

ISRG Journal of Arts, Humanities and Social Sciences (ISRGJAHSS)



ISRG PUBLISHERS

Abbreviated Key Title: ISRG J Arts Humanit Soc Sci

ISSN: 2583-7672 (Online)

Journal homepage: <https://isrgpublishers.com/isrgjahss>

Volume – II Issue-VI (November-December) 2024

Frequency: Bimonthly



Health Risks of Physical Activity in the Elderly

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| **Received:** 13.12.2024 | **Accepted:** 18.12.2024 | **Published:** 21.12.2024

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Abstract

Physical activity is integral to promoting health and longevity in older adults, offering benefits such as enhanced mobility, improved mental health, and reduced risk of chronic diseases. However, aging brings physiological changes, including diminished balance, reduced muscle strength, and sensory impairments, which heighten the risks of falls, musculoskeletal injuries, and other complications during exercise. Preexisting conditions such as arthritis, cardiovascular disease, and neurological disorders further increase the complexity of engaging in physical activity safely. This article examines the multifaceted health risks associated with physical activity in the elderly, highlighting the need for tailored exercise programs and professional supervision to mitigate these dangers. It emphasizes strategies for injury prevention, including functional assessments, gradual progression, and education on proper techniques. By balancing the benefits and risks, this study underscores the importance of creating safe, individualized approaches to encourage active lifestyles in older adults, ultimately enhancing their overall health and quality of life.

Keywords: elderly, physical activity, health risks, aging, injury prevention, tailored exercise programs, balance

Introduction

With the increasing life expectancy of the global population, the importance of maintaining physical activity in old age is well-known for its benefits in improving quality of life, improving mobility, and preventing chronic diseases. Physical activity and the need for it are rooted in the genetic makeup of humans. Early humans had to possess abilities resulting from a level of physical fitness in order to survive. Today, the need still exists, but technological advances have reduced activity. However, many applications offer the possibility of monitoring current activity what

can motivate to reach further goals [1,2,3]. In older people, it plays a very important role due to a number of properties that help maintain a higher level of quality of health. This also applies to the psychological sphere and the effects of hormones that provide arousal and satisfaction. However, physical activity in older people is not without risks. Understanding these potential risks is crucial to designing safe and effective exercise programs tailored to this demographic group [4,5,6,7].

Engaging in physical activity is a well-established means of promoting health and longevity across all stages of life. However, for the elderly population, the benefits of staying active must be carefully weighed against the unique health risks they face. As the global population ages, understanding these risks becomes increasingly important to ensure that older adults can participate in physical activity safely and effectively. This article explores the complex interplay between the physiological changes associated with aging and the potential hazards of physical activity, offering insights into how these challenges can be managed [8,9].

The aging process brings about a host of changes, including reduced bone density, loss of muscle mass, and alterations in cardiovascular and respiratory systems, all of which can heighten the risk of injury or adverse health events during exercise. For many elderly individuals, preexisting conditions such as arthritis, osteoporosis, or cardiovascular disease further complicate their ability to engage in physical activity without experiencing negative outcomes [10,11,12].

Despite these risks, the advantages of regular exercise for older adults are profound. Physical activity can improve balance and coordination, enhance mental health, and reduce the likelihood of chronic diseases, making it an essential component of healthy aging. The challenge lies in balancing these benefits with the potential dangers, which underscores the need for tailored exercise programs and expert guidance [13,14].

This article aims to provide a comprehensive overview of the health risks associated with physical activity in the elderly, highlighting the importance of individualized approaches to exercise. By examining current research and practical strategies, we seek to empower healthcare providers, caregivers, and older adults to make informed decisions about incorporating physical activity into their lives safely. In doing so, we hope to contribute to a broader understanding of how to promote health and well-being in aging populations while minimizing risks [15,16,17].

