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Original article

SEDENTARISM AND BENEFITS OF REGULAR PHYSICAL ACTIVITY IN HEALTHY ADULTS

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Abstract

Increasing physical activity and reduction of sedentary, play important roles in health promotion and prevention of lifestyle-related diseases in adults.

The aim of the study is to summarize the benefits of regular physical activity, as well as recommendations for their correct performance. Numerous research clearly demonstrate that participating in regular physical activity provides many health benefits. This studies associated regular physical activity with important health benefits and provide evidence that a sedentary lifestyle contributes significantly to development of the major risk factors for age-related disease, prominent among them obesity, diabetes, and hypertension. Regular physical activity, reducing disease risk and improving physical performance and quality of life.

Conclusions

When adults do the equivalent of 150 minutes of moderate-intensity aerobic activity each week, the benefits are substantial. These benefits include lower risk of premature death, coronary heart disease, stroke, hypertension, type 2 diabetes, and depression.

The implementation of programs in order to promote physical activity and benefits for health among adults is necessary.

Keywords: physical activity, aging, diseases, health

Introduction

Physical inactivity is a important public health problem and improving physical activity levels is necessary. Physical inactivity speeds up the aging process and numerous researches showed that the number of sedentary adults is getting higher. Being physically active and limiting your sedentary behavior every day is essential for your health and well-being. Global recommendations on physical activity in adults aim to promote the need for it, the benefits that it brings to health. Physical inactivity is responsible for more than five million deaths globally per year (Lee et al., 2012).

There are numerous studies, systematic reviews and meta-analyzes that show that adult sedentary lifestyle has been positively associated with type 2 diabetes, cardiovascular disease, metabolic syndrome, and mortality (Verloigne et al., 2016; de Rezende et al., 2014; Proper et al, 2011; Thorp et al., 2011; van der Ploeg et al., 2012).

Physical activity is defined as bodily

movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure (US Department of Health and Human Services 1996).

Physical inactivity is a term that describes a person who does not regularly perform at least 60 minutes of physical activity per day, 5 days per week (Biddle et al., 1998).

Sedentary behavior is defined as any behavior characterized by energy consumption ≤ 1.5 Metabolic Equivalents (MET), while the body is in inclined posture or wakefulness (Sedentary Behaviour Research Network).

Exercise is a subcategory of leisure-time physical activity and is defined as physical activity in which planned, structured and repetitive bodily movements are performed to improve or maintain one or more components of physical fitness (Hardman & Stensel, 2003). The physical activity provides long-term health benefits. The sedentarism can favors overall mortality, and may result in a poor

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quality of life. An inactive lifestyle increases the risk of chronic health problems such as heart disease, high blood pressure, cancer and diabetes.

Physiological effects of physical activity

Physical activity is important for fitness; it increases functional capacity through improvements in maximal oxygen consumption (V_{O2}max), body composition, muscular strength and endurance, and flexibility (Pollock et al., 1995).

Strong scientific evidence shows that physical activity reduces the risk of premature death (dying earlier than the average age of death for a specific population group) from the leading causes of death, such as heart disease and some cancers, as well as from other causes of death (www.health.gov/paguidelines).

Physical activity is an significant component of total energy expenditure. The amount of energy expended performing a particular activity depends on the muscle mass involved and the volume and intensity at which the activity is performed.

Body composition

Besides the visible changes in the physical appearance, changes in the body composition of the elderly have implications in their physical function and health (Figueiredo et al., 2017).

The physical activity associated with balanced nutrition can contribute to favorable outcomes in the treatment of obesity and can change body composition favorably by reducing fat mass. Even when an exercise programme produces no loss in bodyweight, substantial reductions in abdominal subcutaneous and visceral fat can be achieved (McArdle et al., 2007). Theoretically, 30 minutes of moderate physical activity per day is equivalent to approximately 1500 kcal/week, which translates to a loss of 2.1% or 1.8% body fat for men and women respectively (Elder & Roberts, 2007).

Broeder et al. (1997) has shown that 12 weeks of both resistance and endurance training can produce significant decreases in fat mass and percentage body fat. In the long-term, physical activity can increase resting metabolic rate by increasing lean body mass. Bouchard et al. (1993) believes that physical exercise alone without dieting (caloric restriction) has only a modest effect on total body mass and fat mass loss.

