



AGING AND PHYSICAL ACTIVITY

STARENJE I TJELESNA AKTIVNOST

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SUMMARY

The need for movement is one of basic biological needs in humans. As people grow older, their involvement in physical activity tends to decrease. This reduction in physical activity may have negative effects on health in older adults (+65 years of age), especially due to physical changes and vulnerability attributed to aging. The term physical activity, for + 65 years age group, encompasses transportation, leisure time, household chores, occupational activities, play, games, sports or planned exercise in the context of daily, community and family activities. Regular physical activity in older adults has numerous health benefits. Regular physical activity in older adults reduces the risk of cardiovascular diseases, stroke, hypertension, various types of cancer, dementia, asthma, diabetes type 2 and fractures. Physically active older adults have lower prevalence diseases, higher level of cardiorespiratory and muscular fitness, healthier body mass and composition enhanced bone health and reduced all-cause mortality. World Health Organization recognizes physical inactivity as a major contemporary public health problem. World Health Organization has published a set of gave recommendations, Global recommendations on physical activity for health, in order to improve cardiorespiratory and muscular fitness, bone and functional health, reduce the risk of non-communicable diseases, depression and cognitive decline. These recommendations are applicable to all healthy adults aged 65 years and above regardless of gender, race, ethnicity or income level. Besides the recommendations, World Health Organization emphasizes the need for national authorities to promote healthy ageing by affirmation and implementation of the recommendations through national policies.

Key words: ageing, physical activity, health

SAŽETAK

Jedna od osnovnih ljudskih potreba je potreba za kretanjem. S godinama je uočena tendencija opadanja razine uključenosti u tjelesne aktivnosti. Ovo smanjenje razine tjelesne aktivnosti može negativno utjecati na zdravlje starije populacije (+ 65 godina života), posebice zbog tjelesnih promjena i drugih štetnih faktora vezanih uz starenje. Pojam tjelesna aktivnost, za populaciju +65 godina života, obuhvaća transport, slobodno vrijeme, kućanske poslove, aktivnosti na radnom mjestu, igru, sportske i rekreativne aktivnosti u kontekstu dnevnih, društvenih i obiteljskih aktivnosti. Redovita tjelesna aktivnost kod starije populacije smanjuje rizik od kardiovaskularnih bolesti, moždanog udara, povišenog krvnog tlaka, različitih vrsta raka, demencije, astme, dijabetesa tipa 2 i fraktura. Starije osobe koje su tjelesno aktivne imaju manju prevalenciju bolesti, višu sposobnost kardiorespiratornog i mišićnog sustava, zdraviju tjelesnu masu, gustoću kostiju i manji ukupni mortalitet. Svjetska zdravstvena organizacija je detektirala tjelesnu neaktivnost kao veliki javnozdravstveni problem današnjice. Stoga su objavili skup preporuka, Global recommendations on physical activity for health, s ciljem unaprjeđenja cjelokupnog zdravstvenog statusa i funkcionalnog zdravlja, smanjenja rizika od kroničnih nezaraznih bolesti, depresije i održavanja kognitivnih sposobnosti. Navedene preporuke su primjenjive za sve zdrave odrasle osobe starije od 65 godina, neovisno o spolu, rasi, vjerskoj pripadnosti ili prihodima. Uz ove preporuke Svjetska zdravstvena organizacija ističe potrebu promicanja zdravog starenja na nacionalnoj razini afirmacijom i implementacijom preporuka kroz nacionalne politike.

Ključne riječi: starenje, tjelesna aktivnost, zdravlje

INTRODUCTION

The need for movement is one of basic biological needs in humans. Physical activity (PA) is crucial for maintaining muscular and cardiorespiratory fitness and represents an important foundation of health throughout life. As people grow older, as they reach physical maturity, their involvement in PA tends to decrease(48). This reduction in PA may have negative effects on health in older adults (+65 years of age). There are differences between the present and previous generations of older adult, in present generation being less able to perform everyday activities than older adult from the former generations. The cause for this may be in decreased movement, physical activity and exercise in youth and adult life(19). This phenomenon is similar to the differences between active and inactive people. That is why some people in their sixties are often more vital than the average twenty years old.

PA is a key determinant of energy expenditure, and thus is fundamental to energy balance and weight control. Furthermore, regular participation in PA reduces the risk of diabetes, coronary heart disease and stroke, hypertension, colon cancer, breast cancer and depression(46,49,50,51).

World Health Organization (WHO) defined PA as “any bodily movement produced by skeletal muscles that requires energy expenditure and a behavior that encompasses all forms of activity, including walking and cycling, active play, work-related activity, and active recreation such as working out in a gym, dancing, gardening and competitive sports“. In 2010 WHO has issued Global recommendations on PA for health. According to those recommendations older adults should perform a minimum of 150 minutes of moderate to vigorous PA (MVPA) per week in bouts of at least 10 minutes(48). In a large study conducted by Tucker et al.(42), about adult's compliance with the Physical Activity Guidelines for Americans, only 6% to 26% of older adults meet the proposed guidelines. Therefore, further promotion and facilitation of regular PA among older adults is indispensable. The main task of PA promotion in this population is to determine safe and desirable volume of activity (moderate to vigorous) that an individual can perform regularly, in accordance to his/her health status.

