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THE RELATIONSHIP OF PHYSICAL ACTIVITY, SLEEP QUALITY AND DEPRESSION IN GERIATRIC

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Abstract. *Aging is a continuous process that runs from conception and birth to the end of life. As the world's population ages, it becomes increasingly important to understand the complex relationships between physical activity and quality of life among the elderly. United Nations figures indicate an increase in the number of elderly people of more than 2% between 1950 and 2000, with projections estimating that they will make up 22% of the total population by 2050. Among the critical factors affecting geriatric health are physical activity, sleep quality, and mental health, especially depression. These elements are deeply interconnected, with each influencing the others in significant ways. At the same time, the elderly population reduces overall physical activity, affecting their quality of life. Older adults who are physically inactive tend to have greater health care needs, increased costs, and poorer quality of life compared to their active peers. Regular physical activity is therefore crucial for promoting healthy aging and independence in the geriatric population. In addition to physical activity, sleep quality is another critical factor that can profoundly affect the physical and mental health of older adults. Adequate participation in exercise has been shown to improve physiological functions and delay the aging process, while also improving the emotional adaptation of the elderly to aging through increased social support. In contrast, physical inactivity is associated with a variety of negative health outcomes, including depression, cognitive decline, and increased risk of mortality. Older adults who are physically inactive are more likely to experience sleep disturbances, which can further worsen depressive symptoms and contribute to reduced quality of life. Understanding these associations can serve to introduce interventions to improve the quality of life in the elderly.*

Key words: *elderly people, physical activity, sleep, depression*

Introduction

Aging is a continuous process that runs from conception and birth to the end of life. The aging process has two components: positive, which implies the development of functions in the organism, and negative, which implies the decline of functions. Although the concept of aging is most often associated with changes that are harmful to the body, in some cases changes can also be beneficial, such as greater

experience, wisdom, etc. As the world's population ages, it becomes increasingly important to understand the complex relationships between physical activity and quality of life among the elderly [1]. Among the critical factors affecting geriatric health are physical activity, sleep quality, and mental health, especially depression. These elements are deeply interconnected, with each influencing the others in significant ways. Data from the United Nations indicate an increase in the number of elderly people of more than 2% between 1950 and 2000, with projections estimating that they will make up 22% of the total population by 2050 [2]. At the same time, the elderly population reduces overall physical activity, affecting their quality of life [3]. Maintaining physical and mental well-being is of utmost importance as individuals age. The most common mental disorders in the elderly population are dementia, depression and anxiety disorders [4]. Mental illness increases the risk factor for developing physical comorbid conditions among older people in middle-income countries [5]. Depression is a debilitating disease that affects individuals, and depressive states are not only associated with organic problems such as chronic low back pain and headache attacks [6-8], but also with behavioral problems such as insomnia and anger [9, 10]. Older adults who are physically inactive tend to have greater health care needs, increased costs, and poorer quality of life compared to their active peers. Regular physical activity is therefore crucial for promoting healthy aging and independence in the geriatric population. In addition to physical activity, sleep quality is another critical factor that can profoundly affect the physical and mental health of older adults. Adequate participation in exercise has been shown to improve physiological function and delay the aging process, while also improving older adults' emotional adaptation to aging through increased social support. In contrast, physical inactivity is associated with a variety of negative health outcomes, including depression, cognitive decline, and increased risk of mortality. Older adults who are physically inactive are more likely to experience sleep disturbances, which can further worsen depressive symptoms and contribute to reduced quality of life. Research around the world, especially in highly developed countries, indicates reduced physical activity among new generations. There are several reasons for reduced physical activity in the elderly: muscle loss and weakness, joint fractures, fear of falling, social isolation, health problems, limited access, time constraints, and others [11,12]. On the one hand, the number of cases of chronic degenerative diseases (cardiovascular, endocrine-metabolic and locomotor system) is increasing, while on the other hand, we have a longer average life expectancy. The result of the interaction of these two factors inevitably leads to a decrease in the quality of life. Understanding these associations can inform interventions to improve quality of life in the elderly.

Influence of physical activity on depression

Physical activity has long been recognized as a key component of overall health, offering numerous benefits that extend into old age. Physical activity, apart from its positive impact on physical health, plays an important role in improving mental health. Today, physical activity is used as a therapeutic tool in a large number of psychological disorders. It is effective in anxiety disorders, depression, in the fight

against stress, in the treatment of mental disorders, dementia, etc. Apart from the direct impact on neurotransmitter systems, endorphins and hormones, physical activity increases self-esteem and self-confidence, improves cognitive functions and socialization of the patient. According to the recommendations of the World Health Organization, it is necessary to carry out daily physical activity for at least half an hour or at least three times a week for one hour [13]. Physical activity plays a major role in improving the life of today's modern man, especially in terms of preserving and improving psychophysical health. It is necessary to find the optimal way of physical exercise for the individual, i.e. by choosing an activity that he enjoys and through which he can reduce tension and experienced stress. There are significant positive changes in an individual's health under the influence of physical exercise, which refers to both the individual's physical and psychological well-being, which indicates the direct impact of physical activity on increasing the individual's quality of life. Positive changes in mood occur in a multidimensional way. There are physiological and biochemical changes in the body, changes in the way of thinking, experiencing oneself and the environment under the influence of physical activity [14].