Cardiovascular benefits

The benefits of physical activity on cardiorespiratory health are most documented. It is well known that during exercise, blood pressure increases, particularly when the exercise activates a

large muscle mass and requires a relatively great muscle strain (McArdle et al., 2007). Physical activity induces improvements in endothelial function by increasing the activity of nitric oxide synthase, which produces nitric oxide, and increasing extracellular superoxide dismutase, which prevents breakdown of nitric oxide. These processes are all crucial for directing the appropriate distribution of blood in the body.

Laughlin and McAllister (1992) have described how aerobic exercise training induces an increase in the capacity to carry blood in the coronary arteries. A high level of physical activity during child growth and development reduces the risk of developing cardiovascular disease in adulthood (Eisenmann et al., 2004).

Muscular benefits

The reduction of strength in elderly patients is due to essentially two factors:

- 1) Loss of muscle mass because of atrophy and reduction in the number of fibres;
- 2) Metabolic changes in contractile proteins (Figueiredo et al., 2017).

Sarcopenia is an health problem involving a decline of muscle mass, quality and strength. Sarcopenia, as described by the European Working Group on Sarcopenia in 2010, is a progressive and generalized loss of the skeletal muscle mass and function (Cruz-Jentoft et al., 2010). Absence of exercise is considered a significant risk factor for sarcopenia (Mosoni et al., 1993). Studies indicate that older adults who are less physically active are more likely to have lower skeletal muscle mass and strength and have an increased risk of developing sarcopenia (Burton et al., 2010). Reduction in physical activity alters body composition in different ways; muscle mass decreases while fat mass increases (Kuh et al., 2005).

Resistance training is imperative for proper musculoskeletal development and maintenance. Strength is needed for improving physical functional capacity and quality of life, especially in the elderly or more frail low-fit persons (Fiatorne et al., 1994; Fleck & Kraemer, 1987).

Cardio-respiratory capacity

With ageing, inspiratory capacity decreases as a result of intercostal cartilage calcification, with a reduction of contractility of the inspiratory muscles, loss of elasticity of the lung tissue, and weakening of the diaphragm and intercostal muscles (Figueiredo et al., 2017).

Several authors suggest that there is a positive association between cardio-respiratory



fitness and functional capacity of the elderly (e.g. Paterson and Warburton, 2010; Singh 2002; Dias et al., 2015).

The reduction of muscle mass has been suggested as the primary cause for the loss of muscle strength with age, as well as power, speed, flexibility and precision of movement (Mendes et al., 2015).

Insulin sensitivity

There is substantial evidence that physical activity is an effective method of enhancing insulin sensitivity and therefore counteracting insulin resistance (Hardman & Stensel, 2003). Studies have generally suggested improvements in insulin sensitivity following exercise training programmes ranging from 10% to 65%, but improvements in fasting insulin tend to be no longer present 72 hours after an exercise period (Boulé et al., 2005).

The Diabetes Prevention program study showed a 46% reduction in diabetes incidence for participants who met the physical activity goal of 150 minutes of moderate-intensity activity per week (Hamman et al., 2006).

Immune response

Regular physical activity is associated with beneficial changes to the immune system and a lower risk of upper respiratory tract infections. However, hard or prolonged exercise in endurance sports can lead to immunosuppression and greater infection sensitivity (Moreira et al., 2009).

Physical activity and cancer risk

IARC (2002) showed high levels of physical activity to be consistently associated with reduced risk of colon cancer. It was estimated that 30–60 minutes per day of more intense types of activities are needed to have the greatest effect on colon cancer, *breast cancer* risk. IARC (2002) concluded that there is limited evidence to support a role for physical activity in prostate cancer prevention. Research shows that a wide range of moderate-intensity physical activity—between 210 and 420 minutes a week (3 hours and 30 minutes to 7 hours)—is needed to significantly reduce the risk of colon and breast cancer; currently, 150 minutes a week does not appear to provide a major benefit (www.health.gov/paguideline).

Existing evidence strongly suggests that exercise is not only safe and feasible during cancer treatment, but that it can also improve physical functioning, fatigue, and multiple aspects of quality of life (Schmitz et al., 2010).

