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## **Sports and Exercise Therapy in Holistic Strategy for Treating Chronic Diseases – literature review**

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## **Abstract**

### **Introduction**

The convergence of sports and health is a developing area, focusing on the therapeutic potential of physical activities in numerous chronic disease management strategies as a necessary part of a holistic strategy. Acknowledging sports as a therapeutic tool emphasizes the necessity for a comprehensive understanding of how sports engagement contributes to innovative healthcare interventions.

### **Purpose**

This research aims to investigate the therapeutic potential of prescribing sports and physical exercise in treating primary chronic diseases, exploring its integration into healthcare practices with a focus on efficacy and implications for disease management.

### **State of Knowledge**

Physical activity is recommended for treating diabetes, chronic obstructive pulmonary disease, asthma, and rheumatoid arthritis. It reduces the risk of cardiovascular disease and death, lowers blood pressure, and prevents and manages atherosclerosis and osteoporosis. Non-physical sports like chess and board games also promise protection against dementia, depression, and Alzheimer's.

### **Conclusions**

Incorporating sports into healthcare policies and prescribing personalized exercise are essential components of holistic chronic disease management and show widespread benefits. Professional guidance and clear recommendations, aligned with disease-specific guidelines, play a crucial role in ensuring safe and effective physical activity for patients. Potential risks in specific populations, particularly injury risks, can be minimized through proper preventive measures, adjusting the character of exercises, and heightened patient awareness. To ensure good compliance, exercise prescriptions should offer clear and precise guidelines.

**Key words: sport; exercise therapy; resistance exercise; aerobic exercise; disease management; exercise-induced asthma;**

## **1. Introduction**

The interdisciplinary field of sports and health has been gaining increasing attention, and the potential of sports has been discovered in the treatment of chronic diseases. In this regard, this illustrates the shift from the use of traditional methods of disease management to more comprehensive approaches. It is critical to understand how the mutual relationship between physical and non-physical sports can play a major role in creating new healthcare tools.

## **2. Purpose**

The principal intention of this project is to work out the efficacy of sports and exercises as therapeutic instruments for dealing with chronic diseases. Moreover, the study aims to review the scientific evidence on the use of sports in healthcare and how effective and efficient they are in managing healthcare diseases.

## **3. State of knowledge**

The increasing incidence of chronic diseases, including conditions such as chronic obstructive pulmonary disease, asthma, atherosclerosis, diabetes, obesity, and musculoskeletal disorders, provides one of the greatest global health challenges that the world is currently facing. The following exploration encompasses the positive effects of sports on disease prevention, the challenges associated with exercise prescriptions, and considerations for individuals with specific health conditions.

### **3.1. Chronic Diseases and Lifestyle Interventions**

Chronic diseases constitute a significant global health challenge, with conditions such as cardiovascular diseases, diabetes, obesity, and metabolic disorders, as well as respiratory conditions and musculoskeletal disorders, on the rise [1]. Importantly, these conditions, which can only be controlled but cannot be cured, have an immense impact on quality of life and consume a significant portion of healthcare resources [2]. The increasing prevalence of these diseases requires a paradigm shift in healthcare towards proactive lifestyle interventions, such as increased physical activity, that are critical in addressing the chronic disease epidemic [3].

Regular physical activity is crucial for disease prevention and management, given that even modest amounts of activity can significantly reduce the chances of suffering from certain chronic illnesses [4]. It has been demonstrated, that it has beneficial effects on morbidity and mortality, making it a vital part of prevention and therapy in internal medicine [5]. Therefore, it is crucial to understand how exercise affects our bodies, including energy metabolism and efficient cardiac function. These are primary mechanisms in the prevention and treatment of chronic diseases [6]. There is still much debate regarding the optimal type, frequency, and intensity of physical activity; however, it is clear that regular, moderate activity is beneficial [7].

### **3.2. Non-physical Sports and Activities on Disease Prevention**

In sports, it is not only the case that the definition goes beyond mere movement but also covers non-physical activities such as chess and bridge. There is evidence indicating that practising chess might be protective against dementia, especially among undiagnosed individuals [8].

Going beyond Olympic sports, research shows that playing board games may have a protective effect against dementia, potentially reducing the risk of cognitive decline and

depression. A review conducted by Lillo-Crespo et al. stated that chess players had a less decline in their MMSE score and a lower incidence of depression compared to non-players [9]. Another study on the Chinese game GO also found positive impacts on Alzheimer's disease, including reduced depression and improved functioning [10].