According to the United Nations data, substantial increase in number of older adults is estimated in forthcoming years(44). In older adults, PA helps in maintaining and improving health, independence and quality of life(30). Hence, active lifestyle that involves regular engagement in MVPA may help in deceleration of age-related decline in physical functioning and support longer independent life(9,25,27,45,52). Due to age-related decline in physical functioning and PA, older adults are considered to be a population at risk for harmful health outcomes. Therefore, the need for PA interventions in this age-group cannot be overly emphasized. The biggest challenge in these interventions is to shift one's lifestyle from inactive to a more active. In order to ensure healthy aging, it is very important to include health

protective behaviors such as not smoking, moderate alcohol and regular PA and engaging in social and productive activities such as volunteer work(17). Numerous studies have confirmed benefits of regular PA for older adults and contributed to creation of the PA recommendations and guidelines for older adults with chronic diseases and disabilities(7).

PHYSICAL CHANGES AND BENEFITS OF PA

Through aging, people experience many physical changes and human body becomes more vulnerable and susceptible to disease risk factors. Specifically, incidence of degenerative diseases rises in older adult population (e.g. cardiovascular diseases, hypertension, malignant diseases, ankylosing spondylitis, arthritis, osteoporosis, respiratory diseases, diabetes, sclerosis, etc.). Some of these diseases result in decrease in body height and increase in weight which are the most visible physical changes. Causes of poor health status and premature biological aging in older adult population lie largely in physical inactivity and neglect of basic human need for movement. Likewise, it is necessary to distinguish the difference in health outcomes due to biological aging and due to physical inactivity. Regular PA and sports are among the basic tools in prevention and reduction of non-communicable chronic disease (NCD) risk factors.

Aging leads to natural reduction of physiological functions. With time muscle strength slightly decreases. Muscles become weaker, slower and their ability of rapid power development reduces. After 50 years of age, this process accelerates even more; men tend to lose around 2 kg and women about 1 kg of muscle mass within the next ten years. There are two types of muscle fibers: slow and durable, and fast and explosive. Elderly primarily lose fast muscle fibers. One of the muscles that is mostly affected by the fiber decrease is the front thigh muscle (quadriceps), responsible for rising, e.g. from a chair or climbing stairs.

Furthermore, height loss usually starts at about 35 to 40 years of age due to poor posture and compression of the intervertebral disks. While the height decreases, with age people become more prone to body weight increase. Weight gain in adulthood is attributed to both decrease in physical activity levels and excess caloric intake, typically occurring between age 25 and 45. However, after the age of 65, many older adults experience loss of appetite which results in weight decrease because the amount of daily calories is being reduced and hence insufficient for maintaining body weight. Good way of stimulating one's appetite, in a manner that caloric intake approximates caloric expenditure, is to engage in active healthy lifestyles(39).

The connection between body fat and aging is largely attributed to three factors: diet, reduced ability to mobilize fat stores, and physical inactivity. Aging is primarily accompanied with a displacement of body fat from the periphery toward the organs which can lead to cardiovascular and metabolic diseases. Physically active older adults have significantly less body fat and less dangerous displacement of fat stores, than their age-

matched sedentary peers. Therefore, physically active older adults have lower risk of experiencing cardiovascular and metabolic diseases(21). Body fat increases and gets redistributed, fat-free mass decreases with age due to reduction in general activity, and loss of muscle tissue which constitutes about 50% of the fat-free mass in older adults. Consequently, involvement of older men and women in regular physical activity will help reduce weight, percentage of body fat, increase fat-free mass and regulate changes in body composition.

Older adult often also experience pulmonary changes due to loss of elasticity in the lung tissue and stiffening of the heart and large elastic arteries. In order to prevent adverse vascular changes one should be involved in regular physical exercise. Regular aerobic exercise directly improves blood vessel and lung functions, particularly in populations with one or more risk factors. A most significant lung function changes that accompanies aging are the result of decrease in VO_{2max} (maximal oxygen uptake or maximal aerobic capacity) and HR_{max} (maximal heart rate). The following equation can be used to estimate average HR_{max} for a given age:

$$HR_{max} = [208 - (0.7 \times \text{age})].$$

Inevitably, VO_{2max} decrease with age (approximately 1% per year) due to following factors: genetics, general activity level, intensity and volume of training, reduced blood flow to the muscles, increased body weight and body fat mass and decreased fat-free mass(38).

