes (removal, cohabitation, retirement, etc.), dissatisfaction in the workplace, mobbing, but also environmental factors (sudden temperature changes, jet leg, excessive noise), excessive physical activity or common everyday problems (noisy neighbors, mortgage to pay, traffic, etc.), bad habits and excesses (poor diet, abuse of drugs, drugs or alcohol, nicotine, caffeine, etc.) and also from the absence of stimuli (unemployment, social isolation, inactivity, lack of affection, hypo-feeding, etc.).

Diagnosis: pathological stress cannot be diagnosed by specific tests. There are markers (high pressure, fatigue and insomnia, etc.), but the clinical eye makes the difference. The doctor's anamnesis is fundamental, the data collection performed through dialogue with the patient. Exams that exclude other diseases may be prescribed.

Symptoms: the most frequent are back pain and muscle contractures, persistent tiredness, headache, irritability, palpitations, sweating, sleep disorders, gastric-digestive disorders, arterial pressure peaks. Care: as far as possible, the causes of stress must be removed. If problems persist, the specialist may also prescribe anxiolytics or psychological interventions to manage stress and change stressful lifestyles. Also useful are sports, gymnastics, anti-stress massages, physiotherapy, spas, depending on the cause.

DEEPENING: RELAXATION EXERCISE

Breathing well is one of the most effective measures to achieve relaxation of body and mind. The tension causes an alteration of the rhythm and depth of the breath, with a consequent lowering of blood oxygenation. For this reason, training to breathe well is essential, definitely worth trying in case of stress. Inhale, hold the breath a few seconds and then exhale getting used to using the diaphragm, the muscle that separates the thoracic cavity from the abdominal cavity. Repeat 5/6 times.

SCOLIOSIS

It is an axial deviation of the column associated with a lateral rotation of the vertebral bodies, especially at the dorsal and lumbar level.

Causes: congenital bone malformations of the spine (structural scoliosis); lack of movement or maintenance of incorrect postures for too long (postural scoliosis).

Symptoms: postural scoliosis creates a curvature of the back when standing, pain in the shoulders and persistent back pain; the structural one, on the other hand, shows shoulders of different heights, an unbalanced pelvis, prominent scapulae, a raised and inclined hip.

Diagnosis: standing x-ray x-ray, supine position (lower limb dysmetria) or lateral bending (incorrect posture) depending on the case.

Therapy: the bust is prescribed when the deviation exceeds twenty degrees, and must be worn until adulthood. Corrective gymnastics, corsets, pinstriped corsets block the progression of the deformity. In the case of acute pains, anti-inflammatory, analgesic, muscle relaxants. Recommended yoga and physiotherapy (massage and postural re-education).

DEEPENING: VERTEBRAL ARTRODES

It is a surgical procedure which is used only in particularly serious cases (in the case of a curvature that goes beyond 40 degrees, for example) and which consists in fixing titanium bars to the spine using screws and hooks (it is performed in anesthesia general). After 3 or 4 days in bed the patient can move again. After a year the scaffolding will have straightened the column in a definitive way. Screws and bars are usually left in place, unless they create trouble.

PREGNANCY

Back pain during pregnancy can begin around 5/6 months and intensify with gestation. It most commonly affects women with previous changes, such as discopathies, scoliosis or lordosis. With weight gain the woman changes posture, tending to push the pelvis forward and accentuating the curvature of the lower back.

Symptoms: pain that starts from the kidneys and extends to the legs, the shoulder blades and the cervical spine.

Therapy: unless contraindications, it is treated with physiotherapy (postural re-education, motor coordination and breathing). There are also excellent decontracting and connective massages, if performed by expert hands. Ultrasounds and magnetotherapy are not recommended. Caution with anti-inflammatories, to be taken only on the advice of your doctor.

Prevention: back pain can be avoided by making targeted movements from the first months of gestation. Pilates, yoga or physiotherapy sessions through the Mezieres method, but also swimming if contraindications do not persist. In bed, sleep in the supine position and with legs slightly bent (pillow under the knees).

VERTEBRAL STENOSIS

Abnormal narrowing of the canal that houses the spinal cord and nerve roots, generally in the cervical or lumbar area.

Causes: congenital or induced by degenerative processes of bone tissue and intervertebral discs (arthrosis), which lose water and become deformed. The reduction of space causes compression and chronic inflammation of the nerve roots that come out of the marrow, causing even very strong

pains. Symptoms: back and lower limb pain, sciatic pain, paresthesia, which are accentuated by walking. Diagnosis: MRI or TAC show the possible narrowing of the canal. Electromyography helps to define which nerve root is most involved in the genesis of symptoms.

Therapy: anti-inflammatories and analgesics for acute pain. In case of need, the intervention to enlarge the canal is generally the decompressive minectomy, which involves the removal of the lamina (the posterior part of the vertebrae) followed by a stabilization with titanium screws and bars.

SPONDYLOLISTHESIS Sliding of one vertebra over the other, generally in the lumbar tract. Causes: genetic or traumatic malformation of the vertebral isthmus (posterior vertebrae). Symptoms: asymptomatic, or causes persistent low back pain. Care: physiotherapy for strengthening the abdominal wall. Pinstriped or polyethylene corsets or surgery, in particularly serious cases.

MALOCCLUSION The mouth does not close properly due to a bad teeth arrangement and the masticatory muscles are therefore not in balance. Symptoms: pain in the jaw, facial muscles, noises and restrictions on opening the mouth. Diagnosis: MRI of the mandibular joint Therapies: bite (custom-made orthodontic appliance) and physiotherapy. spondylodiscitis Infection that affects the vertebrae and the intervertebral discs. It can extend to the surrounding muscles and nerve structures, causing the spine to collapse. It can be caused by poorly performed interventions or as a complication of brucellosis (infection resulting from the consumption of sheep's milk and unpasteurized goat's milk). Symptoms: intense back pain and localized especially in the lumbar area, up to the legs.

Diagnosis: blood tests and disk-vertebral needle biopsies. An MRI and a bone scan with radioactively labeled white blood cells may also be useful.

Therapies: high doses of antibiotics for a few months. In the event of complications (neurological deficits, highly compressed bone or antibiotic resistance), surgical removal of infected tissue and locking of the vertebrae with metal plates in order to decompress the nervous structures.

PHYSIOTHERAPY & MASSAGES
The term physiotherapy indicates the set of techniques used to restore the physiology of the osteoarticular and muscular apparatus, from massotherapy to physiokinesis therapy. Massotherapy means massage for therapeutic purposes, consisting of the two phases of "kneading" and "friction" of the tissues. Among the most used, the decontracting massage (relaxes the muscles during acute pain) and the deep connective tissue (raises the pain threshold). By physiokinesis therapy, instead, we mean a series of specific maneuvers useful especially for rehabilitation following trauma.
Postural re-education, finally, the methods used on posture and stretching of the muscles are indicated.

ALEXANDER technique
Postural re-education technique that takes its name from the Australian Frank Matthias Alexander who developed the technique in the 30s. A session lasts about 45 minutes: in the first phase the patient is seated in a chair, then he is made to raise and sit repeatedly while the therapist gently touches the muscles between head and neck, between neck and trunk and between trunk and legs, analyzing muscle contractions; in the second phase the patient concentrates on the points more contracted, in order to relax them following the indications of the therapist. This phase lasts about

10 minutes and is then resumed in other ways. In the third phase the patient lies down on a couch while the therapist analyzes the neuromuscular characteristics again, devoting twenty minutes to the manual work of dissolving tensions. In general, at least 5 or 6 sessions are needed to stem problems such as chronic low back pain, neck pain and other problems affecting the shoulders and arms. This technique is not recommended in the acute phase of pain, requiring at least 3 or 4 days of preventive rest, and also for those suffering from a herniated disc or sciatica. No contraindication, however, in cases in which the pathologies derive from muscular contractions or incorrect postures.

CHIROPRACTIC technique Designed in 1895 in Davenport (United States) by Canadian Daniel David Palmer, it relies on manipulations to correct the c.d. vertebral subluxations. It is not taught in Italian universities, and the risks can be very serious.

FELDENKRAIS method Created by the Russian Israeli physicist and engineer Mosche Feldenkrais, it is a psychological system that integrates movement, sensation and thought to ensure that the patient acquires full autonomy of techniques and concepts. In group sessions we learn how to walk, how to stand up, how to extend the spine; in individual sessions the therapist focuses on correcting individual posture errors.

MCKENZIE method Conceived by the New Zealand physiotherapist Robin McKenzie, it consists in helping the patient to recognize exactly where the pain comes from and then cancel it with a series of targeted postural exercises. Since the method also includes a series of pressure and handling techniques, it is advisable to rely exclusively on qualified personnel.

MEZIERES method
From the French physiotherapist Francoise Mezieres, provides a series of exercises to relax the muscle fibers with the aim of restoring the symmetry of the body divided, according to Mezieres, into 4 muscle chains, thus dissolving the contractures deriving from bad postural habits.

SOUCHARD method
Developed by Philippe Souchard, also called "global postural re-education", it provides individual sessions during which the patient remains lying or leaning against a wall: the work is based on re-balancing and on the feeling of self-perception of the spine, with the aim of discovering the causes of pain, not just to eliminate it.

OSTEOPATHY
It involves the use of special manual techniques, very gentle, to overcome dysfunctions. It does not focus only on the painful part, but considers the organism as a whole. The sessions last one hour with a weekly frequency. In Italy the figure of the osteopath is not yet recognized, therefore the sessions can only be private and not in agreement with the national health system.

SHATSU
Japanese technique invented in the last century by Tokujiro Namikoshi which consists of an acupressure performed on a patient lying on the ground or on a couch through repeated rhythmic sessions with the thumb at some sensitive points of the head, sacrum, spine or of the abdomen, in turn related to the central and peripheral nervous system: relaxation and muscle relaxation is facilitated, and the release of endorphins is stimulated. It can also be done in water (c.d. WATSU), and is recommended for low back pain, joint and cervical pain, muscle contractures, scoliosis or

problems with poor posture. It is not suitable for those suffering from osteoporosis because it could favor bone fractures and is absolutely not recommended in the presence of bone metastases that make the skeleton very fragile.

INSTRUMENTAL THERAPIES

Hyperthermia

Useful in case of muscle and joint pains. The machine emits electromagnetic waves of varying intensity on the area to be treated. The patient feels a slight sensation of heat, which is what has the anti-inflammatory and painkiller effect, reducing joint stiffness. At least 10 consecutive sessions of about 30 minutes each are recommended. This therapy is contraindicated in case of tumors, pregnancy, in the presence of tuberculosis or pacemaker, and all those patients at risk of bleeding or suffering from vasculopathies or endotissutal metal parts must pay particular attention.

INFRARED LASER

It produces an anti-inflammatory and pain-relieving effect through vasodilation and an increase in lymphatic drainage. The laser intensity is adjusted according to the depth to be reached, and the duration of the application ranges from 2 to 6 minutes per point. It is completely painless. We recommend at least 8 sessions, one a day, of about 15 minutes. Not recommended for patients with cancer, pregnancy and areas of bleeding.

MARCONITHERAPY AND RADAR THERAPY

The two techniques use alternating currents at very high frequencies and with great penetration into the tissues, with the main effect of producing heat in the area affected by pain. While marconiterapia is effective in the treatment of arthrosis and lumbago, radar therapy is used especially when the origin of the pain is muscular. We recommend at least 10 sessions of 10/15 minutes each, one per day. Not advised during pregnancy, during fever, in case of bleeding (including the menstrual cycle), in case of diabetes, tuberculosis, cardiovascular diseases, skin inflammation, hypoesthesia or skin anesthesia and in the presence of metal prostheses.

IONOPHORESIS

Useful for osteoarthritis, arthritis, rheumatism, muscle contractures and post-traumatic inflammation. A continuous current, applied through an electrode, is used to ionize the medical substances placed on the skin to facilitate absorption: decontracting, pain-relieving and anti-inflammatory effects are thus obtained. It is completely painless. We recommend 6/10 consecutive daily sessions of 20/30 minutes each. Contraindicated in patients with pacemakers, skin lesions, epilepsy and cutaneous hypoesthesia.

ULTRASOUND

Generated from elements of quartz or ceramic that oscillate electrically producing deep heat. The patient's skin, previously spread with gel / cream (or immersed in water) comes into contact only with a transmitting head (a completely painless procedure). We recommend 10 sessions of 10/15 minutes each. Contraindicated in case of osteoporosis, in acute inflammation states and in the presence of hematomas.

TENS THERAPY (CAPACITIVE-RESISTIVE DIATHERMY)
The most common electro-therapeutic technique in physiotherapy to relieve pain. Appropriate electrodes apply alternating current at the points affected by the pain: in this way the painful impulses are neutralized and, at the same time, the production of beta-endorphins which cooperate in the disappearance of pain is stimulated. The waves have different frequency and duration depending on the type of discomfort to be treated. Recommended at least 10 consecutive sessions, one per day, of about 15 minutes. Contraindicated in persons with pacemakers, pregnant and lactating women and in subjects with cardiac rhythm abnormalities.
Tecar® therapy

Electric current is used to mobilize the electrolytes present in the body, stimulating cellular and natural anti-inflammatory repair processes. In particular, by increasing blood circulation and oxygen concentration, muscle contractions are dissolved and edema reabsorption is facilitated, significantly reducing rehabilitation times. A complete course of care consists of at least 10 sessions of about 30 minutes each. The only contraindications are for pacemaker wearers, pregnant women and temperature insensitive patients.

TRACTION
For the treatment of cervical arthrosis, cervical lordosis and cervicobrachialgia, a system of pulleys attached to weights is used to remove the vertebral bodies and relax the muscles. For the treatment of the lumbar area, on the other hand, special tables are used, divided into two spacing parts on which the patient lies. Then there is the c.d. pomage, a manual traction technique that causes muscle relaxation and the removal of vertebral bodies. Useful in case of compression of nerve roots and in
conservative treatment of herniated disc. We usually recommend at least 10 sessions, 1 or 2 hours for cervical tractions, 20/30 minutes for lumbar tractions. They are contraindicated in cases of severe osteoporosis, recent whiplash, acute low back pain, respiratory failure, bone lesions, malformations of vertebrae and blood vessels, rheumatic diseases and severe forms of vertebral arthrosis.

TOOLS AT HOME
OWN PRESSES
Wooden or plastic supports resting on a sphere. The patient must ascend and try to maintain balance, straining and relaxing the muscles correctly.

PILLOWS AND INFRARED LAMPS
They generate heat that causes muscle relaxation and pain relief. Effective especially in the case of chronic low back pain. No contraindication in case of skin infections.

ROLLER MASSAGERS
Relaxing and analgesic efficacy. They are rollers inserted inside cushions whose alternating movement massages to the surface of the back. The more complex versions are inserted in armchairs, sofas or beds.

BATHTUBS AND HYDROMASSAGE SHOWERS
Their action is similar to that of roller massagers, but they can also count on the de-contracting effect of warm water. They also have a mental effect, making the pain think less.

TENS
Devices for sale at an electro-medical shop that use the same therapeutic principle as appliances used in hospitals and rehabilitation centers.

ALTERNATIVE THERAPIES
THERMAL MEDICINE
Spa treatments useful in case of chronic pain and for post-trauma or post-intervention rehabilitation. Among all, the balneofangoterapia: immersion in hot thermal waters (36/38 degrees) that relax the muscles, dissolve the contractures and increase the production of the wellness hormones (opioid neuropeptides and alphaendine). Effective also the peloidoterapia, treatments based on thermal muds left to act on the body for 10/20 minutes, carrying out an analgesic and myorelaxing action. Antrotherapy, on the other hand, is a treatment that takes place inside a cave with a hot-humid microclimate, in which the heat and vapors present act as decontractors, reducing sensitivity to pain and improving the ability of joint movement. Finally, the emotional showers: jets of hot and cold water that water the body while around perfumes and plays of light act as antistress, promoting muscle relaxation. The only warning is not to undergo these treatments in the acute phase of the disease. Other contraindications will be evaluated by the medical spa.

ACUPUNCTURE
Ancient Chinese technique of stimulating particular points of the body through needles. It is essential to contact qualified acupuncturists. Number of sessions and effects vary from patient to patient.

HOMEOPATHY
Not accepted by official medicine. Several studies have concluded that homeopathic products have an exclusively placebo effect: their possible efficacy does not depend on the properties of the medicine but on the fact that the patient expects it to work.

YOGA
Born in India 5 thousand years ago, yoga helps to remove the daily stress that sometimes stiffens the back muscles. The yoga positions called "asanas" relieve back pain by improving the basic posture and joint mobility; the meditative phases, instead, with their relaxing action, eliminate the muscular contractions due to the inflammation of the column. Breathing allows the correct oxygenation of the muscles. Finally, the correct circulation stimulated by the asana position and by yoga breathing reduces the presence of inflammatory molecules in the blood that can give rise to localized pain. 2 sessions per week are recommended; the results are appreciated only after a few months. Yoga has no contraindications: even to pregnant women it is recommended. In the case of back pain, however, it is best to avoid torsion of the torso and excessive back and forth bending, both standing and sitting.

AQUAGYM Aquagym exercises tone all the muscles without exposing the back to excessive strain. It is an excellent remedy to combat the forms of osteoarthritis of the lumbar area. Consistently done, it's a real cure for the back. To be practiced 2/3 times a week, it is suitable for everyone, just be immersed up to the neck and do not overdo it. PILATES System designed by Joseph Pilates which focuses on postural muscles. Exercises are performed with medicine mats and balls, and proper breathing is essential. The aim is the alignment of the spine and the strengthening of the abdominal muscles, buttocks, adductors and the muscles of the lumbar area. It should be

practiced 2/3 times a week and is suitable for everyone, just practice it with experienced teachers. I SWIM Relieves tension and allows the spine to relax. It also specifically works the trunk and shoulder muscles. The greatest risks in the event of a wrong technique are the increase in kyphosis and lordosis. 2/3 times a week is a proper training frequency. Those who have an accentuation of the dorsal curve must not make free style, only the back. Those who have scoliosis, on the other hand, must also practice free-body compensation exercises. To exclude butterflies and frog in case of herniated disc.

