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The Influence of Racket Sports on Longevity and Comprehensive Health Benefits

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Abstract

Introduction and aim: Physical activity is one of the key components of human life, essential for maintaining health. Racket sports, which emphasize endurance and coordination while engaging a larger number of participants, are increasing in popularity. The aim of this work is to analyze the impact of racket sports on human health in comparison to individual sports.

Materials and methods: The analysis is based on a thorough review of peer-reviewed literature published between 2006 and 2025, ensuring the inclusion of the most up-to-date insights. Knowledge was sourced from PubMed, Google Scholar and Scopus using the advanced search with terms „racket sports” with „and” and „health”, ultimately returning 2769 results.

Results and conclusion: Racket sports offer significant health benefits, including improved cardiovascular function and musculoskeletal health, while also promoting mental well-being and social engagement. The interactive nature empowers social connections which are crucial for mental health, particularly preventing loneliness and depression. While the risk of injury exists, preventive measures may ensure continued benefits of these sports, making them an excellent choice for promoting health and longevity.

Key words: racket sports, health, badminton, tennis, injury

Introduction

Physical activity is one of the dominant factors in maintaining an overall patient’s health and preventing physical and mental deterioration. Moreover it is consistently linked to healthier aging, increased life expectancy and a greater likelihood of maintaining functional independence in later life [1]. On the other hand, a sedentary lifestyle contributes to poorer well-being, increased risk of chronic diseases and premature mortality. Insufficient physical activity is responsible for as many as 5.3 million deaths worldwide annually [2]. Meeting the World Health Organization (WHO) guidelines of at least 150-300 minutes of moderate-intensity or 75-150 minutes of vigorous-intensity aerobic physical activity per week provides significant protection against leading causes of mortality, including cardiovascular disease, type 2 diabetes, certain cancers and metabolic disorders [3]. Additionally, these benefits extend beyond physical health, positively impacting mental well-being and cognitive function [4].

Among the various types of physical activity, endurance sports are particularly effective at improving cardiovascular function, insulin sensitivity and overall health [5]. Racket sports - including tennis, badminton, squash, pickleball and table tennis - are unique in their combination of aerobic and anaerobic exertion, coordination demands and social engagement. These exercises offer greater health benefits than many other physical activities, such as running, rock climbing or football. Their appeal lies not only in their physiological advantages but also in their potential for lifelong participation, which enhances long-term health outcomes [5]. Furthermore, research indicates that racket sports can promote healthy lifestyle and physical activity, particularly among individuals leading a sedentary lifestyle. This is an extremely important aspect in modern times, as

it may help protect a portion of the population from harmful lifestyle habits, obesity, depression and social isolation [6].

The main aim of this review is to synthesize and critically analyze existing literature on the effects of racket sports on longevity and overall patient's health. This review will explore the physiological, psychological and social dimensions of these activities, concentrating on the mechanism through which they enhance well-being and life expectancy. Furthermore, it aims to advocate for the integration of racket sports into public health strategies, emphasizing their potential to deliver substantial social benefits.

Cardiovascular health

Cardiovascular diseases are the leading cause of death in European countries. It is estimated that annually, incidents such as heart attacks and strokes account for 42.5% of deaths. It is also one of the leading causes of disability worldwide [7].

Maintaining a proper lipid profile is one of the many measures that can reduce the likelihood of cardiovascular diseases. Lipid profile consists of total cholesterol (TC), low-density lipoprotein cholesterol (LDL) or triglycerides (TG) and high-density lipoprotein cholesterol (HDL). Raised cholesterol and triglyceride levels are established risk factors for coronary artery disease [8]. Among them, high LDL cholesterol, also called "bad cholesterol" is the greatest risk factor, and its reduction is the most important therapeutic goal for circulatory system diseases, including ischemic heart disease and ischemic stroke [9,10]. On the other hand, high levels of HDL are a protective factor against cardiovascular diseases [11]. It is well documented that physical activity improves lipid profiles independently of other lifestyle modifications such as dietary changes or smoking cessation [12]. A study on individuals aged 53-70 found that frequent tennis players exhibited greater arterial compliance and enhanced insulin sensitivity, which are key contributors to lower cardiovascular risk [5]. Moreover, multiple studies indicate that tennis improves cardiopulmonary function, reduces cardiovascular disease risk and enhances stress management by lowering insulin concentration during exercise and improving body's ability to cope with stress [13].

A large-scale study involving 80,306 participants from Scotland and England confirmed that playing racquet sports significantly reduces cardiovascular disease risk and all-cause mortality [1]. The study participants engaged in various sports, ranging from aerobics and swimming to playing football. The best effect in reducing mortality due to cardiovascular diseases was observed in swimming, aerobics, and racquet sports. The benefits of racket sports were comparable to those of cycling, swimming and aerobic exercises while no significant impact was observed for football and running which shows that specific endurance sports bring better effects. Aerobic sports contribute to

prevention of the deterioration of cardiac and pulmonary function, thereby reducing the risk of disease and mortality associated with these conditions [14] [15].