Musculoskeletal Injuries

Older people are at greater risk for musculoskeletal injuries due to age-related declines in bone density, joint integrity, and muscle mass. Common injuries include sprains and strains. Weakened muscles and connective tissues make older people more susceptible to soft tissue injuries. The coordination and cooperation of nerve fibers with muscle cells deteriorates. As a result, body control is weakened, which is especially noticeable on slippery and uneven surfaces. Sprains occur when ligaments (the tissue that connects bones) are overstretched or torn. Common locations include the ankles, knees, and wrists. Strains involve overstretching or tearing muscles or tendons [18,19]. Back and hamstring strains are particularly common in older people. Another factor is fractures. Osteopenia and osteoporosis, a diseases that cause a decrease in bone density, are a major contributor to these. It is common in older people and increases the likelihood of fractures, especially during high-impact activities or falls. Older people are at greater risk of fractures, particularly in the hips, wrists and spine. Joint pain resulting from, for example, years of overuse and exacerbation of arthritis can significantly reduce the comfort of activity, as well as the physical activity itself. Tendinopathies are worth mentioning. Conditions such as tennis elbow (lateral epicondylitis) and Achilles tendonitis are common due to repetitive movements or overuse, which older tendons are less prepared to handle. Conditions such as osteoarthritis lead to chronic pain and consequently limited mobility. Osteoarthritis, which occurs in

older people, can lead to wear and tear of cartilage. High-impact or repetitive activities can exacerbate this condition, causing joint pain, stiffness and swelling [20,21,22]. At the joint level, bursitis (inflammation of the fluid-filled sacs that cushion the joints) and other soft tissue injuries can also occur. It is worth emphasizing that they are common in older people who engage in repetitive or excessive physical activity.

There are many causes of injuries to the musculoskeletal system. The risk of osteopenia and osteoporosis increases with age. Both conditions involve a decrease in bone density, which in turn increases the risk of fractures. In the context of muscles, sarcopenia should be mentioned, i.e. the loss of muscle mass with age [23,24,25,26]. This affects lower physical resistance and also increases susceptibility to overload. At a later age, it is very important to take care of the integrity of the joints. Degeneration of cartilage and connective tissue causes pain, but above all limits the range of movement and negatively affects shock absorption. In the latter case, the problem mainly concerns the spine, whose natural function is to dampen shocks and vibrations affecting the body. The risk of potential injuries is increased by the lack of or insufficient preparation for exercise. Failure to warm up causes the musculoskeletal system to become vulnerable to strains, tears or other conditions resulting from the resulting overloads. Of course, excessive effort caused by, for example, an incorrect assessment of one's own strength and capabilities may also be the cause of health problems. Similarly, improper movement technique can cause problems, which often leads to injuries or worsens them. Environmental conditions play a significant role in later life [27]. Uneven surfaces, poor lighting, slippage can even lead to serious injuries, and it should be remembered that the level of coordination, reflexes and safety skills in older people are lower [28,29].

It is worth introducing a number of preventive measures that will not only help avoid potential injuries, but above all, maintain fitness and activity in older people. The first step is to assess their health before starting activity. It is worth having older people thoroughly checked for their physical condition, but also for the possible occurrence of diseases, including lifestyle diseases such as atherosclerosis, diabetes, hypertension or overweight. All of them can significantly hinder physical activity and also carry the risk of health complications. An individually selected exercise program should be used, which will take into account possible dysfunctions and will be adjusted to the exercise capacity. It is recommended to do 1-2 strength training sessions and 3 endurance training sessions, while the selection of loads and intensity must correspond to the aforementioned abilities to undertake a given physical work. Strength training, in addition to strengthening muscles and increasing bone density, improves joint stability, increases their flexibility, which at the same time reduces the risk of injury. Endurance training is primarily about taking care of the proper condition of the circulatory system, improving peripheral circulation and microcirculation, and thus increasing the level of activity and vitality of individual body cells and maintaining a higher level of functional efficiency. Treatment and Rehabilitation [30,31,32,33].