PILATES
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SOFT GYM The soft gymnastics consists of a series of exercises lasting 5/10 minutes each, to be performed during the day when and where the opportunity arises. The daily routine of these exercises helps to loosen the muscles and prevent stiff neck, shoulder pain and back pain. Half an hour a day, even divided into different moments, is sufficient. There is no contraindication, but the first time it is better to do the exercises by being followed by a qualified instructor.

OFFICE STRETCHING If there is no time to go to the gym, stretching every day in the office will help keep the muscles in shape and prevent contractures and back pain. The ideal would be to dedicate 5/10 minutes at least 2 times a day. To be practiced with caution in the phases of acute pain and, in general, in a progressive manner: during the exercises one must not feel pain, only tension.

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ANDREA COSTANZO, teacher of traumatology of the street, University of Bologna and of Rome La Sapienza;

GIUSEPPE FRANCAVILLA, president of the degree course in podiatry, University of Palermo;

MAURIZIO LOPRESTI, physiatrist, department of physical medicine and rehabilitation, Gaetano Pini Orthopedic Institute of Milan;

ENRICO OCCHIPINTI, primary of occupational medicine, Policlinico Hospital of Milan;

VINCENZO RUCCO, director of the complex rehabilitation facility, Ospedale di Spilimbergo (Pordenone);

VINCENZO SCAGLIONE, Head of the Spinal Neurosurgery O

Understanding Physical Activity in A Social Context: Beyond Behavioural Science to Public Health

Miranda Thurston

Institute for Public Health and Sport Sciences, Inland Norway University of Applied Sciences, E-mail:miranda.thurston@inn.no

Abstract
The health benefits of regular physical activity are well-documented and have often been described as the 'best buy' in public health (Morris, 1996). Yet many populations are becoming less active, including those in low- and middle-income countries. Within and between population comparisons show that physical activity and inactivity – each an independent risk factor for a variety of health problems – are socially patterned and thus contribute to social inequalities in health. A public health perspective shifts attention away from a single focus on individual behavioural scientific explanations and gives priority to the social and cultural determinants of physical activity and inactivity. Taking a global perspective, and using specific examples from the UK and Scandinavia, the presentation introduces and explores the complex social, cultural and physical environment within which physical activity and inactivity are shaped. This provides an evidence-base that can inform policy and practice in this field.

Introduction

An international survey of policymakers in 2014 reported that "more than 90% believed personal motivation was a strong or very strong influence on the rise in obesity" (Rodgers, Woodward, Swinburn & Dietz, 2018, p. e162). Individual behavioural explanations such as those resting on individual motivation, choice and responsibility can also be found in the physical activity promotion field (Messing et al., 2019). This remains the case even though the influence of social and cultural factors on health behavior in general, and physical activity in particular, have been widely recognized for some time (McNeill, Kreter & Subramanian, 2006). In this paper, I adopt a public health perspective, which shifts the focus from individuals to populations and to the social determinants of physical activity. The key message of the paper is that there is, theoretically at least, scope for change, if we ask the right questions and focus on the right things.

I want to start by clarifying some important issues relating to the terminology of physical activity. I will then offer a brief overview of the social patterning of physical activity at global, national and sub-national levels. I do this to illustrate how patterns between and within countries reveal differences in population levels of physical activity. To paraphrase Geoffrey Rose (2001), this should make us ask the question why some countries (societies) are more physically active than others and why, within those countries, some population sub-groups are more active than others. I will endeavour to answer these questions by pinpointing what I take to be the chief characteristics of physically active societies. By way of conclusion, I set out some ideas for how these characteristics might inform our thinking on how to better facilitate physical activity in populations.

Conceptualizing physical activity as a habitual social practice

In this presentation, I emphasise that physical activity – that is to say, bodily movement produced by skeletal muscles and resulting in energy expenditure beyond basal metabolic rate – is a broad

category that includes play, exercise, physical recreation and sport, as well as occupational activity (Caspersen et al., 1985; WHO, 2018). Over the past 70 or so years, epidemiological and clinical evidence of the beneficial effects of physical activity on human health has increased; hence its elevation as a public health priority in most high-, middle- and low-income nations. However, while many countries have physical activity plans, population levels of physical activity are not only failing to meet global recommendations (Das & Horton, 2016), in many countries they are declining markedly. How can we explain that: if physical activity is a public health 'best-buy' (Morris, 1996) why isn't it being bought?

The departure point for this paper is to conceptualize physical activity (and inactivity) as a 'social practice', that is to say, a phenomenon that emerges from and develops within a social context (Blue et al., 2016). Morris and Crawford's work on London bus drivers and conductors in the 1950s, along with Paffenburger and Hale's (1970s) study of Canadian longshoremen offer relatively clear-cut illustrations of the way in which the structure of the labour market in particular, as well as society in general– shapes levels of physical activity. The labour market and the occupational profile of many countries was markedly different in the second half of the twentieth century, however, when compared with the 21st century: many occupations involved considerable physical activity and, consequently, calorie expenditure. But also beyond the labour market, modes of travel, increasing urbanization, and activity in the home – particularly housework carried out predominantly by women – were also quite differently patterned compared to 2019. The social and cultural context in earlier epochs meant that physical activity was inevitably integrated into people's daily lives – through employment, housework, travel, play, and so on.

Subsequently, in many high-income countries, changes in the population distribution of physical activity have, to a large extent, been driven by societal changes in these domains, with the same pattern emerging in middle- and low-income countries as economic development unfolds (Shetty & Schmidhuber, 2011; WHO, 2018). The digital revolution and its impact on work and leisure is but one more recent manifestation of a societal trend driving many populations towards increasing sedentariness.

Conceptualising physical activity as a social practice, draws on a sociological understanding of 'behaviours' as developmental – that is to say, constructed and re-constructed throughout the life course – in complex relational (social) environments (Kelly & Barker, 2016). Viewed this way, many of our health-related behaviours, including dispositions towards physical activity, can be understood as characterised by habit – rooted in our upbringing and, while very much open to change and adaptation, highly predictable nonetheless from our past conduct. In this vein, Morris and Crawford (1958, p. 1493) speculated that it was habitual physical activity that gave rise to beneficial cardiovascular health outcomes.

As I've indicated, the social and cultural context changes over time and, in doing so, provides more or less fertile soil in which the seeds of population physical activity are sown. Put another way, using the terminology of public health, population levels of physical activity are best explained in relation to the social determinants of health (Dahlgren & Whitehead, 1991). As Li et al. (2005) argue, physical activity is a behavior that is inherently shaped by one's social environment in that most activity occurs within the contexts of families, communities and neighbourhoods.

Despite this, the tendency in physical activity promotion remains to conceptualize the problem of physical inactivity in the individualistic terms of declining motivation, a dearth of willpower and so on, rather than in terms of social and cultural drivers. As Rodgers et al. (2018, p. e162) argue in relation to obesity, it is unlikely that shifts in personal motivation can adequately account for the trends in declines in population physical activity. They argue that "it is implausible that each age, sex and ethnic group with massive differences in life experience and attitudes, had a simultaneous decline in willpower related to health nutrition or exercise". In short, in order to explain population trends it is necessary to look beyond individual factors to the social, political and cultural features of countries, and it is these to which I now want to turn.

Physically active cultures, physically active populations

The World Health Organization (2018) has been at the forefront of advocating the need to develop the physically active societies from which habitually physically active people emerge. We may begin to better understand the complexity of social, political and cultural characteristics of physically active (and inactive) cultures by comparing societies with differing levels of physical activity. Notwithstanding the difficulties of measuring physical activity at a population and sub-group level – especially for the purposes of comparison – there are an increasing number of studies with which to explore this issue. Countries differ in terms of levels of physical activity, sometimes quite markedly so. For example, a recent pooled analysis of 1.9 million people aged 18 and over from 168 countries examined the proportions of adults failing to meet the WHO PA guideline of at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity PA per week (or equivalent combinations of the two) (Guthold et al., 2018). Guthold and colleagues found that global (age-standardised) physical activity (proportions of adults not meeting the WHO PA guideline of at least 150 minutes of moderate intensity or 75 minutes of vigorous intensity PA per week, or equivalent combinations of the two) was 27.5% in 2016, with a difference between the sexes of 8 percentage points (23.4% men vs 3.7% women). And, as Althoff et al. (2017, p.336) have noted, "reduced activity in females contributes to a large portion of the observed activity inequality". Variation between countries was, however, marked, being highest in high-income western countries (42.3%). This study included high-, middle- and low-income countries, socially, politically and culturally very diverse and at various stages of economic and human development. Nonetheless, it is pertinent to ask, why some countries are more physically active than others?

In relation to Europe where the emerging importance of leisure time (rather than occupational) physical activity is important, studies of sports participation (broadly defined to include traditional and more recreational, lifestyle sports) reveal large variations between countries (Eurostat, 2018). These statistics are, of course, different from those cited above in relation to the prevalence of physical activity. Thus, high levels of sports participation do not necessarily reflect high levels of physical activity, counterintuitive as it may seem (Green, Sigurjónsson & Skille, 2019). In part, this might be because leisure-time sports participation sits alongside an increasing tendency towards being sedentary in everyday life (Green, Sigurjónsson & Skille, 2019). Nonetheless, sports participation statistics are an indicator of the social and cultural significance of sport within populations and may well tell us something about habitual participation if not the intensity and volume. From a public health perspective, this is important given the overall aim to get more people more active in their leisure (Blair, 2009).

Even within Europe, large differences between countries are evident: over 70% of people (those aged 15 and over) in Nordic countries and Austria reported they practiced sport at least once a

week compared to around 10% in Bulgaria and Romania (Eurostat, 2018) In general, men practice sport more than women (47% vs 42%) but there are some notable exceptions. For example, in the five EU states where sports participation tends to be most commonplace – Denmark, Germany, Finland, Sweden and Austria – more women than men take part in sport, with the gap in Denmark being the largest. Of further note is that in Denmark, the typical drop-off with age is not so clear-cut: 70% of those age 65 and over report participating in sport at least once a week compared to 81% of 15–24-year-olds (and throughout this time period the proportion never dips below 71%). While it is not a member state of the EU, studies suggest that Norway is especially illustrative of the overall high population levels of participation, strong participation by women and limited drop-off with age found in many Nordic countries in particular (Green, Sigurjónsson & Skille, 2019).

Alongside between-country differences, there are stark within-country differences. Thus, within European countries physical activity displays a social gradient with those with the highest level of education most likely to be physically active (Demarest et al., 2013). However, the magnitude of these differences varies by country: in Austria those with the highest level of education are four times more likely to physically active than those with a low level of education. By contrast, in Slovenia level of education has little significant effect (Forster, n.d.) Furthermore, evidence from a study of Danish 11–15-year-olds suggests that social class differences in physical activity tend to emerge early during childhood (Johnsen et al., 2017).

The tendency for physical activity promotion to rely on individually-oriented interventions, often of a relatively short duration, has had very little impact on shifting population levels of physical activity in the desired direction (Messing et al., 2019), and this is especially true among those in the most disadvantaged groups who have most to gain (Vilhelmsson & Östergren, 2018). This is, in part, because of a lack of 'reach' or penetration of interventions. But, more importantly it is because interventions leave undisturbed the social and cultural context within which patterns of physical inactivity have been developed and sustained. This is particularly the case with regard to social inequalities: Kay (2016, p. 550) has argued that "… policy has placed too much emphasis on the individual as an active agent and ignored the evidence of the constraints and barriers that can affect them". Furthermore, interventions may have the reverse effect of that desired, widening inequalities rather than reducing them because of differential effects across various population sub-groups (Love et al., 2019).

With this brief overview I have endeavoured to outline the argument that some populations and population sub-groups display a tendency to be more physically active than others. Understanding more fully the social and cultural characteristics of populations that are more active has the potential to shed light on the key determinants and help us answer the question why some populations and population sub-groups are more physically active than others.

Physically active societies: social and cultural explanations (650)

What, then, are the features or characteristics of societies where participation is high? It is worth reminding ourselves at this juncture that in both historical and contemporary terms, a country's level of economic development tends to be a major factor in explaining population levels of physical activity. The public health challenge, then, relates mainly to economically developed high-income countries where sedentary behavior alongside physical inactivity have expanded. Yet still, among these countries, some – specifically the Nordic countries – sustain high levels of sports participation during leisure time. And it is to these countries I now turn.

Increasing attention has been given to the Nordic countries in recent years because of their strong performance against a range of health and welfare indicators (Hodgson, 2018). Green, Sigurjónsson and Skille (2019) and others (see for example, Coalter, 2013; Green, Johansen & Thurston, 2019) have offered a range of sociological insights into why the Nordic countries stand out in relation to sports participation. Their detailed analyses are instructive because they focus on the social, political and cultural context of Nordic countries in order to illustrate that, although differing in a number of important respects, they have a number of common attributes that contribute towards creating favourable circumstances for physical activity and sports participation. In what follows, I focus briefly on the social and cultural dimensions of Nordic societies.

Given what we know about how more equal societies – that is to say, in relation to inequalities in income – do better on a range of health and social measures (Wilkinson & Pickett, 2009), it is perhaps unsurprising to find that the Nordic countries have good health indicators including high levels of physical activity. The social democratic welfare state models that have become associated with the Nordic countries as they have become increasingly economically prosperous have kept social inequalities in income relatively small – until recently, that is. With regard to physical activity and sports participation, several authors argue that such a commitment to equality (especially gender equality) and inclusion is a fundamental determinant of participation (Coalter, 2013; Green et al., 2019; Veal, 2015). Globally, there are inequalities in physical activity in relation to sex, age and class/level of income/education. The Nordic countries all stand out as having high levels of female participation, in which there has been convergence between the sexes, which contributes significantly to their overall high population prevalence. Inequalities in physical activity also tend to be small in relation to age, showing limited drop-off. However, a social gradient in participation is evident with regard to level of education (class) and ethnicity. Veal (2015) also notes that more equal societies have more leisure time. Furthermore, while the welfare state directly supports leisure in various ways, it also explicitly links sport with public health goals. Taken together, these state actions produce a favourable context that tends to democratize physical activity participation.

Nonetheless, there is evidently more to levels of sports participation and physical activity than economic prosperity and the rights that typify socio-democratic welfare states. As Green et al. (2019) the cultural traction of physical activity sport – that is to say, its rootedness in family, educational, regional and national cultures and, as a result, the day-to-day lives of citizens of all ages – is an important part of the explanation for high levels of participation. In other words, habitual physical activity has developed as a social practice, especially through sport participation but also through spending time in the outdoors (friluftsliv) and active travel. The social significance of these practices and the values they embody need to be understood in an historical context and remain relevant to explaining the prevalence of social norms relating to physical activity in the Nordic countries. Socialization in the family from a very young age endow children and young people with the necessary social (contacts with sporty people) and cultural capital (knowledge and skills) cultivate a physically active and sporting habitus, contributing to national group habitus. And, while the repertoire of activities is shifting among the population, cycling, running and walking remain popular: these tend to be the medium to low impact pastimes that are often socially inclusive and most likely to benefit physical and mental health (Murphy & Waddington, 1998).

Conclusion

To return to my starting point, the key message in this paper is that if there is to be a shift in population norms for physical activity there needs to be a paradigm shift away from individually-oriented explanations and interventions towards an emphasis on the social and cultural determinants of physical activity. While conceptualizing physical activity as a social practice necessitates embracing complexity and abandoning linear mono-causal explanations such as those relating to personal motivation, it does at the same time offer up a number of (theoretical) entry points for thinking about the creation of favourable circumstances for physical activity, including sports participation.

Because economic development tends to give rise to societies that are increasingly urbanized – it is estimated that 80% of people will live in cities by 2030 (WHO, 2018) – and a labour market characterised by sedentary jobs, the integration of physical activity into everyday lives has become a priority. Urban planning to facilitate cycling, walking and running alongside the incorporation of green spaces has been identified as an especially important practical strategies that involve the combined efforts of many sectors (Das & Horton, 2016).

The analysis presented here indicates, however, that developing physically active populations requires state actions that go far beyond sports policy or even, for that matter, the promotion of public health per se. Urban planning is a tangible, practical way of thinking about how to create a supportive social and physical context for physical activity. But, if population levels of physical activity are to improve, attention needs to be given to the wider social, political, economic and cultural determinants, especially with regard to levels of equality and, in particular, the position of women in society.

In this regard then, what light, if any, might developments in physical activity and sport in countries such as the Nordic states, throw upon the creation of favourable circumstances for enabling increased habitual physical activity? The answer seems to be that the economic and social features of the Nordic countries go a long way towards explaining the higher levels of physical activity, including sport. Thus, countries like Norway are not true comparators for other countries, such as Malaysia. There may, in other words, be little to be learnt about creating favourable conditions for enhancing levels of physical activity – beyond, that is, lessons regarding the fundamental benefits of reducing socio-economic and gender inequalities. Perhaps the most obvious lesson is, therefore, that the key to improving levels of physical activity is likely to lie primarily within the orbit of more contentious and politically demanding economic and social policies than physical activity or even health promotion policies per se. By the same token, it is likely to be the greater socio-economic inequalities in countries beyond Scandinavia that make the latter quite unrealistic as a benchmark for elsewhere – not least because socio-economic determinants of participation inevitably lie well beyond the control of sports policy (Coalter, 2012) or even health policy. Working across policy sectors – multisectoral collaboration – might offer a tangible way forward for discussing, if not resolving, these issues.

Equally, it is highly likely that the expected effects (if these are not entirely spurious) of processes such as school physical education, as well as developments such as lengthened education, will only

operate successfully on physical activity participation amid other favourable factors (and favourable socio-economic 'structural determinants', in particular). Speaking specifically in relation to gender equality, Green et al. (2015, p. 550) argue that if countries are prepared to "adopt policies aimed at achieving more egalitarian socioeconomic conditions" then physically active cultures and populations may, over time, emerge. This remains, however, a rather large 'if'!

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How to Support Sports Clubs to Become Health Promoting Setting?