Additional research has examined the specific benefits of badminton. A study [16] conducted on untrained women over an eight-week period revealed improvements in blood pressure, resting heart rate and lipid profile. Participants also experienced an increase in VO2 max, endurance test performance and vertical jump height. Furthermore, research indicates that badminton reduces heart rate and blood lactate levels both at rest and during exercise, contributing to lower cardiovascular disease risk [16]. These findings suggest that badminton not only improves aerobic capacity but also provides beneficial adaptations in musculoskeletal function, further supporting the overall health benefits of racket sports [17].

Psychological health

It is well-established that physical exercise contributes to the reduction of stress, depressive symptoms, anxiety, and adaptive disorders [18] [19] [20]. Indeed, a study examining female participation in sports revealed that stress reduction was one of the primary motivations for engaging in physical activity [16]. The badminton program studied was particularly effective in improving social engagement, leading to increased enjoyment of the sport and enhanced interaction with friends. The willingness to participate in sports was greater compared to the group engaged in running, possibly due to the nature of the sport, which focuses on individual training rather than group cooperation, as seen in badminton. These conclusions highlight the social benefits of racket sports, which encourage active participation, strengthen friendships and provide an enjoyable and engaging exercise experience. This also shows that participants are more willing to engage in sports that involve other people and offer mutual motivation, as opposed to individual physical activities [21].

Not only badminton, but also tennis has been associated improved mental health and cognitive function during people's lives, especially in comparison to their less active colleagues [12] [22]. Moreover, participation in moderate to vigorous weight-bearing physical activities like tennis promotes social interaction and helps with the loneliness, often experienced by older individuals [12] [23]. Tennis is also not an individual isolated sport and it requires a partner. It promotes social interaction and helps in making new acquaintances. Thus participation in a moderate to vigorous weight bearing physical activity such as tennis may afford the veteran player a host of psychosocial health benefits.

Surprisingly, individuals who played tennis and badminton had the longest expected lifespan among eight other sports, according to studies [6]. It is possible that these differences resulted from the psychological and social aspects of these sports, as they involve greater interaction than running or

swimming. It was also noted that playing tennis and badminton does not require strenuous exertion but demands social interaction, which contributes to the popularity of these activities. Belonging to a group of people who regularly meet, engage in sports and motivate each other may be a key factor in the attractiveness of these sports [24].

Another interesting aspect was noted in a study [25] that compared two groups of badminton players – the British, for whom playing was seen as a fun, invigorating competition and an opportunity to improve their skills, and the group of players from Hong Kong, where proficiency in the sport is perceived as an indicator of economic status and is strongly linked to national culture. Just as the motivations for engaging in the sport varied, so did the attitude toward participation. This was further confirmed in study [26], which found that participation in different sports among children was associated with distinctive patterns of brain activity and behaviour. Racket sport players demonstrated enhanced inhibitory and attentional control compared to youth who did not engage in sports or participated in other types of activities [27].

It is also worth mentioning dementia prevention, for which modifiable risk determinants include, among other factors, physical inactivity, obesity, depression and social isolation [10]. Studies [10] have observed that playing racket sports, including badminton, can reduce the risk of social isolation and physical inactivity. Interaction with others is a factor that prevents the development of depression and dementia while protecting against home isolation [28]. Depressive symptoms should be treated from the onset to prevent the occurrence of dementia and pharmacological treatment should be combined with sports activities such as badminton, as it has shown to reduce symptoms in young adults with intellectual disabilities [29].

Research has shown that social support has a greater impact on longevity than not smoking, maintaining a slim figure or having normal blood pressure [30]. Strong interpersonal relationships protect against premature death more effectively than physical activity alone [6]. Moreover, having a greater number of acquaintances increases the sense of well-being, which suggests that social sports such as doubles tennis or badminton may contribute to longevity more than solitary, intense workouts like running or swimming [6,22].

Neuromuscular and functional health

Besides the benefits related to the impact of racquet sports on the cardiovascular system and mental health, this type of sport also has a beneficial impact on the musculoskeletal system, coordination, agility, and overall physical fitness. All things considered, it is a physically demanding sport – it requires neuromuscular coordination and power output. In a study conducted on a group of women who participated in recreational badminton training [16], the results were surprising - jump height was increased by 13%, a gain not observed in running or non-exercise groups. The intermittent

nature of badminton requires rapid movements, lunges and jumps - placing substantial demand on the neuromuscular system, similar to plyometric training. These movements patterns contribute to improved coordination, agility and lower body power, which are crucial for overall mobility and functional independence [16] [31]. Improvement in mobility, agility, and awareness of the surroundings, which are highly beneficial in the game, also have significant applications in everyday life. The skills acquired during play reduce the frequency of falls in older adults, enhancing their mobility and providing a sense of independence [12][32].

In the study conducted by British psychologists [25], an analysis of body composition, muscle strength and muscle fatigue rate was also performed. It was shown that individuals who played tennis demonstrated significantly greater function in both the upper and lower extremities compared to those who did not engage in the sport. This improvement may be attributed to the intermittent nature of tennis training, which is inherent to the sport and may provide a more effective workout than continuous exercise with a steady intensity. Tennis is also a sport that combines aerobic fitness with health promotion while ensuring safe playing conditions. This thesis is further supported by the study [9] which highlights lower mortality rates among racket sports players along with a more favorable body composition compared to individuals who do not engage in sports.

