

Physical Activity as a Function of Women's Health

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ABSTRACT

Physical activity means any form of body movement that is associated with certain metabolic demands. At the same time, physical activity is one of the most important steps in the maintenance, protection and improvement of health. There is strong evidence to suggest that higher levels of physical activity are associated with numerous preventive effects and therapeutic effects in the treatment of many diseases. Although they account for a larger portion of the population, physical inactivity is more often registered in women, which can be attributed to a variety of reasons – ranging from anatomical and physiological to the socio-psychological. The present paper discusses some of the most important benefits associated with physical activity in women, to encourage their greater participation in various forms of physical activity.

Key words: *physical activity, women, health, benefit*

Introduction

Physical activity is any body movement that becomes as a result of skeletal muscle contraction which increases energy expenditure above a basal level¹. Similarly, the World Health Organization (WHO) defines physical activity as any body movement caused by the contraction of skeletal muscles that requires energy expenditure². Physical activity encompasses a wide range of activities, games, physical exercise, competitive sports events and physical effort during the course of professional activities or performing some household chores, in one word, any type of physical engagement. The WHO and the International Federation of Sports Medicine in April 1994. have agreed on a declaration on common positions related to public health policy, and recommend to the governments around the world. Physical inactivity, for the first time, is defined as an independent risk factor and physical activity as an important factor in protecting and improving health³.

Regular physical activity is a key element for a longer, healthier and happier life. It helps to improve overall health, reduce the risk of many chronic diseases, maintain desirable body weight and promote good mental health. At a time when the benefits of physical activities and sports widely known and recognized, women still represent a sensitive group when it comes to physical activity. Accord-

ing to published statistics of the National Center for Health Statistics of America in 2009, it is observed that the women's ten leading causes of death together represent nearly 80% of all causes, and the first three or about 55% of deaths is in a proven relation to the physical inactivity⁴.

Despite the fact that women now make up more than half the population, women's participation in sport is still significantly less than men. According to the literature, about 60% of women in the US do not practice regular physical activity, and more than 25% are not at all engaged in physical activity. On the other hand, the results of the European Parliament Resolution on women in sport in the EU indicate that only 16% of women regularly engage in physical or sporting activity versus 29% of men⁵.

Taking into account the fast pace of life, exposure to different stressful situations and effects of many risk factors, it is clear the need for inclusion of physical exercise in the largest possible number of women to achieve good fitness and thereby creating conditions for improving health. Therefore, this paper aims to draw attention to the positive effects of physical activity and to promote it as an essential factor towards the preservation and promotion of a good health.

Women and Physical Activity

Traditionally, physical and sports activities were regarded as men's activities. Women and men have different perceptions of their abilities in the sport, where women generally perceive sport as a masculine activity. Such perceptions largely determine women's participation in sports and physical activities, as well as their motivation for success of different types.

Despite the obvious improvements, and the indisputable fact that women are now an integral part of the sporting scene their position is still not at the highest level and it is largely determined by the actual place of women in society. This is also reflected in the following facts:

- for women's sports governments allocate less funds from the budget,
- women receive less prize money in tournaments, have fewer contracts, salaries and bonuses,
- percentage of women in various sports organizations is smaller,
- women are poorly monitored by the media than men.

As the most common reasons for insufficient physical activity women cite the following factors:

- lack of time – a lifestyle of modern women are completely different from the earlier times. Women are exposed to many obligations both at work and at home, and often do not have enough time for themselves,
- lack of motivation – some women do not feel sufficiently motivated for physical activity, due to the lack of a personal trainer or the workout friends, and some of them prejudice that exercise has to be painful, embarrassing and hard if we want to be helpful,
- lack of money – women who have lower incomes are less engaged in physical activity,
- family obligations – women with more children are less involved in regular physical activity,
- lack of energy – fatigue is a factor supporting rapid and strenuous life, so that women who work are often tired and have a little energy for devoting to additional activities,
- health problems – women, especially older ones, may have a chronic disease, which may limit their physical activity,
- stereotypical thinking – women who think that the child care and housework are »women's work«, are also less engaged in physical activity.