### **3.3. Sports in Cardiovascular Health**

Regular exercise has a significant impact on heart health, reducing the risk of cardiovascular disease and death [11,12,13]. It is linked to lower blood pressure, better insulin sensitivity, and a more favorable plasma lipoprotein profile [12,14]. This enhances mitochondrial function and vasculature and also induces the release of myokines from skeletal muscles, which play a crucial role in maintaining cardiovascular health [15]. Physical activity has consistently been associated with a decreased risk of atherosclerosis and related conditions, such as coronary heart disease. It can also enhance lipid and lipoprotein metabolism while improving endothelial functioning, leading to reduced levels of inflammation within the body [16,17,18]. To promote cardiovascular well-being in atherosclerotic cardiovascular disease, routine physical exercise, including moderately intense activities, such as racquet, aerobics, running, and walking, should be encouraged [19,20].

### **3.4. Sports in Diabetes and Glucose Metabolism**

Preventing and managing diabetes requires physical activity, which involves aerobic and resistance exercises [21]. Regular physical activity is often associated with intense training, as it enhances blood glucose control in insulin- and non-insulin-dependent diabetic patients [22,23]. Such benefits can be noticed even in obese people and elders without diabetes [24,25]. It is because of enhanced insulin sensitivity and improved glucose metabolism due to physical conditioning [26]. Research has shown that maintaining an active lifestyle has several considerable advantages for treating or preventing diabetes [27]. For instance, teenagers suffering from type 1 diabetes should be encouraged to engage in moderate physical activity more frequently while avoiding sedentary behaviour, as this lowers cardiovascular risks and improves glucose control [28].

### **3.5. Physical Activity in Respiratory Diseases**

Physical activity is very important for patients with chronic respiratory diseases like asthma and chronic obstructive pulmonary disease (COPD). It can improve their physical condition in combination with their mental condition or well-being, along with the quality of life they live, thus increasing their functional capacity [29].

Research suggests that physical activity may prove beneficial for individuals with asthma, challenging the prevalent notion that it should be avoided [30]. Exercise has been shown to enhance cardiopulmonary fitness without altering lung function [31]. This holds particular relevance in light of the increasing number of asthmatic athletes engaging in competitive sports [32]. However, despite these benefits, a considerable number of adults with asthma fail to meet the recommended levels of physical activity [33]. Exercise-induced asthma poses a significant obstacle to sports participation for individuals with asthma [34]. Therefore, the use of pharmaceutical agents to prevent and manage exercise-induced asthma becomes crucial, allowing individuals with asthma to safely engage in sports [32].

Research consistently shows that physical activity is crucial for COPD patients, with a decline in activity levels observed from the early stages of the disease [35]. Higher levels of physical

activity correlate with improved functional status among COPD patients [36]. Various exercise modalities, including aerobic exercise, balance training, yoga, and inspiratory muscle training, have been demonstrated to be beneficial for individuals with COPD [37]. These approaches contribute to improvements in exercise capacity, symptom reduction, and the overall enhancement of quality of life [38]. Comprehensive exercise programs, incorporating both aerobic and strength exercises and engaging both lower and upper body skeletal muscles, are recommended for individuals with COPD [38]. Despite these benefits, promoting regular physical activity in this population presents challenges, and interventions should concentrate on enhancing exercise tolerance [39,40]. Interventions such as pulmonary rehabilitation, pharmacotherapy, and counseling programs can be employed to increase activity levels [41].

### **3.6. Sports in Musculoskeletal Disorders**

Musculoskeletal conditions, for example, arthritis and osteoporosis, are widespread and affect disability and impairment [42, 43]. Musculoskeletal disorders, in particular, present a global threat to healthy aging, with a reverse correlation between these conditions and reduced physical activity [44]. Participation in such physical activities as aerobic exercises and muscle-strengthening movements is safe and advantageous for people with chronic arthritis. Exercise can reduce the inflammatory process related to the disease, while the worsening of clinical symptoms may be temporary. These interventions help improve physical function, as well as alleviate symptoms related to arthritis, especially juvenile idiopathic arthritis (JIA) or rheumatoid arthritis (RA) [45, 46]. Exercise is fundamental, especially for older people. Consistent physical activity can prevent disability, thus leading to long-term pain relief [47]. However, many adults with arthritis do not get involved in the recommended levels of physical activity, despite their benefits [48]. Physical activity among patients with rheumatoid arthritis reduces cardiovascular risk factors, improves bone health, and relieves depression, as well as easing pain symptoms [49]. To prevent and treat osteoporosis, engaging in physical activity, particularly weight-bearing and resistance exercises, is crucial [50,51,52]. These exercises can improve bone health and reduce the risk of fractures, especially in postmenopausal women [53]. Home-based physical activity programs, which have become more important during the COVID-19 pandemic, can also be effective in maintaining bone health [53]. Therefore, a combination of weight-bearing, resistance, and whole-body vibration exercises is recommended for older adults, particularly women, to improve bone mass and metabolism [52].