According to a report published in Japan [10], enhanced cognitive alertness not only benefits one's tennis performance but may also reduce the risk of falls and enable adults to participate more fully in life. The study demonstrated multiple advantages of playing tennis, ranging from increased cerebral activity linked to eye movement to stress reduction. Long-term tennis and badminton players exhibit faster reaction times compared to non-players, indicating improved balance, motor coordination and reaction speed [33]. Additionally, stress reduction contributes to an improved cardiac risk profile. However, the benefits of playing tennis extend beyond physical endurance. It has been shown to improve balance, gait mechanics and the ability to rise from a chair or sofa, which are crucial skills for maintaining independent living and functional autonomy in older adults [34]. A similar conclusion has emerged in other publication [35] where individuals playing table tennis developed hand-eye coordination, balance and brain stimulation.

Subsequent studies [36] [37] [38] consistently demonstrate that badminton has similar positive effects on patients' lives as tennis. Mental alertness helps maintain independence and problem-solving abilities, regardless of age group. A study [29] confirmed that badminton improves cardiac and respiratory function, increases VO₂ max and bone mineral density and alleviates asthma symptoms. These findings were further validated in the research [17], which observed enhanced physical endurance in young individuals of both sexes, along with improvements in muscle strength, power, flexibility and respiratory function.

Engaging in racket sports also contributes to reducing obesity, as these are interval-based sports that focus on fat burning. Studies [12] [39] confirmed that regular participation in racket sports is associated with weight loss, improved well-being, better body composition and overall public benefits.

Risk of injuries

It is not surprising that physical activity is often connected to various types of injuries. Researchers [34] indicate that regular padel practice involves repetitive movements which may lead to musculoskeletal asymmetries and overuse injuries. Moreover, 40-70% of players report contusions annually, with an injury rate of 2.75 per 1,000 hours of training. Most of them are mild, primarily affecting the lower limbs and muscle-tendon structures, however epicondylitis is the most common condition. The authors [34] conclude that injury rates vary by age and skill level, with older players experiencing more muscle injuries and younger players more tendinosis. Amateur players, especially those who skip warm-ups and balance training, show a higher injury prevalence, particularly in the elbow, shoulder, knee, ankle and lower back.

The prior findings have been confirmed in another study which was focused primarily on badminton injuries [10]. Most of them occur during matches (72%) and the injury incidence in amateur senior players was 0.134 per 1,000 hours which was less than in padel practice [34]. The lower extremities are the most affected, with knee (22.4%) and leg (18.3%) being common sites. Sprains (56%) and Achilles tendon ruptures (13%) are frequent [10]. The study showed that proper warm-ups and stretching may help prevent injuries and promote continued play.

Tennis, as one of racket sports, is also connected to higher risk of injuries, consisting of both acute and chronic ones, particularly to the wrist, elbow, rotator cuff and Achilles tendon [12]. These injuries can also contribute to osteoarthritis, tendonitis and other overuse injuries. Preventative measures such as using appropriate equipment, protective gear and balanced training might reduce the risk. Despite a great number of post-surgical restrictions, many veteran players successfully return to tennis after hip or knee replacement [12]. However, long-term effects of continued play post-surgery remain uncertain.

Limitations

Beyond the physiological risks, the current scientific evidence surrounding the long-term health benefits of racket sports is not without limitations. Many of the studies included in the analysis are literature reviews rather than primary research articles. This reliance on existing literature may introduce potential bias. Many studies emphasize the beneficial role of racket sports in improving health; however, there is a lack of long-term research involving large patient populations. Several

studies publications also base their conclusions on observational research rather than controlled experimental designs, making it difficult to confirm effects over time [17]. Some findings also are concentrated on specific populations such as individuals with disabilities or people with dementia [10,16]. Even despite these limitations, the studies provide valuable insights into the impact of racquet sports on both the mental and physical health of individuals. Future research should include more longitudinal, experimental and diverse population-based studies to strengthen the evidence base.

Conclusions

Racket sports provide a great number of health benefits across multiple domains, including cardiovascular, metabolic, musculoskeletal, cognitive and psychosocial well-being. Regular participation in activities like tennis, badminton, padel and squash is associated with increased life expectancy, improved lipid profiles, better insulin sensitivity and reduced risk of chronic diseases. Moreover, these sports enhance neuromuscular coordination, balance and reaction times, which contribute to functional independence.

Beyond the physical benefits, racket sports play a crucial role in mental health and social engagement. They promote stress reduction and social interaction, which are key factors in preventing depression, loneliness and neurodegenerative diseases such as dementia. The interactive nature of racket sports encourages motivation and sense of belonging, making it more sustainable for long-term participation compared to individual exercises.

However, the risk of injury should not be overlooked. Proper warm-ups, strength training and injury prevention strategies should be considered, ensuring continued participation with minimal physical setbacks.

Given their holistic impact on physical, mental and social health, racket sports should be actively integrated into public health strategies as an effective means of promoting a healthier and more active lifestyle.

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