Aurélie Van Hoye

University of Lorraine, 30 rue du Jardin Botanique, CS 30156, 54600 Villers-lès-Nancy, E-mail:aurelie.van-hoye@univ-lorraine.fr

The potential of sports clubs to become a health promoting setting, while doing their core sporting activity has been underlined by numerous authors. While the settings based approach has emerged with the Ottawa Charter [1], the first research in HP in sports was conducted in Australia in the mid-1990s. In Europe, the application of the settings based approach in sports clubs starts around 2000, when Kokko and colleagues [2] developed the standards for Health Promoting Sports Club. With 20 years of research on health promotion (HP) in sports clubs, my presentation will focus on (1) the theoretical tenets of the health promoting sports club, (2) principal research findings on how this approach was tested among sports clubs, (3) key leverage for sports clubs to become health promoting and (4) limitations and future challenges to develop comprehensive and acceptable interventions to support health promotion in sports clubs.

Theoretical tenets

Within sports clubs, the settings based approach has been designed using two types of categories (determinants and level). Three levels have been identified by Kokko [3] :

- the macro level, related to the sports club's policies and operation regulations regarding HP
- the meso level, encompassing the guidance and support given to coaches and staff by sport officials and management
- the micro-level, described as the HP activities and support given to participants by coaches.

Alongside these internal actors, external actors like the local community, public authorities, health and sport organizations are also needed to support the HP capacity (time, money, people, policies) and readiness of sports clubs. Based on statement from the Vancouver Conference, at each level, four main type of determinants have been identified: social, cultural, environmental and economic [3].

Principal research finding of the health promoting sports clubs

In 2016, a publication on international research in health promoting sports clubs [4] has provided six case studies from five countries. Main conclusion was that research and practice are moving slowly from HP initiatives in sports clubs to an understanding of a HP sports club.

A recent systematic literature review [5] aimed at determine the effectiveness of strategies to improve implementation of policies, practices or programs in sporting organizations identified only three studies meeting inclusion criteria. Two studies focused on nutrition issues and one on alcohol related policy and practices. Each study showed an improvement of at least one measure of policy or practice implementation. Despite these positive results, authors [5] conclude that evidence based regarding the effectiveness of HP sports clubs is lacking. As studies with controlled group were lacking, a recent systematic mapping review [6] focused recently on published articles describing or evaluating HP interventions within sports clubs. A total of 58 studies were included. This literature review showed several gaps in studying HP in sports clubs: (1) half of the paper are coming from Australia, only one came from Asia. Half of the studies targeted sport participants directly without focus on specific population. The majority of the studies were realized on

masculine team sports. The review analyzed 33 unique interventions, mostly delivered at intrapersonal level (29 studies), with only 2 working at all levels. Moreover, 35 studies did not use any specific theoretical background, meaning that settings based approach is actually not implemented in a proper way in sports clubs actually.

Key leverage for health promoting sports clubs

To better operationalize health promoting sports clubs, 14 strategies have to be implemented [6]. We are aware that sports clubs may not fulfill the guidelines in total, but strive for them in a way that make sense to their particular organization. Especially, the challenge is to develop beyond implementing separate sporadic HP initiatives to evolve into a HP setting.

Some limitations

While the theoretical approach has been developed, empirical data on its applications are lacking, due to five factors: (1) measuring outcomes of HPSC approach is challenging, (2) self-reported measurement tool of HPSC framework does not exist, (3) no longitudinal study about the evolution of HP in sports clubs have been undertaken, leading to lack of understanding of causal effects or evolution of the concept, (4) most of the studies were developed in a single country, and not internationally and (5) key interventions components rooted in the theoretical model are only emerging and not tested.

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Socio-economic Differences in Physical Activity and Exercise

Jouni Lahti

Department of Public Health, University of Helsinki, Finland, Email:jouni.mm.lahti@helsinki.fi

While health and life expectancy are improving, the socio-economic health differences have remained or even widened. People in the lower socio-economic positions, on average, live their lives in poorer health and die younger than their counterparts from the higher socio-economic positions. Socio-economic position (SEP) defines the position of a person or a group in the structures of a society covering social, economic and material circumstances from childhood to older ages. Socio-economic position cannot be directly measured, typically used indicators include education, income and occupational class among adults and among children parental SEP is used.

Socio-economic differences in health are affected by different factors related to living conditions and lifestyles which are socially patterned and vary between SEP groups. Lifestyles contribute to socio-economic differences in health in large extent. Alcohol use, smoking, nutrition, sleep as well as physical activity each contribute to socio-economic differences in health, together explaining a major part of the differences. Some studies suggest that smoking is the main contributor while in others physical activity has been the main contributor among health behaviors depending on the health outcome examined.

The socio-economic differences in physical activity are highly related to the domain of physical activity. Participation in leisure-time physical activity and exercise have shown the typical socio-economic gradient as those in the lower SEP groups have the least opportunities to exercise and be active while higher SEP groups have better opportunities to be more active in this physical activity domain. Those in the lower SEP groups, may have for instance higher working hours, shift work and physically more strenuous work and thus less energy to exercise in their spare time. In addition, the lower SEP groups may have less financial resources to be used in organized exercise which may also be seen as lower participation in organized sports and exercise among children and adolescents in lower SEP groups. In contrast to leisure-time physical activity and exercise, in occupational physical activity the socio-economic differences are the opposite. As noted, typically, lower SEP groups have physically more strenuous work and thus higher level of occupational physical activity than their counterparts from higher SEP groups. On the other hand, higher occupational social class is related to excess sedentary time at work. In addition, physical activity during commuting to and from work or transport physical activity in general have shown quite similar across SEP groups and in most studies even higher among lower SEP groups. Regarding housework physical activity, especially, among lower SEP women it may contribute more to total physical activity than among higher SEP women. In fact, in total physical activity, the socio-economic differences have varied between studies examining different populations. It should be noted that there are differences between countries (e.g. high vs. low income) and cultures in socio-economic structures and physical activity patterns. Also, results are dependent on other factors showing different socio-economic patterns e.g. between women and men as well as younger and older.

To conclude, the association between SEP and physical activity is highly dependent on the domain of physical activity and in some extent, the SEP indicator. In general, higher SEP groups, in particular highly educated are physically more active in leisure-time while lower SEP groups tend to be more active in other physical activity domains i.e. transport/commuting, occupational and housework physical activity. However, the health benefits of physical activity vary according to the physical activity domain. For instance, while leisure-time physical activity is likely health enhancing, occupational physical activity may cause strain that is harmful for health. These differences should be considered in further research and in targeting measures to increase physical activity among population groups. In order to reduce health inequalities, it is important to prevent lifestyle differences from arising, regarding physical activity especially, the promotion of adopting physically active lifestyle should be targeted already at children and adolescents and their families.

An Overview of the Mechanisms, Prevalence and Implications of Low Muscle Mass in Cancer.

Ciaran M. Fairman

Exercise Medicine Research Institute, School of Medical and Health Science, Edith Cowan University, Perth, Western Australia, E-mail:c.fairman@ecu.edu

Individuals with cancer are exposed to a variety of cancer-specific factors that result in decrements in muscle mass and function, such as tumor-related factors, cancer therapies (certain hormone and chemotherapies in particularly, malnutrition, physical inactivity and along with increasing age and comorbities.[1-3] It is increasingly recognized that low muscle mass and function with ageing (i.e. Sarcopenia), muscle wasting from the cancer or treatments (i.e. cachexia) have important can increase the incidence and prevalence of treatment toxicity and is associated with poorer prognosis in a variety of cancers.[4-6] Sarcopenia and cachexia are somewhat distinct in their etiology, though can be interrelated in a cancer context whereby a sarcopenic patient can become cachectic, or cachexia can exacerbate sarcopenic symptoms, further depleting already low levels of muscle mass.

Sarcopenia is classified as an age-related loss of muscle tissue and function that begins at ~30 years of age, typically accelerating at ~65 years.[7] Characterized by changes in tissue quality, decreases satellite cells, denervation and/or atrophy of type II muscle fibers and an increase in fat infiltration, sarcopenia is associated with impairments in muscle strength, physical function and may increase the risk of falls.[8] Sacropenia may be of particular relevance in cancer, whereby a lot of individuals are diagnosed at an older age, often presenting with sarcopenic characteristics at diagnosis. The prevalence of sarcopenia in different types of cancer and stages of disease has not been well defined in the oncology literature, likely compounded by the lack of universal diagnostic criteria.[9] Nevertheless, the prevalence of sarcopenia in indivduals with cancer can range from 11-74% depending on the diagnostic criteria and tools of assessment. [2 10-12]

Cachexia is distinct from sarcopenia in that it is a more aggressive form of muscle wasting, characterized by profound, unintentional weight loss (muscle and fat mass) that cannot be fully ameliorated with nutritional interventions.[13-17] Indeed, the development of cachexia is likely to exarcerbate sarcopenia, further depleting already low muscle mass. Criteria for diagnosis of cachexia are still the result of ongoing discussion, though on such criteria is weight loss >5% in the past 6 months. Briefly, this severe-muscle wasting syndrome is thought to be a result of a combination of factors, including systemic inflammation, tumor metabolism and tumor mediated effects, along with malnutrition and physical inactivity.[14 15] Cachexia is a major cause of morbidity and mortality, and the management of weight loss and cachectic symptoms are of high clinical importance to minimize the impact of this syndrome. [13 18-23]

Cancer treatments are also associated with poor body composition, through loss in muscle mass, or increase in fat mass. Chemotherapy is regularly associated with increased adiposity during treatment, with some studies demonstrating significant increases in body fat percentage up to a year following the cessation of treatment.[24-26] Hormonal therapy is associated with the accumulation of fat mass and loss of lean body mass (LBM) in breast and prostate cancer. [27 28]Moreover, the use of corticosteroids to manage cancer and treatment side effects is associated with weight gain and

redistribution of body fat.[29] Cushingoid features (truncal obesity, dorsocervical and facial adiposity) can develop within the first two months of glucocorticoid therapy. Several mechanisms of adverse body composition changes with cancer treatments have been proposed including lower levels of physical activity, development of menopause (in breast cancer), and treatment-related metabolic perturbations.[24] Importantly, there is increasing evidence that poor body composition and muscle mass can increase the severity of treatment toxicities. [30 31]

The heterogeneity of cancer type, treatments, definitions of sarcopenia and cachexia, along with methods of assessments, makes it difficult to accurately define the prevalence of muscle wasting in cancer. Clearly, the identification of novel strategies to maintain or improve muscle mass and strength is of clear high priority and clinical importance.

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Exercise Training in Preoperative Optimization before Tumor Resection

Jesper Frank Christensen

Center of Inflammation and Metabolism/Center for Physical Activity Research (CIM/CFAS), and Department of Surgical Gastroenterology, Rigshospitalet, Copenhagen University Hospital, Denmark, E-mail:jesper.frank.christensen@regionh.dk

In clinical oncology, the 'perioperative window' refers to the days-to-weeks before surgery until the days–to-weeks following tumor excision. This timeframe is typically short, relative to the span of primary tumor evolvement as well as the metastatic process, but this period has been shown to be disproportionally important for patient's treatment outcomes (1). Indeed, getting patients 'to-and-through' tumor resection in as strong condition, and with as low risk of detrimental complications, as possible, is of critical importance (2).

Over the last decade, physical exercise training in the setting of cancer prevention, management and control have emerged as a novel and comprehensive scientific field, but the vast majority of research has been conducted in patients with early stage breast cancer during and after adjuvant chemotherapy (3). Thus, the role of exercise training as a targeted strategy for preoperative optimization has received scarce attention.

Recent studies, however, demonstrate, that physical exercise training may impact, and potentially improve, various interrelated critical outcome measures during the perioperative window. Indeed, physical exercise may improve pathophysiological intermediates (e.g. performance status, cardiopulmonary fitness, anemia), which are causes of inoperability in non-metastatic patients, and/or increase the chance of resectability in patients with locally advanced stage disease, especially in patients undergoing neoadjuvant therapies, by improving treatment tolerability and efficacy (4). Moreover, a range of studies have shown that preoperative exercise training can lower risk of post-operative complications (5, 6), possibly by improved surgical stress tolerance, immune surveillance or hemodynamics resulting in lower need to vasoactive drugs and/or blood transfusions.

In addition to the direct negative consequences of serious peri/post-operative complications (e.g. anastomotic leakages, pneumonia etc.), accumulating evidence shows that perioperative biological processes underpin vulnerability to cancer recurrence (2). Over a century ago, Stephen Paget first introduced the 'seed and soil' framework to describe metastasis in terms of cancer cell dissemination and colonization (7), which is highly relevant in regard to the perioperative window. Indeed, recent studies have demonstrated that the fate of disseminated tumor cells is determined in large part by conditions during transit and at the early stages of colonization (8). Specifically, events during intravascular passage, including interactions with activated platelets, neutrophils, and endothelial cells, and the transient exposure to pro-angiogenic signals induced by the surgical stress response, can promote the metastatic outgrowth (9, 10). Thus, while the negative consequences of high surgical stress are well-established with regard to risk of complications (11), this may also play a critical role in metastatic formation for residual cancer cells (2, 8).

In preclinical models, exercise has been found to alter cancer cells fundamental ability to form tumors; indeed, cancer cells incubated in human serum taken immediately after a single exercise bout were 50% less likely to form tumors, compared to cancer cells incubated in resting serum, when inoculated into mice, and this protective effect was linked induction of the 'HIPPO-tumor suppressor pathway' and its' downstream genes (12). It is therefore intriguing to hypothesize that, in a clinical setting, structured exercise training before tumor resection has the capacity to lower/prolong long-term metastatic formation possibly by lowering surgical stress response counteracting the 'seed' process, and/or inhibiting residual cells from forming tumors after surgery, counteracting the 'soil' process.

Taken together, there is a strong rational to advance the current (limited) mechanistic understanding of exercise training as an integrated component of high-quality cancer treatments in the setting of preoperative optimization, which may improve both short- and long-term treatment outcomes. This extends upon the novel findings over recent years where preclinical studies and preliminary clinical research have shown that structured exercise training may directly impact tumor biology and inhibit tumor growth (13) as well as improve treatment tolerability and/or enhance anti-neoplastic efficacy of established therapies (14, 15). This necessitates a strong multidisciplinary collaboration between surgical and medical oncologists, radiologists, and pathologists, as well as other professions including nurses, physiotherapists, molecular biologists and exercise physiologists to fully examine and implement structured exercise training in the perioperative treatment trajectory

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Effects of Progressive Resistance Training on Post-Surgery Incontinence in Men with Prostate Cancer

Wook Song

Health and Exercise Science Laboratory, Institute of Sports Science, Institute on Aging, Seoul National University, Seoul, Korea, E-mail:songw3@snu.ac.kr

We evaluated the efficacy of progressive resistance training of the pelvic floor muscle for post-prostatectomy incontinence. In this prospective study, 59 patients who underwent radical prostatectomy were evaluated preoperatively. Continence was sequentially assessed within 2 weeks postoperatively, and an exercise regimen was initiated at 6- and 12-weeks. The primary outcome was continent status and the secondary outcome was changes in muscle strength and endurance after the exercise intervention. Continence was defined as no urine loss in a 1h pad test. A total of 59 patients participated in this study. Six patients dropped out of the study because of non-compliance and orthopedic problems. Of the remaining 53 patients, 31 (58.5%) achieved pad-free continence at 12 weeks postoperatively. The patients were divided into two groups based on their continence status, and no statistically significant difference was observed in age, body mass index, prostate volume, prostate-specific antigen, pathological Gleason score sum, and pathological T stage. Meanwhile, preoperative maximal urethral closure pressure and change in hip extensor muscle strength and endurance during the 12-week exercise program were significantly higher in the continent group. In multivariate analysis, change in hip extensor muscle strength was the only significant parameter predicting achievement of continence status (Odds ratio, 1.039; $p = 0.045$). The changes in hip extensor muscle strength in the current exercise program was an independent predictor of continence status after radical prostatectomy. A large-scale prospective study on the relationship between extensor muscle strength and urinary incontinence should be explored in future.

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A Review of Exercise Interventions for Alzheimer Diseases

Shaun M. Galloway

University of Wolverhampton, United Kingdom, E-mail:shaun_galloway@yahoo.com

Alzheimer's disease (AD) falls into a broader classification called dementia. As a disability – dementia affects more people over 60 than either cardiovascular disease or cancer (Ballard et al, 2011). The effects of dementia cannot be understated. Currently it is known that AD results in amyloid plaques and neurofibrillary tangles. The death of the brain and brain functions is the result. Alzheimer's disease follows a three stage process. Stage one is typically represented by some memory loss, minor motor function problems and a minor loss of organisational skills. Stage two results are far starker – seeing loss of personal history memory, large mood swings, sleep issues and loss of bowel control. Finally, stage three usually results in loss of awareness of surroundings and major motor control issues (inability to walk, swallow and sit to name a few) (Jenssen et al, 2014). Once AD has been diagnosed (and it is not 100% sure, Ballard et al, 2011) a patient may have between 4 to 5 years to live on average. However, Ballard and colleagues (2011) have suggested that it is possible to live as long as 20 years from diagnosis depending on many factors. One such factor could be exercise. Exercise has been thought to extend and create a better quality of life for both the patient as well as the caregivers (Hernández et al, 2015). It has been suggested that there are different effects of exercise for a patient throughout the three phases of AD (Paillard et al, 2015). This presentation will look to examine the various types of exercise and their effects on AD.

Exercise interventions that have been used in conjunction with AD are varied and as a result it is quite hard to really know the exercise modalities true results (Hernández et al, 2015). Typical problems found with evaluating research of this type fall into the following categories: a lack of quality RCT research designs, lack of lab studies, length of intervention, lack of detail on the intervention and clearly unified outcome measure(s) (Farina, 2014; Rao et al, 2014; Hernández et al, 2015). Outcome markers generally focus on measures of: cognitive ability, functional battery of tests (ie balance, simple reaction to stimulus, basic motor tests), behavioural and combinations of the markers listed (Hernández et al, 2015). Interestingly, social markers are now being considered much more often for the quality of life for both the patient and possibly as important the caregiver (Schumann, et al, 2019). Training variables considered are usually: frequency, intensity and duration. Currently, there is a reasonable body of knowledge for the effects of the following exercise interventions and AD: walking, dance, tai chi, combat sports (boxing and karate) and strength training. This paper will address each of these exercise modalities and their effects in the order listed above.