Certainly, apart from socio-cultural differences, less physical activity in women is also a consequence of anatomical – physiological characteristics that significantly determine the response to exercise, thus the willingness to deal with it.

It is well known that men tend to have proportionately more muscle mass, the more bone mass, a lower percentage of fat than women, which is primarily the result of action of gonadal steroid hormones.

Striking differences between men and women occur during puberty, when for the first time registered a typical android and gynoid fat distribution. For the same body mass index (BMI), women have about 10% more fat than men^{6,7}. In addition, women have a different distribution of subcutaneous adipose tissue with a higher prevalence of abdominal and gluteofemoral area^{8,9} due to increased activity of lipoprotein lipase, lipid synthesis, and insulin-stimulated glucose uptake^{10–12}.

Puberty is the period in which it becomes apparent anabolic effect of testosterone on skeletal muscle, where the boys get almost 35% more muscle mass and strength than girls. Testosterone stimulates myoblasts and increases the number of satellite cells, which promotes the synthesis of proteins and inhibition of apoptosis of osteoblasts leading to increase of bone formation^{13–15}.

Between the sexes, there is also a difference in the size of the lungs, which can have significant consequences. Women have smaller lungs, airways narrow, hence lower diffusion lung capacity of men, which combined with the action of reproductive hormones (estrogen and progesterone) can cause some pulmonary limitations during exercise. It has been observed that women may have a greater flow limitation in expiratory flow, increased work of breathing, and perhaps a greater exercise-induced arterial hypoxemia compared to man, with a negative effect on aerobic capacity and exercise tolerance in women^{16–18}.

When we talk about the cardiovascular system, there are also significant differences between the sexes. Women have smaller size and mass of left ventricle, as well as different blood pressure control. Left ventricular ejection fraction was approximately equal in men and women, with lower stroke volume in women which is compensated by higher heart rate^{19,20}. In the case of cardiovascular stress (exercise) men usually show increased vascular resistance, unlike the women who have a dominant increase of the heart rate¹⁹. Women have less sympathetic activity (lower vascular resistance and blood pressure) and increased parasympathetic activity than men. Regarding to this, during body movement, accompanied with fluids redistribution, women are more susceptible orthostatic hypotension and fainting²¹.

Besides the smaller size of the heart, women have fewer red blood cells, a small amount of hemoglobin, and thus lower oxygen-carrying capacity. Namely, in men each 100 ml of blood contains approximately 15–16 g of hemoglobin, while the values in women are less about 10%, with approximately 14g of hemoglobin per 100ml of blood. These differences in the concentration of hemoglobin contribute less aerobic capacity of women²².

The Beneficial Effects of Physical Activity

The health benefits of physical activity are well known. It has been proven that they include lower blood pressure, lower cholesterol, maintain a desirable body weight. In addition, physical activity is beneficial to mental health,

social engagement, improve sleep, and in older women reduce the risk of osteoporosis and bone fractures.

Depression is a common mental disorder. According to the WHO, more than 350 million people have problems with depression, and women are more susceptible than men. Numerous studies have shown that physical activity is positively correlated with a reduction in depression and depressive symptoms. Exercise leads to increased release of endorphins, a hormone that helps in fight against depression, causing the reduction of anxiety, stress and mood improvement^{23,24}. In addition, recent studies indicate the neuroimmunomodulatory effects of physical activity on the brain in depression and depression-like behaviors, by increasing the useful neuroimmune factors [interleukin (IL)-10, IL-6 (acutely), macrophage migration inhibitory factor, quiescent astrocytes, M2 microglia], and reducing adverse neuroimmune factors (Th1/Th2 balance, pro-inflammatory cytokines, C-reactive protein, M1 microglia and reactive astrocytes²⁵.

Better sleep is another benefit of exercises, and also an important factor that determines the quality of life. People who are more active fall asleep faster, have better sleep, and they are more productive and less tired during the day²⁶. Women who engage in physical activity sleep more and better, than women who lead largely sedentary lifestyle²⁷.