There are numerous meta-analyses that confirm the evidence of extensive health benefits of regular PA in older adults. For instance, regular MVPA of 150 minutes per week reduces the risk of cardiovascular disease by 21-29%(22), stroke by 22-29%(7), elevated blood pressure by 19%(14), colon cancer by 26%(5), breast cancer by 12%(43), lung cancer by 23%(41), stomach cancer by 18%(1), bladder cancer by 20%(16), ovarian cancer by 24%(53), prostate cancer by 19%(25), pancreatic cancer by 28%(29), dementia by 14%(4), asthma by 12%(10), diabetes type 2 by 31%(15), and fractures by 29%(36). Physically active older adults have lower prevalence of above mentioned diseases, higher level of cardiorespiratory and muscular fitness, healthier body mass and composition, enhanced bone health and reduced all-cause mortality(3,31, 32,35).

Higher physical inactivity in the older adults population may also be caused by poorer physical functioning(13,23). Yet, regular PA is not only safe for this population but also highly correlates with higher levels of functional health and overcoming fear of falling, which is one of the important age-related issues that makes participation in PA frightening and less attractive to this population(6,8,26). Difficulties with mobility and PA could be caused by age-related musculoskeletal(12,20) and neural degeneration(11) which often results in reduced PA(37,40).

The fact that most people become sedentary as they age accelerates described processes of natural degeneration(27). On the other hand, regular PA ensure

effective performance of everyday activities, and contributes to good health and overall quality of life in older adults in an easy, joyous, low costly and easily accessible manner(2).

GLOBAL RECOMMENDATIONS ON PA FOR HEALTH IN OLDER ADULTS

WHO recognizes physical inactivity as a major contemporary public health problem. The term PA, for + 65 years age group, encompasses transportation (e.g. walking, cycling), leisure time PA, household chores, occupational activities (if one is still working), play, games, sports or planned exercise in the context of daily, community and family activities. After a thorough analysis of relevant literature WHO gave recommendations in order to improve cardiorespiratory and muscular fitness, bone and functional health, reduce the risk of NCDs, depression and cognitive decline:

1. Adults aged 65 years and above should do at least 150 minutes of moderate-intensity aerobic PA throughout the week or do at least 75 minutes of vigorous-intensity aerobic PA throughout the week or an equivalent combination of moderate- and vigorous intensity activity.
2. Aerobic activity should be performed in bouts of at least 10 minutes duration.
3. For additional health benefits, adults aged 65 years and above should increase their moderate intensity aerobic PA to 300 minutes per week, or engage in 150 minutes of vigorous intensity aerobic PA per week, or an equivalent combination of moderate-and vigorous-intensity activity.
4. Adults of this age group, with poor mobility, should perform PA to enhance balance and prevent falls on 3 or more days per week.
5. Muscle-strengthening activities should be done involving major muscle groups, on 2 or more days a week.
6. When adults of this age group cannot do the recommended amounts of PA due to health conditions, they should be as physically active as their abilities and conditions allow(48).

WHO's *Global recommendations on PA for health* are relevant and applicable to all healthy adults aged 65 years and above regardless of gender, race, ethnicity or income level. The guidelines emphasize that every person should increase personal PA level gradually. However, recommendations have to be adjusted with respect for each individual's health status. Older adults with NCDs or other health issues should seek medical advice before trying to meet recommended level of PA. All benefits of regular PA in older age are visible in healthy older adults as well as in those with NCDs.

Although, to date there is no sufficiently precise evidence for justifying the development of individual recommendations for various health conditions like cardio-respiratory health (coronary heart disease, cardiovascular disease, stroke and hypertension);

metabolic health (diabetes and obesity); bone health and osteoporosis; breast and colon cancer and prevention of falls, depression and cognitive decline; it seems that all above listed recommendations are applicable for all of them(48).

In order to enhance quality of life as people age, the WHO has emphasized the need for national authorities to promote healthy ageing by affirmation and implementation of these recommendations through national policies, which will accelerate the achievement of the recommended levels of PA and amplify additional investments in the field(47). National authorities should recognize that even with minimal investments and implementation of comprehensive policies a raise of the recommended levels of PA on a national level are possible. These recommendations need to be customized for each country, considering PA domain which is more prevalent at a population level (i.e. leisure time, occupational or transportation PA)(17).

CONCLUSION

Despite the described changes, that naturally occur with age it is wrong to believe that older adults should be involved only in light, slow exercises. Although, with age

people are at greater risk of injuries, if the exercise is performed properly, the risk will be minimized and not age-related. Increasing the strength and endurance of older adults through PA will also help reduce the risk of falls and related injury, and accelerate healing and recovery(18). Good physical fitness in older adults can be achieved by maintaining a high level of strength, flexibility and endurance through PA. Further, there is strong evidence that older people who engage in regular physical exercise have stronger immune systems opposed to the people who do not exercise, regardless of age(28). In general, the benefits of maintaining regular PA program outweigh risks.

When motivating sedentary people to engage in regular PA it is important to stress the benefits in a comprehensive way. Older adult should make PA an integral part of their everyday life because of its role in increasing energy levels and promotion of physical, mental, and psychological wellbeing and independence.

The most beautiful and the most positive truth related to PA is that it is never too late! Regardless of whether a person has been physically inactive or occasionally active, if exercise has been properly programmed, controlled and adapted to the individuals needs, positive effects of physical exercise will certainly follow.

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