Walking has long been one of the major exercise interventions for patients of Alzheimer's disease. Many suggestions have been given for intensity level of a walking intervention however Venturelli and colleagues have provided a clear well supported suggestion of maintaining a moderate intensity (Venturelli et al 2011). Though not directly connected to exercise interventions and AD, Marselle et al (2019) and Trøstrup et al (2019) have conducted research into the mental health benefits of

walking in nature. Surely, the inclusion of nature during walking interventions would be of benefit to AD patients. Walking has been suggested to help with cognitive functions, motor functioning and social markers (Sobel et al, 2016). Whilst urban walking provides a generally level surface and very few disruptions in motor pattern – nature walks typically have random patterns (indentations and roots/rocks) as well as varying effort levels (inclines and declines). This could pose a useful area of inquiry for the future.

Dance has consistently been found to have a positive effect on AD patients. The effects of dance has found to increase social interaction, increase physical activity (possibly being a preferred exercise mode in comparison with all the other modes of exercise), increase implicit memory and development of learning new behaviours (Flynn, 2018). A drawback of many of many dance studies is that it doesn't take into consideration the confound of music. Music by itself was also found to be beneficial for patients of AD (Fang et al, 2017). It is hard to distinguish whether the effects of dance or the music or even both in combination are the reason for the positive effects seen (Särkämö et al 2014).

Tai Chi is an activity which has rhythmic asymmetrical movements that focus on balance and breathing (Hutson & McFarlane, 2016). Tai Chi has averaged 100 studies per year focusing on mental health issues since 2011 and its positive effects have been somewhat contentious as many of these studies are weak scientifically (poorly defined variables, poorly presented intervention procedures and no control group). However Wayne et al (2014) have examined the effects of Tai Chi on the cognitive performance of older adults and have found Tai Chi to have a positive (if weak) effect on the development of cognitive abilities. It is interesting to note that obvious connections between Tai Chi and increased balance and motor control have not been studied on patients with AD to date with strict scientific guidelines.

Whilst the previous exercise modalities have been mostly slow and rhythmic – the next two exercise categories are both explosive and have the possibility for personal harm. Boxing and karate sparring have both been found to be beneficial for the treatment of patients with AD. Neuroscientist have thought that because of the existence of harm/threat the neuro pathways that were used might bypass the damaged area of the brain and this might be a reason for the positive effects of combat sport which have perceived threat (de Souza Paiva et al, 2013; Lopes Filho et al, 2016). One such program that has had research conducted on it is the "Rocky steady boxing" program which using boxing to combat parkinsons (Combs et al, 2011; Combs et al, 2013). Combs and colleagues have now started to examine the effects of this boxing program on AD patients.

Strength training has been studied using various training loads effects on patients with AD. For the purposes of this review the reviewer will only take into consideration those papers that have loads consistent with hypertrophy and maximal strength. Loads related to strength endurance and anatomical adaptation is excluded as their physiological response is much more akin to aerobic activity. While hypertrophy and maximal strength development loads in any AD patients except those who have a weight training background is not possible – these loads do seem possible after 4-6 weeks of 2-3 training per week (Garuffi et al, 2013). As mentioned previously, these types of loads work at a neural level that general aerobic based exercises do not and it is these exercises that might produce different responses to patients with AD. The main problem to the use of this exercise modality is that an exercise leader needs to know how to progress a participant who has little experience to lifting harder loads in an unsure environment (one that is impeded due to motor learning difficulties). Nevertheless, it appears to be promising avenue for future examination (Ahlskog, 2011).

In conclusion, the effects of exercise interventions for AD patients has demonstrated moderate to small effects (Hernández et al, 2015). In very few studies has there been any negative effects found for exercise and AD patients (Rao et al, 2014). It appears that the first group of exercise interventions presented (walking, dance, tai chi) effect cognitive abilities more successfully. Whereas, the more explosive – threat based activities may help more with motor skills and possibly the development of new neuropaths that bypass the injured area. A great deal more research is needed with well executed scientific designs to realise the full potential of exercise as a mediator in patients with AD.

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Screen Time in Early Childhood- Are We Hothousing Children for A Lifetime of Physical Inactivity and Exercise Insufficiency?

Michael Chia

National Institute of Education, Nanyang Technological University, Singapore, E-mail:michael.chia@nie.edu.sg

The importance of digital media use for work and for leisure continues to grow in prominence and there is pressure to introduce screen time in young people even before they can communicate appropriately. Digital media use among pre-primary schoolchildren in Singapore is endemic and indicators are that this will continue unabated. First-year findings from a three-year longitudinal study called the Singapore Ipreschooler Study are profiled against the international benchmarks for digital media use in young children and 24-hour guidelines for physical activity, sedentary behaviour and sleep. There is a cogent drive towards the use of digital media in nearly all aspects of life and throughout the lifespan of schooling. How can we, advocates, protagonists and champions of the holistic development of young people, strike a dynamic balance, in marshalling the immense potential of screen digital media for good and minimise the inimical impact of the excessive engagement with screen digital media among young children and adults who should know and practise better? A snapshot of research- International Ipreschooler Surveillance Study Among Asian and otheRs (IISSAAR), which attempts to chronicle the digital media habits of parents and their children aged between two and six years, over three years in 2019, 2020 and 2021, is presented.

Endocrinology of Healthy Ageing: Can We Blood Test for Biological Age?

Bradley T Elliott

University of Westminster, E-mail:b.elliott@westminster.ac.uk

A significant and ongoing increase in human longevity is occurring globally (de Beer et al., 2017). Where past successes have focused on transmittable diseases, vaccinations and preventative medicines, current approaches must now focus on non-transmittable disorders, including frailty syndromes, sarcopenia and chronic conditions that associate with ageing.

Our recent work has focused on muscular frailty and endocrine changes with ageing and interactions of environment, exercise and diet. This work aims to better understand the process of ageing from a physiological point of view. One avenue of interest has been the myostatin and GDF11 family of signalling peptides along with their associated binding proteins as they are suspected to play an undefined role in ageing (Elliott et al., 2012, Egerman and Glass, 2019).

To first define human ageing, healthy participants (n = 88) were recruited and body composition, grip strength, walking speed, and circulating plasma concentrations of myostatin (total and free), activin A, follistatin-like binding protein (FLRG), and GDF11 quantified. Simple regressions between circulating factors and chronological age, grip strength, and walking speed were examined. Multiple stepwise regressions for age, grip strength, and walking speed are also reported. Age negatively correlated with total myostatin ($P = 0.032$, $r^2 = 0.053$), grip strength positively with activin A ($P = 0.046$, $r^2 = 0.048$), whereas walking speed showed no simple regression relationships. Complex regressions suggest a role of myostatin in chronological age, and GDF11 in grip strength (Barrios-Silva et al., 2018).

To begin to define the roles these endocrine changes were playing in muscle frailty in ageing, C2C12 myoblasts were grown as standard and stimulated with media conditioned with 5% plasma from healthy male participants that were either younger (n = 6, 18–35 years of age) or older (n = 6, >57 years of age). Concentration of plasma myostatin (total and free), follistatin-like binding protein (FLRG), GDF-11 and activin A were quantified by ELISA. Both FLRG and activin A were elevated in older individuals (109.6 and 35.1%increase, respectively). Myoblasts in vitro showed no difference in proliferation rate between ages, however scratch closure was greater in younger vs. older plasma stimulated myoblasts (78.2 vs. 87.2% of baseline scratch diameter, respectively). Myotube diameters were larger in cells stimulated with younger plasma than with older at 24 and 48 h, but not at 2 h. A significant negative correlation was noted between in vivo plasma FLRG concentration and in vitro myotube diameter 48 h following plasma stimulation ($r2 = 0.392$, $p = 0.030$) (Kalampouka et al., 2018).

To explore roles of exercise induced changes in ageing, a meta-analysis examining the effect of short term training on basal testosterone in older males was conducted. From 1259 originally identified titles, 22 studies (randomized controlled trials; RCTs; n = 9, and uncontrolled trials; UCTs; n = 13) were included which had a training component, participants >60 years of age, and salivary or serum testosterone as an outcome measure. Standardised difference of means for endurance, resistance, and interval training was 0.398 (95% CI = 0.034–0.761; P = 0.010), −0.003 (95% CI = −0.330–0.324; P = 0.986), and 0.283 (95% CI = 0.030–0.535; P = 0.028), respectively (Hayes and Elliott, 2018).

Conversely, lifelong exercise associates with reduced frailty and successful ageing. Thus, we examined two groups of older individuals, sedentary (SED, n = 13) and lifelong exercisers (LEX, n = 11) who maintained high levels of physical activity into older age. GDF11 was higher in LEX vs SED, whilst follistatin was lower ($p = 0.002$). Muscular force output, as measured by 6 second cycle test, was noted to correlate to circulating follistatin concentrations, independent of group ($r = 0.603$, $p = 0.002$) (Elliott et al., 2017).

By first characterising changes with age, and then examining differences in older individuals with both short-term and lifelong interventions, we have gained a deeper understanding of the endocrine aspects of ageing. To date, our work has demonstrated differences in the myostatin / GDF11 family, both between younger and older individuals and within older individuals who partake in lifelong exercise vs those that do not. Future research will need to create a fuller picture of ageing and exercise induced changes, as well as examining outlier individuals. These studies will provide further clues as to what is intrinsic to ageing, and which factors can be modified in an interventional manner.

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Exercise For Preventing Falls In Older People

Mathew Hill

Coventry University, United Kingdom, E-mail:matt.hill@coventry.ac.uk

Falls among older adults represent a major public health problem, often leading to progressive functional decline, the start of dependency and the development of comorbidities. Among community-dwelling older people over the age of 65 years, 28 – 35% fall each year (Peeters et al. 2009), which increases to 50% among those beyond 75 years of age, older people living in care, or those with a previous history of falling (Rubenstein 2006). Falls in older people impose debilitating and isolating social consequences, along with high and escalating economic costs (Roe et al. 2009). As the proportion of older people is rising globally, fall prevention remains an urgent public health challenge and a top priority in aging research.

The aetiology of falls is complex, involving multiple intrinsic (i.e. reduced strength and balance) and extrinsic (i.e. environmental) factors (Bueno-Cavanillas 2000). However, falls are not random events and are often preventable by targeting intrinsic risk-factors. Primary physiological risk-factors include a (concomitant) loss of muscle mass and function (sarcopenia) (Hairi *et al*. 2010) and poor balance and/or mobility (Delbaere et al. 2010). Crucially, there is considerable meta-analytical evidence of randomised controlled trials that age-related declines in physical functioning are reversible with exercise interventions (Peterson et al. 2010). Resistance training has demonstrated success in improving muscle strength and mass among older people (Hunter et al. 2004) and is widely utilised in multi-component fall prevention interventions (Granacher et al. 2011), since muscle weakness and falls are causally associated (Benichou & Lord, 2016). However, the improvements in muscle function with traditional progressive resistance training can be somewhat limited and importantly, are often not transferred to improved balance or mobility performance (for review see Orr et al. 2008). Recent systematic review with meta-analysis provides strong evidence that exercise as a single intervention prevents falls in older people, with programmes that involve a high challenge to balance and include more than 3 hours per week of exercise eliciting the largest effects (Sherrington et al. 2016).

The aims of this session will be threefold: (i) to present data on the importance of muscle strength/power and balance in seniors, (ii) to describe and discuss the general effectiveness of balance and resistance training interventions on fall related outcomes in seniors, (iii) to present critical factors related to the dose of balance and resistance training to provoke practically and clinically relevant responses in fall-risk. Practitioners, therapists and exercise scientists will benefit from this presentation by learning how to adequately implement exercise interventions in primary fall prevention.

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Senior Health Station

Jin-Jong, Chen

Institute & Faculty of Physical Therapy, National Yang-Ming University, Taipei, Taiwan, E-mail:jinjong.chen518@gmail.ypu.edu.tw

Silver tsunami is sweeping across the globe and the trend seems to be inevitable. We are looking for a way to lower the burden of eldercare. Then we find that exercise is the effective way to solve seniors' health problems. But, most elder people haven't entered fitness centers. Due to the lack of instructors, suitable environment and professional equipment, what the elderly do is not beneficial to their health. Not to mention the elder people who do not exercise regularly. Senior Health Station (SHS) focus on developing popular, easily accepted, safe and effective exercise intervention programs and business models for subclinical and low fitness individuals, such as non-fit middle age and old age, post-operation and post-acute illness subjects, mild cognitive impairment and frailty elderly. Artificial intelligence for exercise instruction based on individual characteristics and response will be established and precision control of exercise intensity and movement will be provided according to wearable devices information for accurate, safe and effective intervention. Complete service program includes scientific functional evaluation, horizontal periodic vibration for healthy vascular of brain and heart, whole body vibration for health promotion, instruction for safe and effective walking and fast walking, isokinetic strength conditioning, monitoring of physiological parameters for health administration, and sleep problem improvement. In our pilot study, 5 mild cognitive impairment and frailty elderly have a dramatic functional fitness improvement after 12- week exercise program in SHS. A comprehensive SHS tourism which integrates all serves will develop in future for lifestyle change.

Think Simple In Training Elderly To Engage In Physical Exercise

Kentaro Esaki

Esaki Medical Instrument, Co., Ltd, Japan, E-mail:kesaki@esakimedical.co.jp

Background

In Japan, one out of every three people is aged 65 or older.
According to IHME, life expectancy of Japanese in 2017 is 84.2 years, in which the healthy life expectancy is 73.1 years old, and 11.1 years are in needs for long-term care or bedridden.

These have created a strong impact on social security and costs has becoming a social issue.

At present, we have over 40,000 long-term care establishments, of which about 7,500 specialized in post-care rehabilitation. (Ministry of Health, Labor and Welfare statistics 2016)

The survey by the Ministry of Health, Labor and Welfare in 2016 has also shown that joint diseases, fractures and falls are the top three causes for elderly people in need of support, where many were weak due to inactiveness of the muscle.

As such functional training for the elderly is ultimately vital.
It is mainly divided into 3 categories namely;
For improvement of ADL, for improvement of cognitive function, and for improvement of living at home.

The purpose on functional training program varies in each facility, basis muscle training eg, exercise sitting on a chair, walking training, and karaoke are conducted.

Some existing issues on functional training for elderly people

1) Osteoporosis and osteoarthritis, which are the main symptoms of elderly musculoskeletal diseases, have been co-related with muscle weakness and disuse atrophy, the training program needs constant professional guidance prioritizing to safety and if leave alone, exercise will become not so effective and unsafe.

2) There are many cases where elderly facilities are instructed to bed-rest the residents in most of the time to avoid causing accident and falls.

3) With the limitation number of Physical therapist, and Occupational therapist, many are stationed in specialized outpatient rehabilitation centers ,whereas the inpatient ward lacks specialized staff to guide on using the complicated equipment and tend to overestimate the risk in muscle training.

4) The introduction of highly specialized training programs and machines did not inspire the

motivation of the elderly, and there were many cases in which facilities were provided with a program that had been compromised, and in the worst case, residents stop doing muscle training.

5) There are many companies that sell scientific equipment with a large scientific and data collection function. Many facilities have inclined of taking up the equipment without much thought of the compatibility levels of their residents and resources.

6) Complex theory of muscle training is difficult to practice in less specialized facilities.
Training using free weights or weight stack machines, risk of injury increased without skillful trainer.

Our Solutions

Exercise is divided into active and passive.
It is said that muscle strength improves only by active exercise.
In active exercise, there are aerobic exercise and anerobic exercise
The prestige Muscle Doctor in Japan Mr. Hisashi Kojima, he has added the daily living activities into the active exercise.

	frequency	volume	intensity
daily living activities	high	high	low
aerobic exercise	mid	high	mid
anerobic exercise	low	low	high

To improve muscle activeness, to build muscle strength, anerobic exercise is required but if you do not balance the frequency, volume, and load, you will be overloaded and will increase your risk of injury.

I would like to talk about the present conditions and problems of training for elderly people in Japan, and how these are solved with proper application.

Sudden Cardiac Death During Exercise and In General Population: How Can a Dedicated Community Screening Program Help?

Oteh Maskon

Annur Specialist Hospital, Bangi, Selangor, Malaysia, E-mail:omaskon@gmail.com

Background: Prevalence of premature coronary artery disease is on the rise. Approximately 25% of patients presenting with ST-Elevation Myocardial Infarction (STEMI) comprised of people 50 years or younger. ACS makes up the major cause of Sudden Cardiac Death (SCD) among athletes and general population. Other less common cause of SCD such as cardiomyopathies and inherited arrhythmias make up for the remaining causes. Various methods of community and dedicated screening protocol aim at detecting and hence reducing the risk of SCD.

Objectives: To develop an effective and low cost community screening program that will help detect the risk of premature coronary disease and sudden cardiac death, aimed particularly at young population.

Methods: The community based screening program has been developed as a result of adaptation of various local and international protocol and recommendation on screening of young athletes. The screening consists of 1) questionnaire based heart risk assessment (QBHRA) which is divided into 5 components: Family history of premature heart disease or SCD; Details of existing CV risk factors or disease; Habits including smoking, exercise and diets; Critical symptoms of heart disease or other diseases that may be associated with sudden death; and Self-examination of cutaneous signs of familial hypercholesterolemia. 2) Electrocardiogram 3) Abbreviated Cardiovascular and Respiratory Examination (ACRE) 4) Anthropometry and blood tests (Cholesterol and glucose). Individual result will be assessed by a qualified medical practitioner who in turns counsel the person of his/her risk. Additional usage of risk score (American ASCVD) or local NHAM NCVD score) may be employed to aid consultation. Persons found to have critical finding such as severely elevated blood pressure, blood cholesterol or sugar, or overt clinical symptoms/signs of cardiac disorders will be advised to attend his doctor or specialized cardiac clinic.