The risk of cardiovascular complications increases with age. Of course, regular physical exercise strengthens the circulatory system and supports its proper functioning, but one should be aware of the risk of adverse events. One of the more common cases is arrhythmia. Intense activity, increased excitability of the heart

muscle can affect the irregularity of heart beats, which in turn increases the risk of a heart attack. A heart attack, in turn, is defined as the state of the heart muscle at the moment of ischemia. In addition to arrhythmia, it can be caused by hypertension, sudden jumps in heart rate, functional defects of heart valves, clots and emboli formed in the arteries, peripheral or coronary circulation. There is no denying that coexisting atherosclerosis, which is the cause of a reduction in the lumen of blood vessels and obstruction of blood flow, strongly contributes to the occurrence of a heart attack. Education and awareness of how the body functions and whether in a given case there are diseases that affect the circulatory system and the whole body are also important. In such a case, there is no disqualification from engaging in physical activity, but you must adhere to the restrictions and, above all, be subject to constant medical supervision [34,35].

Falls and Balance Issues

The sense of balance and body coordination, understood as the ability to combine movements of different intensity and range, tend to deteriorate with age due to changes in muscle strength, the quality of the functioning of the neuromotor system, i.e. connections between the bundles of the nervous system and muscle cells, and sensory functions. Physical activities that involve rapid changes in direction, uneven surfaces and the need to maintain balance or complex movements increase the risk of falls, which is one of the main causes of hospitalization in the elderly. It is worth mentioning that falls can result not only in musculoskeletal and joint injuries, but also concussions and brain injuries. Then, the quality of everyday life deteriorates significantly, and the inability to continue physical activity is the least severe punishment in this case [36,37,38]. The causes of falls should be sought mainly in the aforementioned sensory disorders. Poorer vision, especially in the autumn-winter period, a decrease in the quality of the functioning of the vestibular system responsible for the sense of balance and spatial orientation, as well as poorer proprioception have a significant impact on spatial awareness and maintaining balance. In older people, chronic neurological conditions such as peripheral neuropathy or Parkinson's disease may occur. In such cases, the activity undertaken must be specifically targeted and take into account mobility problems resulting from existing diseases. In such cases, it is important to perform physical activity under the supervision of an instructor, with ongoing monitoring of the level of difficulty and progress. Even minor overloads or the application of movements beyond the acceptable range may result in pain or even deterioration of health. In this case, even rehabilitation exercises performed as part of regular physiotherapy may be a type of exercise [39]. Thanks to this, one can even count on an improvement in fitness. For people with neurological conditions, psychological support seems to be important, helping to overcome the fear barriers associated with undertaking physical activity [40,41,42].

Dehydration and Heat-Related Illnesses

Older people often have a reduced sense of thirst and a reduced ability to regulate body temperature, making them more susceptible to dehydration. By definition, this is a state of loss of water and electrolytes, which are essential for the proper functioning of the body. Especially in warm climates, people are exposed to increased sweating and water loss. It is also worth adding that with age, kidney function may be impaired and water resorption may be reduced. Insufficient fluid intake during exercise, in turn, may consequently lead to fatigue, dizziness or disorientation. Another consequence, which concerns the

mentioned areas with high temperature and humidity, is the phenomenon of heat stroke, when the body is unable to lower the temperature. Fluid loss further aggravates this condition. Habit seems to be important in the absence of adequate hydration. Failure to meet the basic conditions related to fluid assimilation during physical activity and lack of awareness related to, among others, the recommended amount of fluid intake causes additional problems in this regard. The risk of dehydration also increases with the use of diuretics, which is often part of ongoing treatment for older people. Diabetes, considered a disease of civilization, also contributes to dehydration due to the fact that the body, in order to get rid of excess sugar, increases the intensity of renal filtration, which translates into greater water excretion [43,44,45].