### **3.7. Psychological Benefits of Sports**

Physical activity has consistently been found to reduce stress levels among diverse populations, such as old people, depressed individuals with anxiety disorders, and those suffering from raised levels of anxiety and depression [54, 55, 56]. The benefits of physical activity for managing these conditions are further supported by its ability to reduce symptoms of anxiety and stress-related disorders [57]. The positive effects of physical activity on emotional states are attributed to various physiological and psychological mechanisms, including the release of endorphins and monoamines, improvement of self-efficacy, and distraction [56].

### **3.8. Exercise Prescription and Personalization**

Professional guidance in exercise prescription is crucial for ensuring safe and effective physical activity. However, patients often fail to fully benefit from exercise prescriptions due to receiving vague or inappropriate instructions. Effective exercise prescriptions should

encompass clear recommendations regarding the type, frequency, intensity, duration, and progression of exercise, aligning with disease-specific guidelines [58,59].

### **3.9. Challenges and Considerations**

As the integration of sports and physical activity into specific patient populations gains traction, it brings to the forefront a myriad of risks that must be carefully weighed against the potential benefits.

There is a general risk of injuries, particularly for less experienced patients engaging in sports, leading to an elevated likelihood of requiring surgery, especially in the lower extremities [60]. Extreme sports, in particular, pose significant medical hazards and should either be avoided entirely or undertaken with substantial precautions to mitigate associated risks [61]. Additionally, there is a risk of infections connected with injuries, mainly skin infections, which can be easily mitigated through proper preventive measures such as appropriate pharmacotherapy [62].

Physical activity carries a higher risk of acute coronary events during and after exercise, particularly in untrained people with existing coronary heart diseases [63]. Sporting activities can acutely increase cardiovascular events and death rates, especially in individuals with known coronary artery disease and in high-stress situations [64]. While rare, sudden and unexpected cardiac events among young athletes remain a major concern, thus necessitating early detection of underlying cardiovascular illnesses [65]. Hence, awareness among athletes and sports professionals about these risks is critical for their well-being.

Intense physical activities put type 1 diabetic patients at risk of hypoglycemia. Therefore, continuous or flash glucose monitoring systems may help alleviate this risk [66]. During exercise, it is important to balance insulin dosages with carbohydrate intake to avoid hypoglycemia [67]. Diabetic athletes need evaluation for complications along with adjustments to their exercises to allow enough supplementation with carbohydrates in case they are insulin-dependent but beware of frequent blood sugar tests [68]. Diabetes control must be intensified through regular blood glucose checks if effective care is to be provided to active diabetes patients [69].

Due to the increased risk of developing this condition, exercise-induced asthma poses a major worry for athletes, especially those who participate in endurance sports [70, 71, 72]. It is worth noting that this worsens as a result of things like hyperventilation during exercises and high exposure of the respiratory tract to allergens, contaminants, and cold, dry air [71]. Although the risk of dying from asthma during sports is small, it still emphasizes the need for proper management and medication [73]. However, even with these risks, physical training has been shown to increase cardiopulmonary fitness among children and adolescents, thereby reducing asthmatic symptoms in this group [70].

In general, moderate exercise is considered safe and beneficial for patients suffering from arthritis [74, 75]. Nevertheless, painful musculoskeletal conditions significantly hinder people from making changes to their lifestyles [44]. Therefore, certain exercises, such as high-impact or high-intensity activities, may increase the risk of fractures in osteoporotic patients.

#### 4. Conclusion

The incorporation of sports into healthcare policies and the provision of personalized exercise are crucial components of comprehensive chronic disease management and have been shown to yield numerous advantages. According to the studies mentioned in our review, physical activity is recommended for treating conditions such as diabetes, COPD, asthma, and rheumatoid arthritis. It lowers the risk of cardiovascular disease and death, lowers blood pressure, and prevents and manages atherosclerosis and osteoporosis. Non-physical sports like chess and board games also promise protection against dementia, depression, and Alzheimer's. Professional guidance and clear recommendations, aligned with disease-specific guidelines, are essential for ensuring safe and effective physical activity. Potential risks in specific patient populations, particularly injury risks, can be minimized through proper preventive measures and heightened patient awareness. To ensure adherence, exercise prescriptions should provide concise and precise guidelines.

#### Disclosure:

Authors' contribution:

Conceptualization: Mateusz Bieńko, Marta Rutkowska, Mikołaj Margas, Magdalena Marchaj.

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