Preliminary Results: To date 666 subjects have been screened. Mean age of participants were 42.4 +- 14.9 years, with female predominance (48.0%). 29.3% have positive family history of SCD or premature CAD. Serious cardiac symptoms including chest pain, syncope/presyncope or dyspnea were reported in 30.5%. Mean BMI was 26.2 +- 5.3 kg/m2 with 77.6% either obese or overweight. 41.2% reported either SBP >140mmHg or DBP >90 mmHg, 26.5% have random glucose >7mmol/l, 38.5% Total Cholesterol > 5.2mmol/l and 4% with TC >7.0mmol/l (high probability of familial hypercholesterolemia). Just over 13% reported doing regular exercise as per recommendation in general population, while only 38.2% observed dietary lifestyle. Result of ECG and ACRE are yet to be analysed.

Conclusion: Community level screening of risk for SCD and premature CAD may potentially be able to detect a significant proportion of subjects at risk. There is high prevalence of risk factors and symptoms for both conditions.

Exercise after an Acute Cardiac Event

Francesco Maranta, MD[1], Domenico Cianflone, MD[1]

[1]Cardiovascular Rehabilitation Unit, IRCCS San Raffaele Hospital and Vita-Salute San Raffaele University, Milan, Italy, E-mail: maranta.francesco@hsr.it

The occurrence of an acute cardiac event has a great prognostic impact on the short-, medium- and long-term morbidity and mortality of the patients.[1] Moreover, after that patients (and in many times also doctors) are scared of physical activity and return to everyday life.
The Cardiovascular Rehabilitation (CR) is an important but underused tool for the effective management of post-acute patients.[2] Exercise-based CR is a multi-factorial intervention recommended by international guidelines to patients with coronary artery disease (CAD)[3] and heart failure (HF)[4]: it is a fundamental aspect of secondary prevention, able to limit the pathophysiological and psychological effects of cardiovascular disease, manage symptoms and reduce the risk of future cardiovascular events. Several studies and meta-analyses underline the beneficial effect of CR in reducing mortality, hospital readmissions, costs and in improving exercise capacity, quality of life and psychological well-being.[5,6] It has been shown that participation to an exercise-based CR program after acute coronary syndrome (ACS) and coronary artery bypass grafting (CABG) is associated with reduced mortality even in the modern era of CAD treatment with statins and acute revascularization.[7] CR is traditionally divided into three phases. An initial phase, typically an inpatient service, consisting of early mobilization, brief counselling about the illness, the treatment, the risk factors management and the follow-up planning. A second phase is mainly represented by a supervised ambulatory outpatient program (inpatient in case of most compromised or post-cardiac surgery patients) with aerobic physical activity at increasing work-load. The third phase is the lifetime maintenance phase where the aim is to continue the risk factor- and lifestyle change and exercise training: aerobic exercise in particular has a great prognostic impact also in the long-term.

At present, the benefit of CR appears to be through direct physiological effects of exercise training and through effects on risk factors, behavior and mood. Aerobic exercise is the key component of post-acute patient management. It should be offered to patients with known CAD or stable HF, usually as part of a structured CR program, with the need for an evaluation of both exercise capacity and exercise-associated risk: patients should undergo aerobic exercise training ≥3 times a week and for 30 min per session. Sedentary patients should be strongly encouraged to start light-intensity exercise programs after adequate exercise-related risk stratification.[3]

Certainly, there is a wide heterogeneity in CR programs with the need for defining internationally accepted standards in CR delivery and scientific evaluation. In our unit we have derived and validated a scoring system with an operative algorithm to better stratify patients and define their probability of functional recovery.[8]

Even if CR benefits are well known, CR referral and uptake is often suboptimal.[2] The successful implementation of CVD prevention guidelines relies heavily on acute-care physicians, that are the first point of contact for the patient and the critical point for referral to CR, and on general practitioners, who manage the patients after hospital discharge. To overcame some limitation to

CR implementation alternative modes of CR delivery have been proposed, including home-based programs and e-health programs using e.g. the Internet and mobile phones.[9] It should be noted that the available resources at present are not enough to offer CR to all the patient that should have an adequate program after an acute event. The role of governments, healthcare system administrators, health insurance industry and professional and scientific organizations is central to improve care delivery.[2]

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Cardiovascular Prevention with Exercise Medicine: Psychological Barriers To Effective Adherence To Reduce CVD

Federica Alemanno

Department of Specialistic Rehabilitation of Neurological, Cognitive and Motor Disorders, IRCCS San Raffaele Hospital and Vita-Salute San Raffaele University, Milan, Italy, E-mail: alemanno.federica@hsr.it

Introduction

Growing evidence have shown that a range of psychosocial risk factors are linked to the pathogenesis of cardiovascular disease (CVD). These factors, such as anxiety, stress, depression, low-socioeconomic status have been associated both with the development of CVD and poorer prognosis post-onset. Consequently, CVD can dramatically reduce patients' quality of life (QoL).
Comprehensive cardiac rehabilitation (CR) regroups prevention programs affecting all aspects of patients' life and involving multidisciplinary teams. These programs are designed to prevent the diseases' progression, to promote patients' QoL and to decrease the disease-related disabilities and mortality. Although such programs are highly effective in improving patients' QoL, CR participation remains disappointingly low. Identifying motivational factors that increase patients' adherence to CR program is thus crucial to enhance patients' compliance and acceptance.

Identification of barriers to cardiac rehabilitation adherence

Multiple barriers, both physical and psychosocial, have been identified that limit patients' participation. Patient-related factors include gender (women are more likely to drop out), lack of physician referral, older age, race/ethnicity (minority status), low level of education, and being socio-economically disadvantaged. Other barriers include logistical issues, such as traveling to the rehabilitation center, lack of motivation for exercise, not having time or laziness. Patients are often living alone (> 70 years old) and find themselves less supported and motivated.
It has been demonstrated that patients with poor adherence had lower QoL, higher levels of depression and were less likely to be married. The role of patients' familial, social and rehabilitation team support is also central in the CR programs since these environments are crucial for helping and encouraging patients to complete the rehabilitative program. Healthcare system factors might also represent a barrier for some patients who might encounter a limited availability of rehabilitation programs or exercise facilities that are suitable for CR.

Strategies to overcome adherence difficulties

Several measures have been identified to help increase patients compliance, such as:

1. Enhance understanding: present clear material and explanations to patients.
2. Simplify the regimen: in order to be integrated into patients' existing habits and lifestyles.
3. Enhance motivation: including effective communication between patients and the treating team in order to install a trusting clinical relationship that will lead to higher adherence rates.
4. Engage social support: family and close friends may be able to serve as reminders, cheerleaders.
5. Develop troubleshooting strategies: provide patients with enough resources to meet challenges.
6. Tailored, coordinated multidisciplinary programs: to meet individual patients' needs.
7. The appropriate use of technology: telemedicine is able to provide remote support, consulting and assistance to patients. New technologies, such as virtual reality, improve

patients' compliance and satisfaction. Isolated patients can also benefit from the most up-to-date treatments provided by the main national research hospitals.

Conclusions

The multifaceted aspects of psychological and psychosocial barriers to adherence to CR should lead the multidisciplinary team to adopt multi-pronged strategies to improve best patients' compliance. It is of primary importance not to neglect these aspects, to involve every professional figure of the multidisciplinary team (cardiologist, psychologist, nurse and physiotherapist) as well as patient's familial environment to place CVD patients at the core of an integrated program.

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Tennis Elbow and Exercise

Srikanth Babu Venga

Menara Medical Centre, International Journal of Physiotherapy and Research, E-mail:jespalcoolsmile@gmail.com

Tennis elbow also called as lateral epicondylitis or lateral elbow tendinopathy. It is one of the most prevalent disorders of the upper extremity, clinically determined by lateral elbow pain around the lateral epicondyl of the humerus provoked by resisted use of wrist and finger extensors.

The incidence of tennis elbow varies approximately 1% to 3% in the general population and is equally common among men and women. The peak age of incidence is between 30 and 50 with a mean age of 42. Non communicable diseases such as chronic hyperglycemia increase the risk of tennis elbow. It is generally a work related or sport related pain disorder usually caused by excessive quick, monotonous, repetitive, eccentric and gripping activities of the wrist. Diagnosis is simple and can be confirmed by tests that reproduce pain, such as palpation over the facets of the lateral epicondyl, resisted wrist extension and resisted middle finger extension. Although signs and symptoms of tennis elbow are clear and its diagnosis is easy, to date no ideal treatment has emerged.

A wide array of conservative treatment approaches have been recommended for tennis elbow, these treatments have different mechanism of action but all have the same aim to reduce pain and to improve function. Exercises are proven benefit to improve the pain and function in patients with tennis elbow. Strengthening and stretching exercises are the main components of exercise programs because tendons must be strong and flexible to prevent possible injuries.

There are essentially three forms of musculotendinous contractions that strengthen soft tissue structures such as tendons – Isometric, concentric and eccentric contractions. Among the three eccentric contractions appear to have most beneficial effects for the treatment of tennis elbow. In case of tennis elbow eccentric training should be performed for the extensor tendons of the wrist including extensor Carpi Radialis Brevis and Extensor Indicis. The three principles of eccentric exercises are load, speed and frequency of contractions. Increasing the load subjects the tendon to greater stress and forms the basis for the progression of the program. Stanish et al state that the speed of eccentric training should be increased in every training session. Three sets of ten repetitions with 1 min rest interval between sets with elbow in full extension, forearm in pronation and with the arm supported can normally be performed without overloading the injured tendon as determined by the patient's tolerance. When patients are able to perform the eccentric exercises without experiencing any minor pain or discomfort, the load is increased using free weights or therabands.

Eccentric training results in tendon strengthening by stimulating mechano-receptors in tenocytes to produce collagen, which is probable the key cellular mechanism that determines recovery from tendon injuries. In addition eccentric training may induce a response that normalizes the high concentration of glycosaminoglycons; it may also improve collagen alignment of the tendon and

stimulate collagen cross linkage formation both of which improve tensile strength.

Even though a variety of stretching techniques such as ballistic, static, proprioceptive facilitation movements have been proposed to increase the flexibility experts claim that simple static stretching procedure is the most widely used stretching technique. 30-45 sec of optimal stretching is most effective hold time for increasing tendon flexibility. Taylor et al, reported that more than 80% of a muscle – tendon unit length can be obtained after the fourth repetition of a static stretch. Fyfe and stanish claim that six repetitions of static stretching exercise should be performed in each treatment session with three before and three after eccentric training. Clinicians suggest a 15-45 sec rest interval between each repetition. Increasing tissue temperature before stretching would increase the flexibility of the muscle tendon unit.

Conclusion: Although many exercise programmes are available in treating Tennis elbow there is more scope for research in this area.

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The Exercise for Text Neck Treatment and Prevention

Atsushi Oishi

Department of Physiotherapy outpatient, Funabashi Orthopaedic Hospital, Chiba, Japan , E-mail:paddy_atsu014@yahoo.co.jp

Abstract

Mobile handheld devices such as keypad phones, touchscreen smartphones and tablet computers have been used frequently in the last decade. These devices are very convenient and necessary in our daily lives, although, the overuse of them can lead to musculoskeletal disorder, especially of the neck, shoulder and arm. This leads to pain resulting from excessive strain on the spine from looking in a forward and downward position. This session introduces the etiology and the mechanism of text neck, advice on how to use mobile devices and the efficacy of exercises for text neck.

The prevalence of text neck is 55.8% in a lifetime[1)]. The risk factor for developing musculoskeletal complaints among mobile device users is neck flexion, frequency of phone call, texting and gaming[1)]. Using mobile phones more than 5 hours daily was significantly associated with neck-shoulder pain when age and gender were adjusted. However, total time spent on mobile device is still inconclusive[1)].

The cervical angle during smart phone use is 33-45 degrees from vertical, especially when sitting[2)]. The more the cervical angle increase, the mechanical force to the neck also increases. The force to the cervical spine is 10-12lbs in neutral position. However, it increases to 40lbs at 30 degree flexion and 49lbs at 45 degrees[3)]. Bilateral texting was associated with increased cervical flexion, and unilateral texting was correlated with cervical rotation and side flexion[4)]. The patients who have chronic neck-shoulder pain tend to increase cervical side flexion angles while texting[4)]. Hence, correcting awkward neck postures is recommended to use hand held devices for prevent or treatment of text neck.

The effect of exercises for text neck is reported only a few articles. A 12 week program of exercise focusing scapulae, shoulder and arm training with posture correction improves upper extremity symptoms among touchscreen smartphone users[5)]. The strategy of the exercise program is focusing on the weakness and tightness of upper extremities with correcting head position in the text neck patients. Hence, head position changes the muscle activity in upper trapezius and serratus anterior during overhead reaching tasks[6)]. However, the subjects were only university students. Therefore, exercise program must be considered for each patient's condition especially for the severity and chronicity of symptoms. Aerobic exercise and non-resistance muscle contraction with large amplitude are recommended for chronic text neck patients.

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Exercise Has Been Evidence as the Only Means of Management of OA Knee

Sam Wan

Physiotherapy Department, Tue Mun Hospital, N.t., Hong Kong, E-mail:ws065@ha.org.hk

Knee osteoarthritis is a common degenerative condition that causes pain and physical disability in older adults. According to the World Health Organization (WHO), the proportion of the world's population over 60 years old will increase from 12% to 22% between 2015 and 2050[1]. With the aging of the world's population, the burden of knee osteoarthritis on health care provision is expected to surge. However, the real burden of knee osteoarthritis to the society and the healthcare system was usually underestimated.

Although knee osteoarthritis is a chronic and progressive disease, evidence showing its adverse outcomes such as pain and disability can be managed effectively by exercise. For example, the National Institute for Health and Care Excellence (NICE) recommended adults with osteoarthritis to adopt exercise as the core treatment which should include local muscle strengthening and aerobic exercise irrespective of age, comorbidity, pain severity or disability. Manipulation, electrotherapy such as transcutaneous electrical nerve stimulation (TENS) and local use of heat or cold should be considered as an adjunct only[2]. Other International guidelines also supported that regular exercise would be the most crucial for relieving pain and improving function in people with knee osteoarthritis[3, 4]. Exercise such as muscle strengthening exercise, walking and Tai Chi should be strongly recommended[3]. Aquatic exercise may also be considered as it may be too irritable for some people to exercise in a full-weight bearing environment[3]. However, the effectiveness of acupuncture, ultrasound and shockwave for knee osteoarthritis were inconclusive[3, 4].

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Cardiometabolic Health Risks in Obesity: The Effect of Inpatient Lifestyle Intervention in Youths and The Role of Spontaneous Physical Activity

Irena Aldhoon-Hainerova, Hana Zamrazilova, Vojtech Hainer

Institute of Endocrinology, Prague, Czech Republic, E-mail:ihainer@hotmail.com, hzamrazilova@endo.cz, vhainer@endo.cz

A lack of physical activity (PA) and an increased sedentarism greatly contributed to the global rising prevalence of obesity and increased metabolic risks observed even in children and adolescents. Metabolic syndrome as a cluster of cardiometabolic health risks has already been identified in obese youths. The prevalence of metabolic syndrome in our representative cohort of 1,533 individuals was overall 3.7 % with higher prevalence in boys than in girls. In the cohort of 562 overweight/obese adolescents 16.9 % fulfilled the criterion of metabolic syndrome.
Lifestyle modification programs that lead to amelioration of body composition are associated with improvement of cardiometabolic health. PA is an essential component of weight management in both adults and children and positively affects cardiometabolic risks independent of weight loss. We demonstrated the positive effect of such an intervention in our cohort of 450 individuals that underwent a 4-week in-patient weight management program.
Most obese individuals are able to lose body weight and attain positive effects on cardiometabolic health; however, the long-term maintenance of these effects is still in most individuals rather challenging. A new approach in long-term weight management addressing this issue is thus necessary. A second part of the lecture will therefore discuss the role of spontaneous PA in obesity and its management.

A spontaneous physical activity (SPA) with its associated non-exercise induced thermogenesis (NEAT) has not been addressed although it can contribute up to 30 percent of daily energy expenditure (1). SPA in humans consists of unconscious restless behavior as fidgeting, frequent sit-to-stand movements, gesticulating, and more time spent standing and moving. SPA is inversely related to body weight and to weight gain in prospective studies (2). It has recently been reported that dynamic sitting (as fidgeting and desk work) evaluated by accelerometer was associated with cardiometabolic health in both young and elderly subjects (3). NEAT should therefore be included in the current medical recommendation not only to address energy balance, but also to reduce occurrence of the metabolic syndrome, cardiovascular events and all-cause mortality (4).
SPA is regulated by orexin neurons located in the lateral hypothalamic area. Orexins increase food intake and elevate locomotor activity, sympathetic tone, metabolic rate and wakefulness. Orexin-A levels were found to be higher in normal weight subjects compared to overweight and obese individuals. Additionally its levels correlated with total PA, moderate PA and walking. It has also been demonstrated that working and domestic PAs were significantly related to plasma orexin-A levels (5). Orexins modify not only energy balance but also metabolic risks. Higher concentrations of orexin-A were associated with better metabolic profiles in patients with schizophrenia receiving antipsychotic treatment (6). Recent studies in mice reported that orexin activation resulted in increased SPA associated with elevated energy expenditure. Weight gain and adiposity were significantly attenuated even in animals fed with a high fat diet (7). It was therefore suggested to employ orexin A or orexin receptor agonists as a novel therapeutic target for the treatment of obesity.

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The Metabolic and Health Effects of Sitting Less. Evidence from Acute Laboratory Trials and Real World RCTS

Arto J. Pesola

Active Life Lab, South-Eastern Finland University of Applied Sciences, Mikkeli, Finland, E-mail:arto.pesola@xamk.fi

Traditionally, the physical activity guidelines have recommended all adults to undertake at least 30 minutes of moderate-to-vigorous physical activity a day to get substantial health benefits[1]. However, outside of this active moment, people may spend their days being largely sedentary[2]. The metabolic and health consequences of prolonged sitting *per se*, i.e. being distinct from the effects of insufficient moderate-to-vigorous activity levels, have gained prominence during the past decades[3]. Acute laboratory trials have shown that frequently breaking up prolonged sedentary time and reducing total sedentary time can improve postprandial glucose and insulin responses and reduce 24-hour glycemic variability[4,5]. Crediting the evidence, several health authorities have published recommendations and guidelines on breaking up and reducing prolonged sedentary time[6–8]. Recently, U.S. Department of Health and Human Services published the updated physical activity guidelines for Americans, and for the first time stated that "moving more *and sitting less* will benefit nearly everyone"[9].