Additional benefits of physical activity may be registered in older women. It has been shown that regular physical activity can stimulate bone formation and regulates their maintenance, including the accumulation of minerals, leading to muscle strengthening, improving balance, and thus reducing the overall risk of falls and fractures^{28,29}.

Physical Activity in the Prevention and Treatment of Disease

Physical activity, definitely, has a preventive effect and leads to a reduction in the development of various diseases, and has been shown to have an important role in the therapeutic treatment of many diseases, which significantly affects the morbidity and mortality of the population.

Lack of physical activity in women and girls is associated with overweight and obesity, which can contribute to many health disorders. This includes a precocious puberty, the appearance of polycystic ovarian syndrome, gestational and type 2 diabetes, and the development of the metabolic syndrome and cardiovascular disease, osteoporosis and others.

Precocious puberty is one of the earliest forms of expressing health disorders in girls due to inadequate physical activity and obesity. Early sexual maturation among them is ten times more common and may be accompanied by various health and psycho-social manifestations³⁰. These girls are at greater risk for the development of polycystic ovary syndrome (PCOS). Women with PCOS have a problem to get pregnant, and PCOS is considered as one

of the most common causes of infertility in women. In addition, it is observed a significant correlation between PCOS and the risk of developing the condition known as pre-diabetes and type 2 diabetes mellitus. Approximately 30–40% of women with PCOS have pre-diabetes, and 12.6% have type 2 diabetes, where insulin resistance is registered in 65–70% of PCOS patients³¹. Physical activity, also, plays a role in the prevention of PCOS and in the treatment of this disease³².

Physical activity is an important factor in the prevention of diabetes, and no less important therapeutic regimen for patients suffering from this disease. Regular physical activity provides better control of blood glucose levels, increased insulin sensitivity, and can prevent or delay type 2 diabetes. Further acts upon the control of blood pressure and blood lipid levels, and prevent or delay the onset of diabetes-related complications. The results of randomized trials have shown that lifestyle changes, including physical activity and diet-induced weight loss, reduce by 58% the risk of developing type 2 diabetes in those with impaired glucose tolerance (IGT)^{33,34}. Structured exercise programs of ≥ 8 week's duration have been shown to lower HbA_{1c} by an average of 0.66% (7.65 vs. 8.31%, exercise than control groups) in people with type 2 diabetes, and this effect was not primarily mediated by weight loss³⁵. Current recommendations suggest that patients with type 2 diabetes should perform at least 150 minutes per week of moderate-intensity aerobic exercise and should perform resistance exercise 3 times per week. Among persons at high risk for developing type 2 diabetes, it is suggested structured programs that emphasize lifestyle changes that include moderate weight loss and regular physical activity (150 min/week), with dietary strategies^{36,37}.

Directly related to obesity and consequent insulin resistance, is the metabolic syndrome – a condition that is defined as an association of central obesity and high blood pressure, increased lipid levels and increased blood glucose values. It is believed that even in developed countries 20–30% of middle-aged and older have metabolic syndrome, which increases the risk of developing cardiovascular disease primarily and type 2 diabetes mellitus. The first step in the treatment of this syndrome is a change of lifestyle, with regular exercise as an essential element.

According to WHO, ischemic cardiac and cerebrovascular events remain the leading causes of mortality in the world. In a report from 2008 it is anticipated further growth trend of mortality from myocardial infarction and stroke in total mortality, from 21.9% as registered in 2004. year to 26.3% in 2030. year³⁸. There are numerous risk factors for cardiovascular disease, which can be generally divided into changeable and unchangeable. Emphasis is placed on the category of variable factors, particularly physical inactivity, bearing in mind that the American Heart Association (AHA) announced sedentary lifestyle as a major modifiable risk factor for coronary heart disease³⁹. There is strong evidence that the active person are in less cardiovascular risk than inactive people, where this risk can be lower to 40%^{40–42}. Although not yet fully understood mechanisms of cardio protective effects, seems to be of

most importance changes in the inflammatory/hemostatic factors and blood pressure⁴⁰. Regarding that, the AHA has recently defined a new concept of »ideal cardiovascular health«, which in addition to the absence of clinical cardiovascular disease involves the finding of normal levels of total cholesterol (200 mg/dL), blood pressure (120/80 mm Hg), blood glucose (100 mg/dL), as well as adherence to healthy behaviors, including having a lean body mass index (25 kg/m²), abstinence from smoking, participation in physical activity at recommended levels, along with an appropriate diet⁴³. It is observed that physical activity is an integral part of the concept.