Overtraining and Fatigue

Without proper regeneration and rest, older people can experience chronic fatigue. This results in further abnormalities, including weakened immunity and thus increased susceptibility to infections. Mental burnout may occur, which is related to, among other things, maintaining an exercise routine and, as a consequence, abandoning further physical activity. Overtraining syndrome (OTS) should be mentioned [46,47]. The tendency to damage the musculoskeletal system becomes dangerous, as well as the appearance of pain in the muscles and joints, especially of the overload type, enthesopathies, a tendency to inflammation of tendons and fatigue fractures, weaker metabolism, and changes in body weight [48]. During excessively intense physical exercise, muscle tissue is damaged. Cytokines appear in the blood at that time, which determine the development of inflammation. An unstoppable cascade of these changes causes an unfavorable reaction of the brain, liver, and immune system. Susceptibility to various types of infections and allergies may occur [49,50]. Overtraining syndrome can also result in a worsening of the mental state, increased susceptibility to stress, impaired cognitive functions, and often also depression, also caused by hormonal disorders. Fatigue itself can be short-term (acute) and long-term (chronic). Acute fatigue is much safer in terms of time, the symptoms of which pass much faster. It is worth mentioning the mechanisms of regulating energy demand. The routes used in later life may be less effective, which is partly related to a different metabolic rate. For this reason, it is even more important to remember about the right diet and the proportions of carbohydrates, proteins and fats [51].

The level of fatigue can be influenced by improper training practices and poor load programming. In addition, accompanying chronic diseases such as arthritis, diabetes or circulatory system diseases. Stress is a separate factor. Especially chronic stress reduces the level of motivation and the willingness to undertake the effort associated with physical activity. Among the psychological symptoms that constitute a hindrance are also a low mood, irritability or coexisting fears. In addition, there is poor sleep quality or even insomnia. In old age, excessive exercise can cause illness or worsen cardiovascular diseases, which include the arrhythmias and hypertension mentioned in the article. Therefore, it is important to remember about the quality and effectiveness of rest, sleep quality and monitoring of activity, subjective symptoms of fatigue, as well as following the principles of healthy nutrition [52, 53].

Psychological Risks

Although exercise often improves mental health, it can sometimes have negative effects, such as fear of being perceived badly by society, low fitness levels, poor performance, or not being up to the

challenge. Importantly, if exercise routines are not socially or inclusively inclusive, they can unwittingly reinforce feelings of loneliness [54,55,56].

Physical activity is often promoted as a way to improve physical and mental well-being in all age groups, including older adults. While its benefits are well-documented, engaging in physical activity also carries psychological risks for older adults. These risks can result from unrealistic expectations, pre-existing mental health issues, and the social and emotional challenges associated with aging [57,58].

It turns out that older adults often have a fear of injury or falling during exercise. This, in turn, can lead to a complete lack of physical activity and a sedentary lifestyle. Also, setting overly ambitious fitness goals can lead to discouragement and withdrawal from taking part in exercise. In more severe cases, the lack of satisfaction resulting from achieving goals can lead to depression. The aforementioned exhaustion does not only concern the physical sphere, but also the mental sphere to a great extent, affecting volitional traits. A psychological barrier can also be the appearance and reluctance to present oneself in a group of people exercising, which deepens social isolation [59,60].

Lack of support can be a difficult barrier to overcome. Insufficient support from family, friends or professionals can increase feelings of isolation or discouragement. Older people may have impaired cognitive functions, which is a significant barrier to taking on new activities.

It is worth taking care to recognize any fears that occur before taking up physical activity, to gradually increase the load and set goals to achieve, to monitor activity, and to weave in relaxation programs, which can prevent excessive load and increase the level of motivation associated with taking up exercise. This can be helped by education and increasing awareness of the mechanisms of the body's physiology and the impact of physical activity on the body. By understanding these risks and implementing effective prevention strategies, older people can take up physical activity with confidence and reap its mental and physical benefits. A balanced and supportive approach ensures that physical activity remains a positive and empowering experience for older people [61,62].