Sedentary behaviour is defined as any waking behaviour characterized by low energy expenditure (les than 1,5 METs) and a sitting or reclined posture[10]. During periods of prolonged sitting, large ambulatory muscles are completely inactive and total energy expenditure decreases to resting level[11,12]. Acutely, this results in decreased muscle blood flow and shear stress, reduced contraction-mediated glucose uptake, reduced insulin sensitivity and potentially increased blood pressure and blood viscosity[13–17]. Simply standing up breaks up the sedentary behaviour and results in many-fold increased thigh muscle activity and increased energy expenditure[11,18]. However, healthy normal weight people seem not to gain metabolic benefits from standing instead of sitting, but they need to do light walking[19]. Instead, overweight or obese people can improve their glucose tolerance by breaking up sitting with standing, and gain further benefits from walking[20,21]. Interestingly, overweight people's muscles are more inactive during sitting but more active during standing as compared to normal weight people's muscles, resulting in a greater muscle activity response between sitting and standing[12]. As such, several potential factors modify the effectiveness, including baseline activity and metabolic milieu, diet timing, frequency and intensity of breaks in sedentary time, total sitting and prolonged sitting duration, and total physical activity volume.

The sitting reduction trials are only beneficial if they can be implemented to everyday life. A few real-life randomized controlled trials have provided initial evidence of the effectiveness of specifically reducing sitting at work environments and at home in normal weight or overweight healthy people[22–24]. Despite the modest decrease in sedentary time (between 0,5 hours and 1 hours per day) and a diminished effect during follow-up period, these trials have resulted in beneficial biomarker and weight responses between intervention and control groups during one year[22,24,25]. Based on a closer look at one of the trials, it can be speculated that the effectiveness was due to increased sedentary time and weight within the control group, instead of reduced weight within intervention group, suggesting that decreasing sedentary time can be an effective strategy to prevent weight gain[22]. The benefits are likely larger in metabolically unfit, inactive individuals, and

during longer follow-up times. These are promising future avenues to gain full public health benefits from reducing sitting during everyday life.

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The Benefits of Exercise on Obstructive Sleep Apnea-Induced Metabolic Dysfunction

Tsung-I Chen

Clinical Exercise Physiology Society, Center for Physical Education Teaching, College of Liberal Arts & Basic Education, Tzu Chi University, Hualien, Taiwan, E-mail:tichen@gms.tcu.edu.tw

Introduction

Obstructive sleep apnea (OSA) is a serious public health problem. The prevalence in the general adult population ranged from 6% to 17% [1]. OSA patients have recurrent episodes of reduction and restoration of arterial oxygen saturation due to periodic obstruction and resumption of ventilation of the upper airway. This condition is characterized by intermittent hypoxia (IH). It has been suggested that IH-induced cell damage may be related to the increase in intracellular reactive oxygen species (ROS) generated during reoxygenation after hypoxia. IH may cause lipid peroxidation, protein oxidation and DNA damage and attenuation of antioxidant enzyme capacity [2]. In addition, it has been suggested that OSA is an independent risk factor for the development of metabolic syndrome [3]

OSA and metabolic syndrome

Metabolic syndrome represents a cluster of closely related cardiometabolic features, including the essential components of visceral obesity, insulin resistance, hypertension and dyslipidemia [4]. Obesity is a major risk factor of OSA and both of these two closely intertwined conditions result in increased sympathetic activity, oxidative stress, and chronic low-grade inflammation, which ultimately contribute, among other morbidities, to metabolic dysfunction, as reflected by visceral white adipose tissue insulin resistance [5]. A previous study suggested that patients with metabolic syndrome plus OSA compared to a group with metabolic syndrome but without OSA and found those with comorbid metabolic syndrome and OSA had higher blood pressure, higher sympathetic nervous system drive and abnormal baroreflex sensitivity which is correlated with abnormal autonomic nervous system activity [6].

Exercise and OSA

Accumulated data suggested that changes in lifestyle by means of a hypocaloric diet and exercise training reduce obesity, high blood pressure, and diabetes. This non-pharmacological treatment also improves OSA severity. Interventional studies demonstrated that a 10% reduction in body weight is associated with a 30% reduction in apnea–hypopnea index [7]. In OSA patients, physiological adaptations due to physical exercise include increases in upper airway dilator muscle tone and in slow-wave sleep time; and decreases in fluid accumulation in the neck, systemic inflammatory response, and body weight. The major benefits of exercise programs for OSA patients include reducing the severity of the condition and daytime sleepiness, as well as increasing sleep efficiency and maximum oxygen consumption [8].

Therefore, understanding the influence of exercise on OSA-induced metabolic dysfunction should help develop exercise therapeutic strategies in OSA patients. Although exercise training-induced beneficial effects against metabolic dysfunction might arise from differences in employed models (training intensity, exercise mode, gender and subjects), it has been suggested that a regular, 60-min, moderate intensity exercise, 3 days per week for 10 to 12 weeks that decreased OSA severity in patients with heart failure and sleep-disordered breathing [9]. Therefore, a regular moderate exercise might play a role to prevent the risk of developing metabolic syndrome in OSA

patients.

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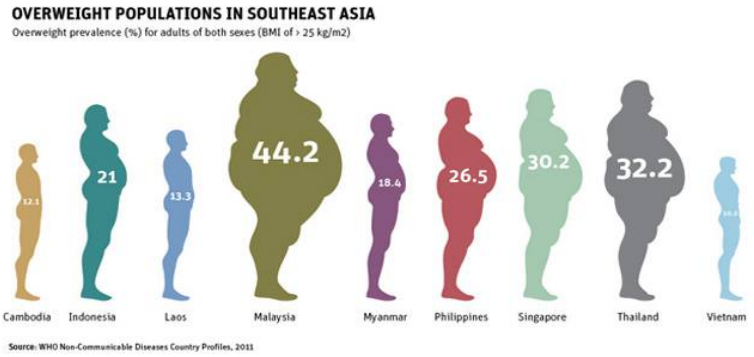
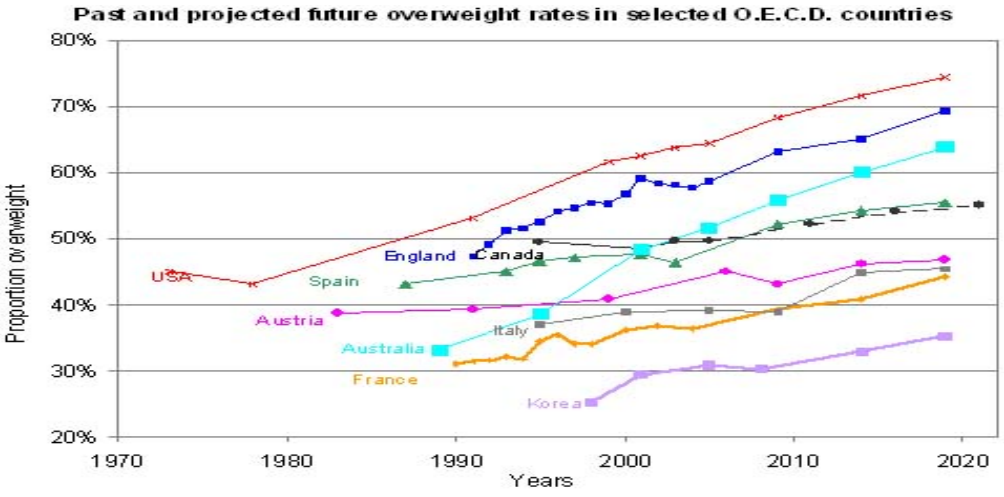
Obesity: The Role Of Nutrition And Exercise

Bob Girandola

Department of Human Biology, University of Southern California, Los Angeles, CA USA, E-mail:girandol@usc.edu

Obesity has been classified as one of the major non-communicable diseases that has affected the entire global population. Every country is affected, even those that have a significant portion of the population who have a negative caloric balance. It is clear from the next figures that many countries are not solving this problem.



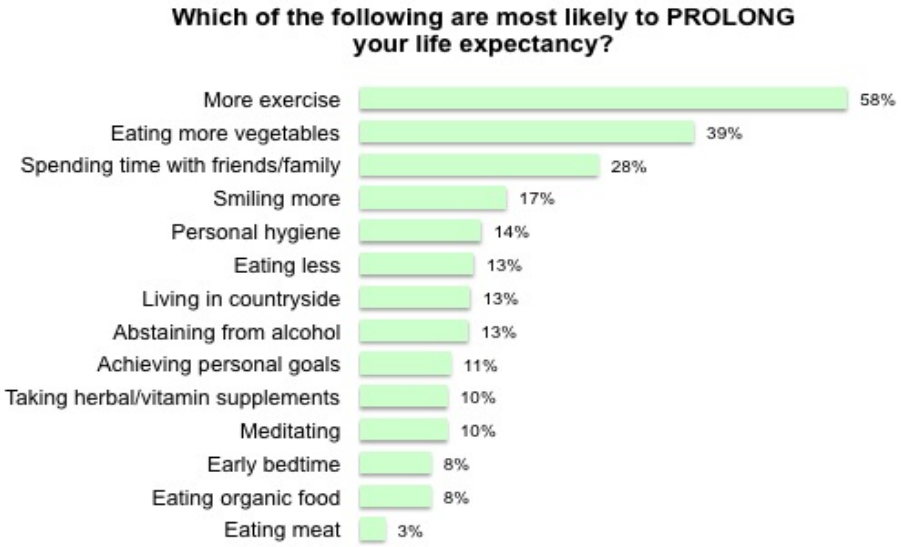


All data from CDC in the USA and WHO from international countries indicates this problem has been increasing since the 1970's, with no end in sight. People gain weight as a result of a positive caloric balance. However, the question has always been, is it primarily due to gluttony or being too sedentary!

Evaluating data from the USA since the 1970's indicate that Americans are consuming approximately 400-500 Calories more. However, data from the Southern part of the USA and other places indicate that activity has decreased markedly. Whether obesity is mainly due to excess food or lack of exercise can never be completely answered. However, it is clear that a large portion of the world's population has a positive caloric deficit. The industrial revolution in the USA has "forced" a large segment of the American population to become totally sedentary. Watching TV , playing video games, staring at a computer screen, driving an automobile even 2-3 km to shop is common now. At the same time packaged foods, usually high in calories and super tempting, due to the salt and sugar that is added is always available. We cannot really blame companies like Coca Cola, Frito Lay, MacDonald's etc., because they are trying to sell a product and they are beholding to their stock holders. It does not do them any good if they market a healthy low calorie food or beverage, if no one buys it!!

While health agencies, CDC, Surgeon General, all promote the idea of losing weight, eating healthier, being active, there is no incentive to do it! People LOVE to eat but they don't particularly like to exercise, that is the conundrum! Sport clubs in USA try to use any means to lure customers and try to make exercise more "fun" but it is not easy. However, many people have stated that in this toxic food environment, without the actual desire to exercise regularly, it may be a lost cause.

To emphasize this point the two categories of BMI that have increased in GREATEST Proportion over the past 20-years are 40-50 (morbid and super obesity). People are not only getting obese they are getting morbidly obese. Most of todays children have grown up with cell phones, computers, laptops, and convenience measures of every kind. Robot vacuum cleaners, voice activated devices for which you never have to leave your chair. IT is no wonder that this generation has no idea of caloric expenditure for daily activities. Trying to explain the joy and satisfaction of exercise to this generation is a daunting task but one which has to be done, if they are to lead long healthy lives. There is still controversy as to the genetic relationship (set point!) for body weight and body fat, but that does not imply that even if an individual is heavier they cannot benefit from being active. This chart shows the most important factors to longevity.



One of my lifelong ambitions has been trying to make young individuals learn to enjoy physical activity and the feelings one gets after a strenuous effort. Making it seem like a chore will undoubtedly cause dropouts, as is often experienced in health clubs in the USA. The movie WALL – E some years ago clearly depicts what could happen to a society that simply does NOT move.

Yoga Exercises for Management of Mental Health

Lingham Pillai Acharya

Yoga Sports Association Malaysia, E-mail:Linghampillai@gmail.com

Introduction

5,000 Years Old Ancient Science

Systemic way and formulated methodology –

AshtangaYoga (8 limbs) • Yama– social, ethical discipline • Niyama– personal discipline • Asana–perfectness of body control in various postures • Pranayama– rhythmic movement of the breath • Pratyahara–control of mind and senses • Dharana– attention power, concentration and focus • Dhyana– meditation, inner harmonisation • Samadhi –placing intelligence evenly in the entire body

- Indian Tradition: 6 main arts for developing of mind and body
- Yogika – yoga postures
- Mallika – athletics
- Dhanushya Vidya – archery
- Natya – dance & drama
- Sangitika – music
- Vyavaharika – economics

The movement of yogasanas – Endorestiform Nucleus (Fine Motor Control) in yogic principle known as Ananda Mukti (Blissful Liberation):

In yoga, rhythmic and controlled movements are used, especially movements against gravity; the eccentric contractions strengthens and stretch the muscles simultaneously
Developing delicate balance between muscular tension and relaxation

- Composure
- Strength
- Balance

- Flexibility
- Resistance
- Agility
- The Ancient Rishis, who were the scientists of ages bygone, had the clarity of biomechanics and kinesiology that surprises the existing scientists for the outstanding design of yogic postures with perfect alignment and precision
- Sequencing and formulating yoga postures are of primary focus
  Specific Sport example: Archery
  Which part is most important stabilizer for an archer? What are the elements involved in making a perfect bulls eye?
    - Mind & body in perfect union
    - Connective link – control of breath

Highly recommended Asana:

- Vriksasana – tree pose
- Tula Dandasana – the standing scale pose
- Eka Pada Tadasana – one leg stance
- Kakasana – crow pose
- Bakasana – crane pose
- Utkatasana – chair pose
- Virabhadrasana – warrior pose

Counter reaction / Prathikriyasana
(Restorative relaxation technique)

- Recovery time
- Malasana
- Vajrasana
- Savasana

Prana / the Energy Currency

- The human body function needs chemical energy
- Energy for activity provided in the muscles in the form of energy-rich molecule ATP – Adenosine Triphosphere
- Basic energy currency for muscle contraction
- Body maintains continuous energy supply
- Carbohydrates, fat and protein – main fuels for exercise
- Free fatty acids are major fuel source that can be broken down to produce energy
- Pranayama helps increase energy production by high oxygen consumption at Cellular Respiration
- Example of breathing technique: Langhana – the process of focusing on the exhalation of the breath, with short inhalations, enhances production of ATP during muscle contractions during breath into movement.

Flexibility

- Another hallmark of all yogasanas
- Main benefit to avoid injuries, especially in athletes
- Detection of injury requires the sensitivity of the athlete & coach, avoiding loss of training time & moving immediately into a preventative mode –*"Prevention is better than cure"*
- Yogasanas increase strength of bones and ligaments
- Increase neuro-muscular function
- Increase in muscle contraction
- Increase in coordination
- In yogasanas strength training, resistance training and flexibility training takes place. This is demonstrated by correct intelligent way of sequencing asanas, by way of ashtanga vinyasa kramam, and hatha yoga, that involves *aerobic* and *anaerobic* conditioning
- In Vinyasa Kramam series of Yoga movements at various intervals, all types of contractions are present, tailored to specific needs

Conclusion

- To create Trainers and Coaches, to have deeper understanding, just not about application of Yoga Posture, but the entire science behind it for producing quality teachers & coaches
- To professionalise our industry, for better service to the sport industry by maximising the potential performance of athletes
- Understanding of the athletes personality by the trainers and coaches for better progress
- The effectiveness of progressive muscle relaxation for recovery of vital importance – Yoga Nidra
- Evolve. Resolve. Involve. – Getting more people involved into the practice
- Celebrating International Yoga Day, 21st June, creates awareness & demand
- Yoga Sports for Everyone
- Yoga Sports Coaching Program – 1 year program

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Music, Exercise and Mental Health

Garry Kuan

Exercise and Sports Science, School of Health Sciences, Universiti Sains Malaysia
Department of Life Sciences, Brunel University London, United Kingdom, E-mail:
garry@usm.my/garry.kuan@brunel.ac.uk

Mental health is recognised as a global societal challenge; for example, depression alone has the highest financial burden of disease (WHO, 2017). Exercise interventions are associated with depression relief and improvement of mental health. Researchers have suggested that music can be carefully selected to match the requirements of activities and characteristics of both individuals and groups, to produce significant impacts on performance enhancement and motivation to exercise. Also, music has been shown to have psychophysical effects of lowered perceived effort and arousal control and improved affective states and synchronisation effects. There is increasing evidence to suggest that the "right" music, can lead to greater frequency, intensity, and duration of exercise behaviour and motivation, which could then lead to enhance performance and improvement in mental health. This presentation will be focusing on using the holistic and innovative method in integrating music into physical education, promoting community engagements, and to use music as a therapeutic effect for enhancing the self-esteem and mental health among the medical students at Universiti Sains Malaysia. I will consider the use of music for enhancing exercise, movement, and enjoyment using the Brain-Breaks Solutions, which is part of the Global Community Health (GCH) and HOPSports' project. Then, I will explain on issues related to the understanding of how music works, the selection of music and practical application of integrating music and physical activity in the curriculum to enhance motivation, positive mood, and exercise duration. I will also address the cultural perspectives of choosing the "right" music in different cultural perspectives. Finally, I will conclude by noting how, in all of this research, have contributed to new knowledge to enhance the understanding of the ubiquitous of using music in exercise, contributing to the enhancement of mental wellness.

Laughter Promotes Mental Health

Lim Boon Hooi

University of Malaya, Kuala Lumpur, Malaysia, E-mail:lboonhooi62@gmail.com

ABSTRACT

In modern society, high levels of stress are caused by fierce competition and socioeconomic stressors. As this stress has a negative impact on self-esteem, which affects quality of life and personal motivation, it increases depression and leads to a harmful influence on a person's mental health.