In addition to prevention, physical activity is recommended in the treatment of patients with cardiovascular disease, with an exercise program must be individualized for each patient individually. Appropriate exercise programs for patients with coronary heart disease have multiple benefits, including improved functional capacity, reduce symptoms of myocardial ischemia, and subsequent coronary artery disease mortality, and, also, it is registered improve blood lipid profiles, body weight and blood pressure control⁴⁴.

Osteoporosis is a disease characterized by reduced bone mass. Although it can occur in all populations and at all ages, osteoporosis is a disease primarily of older women, due to the progressive postmenopausal bone loss. It is known that the normal bone loss is recorded about 3 decades of life and the peak bone mass is of crucial importance for its value in old age. During the period of growth and development, physical activity increases bone mass, this allows reaching the peak value while regular exercise slows or stops the bone loss in the elderly. Bonjour et al. using the modeling from epidemiological studies found that 10% increase in peak bone mass reduces the risk of fractures in postmenopausal patients by 50%⁴⁵. Also, it should be noted that different programs of exercise can prevent or reverse almost 1% of bone loss in both premenopausal and postmenopausal women⁴⁶.

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Physical Activity in the Woman's Special Physiological States

When it comes to physical activity in specific physiological states of women, it primarily refers to physical activity during menstruation and during pregnancy.

The essence of all examinations is that there is no reason to limit physical activity during menstruation, due to the fact that exercise has little or no effect on the menstrual cycle of women. Some papers pointed the possibility that physical activity may be associated with longer menstrual cycles, fewer days of bleeding and fewer irregular cycles^{47,48}. Just finding that physical activity is associated with longer menstrual cycle is one of the potential explanations how physical activity can reduce the risk of breast cancer. In some cases, exercise can have a negative effect on the menstrual cycle, but it is only registered in women with rigorous exercise (usually a professional athlete) whose menstrual irregularities (oligomenorrhea or amenorrhea) occur much more often. Also, it is shown that the menstrual cramps and pain less pronounced in physically active women compared to inactive⁴⁹.

When we talk about physical activity during pregnancy, there is strong evidence to suggest that physical activity isn't linked to a higher risk of early fetal loss, preterm delivery or low birth weight baby. On the other hand, the results of numerous studies affirm physical activity as a factor in reducing the risk of complications during pregnancy, especially preeclampsia and gestational diabetes, and the development of postpartum depression. About the importance of physical activity during pregnancy indicates the data that a special chapter in Physical Activity Guidelines for Americans devoted to this topic, with the recommendation that healthy women should have at least 150 minutes of moderate-intensity aerobic activity per week during pregnancy and the postpartum period¹.

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FIZIČKA AKTIVNOST KAO FUNKCIJA ZDRAVLJA ŽENA

SAŽETAK

Fizička aktivnost znači svaki oblik pokreta tijela koji je povezan s određenim metaboličkim zahtjevima. U isto vrijeme, tjelesna aktivnost je jedan od najvažnijih koraka u održavanju, zaštiti i unapređenju zdravlja. Postoje jaki dokazi koji ukazuju da je viša razina tjelesne aktivnosti povezana s brojnim preventivnim i terapijskim učincima u liječenju mnogih bolesti. Iako čine veći dio stanovništva, tjelesna neaktivnost češće je registrirana kod žena, što se može pripisati nizu razloga – od anatomske i fiziološke do društveno-psihološke. Ovaj članak raspravlja o nekim od najvažnijih prednosti povezanih s tjelesnom aktivnošću žena, kako bi potaknuo njihovo veće sudjelovanje u različitim oblicima tjelesne aktivnosti.