Prospective, observational studies have demonstrated that physical activity after cancer

diagnosis is associated with a reduced risk of cancer recurrence and improved overall mortality among multiple cancer survivor groups, including breast, colorectal, prostate, and ovarian cancer (Ibrahim et al., 2011; Moorman et al., 2011; Kenfield et al., 2011).

Bone health and osteoporosis risk

Studies show that the frequent decline in bone density that happens during aging can be slowed with regular physical activity, these effects are seen in people who participate in aerobic, muscle-strengthening, and bone-strengthening physical activity programs of moderate or vigorous intensity (www.health.gov/paguideline). There are research results that indicate that kinesiotherapy and passive motion training have positive effects on cartilage tissue by speeding the restitution phase (Karlsson et al., 2008). WHO (2003) has concluded that there is convincing evidence that physical activity decreases the risk of osteoporotic fractures in older people (for men and women older than 50–60 years with a low calcium intake and/or poor vitamin D status).

Mental benefits

Mental health benefits have been found in people who do aerobic or a combination of aerobic and muscle-strengthening activities 3 to 4 days a week. American College of Sports Medicine (1998) concluded that exercise reduces and prevents a number of functional declines in aging. Numerous research recommend physical activity to adults and older persons. The effect of physical activity for the prevention of a range of chronic diseases is widely acknowledged. In the context of mental health, Paterson and Warburton (2010) build up the association between long-term regular physical activity with a decrease in the risk of dementia and Alzheimer's disease.

Health benefits associated with regular physical activity for adults and older adults

Strong evidence

- Lower risk of early death
- Lower risk of coronary heart disease
- Lower risk of stroke
- Lower risk of high blood pressure
- Lower risk of adverse blood lipid profile
- Lower risk of type 2 diabetes
- Lower risk of metabolic syndrome
- Lower risk of colon and breast cancer
- Prevention of weight gain
- Weight loss, particularly when combined with reduced calorie intake
- Improved cardiorespiratory and muscular fitness



- Prevention of falls
- Reduced depression
- Better cognitive function (for older adults)

Moderate too strong evidence

- Better functional health (for older adults)
- Reduced abdominal obesity

Moderate evidence

- Lower risk of hip fracture
- Lower risk of lung cancer
- Lower risk of endometrial cancer
- Weight maintenance after weight loss
- Increased bone density
- Improved sleep quality

source: www.health.gov/paguidelines

Many studies conclude that the benefits of physical activity are divided into three broad categories: physiological, psychological, and social. The physiological benefits are immediate and the longer-term and include improvement cardiovascular endurance, muscle strengthening, flexibility, balance, glucose levels and sleep.

How much physical activity is optimal

The general recommendation is that every adult should accumulate every day 30 minutes or more of moderate physical activity. For substantial health benefits, adults should do at least 150 minutes a week of moderate-intensity, or 75 minutes a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Adults should also do muscle-strengthening activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits (www.health.gov/paguidelines).

National Institute for Health and Care Excellence, NICE recommends physical exercise for muscle strength, flexibility, and bone system to be performed at least two times a week, divided by inches of at least 10 minutes (<http://guidance.nice.org.uk/ph17>).

The ACSM position stand (1990) states that these adaptations can be stimulated through the safe progressive application of the principle of overload, specifically the frequency, intensity, and duration of training, and considerations of the mode of activity and the initial level of fitness. Physical activity includes all forms of activity, such as everyday walking or cycling, active play, work-related activity, active recreation (such as working out in a gym), dancing, gardening or playing active games, as well

as organized and competitive sport (Chief Medical Officer, 2004). Regular physical activity – such as walking, cycling, or dancing – has significant benefits for health, it can reduce the risk of cardiovascular disease, diabetes and osteoporosis, help control weight, and promote mental well-being (<http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/benefits-of-regular-physical-activity>).

Conclusions

Physical inactivity is a important public health problem and improving physical activity levels is necessary. When adults do the equivalent of 150 minutes of moderate-intensity aerobic activity each week, the benefits are substantial. These benefits include lower risk of premature death, coronary heart disease, stroke, hypertension, type 2 diabetes, and depression. The implementation of programs in order to promote physical activity among adults is necessary. Physical activities for adults must be attractive, varied and complex.

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