Laughter therapy, as a non-pharmacological, alternative treatment, has a positive effect on the mental health and the immune system. In addition, laughter therapy does not require specialized preparations, such as suitable facilities and equipment, and it is easily accessible and acceptable. Laughter decreases serum levels of cortisol, epinephrine, growth hormone, and 3,4-dihydrophenylacetic acid (a major dopamine catabolite), indicating a reversal of the stress response (Berk et al. 1989a). Depression is a mental health problem, where neurotransmitters in the brain, such as norepinephrine, dopamine, and serotonin, are reduced, and there is something wrong in the mood control circuit of the brain. Laughter can alter dopamine and serotonin activity. Furthermore, endorphins secreted by laughter can help when people are uncomfortable or in a depressed mood.

As for the mental effects of the laughter therapy, it helps reduce unpleasant feelings such as tension, anxiety, hatred, and anger, alleviates stress and depression, aids better interpersonal relationships, and improves insomnia, memory failure, and dementia (Bains et al., 2015; Ko & Youn, 2011; Takeda et al., 2010).

Laughter Yoga, developed by physician, Madan Kataria in Mumbai (2002), is based on the idea that making ourselves laugh is beneficial for our health. It is a combination of breathing techniques, simple movements, and simulated laughter. A study with brain scans revealed that our brains respond to another person's laughter. The steps of conducting Laughter Yoga will be defined and benefits of Laughter Yoga will be explained. Final part of this talk will be a practical sharing session.

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The Psychological and Aura Chakra Effect of Qigong Practice in the Elderly

Cheng, Chien Min
National Kaohsiung University of Science and Technology(NKUST), Taiwan
jimmy@nkust.edu.tw

Hashim, M. H. M.
Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia
mhisyam@uthm.edu.my

INTRODUCTION
Healthy aging is an important issue of concern for the aging society; the traditional Qigong health movement in Taiwan has been quite popular and has received a certain degree of attention. The purpose of this study was to investigate the effects of Qigong health exercise on mental health and aura field energy of the elderly. It is expected that the traditional Ping-shuai-gong and primary Xiang-gong movements interfered with the regular exercises of the elderly, and whether it can effectively improve or delay the situation of dementia.

METHODS
Seventy-eight subjects were randomly assigned to the experimental group (EX, N=38; M=17, F=21; mean age = 68.45±7.5) and the control group (CO, N=40; M=26, F= 14; mean age = 68.08 ± 5.02); the EX group must practice Ping-Shuai-gong and primary Xiang-gong 3 to 5 times a week, each time 30 to 60 minutes, the CO group keeps the usual routine, no experimental treatment. The two groups of subjects were monitored by a professional psychologist in every three months with the Cognitive Abilities Screening Instrument (CASI) and the non-invasive detection of the AURA VIDEO STATION 7 SYSTEM, last for six months. The study data was processed by one-way ANCOVA; repeated measure and one-way ANOVA by IBM SPSS 21, and the significant level was set to α=.05.

RESULTS
The short-term memory (STM) of the CASI score in the EX group was significantly different ($p<.05$). The chakra energy and aura field in the EX group were greater than those in the CO group, and had good emotional stability ($p< .05$).
CONCLUSIONS
This study found that traditional simple health exercises can help improve the short-term memory of the elderly, while contributing to emotional stability and positive impact on health.

Keywords: Elderly, Aura Chakra, Qigong, Power AVS

The Effects of the Big-Five Personality Traits on Exercise and Diet

Kean M. Lee & Steve M.J. Janssen

University of Nottingham Malaysia

Introduction: Adoption of sedentary lifestyles increases an individual's risk of dying from ischemic heart disease (Blair et al., 1995; Lee, Hsieh, &Paffenbarger, 1995; Paffenbarger, Wing, & Hyde, 1978). Despite such consequences and efforts of the Malaysian government, only 37% of Malaysian adolescents are considered physically active (Ministry of Health Malaysia, 2018), which is substantially lower than that of Singaporean (74%; Win et al., 2015) and British adolescents (66%; Roth & Stamatakis, 2010). To increase the percentage of Malaysians that are physically active, a better understanding of the individual differences that affect health behaviours, such as exercise and diet, is therefore necessary. Although studies have shown that gender, ethnicity, and socio-economic status can help predict an individual's likelihood to exercise (Hayes & Ross, 1986; Roth & Stamatakis, 2010; Stubbe et al., 2006), examining the Big-Five Model of Personality may provide additional predictors(Raynor & Levine, 2009). It has been reported in the literature that Conscientiousness, Extraversion, and Neuroticism are personality traits that either promote or impede exercise behaviourin young adults(Booth-Kewley& Vickers, 1994; Raynor & Levine, 2009). Such understandingscould allow us to identify individuals that require more assistance when cultivating habits for healthy lifestyles. **Methods:** The current study adds to the literature by examining the association between personality traits and health behaviouramong Malaysian university students (N = 206, F = 63.6%, M age = 21.0, SD age = 1.6, age range = 18-26). After providing informed consent, participants were asked to complete the 44-item Big-Five Inventory (John & Srivastava, 1999), a diet frequency questionnaire (El Ansari & Berg-Beckhoff, 2017), and a series of questions on health attitudes, barriers to exercise, and vice usageadapted from several health surveys. **Results:** The results showed that highly conscientious individuals were more likely to adhere to exercise regimes and eat balanced diets while perceiving less internal and external barriers to exercise, supporting the prior literature.Besides the influence of Conscientiousness, the results also showed that individuals with higher levels of Openness perceived less internal barriers to exercise and that individuals with higher levels of Extraversion ate less balanced diets. The influences of these personality traits were observed even after taking gender, ethnicity, and physical injury into account. However, after taking these variables into account, no personality trait predicted the use of vice. **Conclusions:** The findings of this study suggest that, to improve the population's health behaviour, it would be more effective to consider individuals' personality traits. Especially, people with lower levels of conscientiousness seem to require more support than people with higher levels of conscientiousness. Simply informing them about the health benefits of exercising or eating a balanced diet is not sufficient. They could, for example, be offered specific strategies to help them to adhere to exercise regimes or to eat a more balanced diet.

Acknowledgements
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Guidelines to Prescribe Safe and Effective Exercise Routine to Manage Essential Hypertension in Adults – A Review

Wong Hoong Kid, Nanirin Noomi, Kalaiselvi Mohan

MS New Symphony Exercise Clinic

Introduction: Exercise has been statistically proven by many studies that it is effective to lower blood pressure (BP) by exercise alone. The effect of exercise shows significant reduction in post exercise BP and chronic BP reduction due to the release of nitric oxide (NO) which is triggered by exercise. Both aerobic and resistance exercise have been shown to exert different hypotensive effects on hypertensive individuals. However, executing exercise improperly with resistance training could cause injuries or induce hypertensive response or even harm the cardiovascular system. **Objective:** To review professional recommendations for exercise prescription and stipulate recommendation with safety guideline to manage essential hypertension in adults. **Method:** Search strategies for this review are articles from MEDLINE, PubMed, Google Scholar, ScienceDirect, American Journal of Hypertension, The Journal of Clinical Hypertension, American Heart Association Journal that were published between year 2010 to 2019. Study types reviewed were limited to meta-analyses, randomized controlled trials, clinical trials and reviews. Grading system was integrated to rate the study references before including them in this review. **Conclusion:** Adults with hypertension are more susceptible to musculoskeletal injuries which could be easily caused by improper resistance training such as explosive or jerky movements. Ironically, high intensity resistance training shows high potency on NO secretion. Thus, screening of patients for musculoskeletal condition is crucial for prescribing safe and effective exercise programme to cope with hypertension. Aerobic training alone is proven to be able to lower BP at moderate intensity level. Combination of aerobic and resistance training has been shown to elicit similar reduction in blood pressure and additional health benefits include improved muscular strength and cardiorespiratory fitness. Isometric resistance training shows higher magnitude of blood pressure reduction than other forms of exercise. However, more evidence regarding the safety concern of isometric resistance training to the hypertensive are needed. Good cardiorespiratory fitness is essentially associated with lowering the risk factor of cardiovascular diseases. Thus, guidelines to prescribe a safety and effective hypertension exercise programme are:

- Patients with stage 2 or 3 hypertension, diabetes and cardiovascular disease require initial treatment and clearance from medical doctors.
- Patients are suggested rest for 10 minutes before the blood pressure measurement to avoid possibility of white-coat syndrome.
- Applying pressure on reported vulnerable joint of the patients should be avoided.
- Concurrent exercise are recommended to the patients with frequency of exercise session: 3-5 days/week with each session 45-60 minutes.
- Aerobic training intensity is 60-80% MHR with standardized warm up and cooling down session to prevent post-exercise discomfort.
- Resistance Training intensity is between 50-70% 1RM.
- Continuous breathing during resistance training is maintained to avoid hypertensive response.

Key words: hypertension, exercise prescription, Blood pressure. Resistance training, aerobic training

Efficiency of Concurrent Exercise Treatment on Essential Hypertensive Patients

Chee Cheng Hong, Wong Hoong Kid

MS New Symphony Exercise Clinic

INTRODUCTION: Hypertension has been identified as a global risk factor and it increases the medical burden of each nation. In Malaysia, it has been reported that there is a high adult hypertensive prevalence of 43.5% in 2011; a significant increase from 32% in 1996. Even though studies have shown that exercise aids in the reduction of blood pressure among the hypertensive patients, certain aspects need to be more precise. Therefore, this study was conducted to evaluate the efficiency of concurrent aerobic and resistance exercise as a hypertensive treatment. **METHODS:** 11 essential hypertensive patients (Age: 41.2 ± 12.2 years; Gender: 7 men and 4 women), with an eccentric lifestyle were recruited for this study. They were assigned to a 3 months exercise programme of concurrent exercise (CE) which consisted of aerobic and resistance exercise (RE). 5 of them were on medications, the intensity of each exercise was determined according to their fitness level via DrFit® software. The CE programme started with aerobic exercise (AE) using DrFit® treadmill at an intensity of 60-70% MHR, a total duration of 30 minutes split into 5 minutes of warm up, 20 minutes of target heart rate (THR) training, and 5 minutes of cool down, and followed by RE. The RE programme started with a conventional exercise programme which uses gym equipment and free weights. Resting heart rate (RHR) and pre-exercise blood pressure (BP) were measured before each training session began. A total of 5 BP measurements were recorded throughout the exercise sessions. Two measurements from the aerobic exercise session; immediate post aerobic exercise BP (IPABP) and post 5-minute aerobic exercise BP (P5MABP). The other three BP measurements were from the resistance exercise session; immediate post-exercise BP (IPBP), post 5-minutes BP (P5MBP), and post 10-minutes BP (P10MBP), were recorded. **RESULTS:** There was a significant decrease of P10MBP in all subjects who had completed 23.3 ±19.3 exercise sessions; a decrease of 10.6 ±1.7mmHg ($p=0.00003$) and 6.1 ±0.6mmHg ($p=0.002$) in SBP and DBP, respectively. Each subject had completed at least 2 exercise sessions per week. Overall results showed that there was a significant decrease in blood pressure after each concurrent exercise session. **CONCLUSION:** Hypertensive patients are recommended to undergo a 1-hour concurrent exercise at least 2-3 days per week as a part of effective treatment for hypertension.

Contributing Factors That Hinder Public from Going to Fitness Center For Exercise – A Case Study

RajeshwaranKalaiarsan and Adli Ahmad Zaharudin

Asia College of Exercise and Sport Medicine (ACESM),
Setia Alam, Selangor, MALAYSIA

Introduction: Even though exercise is well recognized as good for health, not many people are going to fitness centers for exercise despite the benefits and advantages offered there. Therefore, this study was conducted to explore the common barriers that hinder public from going to fitness centers for exercise. **Methods**: A Questionnaire was developed to assess the contributing factors that hinder society from going to fitness centers for exercise. The questionnaire contained eight questions with three options given for each question. A total of 84 respondents (38 males and 46 females with an average age of 41.4 $\pm$ 12.9 years) participated in this study. 41. 7% of the respondents were graduates; 22.6% were diploma holders and another 15.5% and 3.6% were bachelor and master degree holders, respectively. Data collected was analyzed using SPSS version 24. **Results**: Out of eight contributing factors highlighted in the questionnaire, there were three significant contributing factors agreed by majority of the respondents. 48.8% agreed that responsibilities (work, child care, etc) were their main contributing factor for not going to fitness centers for exercise. While 44.1% responded that high fee of fitness centers was a barrier for them to exercise there. Another factor that caused 29.8% of them to stay away from going to fitness centers for exercise was the intimidating factor. Despite the high fee and time constraint, 48.8% of respondent agreed that investing money and time on exercise at fitness centers was worthwhile. Two possible contributing factors; goal achievement rate and possibility of getting injury, received a non-affirmative response in which 40.5% and 52.4% of respondent, respectively, gave a neutral answer. Most of the respondents; 35.7% and 44% denied that basic knowledge on fitness exercise and influence of social media; respectively, were contributing barriers for them to go there for exercise. **Conclusions**: The three factors that hinder respondents from doing exercise in fitness centers could be due to financial constraint and gender-associated issue because 58.33% and 54.8% of the respondents were non-graduate and female, respectively. In addition, non-affirmative responses were attributed to unawareness of benefits offered by the fitness centers.

Keywords: exercise barriers, fitness center

Prevalence of Painful Diabetic Peripheral Neuropathy (Pdpn) In Patients of Type-II Diabetes Mellitus

Arosha Arsahd[1], Azka Tariq[1], Syed Rehan Iftikhar Bukhari[2*], Berkes Istvan[2], Sultan Ayaz[3]

[1]College of Physical therapy, Government College University Faisalabad.
[2]Doctoral school of clinical medicine, Semmelweis University, Budapest, Hungary.
[3]Directorate of Medical Sciences, Government College University, Faisalabad
dr.syedrehan@gmail.com

Introduction: Diabetes mellitus is a global health issue carrying high prevalence even in developed countries and it is the 4th major cause of death worldwide. The prevalence of diabetes is increasing rapidly over the past years. This cross sectional study is aimed to determine the prevalence of painful diabetic peripheral neuropathy (PDPN) in patients with uncontrolled type 2 diabetes in Pakistan. **Methods**: A simple random sampling technique was used to collect data from 120 patients in four months; data collection was carried out via questionnaire and interviewing the participants. Statistical package for the social scientists SPSS version 23 with the reliability of 0.733 was used to analyze data statistically. **Results**: This study revealed that out of 120 individuals, thirty-seven percent were males and sixty-three percent were females, all were suffering from Type-2 Diabetes Mellitus. Among them, seventy-one percent of subjects were suffering from diabetic peripheral neuropathy (DPN) and fifty-three percent of subjects were suffering from painful diabetic peripheral neuropathy (PDPN). **Conclusion**: This study concluded that painful diabetic peripheral neuropathy (PDPN) is highly prevalent in type 2 diabetes i.e. 52.9%, in Pakistan.

Keywords: Uncontrolled diabetes mellitus, Diabetic peripheral neuropathy (DPN), Painful diabetic peripheral neuropathy (PDPN).

Effects of Brisk Walking on Plasma Lipoprotein(A), Percent Body Fat, Waist Circumference and Resting Blood Pressure in Overweight and Obese Females

Nurul Shafiqah Kamarul Hisham, Nur Amalina Jeffri and Chee Keong Chen

Exercise and Sports Science Programme, School of Health Sciences, Health Campus, Universiti Sains Malaysia, 16150 Kelantan, Malaysia.

Introduction: Obesity has become a global epidemic and represents a major public health challenge of getting chronic diseases. Physical activity is a major modifiable determinant of chronic diseases. To our knowledge, studies about the effects of brisk walking on plasma lipoprotein(a), percent body fat, waist circumference and resting blood pressure in overweight and obese females in Malaysia is scarce. **Objective:** To investigate the effects of 6 weeks of brisk walking programme on plasma lipoprotein(a) level, percent body fat, waist circumference and resting blood pressure in overweight and obese females. **Methods:** 38 overweight and obese females with age ranging from 20 to 35 years old were recruited and randomly assigned into 2 groups: control group (C) and brisk walking group (BW). Pre-test and post-test were carried out to measure participants' plasma lipoprotein(a), body fat percentage, waist circumference and resting blood pressure. During 6 weeks of study period, participants in C group were required to carry out their usually sedentary lifestyle and they were informed to refrain from any other training programme and continue their normal diet. Participants in BW group performed the brisk walking exercise for 2.2 km with intensity of 55%-75% of their maximum heart rate, 3 sessions per week for 6 weeks. They were also required to continue their normal diet during the brisk walking programme. **Results:** After 6 weeks of intervention, plasma lipoprotein(a) level was significantly reduced in both C group and BW group ($p<0.001$). In addition, there was also a significant decrease in percent body fat and waist circumference ($p<0.001$) in BW group. BW group also showed significant reduction in both resting systolic blood pressure and resting diastolic blood pressure at $p<0.001$. Resting blood pressure also indicated a significant reduction in BW group compared to C group at post-test ($p<0.05$). **Conclusion:** 6 weeks of brisk walking programme with 2.2 km per session, 3 sessions per week reduces plasma lipoprotein(a) level, percent body fat, waist circumference and resting blood pressure in overweight and obese females. Therefore, brisk walking exercise seems to have potential to reduce some of the risk factors associated with chronic diseases among overweight and obese females.