In geriatrics, regular physical activity is especially important as it helps maintain mobility, manage chronic conditions and improve mental health. Numerous studies have shown that physical activity can significantly reduce symptoms of depression in the elderly. Exercise increases the production of endorphins, often called "feel-good" hormones, which can alleviate feelings of sadness and anxiety. Furthermore, physical activity can improve self-esteem and provide a sense of accomplishment, both of which are important for mental health. Muscle-strengthening activities should be included in the routine two or more days each week [15]. Physical activity must be such that the individual approaches it voluntarily, that the activity has a positive effect on his physical health, that it includes him or facilitates his inclusion in the social community, that it gives him a sense of self-confidence and satisfaction [16].

In research dealing with the connection between physical activity, increasing general well-being and the level of mental health, it is often a problem to determine the course of action due to the assumption that people with a higher level of mental health are more likely to engage in some physical activity. An increase in physical activity results in an increase in the level of general well-being and resistance to mental health disorders, which also increases the motivation for further participation in physical activities [17]. The results of Downward and Rasciute's research [18] showed that playing sports is positively related to subjective well-being, whereby sports in which social interactions with others are possible, such as team sports, additionally contribute to a greater sense of subjective well-being. Similar results were obtained by Huang and Humpreys [19] and Ruseski et al. [20] in which it is assumed that physical activity contributes to the feeling of subjective well-being through a beneficial effect on physical health. In an international study that included over 17,000 subjects aged 17 to 30, it was found that there is a strong positive association between life satisfaction and physical activity. In addition, those participants who exercised more often reported greater life satisfaction than those who exercised less regularly [21]. While there is a considerable amount of evidence that testifies to the positive physiological consequences of regular physical activity, the research

findings of studies dealing with the relationship between physical activity and mental health are not so unique. The results of some studies conducted in the eighties of the last century, but also those of an earlier date, indicate that physical activity of moderate and low intensity can have favorable effects on mood and well-being, while physical activity of high intensity can result in an increase in tension, anxiety and fatigue [22]. King et al. [23] found no statistically significant differences in the measures of depression, tension, well-being and mood in participants who engaged in aerobic training for 6 months and participants who were in the control group. The relationship between physical activity and depression is bidirectional. While physical activity can reduce symptoms of depression, depression itself can act as a barrier to engaging in physical activity. Depression is the main reason that causes disability in a person, makes their daily activities difficult, affects their physical health, and is also unable to concentrate in a certain situation [24]. Older adults with depression may experience decreased motivation, fatigue, and physical discomfort, which may inhibit their ability to exercise. Therefore, addressing depressive symptoms is essential to encourage physical activity in the elderly.

Sleep quality and its influence on depression

Sleep quality is another critical factor affecting the mental health of the elderly. Sleep duration changes with age. The National Sleep Foundation recommends 7-8 hours of sleep for adults over the age of 65 [25]. Vitiello and Prinz [26] state that elderly people spend more time in bed, sleep less, need more time to fall asleep, wake up more often and subsequently stay awake longer, and have less efficient sleep. Nocturnal sleep latency (time taken to fall asleep) may be prolonged in the elderly [27]. Sleep duration has been shown to be slightly shorter in older compared to younger and middle-aged adults [28]. The explanation for this could be that they are older, except that they sleep more often during the day, they slept more often 1-2 hours before going to sleep and thus needed a longer period to fall asleep. While napping is common among the elderly, the results regarding the benefits or harms of this practice are mixed. Some studies show beneficial and potentially protective effects of napping in later life, while others show that it is a risk factor for morbidity and mortality [29].

Poor sleep quality and insomnia are common in the geriatric population, often as a result of physiological changes, medical conditions, and side effects of medications. According to academic research, 40–70% of older adults have persistent chronic sleep problems, and more than half of these cases are misdiagnosed [30]. Executive dysfunction, which impairs memory, planning, organization, emotional regulation, and impulse control, is also associated with poor sleep [31]. Several studies have highlighted that poor sleep quality is an important warning sign for psychiatric and medical disorders in the elderly [32,33,34]. Insomnia doubles the risk of developing depression [35]. Among the elderly, depression has become the second most common mental disorder after Alzheimer's disease [36]. It is also the only mental disorder that ranks at the top in terms of disease burden in both high- and low-income countries. It

has been reported that about 80% of older adults commit suicide as a result of depression [37].
Sleep disturbances can worsen symptoms of depression, creating a vicious cycle in which poor sleep leads to worsening depression, which in turn further impairs sleep. Quality sleep is essential for emotional regulation and cognitive function. During sleep, the brain processes emotions and experiences, which is crucial for maintaining mental health.