Complications from Pre-Existing Conditions

Many older adults live with chronic health conditions that can interact in complex ways with physical activity. These include diabetes, as mentioned earlier. Vigorous exercise can lead to hypoglycemia or hyperglycemia if blood sugar levels are not carefully monitored. Conditions such as chronic obstructive pulmonary disease (COPD) can make aerobic exercise more difficult, increasing the risk of shortness of breath or respiratory failure [63,64,65].

People with Parkinson's disease, dementia, or other neurological conditions may face additional risks related to coordination and cognitive function during exercise [66].

To maximize the benefits of physical activity while minimizing the risks, certain precautions should be taken. Older adults should consult their physician before starting a new exercise program, especially if they have pre-existing health conditions. Programs should be tailored to the individual's fitness level, health status, and preferences. The emphasis should be on low-intensity, aerobic activities. Working with qualified trainers or attending group

classes designed for seniors can help ensure proper technique and safety. The intensity and duration should be increased gradually to allow the body to adapt and reduce the risk of injury or overexertion. Appropriate footwear, clothing and other aids (e.g. Nordic walking poles) can increase safety and comfort during physical activity [67,68,69].

A gentle warm-up that involves all parts of the body significantly reduces the risk of injury. Ensuring regular fluid intake and avoiding extreme weather conditions can prevent dehydration and heat-related complications. Older adults should be educated on how to recognise the early signs of overexertion, dehydration or injury. Understanding when to stop and seek medical attention is crucial. Encouraging exercise or group activities in community centres can provide both motivation and an extra layer of safety, as peers can monitor each other. Regularly meeting with healthcare providers or trainers to assess progress and adjust exercise plans can help address emerging health concerns or changing abilities [70].

Conclusion

While physical activity offers significant benefits for older adults, it is essential to recognize and address the associated risks. A balanced approach, informed by medical advice and tailored to individual capabilities, can help older individuals enjoy the advantages of exercise while minimizing potential harm. By prioritizing safety and adopting preventative strategies, older adults can maintain an active lifestyle that supports both physical and mental well-being.

In conclusion, while physical activity is widely recognized as a cornerstone of healthy aging, it is crucial to acknowledge and address the associated health risks for the elderly population. Age-related physiological changes, such as decreased bone density, reduced muscle mass, and diminished cardiovascular resilience, can increase susceptibility to injuries and complications. However, these risks should not deter elderly individuals from engaging in regular physical activity; rather, they highlight the importance of tailored exercise programs designed to accommodate individual capabilities and limitations.

Healthcare providers play a pivotal role in promoting safe and effective physical activity among older adults. Comprehensive assessments, including medical history reviews and functional fitness evaluations, can help identify potential risk factors and guide the development of personalized exercise regimens. Additionally, educating elderly individuals about proper techniques, suitable intensity levels, and the importance of gradual progression can significantly mitigate the likelihood of adverse outcomes.

The benefits of physical activity, such as improved mobility, better mental health, and enhanced quality of life, often outweigh the risks when approached with appropriate precautions. Community-based programs and resources can further support older adults in maintaining an active lifestyle by fostering social connections and providing accessible, low-impact exercise options.

Future research should continue to explore the nuanced relationship between physical activity and health risks in the elderly, with an emphasis on identifying best practices for injury prevention and management. By prioritizing a balanced approach to physical activity, society can empower older adults to enjoy the

myriad advantages of an active lifestyle while minimizing potential harm.

Ultimately, understanding and addressing the health risks of physical activity in the elderly requires a collaborative effort among healthcare professionals, caregivers, policymakers, and the individuals themselves. Through education, innovation, and support, we can ensure that aging populations reap the full spectrum of benefits that physical activity has to offer while safeguarding their health and well-being

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