Acknowledgement: *This study is supported by MS Exercise Medicine Research Grant by MS New Symphony Exercise Clinic*

Sit In Physical Education is a Hit with Female Children and Adolescents but Has No Impact on Alertness, Mood, And Memory

Terence CHUA[1], Michael CHIA[1]

Physical Education and Sports Science, National Institute of Education, Nanyang Technological University, Singapore

Introduction: Aerobic exercise at moderate-intensity has beneficial effects on the cognitive function of children and adolescents (Haapala, 2012). The impact of sprint interval training (SIT) on indices of student learning is under-researched. The aim was to examine the acute impact (15 minutes after exercise) of SIT on indices of learning:- (i) alertness; (ii) mood and (iii) memory recall, and its feasibility when conducted within a school Physical Education (PE) setting once to twice weekly for three weeks. **Methods:**One primary (n=82; age range=9-10y) and one secondary (n=146; age range=12-13y) all-girl schools participated in the study. A crossover design situated within two 3-week blocks was separated by a 'wash-out' period of 4 weeks. Participants were allocated to a SIT and a control (CON; usual PE without SIT) group. The SIT group completed three, 20-second maximal effort shuttle-sprints, interspersed with an active recovery (walking) interval of 60s (work-to-rest ratio of 1:3). Participants rated their level of alertness and mood on a single-item hedonic scale (Ottawa mood scale, 2011) of 1 to 10 (i.e. higher number means more alert and better mood, respectively) and underwent a Rey Auditory Memory Recall test before and 15 minutes after a SIT session on two separate occasions (one before and one after the cross-over period). The CON group performed the same pre-to-post-tests as the SIT group. PE teachers rated their perception of feasibility in conducting SIT-type activity in a PE setting on a self-constructed scale of 1 to 5 (i.e. higher number indicates more feasible). Student-T tests were used to analyse within-subject differences between groups and, main intervention effect and time*group interaction effect were investigated with mixed designs ANOVA. The level of statistical significance was set at $p< .05$. **Results:** Amongst primary school pupils, mean differences in the change in alertness (block 1: -0.19, $p= .491$; block 2: -0.39, $p= .325$), mood (block 1: -0.47, $p= .258$; block 2: -0.33, $p= .399$) and memory recall (block 1: 0.44, $p= .281$; block 2: -0.76, $p= .098$) were not significant. SIT had an impact on alertness in secondary school students in block 1 (SIT: 0.14 vs. CON: -0.36, $p= .031$, $d= 0.41$) while change in alertness in the latter block (block 2: -0.14, p= .681), mood (block 1: -0.01, $p= 0.964$; block 2: 0.35, p= .267), and memory (block 1: -0.08, $p= .822$; block 2: 0.44, p= .267) were not significantly different. Multivariate testing indicated that the main intervention effect and time*group interactions on the indices of learning in the two school cohorts were not significantly different across both blocks ($p> .05$). 55.9± 9.3% of primary and 58.6 ± 20.3% of secondary school cohorts participated in the research. 93.7± 5.1% of primary pupils and 83.3 ± 25.9% of secondary students adhered to the SIT intervention. PE teachers reported a feasibility rating of 4.0 and 4.5 for embedding SIT-type activity within a PE setting to get students fit for sport and health respectively.**Conclusion:**There was no acute impact of SIT on alertness, mood or memory in female children and adolescents. Teachers believed that it was feasible to conduct SIT-type activities as part of their PE lessons. Future research should examine the impact of SIT on alertness, mood and memory in the latter part of the day or have an intervention period of more than six sessions over three weeks.

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Blood Bone Metabolism Markers in Response to Oat Bran Consumption and Brisk Walking Exercise In Middle Age Hypercholesterolemic Women

Foong Kiew Ooi and Fakri Noor Fatin Nazieffa

Exercise and Sports Science Programme, School of Health Sciences, Universiti Sains Malaysia, Kelantan, Malaysia

INTRODUCTION: Data from previous studies have demonstrated that hypercholesterolemia may reduce bone formation and enhance bone resorption. To date, information on the combined effects of oat bran consumption and exercise on bone metabolism, i.e bone formation and resorption in hypercholesterolemic population is lacking. Therefore, the present study was proposed to investigate the beneficial effects of combined oat bran consumption and brisk walking on blood bone metabolism markers in middle age hypercholesterolemic women. **METHODS:** Thirty-three hypercholesterolemic women participants with mean age 45.0 ± 4.0 years old were recruited. They were randomised into three groups (n=11 per group) in this study, i.e. control group who were sedentary and without oat bran consumption (C), oat bran consumption alone (Ob), and combined oat bran consumption and brisk walking exercise (ObEx) groups. Participants in the ObEx group performed brisk walking exercise sessions 30 minutes per session, 3 sessions per week for 6 weeks. Participants in the Ob group and ObEx group consumed 18 g of oat bran powder diluted with plain water daily for 6 weeks. Participants' anthropometry and blood bone metabolism markers such as serum total calcium, serum phosphorus, bone formation marker (serum alkaline phosphatase) and bone resorption marker; i.e. serum C-terminal telopeptide of type 1 collagen (1CTP) were measured at pre- and post-intervention. **RESULTS:** The data of the study showed that at post-intervention, there was a significant ($p<0.05$) increase in serum alkaline phosphatase concentrations in Ob (pre-intervention: 58.45 ± 15.78 µg/ml; post intervention: 64.45 ± 13.87 µg/ml) and ObEx (pre-intervention: 59.54 ± 15.85 µg/ml; post intervention: 67.27 ± 19.94 µg/ml) groups. However, no statistically significant differences ($p>0.05$) in serum total calcium, serum phosphorus, and 1CTP were observed between pre- and post-intervention in the C, Ob and ObEx groups. **CONCLUSIONS:** Daily oat bran consumption of 18 g alone, and brisk walking exercise performed for 3 days per week combined with daily consumption of 18 g of oat bran, may have potential to be proposed for formulating guidelines in planning nutrition and/or exercise promotion programmes for increasing bone formation marker in middle age hypercholesterolemic women.

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The Effect of Early-Stage Aerobic and Resistance Exercise on Colorectal Cancer Survivors Post Operations

[1]Feng Beibei, [1]Wang Shuting, [2]Wang Huaiming, [2]Ma Tenghui, [1]Zhu Xiaoxia, [1]Wang Yafei, [1]Wang Yuling*, [2]Wang Lei*

[1]Department of Rehabilitation Medicine, The Sixth Affiliated Hospital of Sun Yat-sen University, Guangzhou, China;

[2]Department of Colorectal Surgery, The Sixth Affiliated Hospital of Sun Yat-sen University, Guangzhou, China;

E-mail: wangl9@mail.sysu.edu.cn; *Wang Yuling,* E-mail: *wangyul@mail.sysu.edu.cn*

INTRODUCTION: With the popularity of enhanced recovery after surgery protocol, early mobilization has been advocated in cancer patients post surgeries. However, the exact clinical efficacy of early aerobic and/or resistance exercise in patients with colorectal cancer after surgeries has not been fully verified. The majority of exercise protocols mentioned previously mainly focused on home-based exercises at a later stage after discharge, and worse still, those exercise programs were not well standardized. Hence, this study would like to investigate the feasibility and efficacy of early-stage aerobic and resistance exercise on functional capacity, fatigue, muscle function and quality of life in colorectal cancer survivors undergone surgery. **METHODS:** Totally 41 participants diagnosed as colorectal cancer (stage I-III) with an indication to operations were recruited. They were then randomly assigned to the experimental group (EG, n=18) and control group (CG, n=23) by random numbers generated by the statistical software. During the first week after surgery, the exercise group received standard care and low-to-moderate intensity aerobic and resistance exercise, while the control group only received standard care. Outcome measurements included quality of life (FACIT-C), fatigue (FACIT-F), 6-minute walking distance (6MWD) and muscle strength (by dynamometer). Assessments were performed at baseline and post-intervention. **RESULTS:** No significant differences were found at baseline between two groups in terms of age, gender as well as other demographic information. The EG group showed a lower rate of adverse events compared with the CG group. No statistical differences were seen in the changes of 6MWD, FACIT scores and muscle strength before and 1 week after operation between two groups. Within-group differences discovered that each group had a significant reduction of 6MWD at one-week post surgeries ($p<0.01$). There were significant decreases in both FACT-C and FACT-F scores in the CG group, while the only FACI-F scoring was obviously lessened in the EG group. As for muscle strength, only the CG group demonstrated significant reduced muscle strength in left elbow flexors and bilateral hip abductors ($p<0.05$). **CONCLUSIONS:** The functional capacity of colorectal survivors was undermined at one-week after operations. An early-stage training program of aerobic and resistance exercise is feasible in colorectal cancer survivors who had undergone surgeries with a lower adverse event incidence. But its short-term effects in improving symptoms of fatigue, deconditioning and cancer-related functional ability and quality of life post surgeries still need further evidence to confirm.

EFFECT OF FLATFEET ON PLANTAR PRESSURE DISTRIBUTION AMONG WEIGHTLIFTING ATHLETES

[1]Feng Beibei, [2]Guo Suimin, [3]Zhao Xiaoyu, [1]Wang Yuling*

[1]Department of Rehabilitation Medicine, The Sixth Affiliated Hospital of Sun Yat-sen University, Guangzhou, China;

[2]Department of Sports Rehabilitation, Guangzhou Sport University, Guangzhou, China;

[3]Shanghai University of Sport, Shanghai, China;

E-mail: wangyul@mail.sysu.edu.cn

INTRODUCTION: Flatfeet has been one of prevalent musculoskeletal disorders in the past years. The occurrence of flatfeet may lead to a series of functional limitations and disabilities, such as pain, abnormal gait and impaired sports performance. However, the prevalence of flatfeet in a specific type of sport as weightlifting was not well studied and its effect on plantar pressure distribution remained unclear. Therefore, this study aimed to firstly explore the incidence rates of flatfeet among weightlifting athletes, and secondly to examine the effect of flatfeet on the plantar pressure distribution patterns among weightlifters, which may thus shed light on the potential risks of musculoskeletal complaints in this typical athlete population. **METHODS:** Totally 38 weightlifters from the professional weightlifting team in the Guangdong province were recruited in this study. The screening for flatfeet was conducted via the standardized three-line foot print method. All participants were asked to stand in a neutral position on the pressure platform of the HR Mat system to measure their patterns of plantar pressure distribution. The parameters of plantar force percentage, contact area, contact area percentage, contact pressure as well as peak contact pressure were assessed. The musculoskeletal symptoms of all participants were evaluated in this study as well. **RESULTS:** Approximately 37% of the participants were classified as flatfeet after screening. The force percentages at midfoot and the 1st metatarsal in the flatfeet group were significantly higher than that in the normal feet group, while the force proportion at the heel area in the flatfeet group was smaller (p<0.05). The midfoot contact area and its proportion were obviously greater in the flatfeet group (p<0.0001), but the contact area percentages at medial heel and the 3rd metatarsal in the flatfeet group were smaller (p<0.05). In terms of plantar pressure, flatfeet participants generated significantly higher pressure at the 1st metatarsal, compared with the normal feet group (p<0.05). Instead, a lower pressure at the lateral heel was observed in the flatfeet group (p<0.05). **CONCLUSIONS:** It seemed flatfeet was quite prevalent in the weightlifting athletes, which deserved our further attention. Flatfeet can influence the plantar pressure distribution among weightlifters, with increased pressure at the 1st metatarsal and elevated midfoot contact area as well as decreased pressure at the lateral heel zone. The loading of flatfeet individuals shifted medially to the midfoot and medial forefoot, which could thus elevate the risk to develop musculoskeletal disorders as well as other sports-related injuries.

The Effects of High Intensity Interval Training (Hiit) and Combine Aerobic Training on Selected Obesity Parameters Among Obese/Overweight Women

[1]Sakinah Mohd Hassan, [*2]Hairul Anuar Hashim, [1]Asmadi Ishak, [2]Chen Chee Keong

[1] Faculty of Sport Science and Coaching, Universiti Pendidikan Sultan Idris, 35900 Tanjung Malim, Perak
[2] Exercise and Sports Science Programme, School of Health Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan

E-mail:hairulkb@usm.my

INTRODUCTION: This study investigated the effects of high intensity interval training and aerobic training on selected obesity parameters among obese/overweight women. **METHODS:** Twenty-eight women (Age= 22.6±2.5 years, Height= 155.9±4.8 cm, Body mass= 78.6±12.4 kg) with over 30 kg/m² of BMI were assigned into 3 groups of either the control group (n=9), the high interval training group (n=9) or the combined high intensity interval training and aerobic training (n=10). The experimental groups underwent a 12-week high intensity interval training (HIIT) program and a combination of HIIT and aerobic training. Body compositions consisting of Body Mass Index (BMI), % body fat, and Waist Hip Ratio (WHR) were measured before and after the exercise programs. Blood samples were taken at baseline and at post intervention and analyzed for lipid profile (High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL) and Total Cholesterol). **RESULTS:** The results showed significant decreases ($p < 0.05$) in BMI, % body fat and waist hip ratio (WHR) for both experimental groups. However, no significant difference were found in HDL, LDL and total cholesterol in all groups ($p > 0.05$) after the HIIT training. **CONCLUSION:** It is concluded that body composition changes in obese/overweight women observed following both forms of training program. HIIT and HIIT combined with aerobic exercise may reduce body composition but not for Lipid profile.

Keywords: high intensity interval training, obesity, body composition, Calisthenics training

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IMPACT OF EIGHT WEEKS MODERATE INTENSITY EXERCISE ON LIVER ENZYMES

Salahuddin Khan[1]. Alamgir Khan[2] Hazratullah[3] Usman Muavia[4] Nairas Fareed[5]

[1,] Professor/Chairperson.[2,3] PhD Scholar Department of Sport Sciences and Physical Education Gomal University D.I. Khan, Khyber Pakhtunkhwa Pakistan
[4,5] MPhil Scholar Riphah International University Faisal Abad Campus
E-mail: drsalahuddinkhan@yahoo.com

INTRODUCTION: The study aimed to assess the impact of eight weeks' moderate intensity exercise (MIE) on two particular liver enzymes i.e. alanine transaminase and alkaline phosphate.

METHODS: Non sportsmen (n=20, age 20 to 30 years old, BMI from 18 to 30) were divided into two group (experimental and control). Moderate intensity exercise protocol applied on experimental group for eight weeks. 5ml blood was collected from all subjects to measure the effect of MIE on ALT and ALP. The data of pre and post-test were processed through SPSS version 24. **RESULTS:** Significant difference was found between the ALT score of CG during pretest (29.00 ± .737) and posttest (33.20 ± 3.15) t value (9) = -3.161, P < .05. In the same way, data indicates that there is significant difference between the ALP score of CG in pretest (90.60 ± 8.19) and posttest (132.90 ± 16.36). The ALP of CG in pretest was better from posttest ALP score t (9) = -9.933, P < .05. In respect of treatment group, significant difference was found between the ALT score in pretest (30.00 ± .816) and posttest (25.80 ± .918). The EXG score was better in ALT after treatment. t (9) = 10.804, P < .05. No significant difference was observed between the ALP score of EXG before (92.30 ± 7.58) and after exercise (91.90 ± 7.57), t (9) = .113, P > .05. **CONCLUSION:** It was concluded that the level of ALT and ALP of EXG were found significantly higher ($p<0.05$) as compared to (CG).

Key words: Liver, Enzymes; Alanine Transaminase, Alkaline Phosphate, Moderate Intensity Exercise, Non sportsmen.

CORRELATION BETWEEN PHYSICAL ACTIVITY LEVEL AND RISK OF UPPER RESPIRATORY TRACT INFECTION, FATIGUE LEVEL, AND QUALITY OF LIFE AMONG HEAD AND NECK CANCER SURVIVORS

Nor Faeiza Hamdan[1], Muhammad Khairul Azhar Zohari[1], Mohamad Hafiz Mohd Nasir[1], Nor Hafizah Mat Lazim[2], Nur Syahmina Rasudin[3], Chee Keong Chen[1], Marilyn Ong[1], Ayu Suzailiana Muhamad[1]

[1]Exercise and Sports Science Programme, School of Health Sciences, Health Campus, Universiti Sains Malaysia, 16150 Kelantan, Malaysia

[2]Otorhinolaryngology Department, School of Medical Sciences, Health Campus, Universiti Sains Malaysia, 16150 Kelantan, Malaysia

[3]Biomedicine Programme, School of Health Sciences, Health Campus, Universiti Sains Malaysia, 16150 Kelantan, Malaysia

Presenter: Nor Faeiza Hamdan, faeizahamdan@gmail.com

Background: Exercise has been shown to improve functional capacity, quality of life, body composition, cardiorespiratory fitness, muscular fitness and flexibility among cancer patients and survivors. Participation in physical activity has emerged as a potent rehabilitative modality for cancer survivors. Thus, this study aims to determine the correlation between physical activity level and the risk of upper respiratory tract infection (URTI), fatigue level and quality of life among head and neck cancer survivors.

Methods: Thirty-two cancer survivors within 6 months of post-chemotherapy, were randomly recruited from the Otorhinolaryngology Clinic in HUSM. All participants completed the International Physical Activity Questionnaires (IPAQ), Wisconsin Upper Respiratory Symptom Survey–21 (WURSS-21), Fatigue Visual Analogue Scale (fatigue level) and FACT-H&N questionnaires (quality of life). The IPAQ has 5 parts with a total of 27 questions, the WURSS-21 has 4 parts with 21 short questions, and the FACT-H&N questionnaires has 4 subscales with 6 to 7 items each subscale. The data obtained from the IPAQ were analysed where, participants were categorised into either low, moderate or high physical activity level groups. After IPAQ analysis was carried out, comparison on the URTI frequency, URTI duration and URTI severity, fatigue level and quality of life were conducted between groups by using independent t-test.

Results: IPAQ analysis revealed that 24 out of 32 participants were categorised in the low physical activity level group while only 8 participants were in the moderate physical activity level group. Independent t-test showed that fatigue level was significantly higher in the low physical activity level group compared to the moderate physical activity level group. However, there was no significant difference on frequency, duration and severity of URTI and quality of life between the groups.

Conclusions: Physical activity level affects the level of fatigue where, engaging in moderate physical activity regularly may increase strength and energy thus reducing the feeling of fatigue among the cancer survivors. However, the present study fails to provide evidence on the benefits of physical activity in reducing URTI frequency, duration and severity and improving quality of life. This might be due small sample size in the moderate physical activity group and inaccurate reports gathered from the participants because they need to recall the URTI incidence within the last 6 months. More studies especially randomised control trial is needed to be carried out to further investigate this field of knowledge.

Keywords: Head and neck cancer, cancer survivors, physical activity, URTI, fatigue, quality of life.