Physical activity and sleep quality

Physical activity and sleep quality are closely related. Regular physical activity has been shown to improve sleep quality by helping to regulate circadian rhythms, increasing sleep efficiency and reducing the time it takes to fall asleep. Exercise can also reduce the incidence of sleep disorders such as sleep apnea and restless legs syndrome, which are common in older adults and can seriously affect sleep quality. Poor sleep quality and abnormal sleep duration (more or less than 7-8 hours per day) have been found to be associated with increased morbidity and mortality. It has been shown that exercise, which is performed for more than one hour per day, is associated with a longer duration of sleep, and it has been established that low-intensity exercises have positive effects on sleep [38].
Sleep disorders in the elderly are associated with an inactive lifestyle. It has been observed that older people who exercise regularly have better sleep quality and fewer sleep problems [39,40,41]. Physical activity can relieve symptoms of anxiety and stress, which often contribute to sleep disorders. Research conducted by Yang et al. [42] showed that physical activity has a positive effect on the sleep quality of adults and middle-aged adults with sleep disorders. Benloucif et al. [43] also mentioned that exposure to physical activity in the morning or evening, consisting of stretching exercises, low-impact aerobic activity, and playing games, improves sleep quality in the elderly. In addition, according to research by Hartescu et al.[44], low-intensity physical activity could improve sleep quality in the elderly, and a higher level of physical activity was associated with excellent sleep quality in the elderly.
By promoting relaxation and reducing stress levels, exercise can create a more conducive environment for sleep. Consequently, improved sleep quality can improve general well-being and reduce the risk of depression.

Conclusion

Understanding the interrelationship between physical activity, sleep quality, and depression in older adults is essential for developing effective interventions to improve their quality of life. Promoting regular physical activity can lead to improved sleep quality and mental health, while addressing sleep disorders can further reduce symptoms of depression and encourage a more active lifestyle. By recognizing and considering these interconnections, health care providers can offer comprehensive care that significantly improves the quality of life of older adults.

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POVEZANOST FIZIČKE AKTIVNOSTI, KVALITETA SPAVANJA I DEPRESIJE U GERIJATRIJI

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Sažetak. *Starenje je kontinuiran proces koji teče od začeća i rođenja do kraja života. Kako svjetska populacija stari, postaje sve važnije razumjeti složene odnose između fizičke aktivnosti i kvaliteta života među starijima. Podaci Ujedinjenih nacija ukazuju na povećanje broja starijih od 2% između 1950. i 2000. godine, sa projekcijama koje procenjuju da će oni činiti 22% ukupne populacije do 2050. godine. Među kritičnim faktorima koji utiču na gerijatrijsko zdravlje su fizička aktivnost, kvalitet spavanja i mentalno zdravlje, posebno depresija. Ovi elementi su duboko međusobno povezani, pri čemu svaki utiče na druge na značajan način. Istovremeno, starija populacija smanjuje ukupnu fizičku aktivnost, utičući na njihov kvalitet života. Starije odrasle osobe koje su fizički neaktivne obično imaju veće potrebe za zdravstvenom zaštitom, povećane troškove i lošiji kvalitet života u poređenju sa svojim aktivnim vršnjacima. Redovna fizička aktivnost je stoga ključna za promovisanje zdravog starenja i nezavisnosti u gerijatrijskoj populaciji. Pored fizičke aktivnosti, kvalitet spavanja je još jedan kritični faktor koji može duboko uticati na fizičko i mentalno zdravlje starijih osoba. Pokazalo se da adekvatno učešće u vežbanju poboljšava fiziološke funkcije i odlaže proces starenja, dok takođe poboljšava emocionalnu adaptaciju starijih osoba na starenje kroz povećanu društvenu podršku. Nasuprot tome, fizička neaktivnost je povezana sa različitim negativnim zdravstvenim posledicama, uključujući depresiju, kognitivni pad i povećan rizik od smrtnosti. Starije odrasle osobe koje su fizički neaktivne češće doživljavaju poremećaje spavanja, što može dodatno pogoršati simptome depresije i doprineti smanjenom kvalitetu života. Razumijevanje ovih asocijacija može poslužiti za uvođenje intervencija za poboljšanje kvaliteta života kod starijih osoba.*

Ključne riječi*: osobe starije životne dobi, fizička aktivnost, spavanje, depresija*