EDITORIAL

ACCEPTED: October 2021
PUBLISHED ONLINE: November 2021
Müller P, Ahrens D, Braun-Dullaeus R, Schreiber S. Physical activity and aging processes in the context of demographic change. Dtsch Z Sportmed. 2021; 72: 325-326.
doi:10.5960/dzsm.2021.508

Physical Activity and Aging Processes in the Context of Demographic Change

Körperliche Aktivität und Alterungsprozesse im Kontext des demographischen Wandels

A central issue for society in general and health policy in particular is the increase in prevalence of chronic diseases in the context of demographic change. In this regard, non-pharmacological prevention and therapy concepts, in particular physical activity and exercise, are becoming increasingly important.

The demographic change in western countries is characterized by low birth rates and continuously increasing life expectancy. As a result, the proportion of the elderly population in Germany will increase sharply in the coming years. According to forecasts by the Federal Statistical Office, the age group > 80 years will almost triple from 5% in 2015 to 13% in 2060. Since age is a major risk factor for numerous non-communicable diseases, there will be an increase in the individual risk of disease.

In the interplay of biological aging processes and demographic change there is a drastic increase in age-associated diseases of the cardiovascular system (e.g. heart failure, hypertension, coronary heart disease), the metabolic system (e.g. diabetes mellitus type 2, obesity), the central nervous system (e.g. dementia, movement disorders) and the musculoskeletal system (e.g. osteoporosis, sarcopenia).

Physical Activity in the Prevention and Therapy of Chronic Diseases

In addition to age, modifiable risk factors in the development of numerous chronic diseases are physical inactivity, the „western diet“ and smoking. The main focus of this article is the role of physical (in-) activity on aging. The majority of European and international guidelines recommend at least 150 minutes of moderate or 75 minutes of high-intensity activity and supplementary strength training per week. However, it can be stated that over 40% of the adult population in western countries do not meet these minimum requirements (3). Physical inactivity among adolescents is even more dramatic. Current data show that only 20% of 11 to 17 year olds achieve the 60 minutes of physical activity recommended for adolescents (4).

However, physical activity can be classified as a low-cost intervention both in the prevention and therapy of numerous cardiovascular, neoplastic, metabolic and neurodegenerative diseases (7, 8, 10). In a landmark study in 1953, Morris and Heady reported the relationship between physical activity and mortality based on epidemiological data (6). The positive relationship between physical activity and mortality was demonstrated in numerous subsequent prospective studies (10). Also in 1953, Morris and colleagues stated in the Lancet that physically inactive bus drivers had an increased risk of developing coronary heart disease. In the following decades, the positive effects of physical activity were proven in numerous studies. The current data shows very impressively that physical activity and exercise can extend the life span and prevent numerous chronic diseases or delay their onset. In a review article, Ruegsegger and Booth list the positive effects of physical activity on over 40 diseases (including coronary heart disease, sarcopenia, diabetes mellitus type 2, breast cancer, colon cancer, cognitive dysfunction, stroke) (8).

The example of dementia highlights the clinical relevance and importance of lifestyle factors in disease prevention. According to statistical analyses, a third of global Alzheimer‘s disease can be attributed to modifiable risk factors. In Germany, physical inactivity has the highest predicted influence on dementia risk. According to one calculation scenario, a 10 to 50% reduction in the modifiable risk factors could reduce the number of Alzheimer‘s disease in Germany by 23,000 to 130,000 cases (5).

Physical activity and exercise can make an important clinical contribution not only in prevention, but also in the treatment of numerous chronic diseases. For a long time, chronically ill patients (especially those with cardiovascular diseases, e.g. heart failure) were advised to take physical rest and avoid exercise. However, lately there has been a shift in paradigms in medicine and secondary prevention. Numerous randomized controlled intervention studies have demonstrated the positive effects of physical activity and aerobic endurance training in the secondary prevention of numerous chronic diseases (8, 10).

However, which kind of exercise (type, training intensity, training duration, training frequency) is most efficient in prevention and therapy is still an open question. The main focus of previous intervention studies has been the influence of moderate endurance training (especially running and cycling). More recent studies have investigated the influence of high-intensity training methods including in patients with heart failure. Their safety has been confirmed in several randomized controlled intervention studies.

Another current research focus are the underlying molecular mechanisms of physical activity, which are, up to date, only rudimentarily understood. Based on the pleiotropic effects of physical activity, it can be classified as a „polypill“. Physical activity, ›

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for example, has a positive effect on endothelial function, insulin sensitivity, arterial blood pressure, the immune system and neuroplasticity (9).

Significance of the Sports Medical Examination and Performance Diagnostic

Sports medical examinations and performance diagnostics are becoming increasingly important in the context of the increasing relevance of physical activity and exercise in the prevention and treatment of chronic diseases. The sports medical check-up should identify risk factors (especially for cardiovascular diseases and the risk of sudden cardiac death in sports) and enable the safety of physical activity and exercise. In addition, performance diagnostic is the basis for individualized training recommendations and can help to optimize the positive effects of physical activity (1).

COVID-19 and Physical Activity

Also (or especially) when considering the influence of physical activity on aging processes, the effects of the COVID-19 pandemic must be taken into account. Due to numerous restrictions in the context of this pandemic, several international studies reported that physical activity levels decreased by more than 20% during the first wave of the pandemic (2). In particular, quarantine at home, home office regulations, closings of sports facilities and avoidance of social contacts have had a negative effect. Potential long-term effects of COVID-19 on physical activity are currently being investigated in several trials. However, this shows the potential of (app-supported) physical training at home and telemedicine care.

In addition, current studies have shown that physical inactivity is associated with a higher risk of severe COVID-19 disease. In this regard, a current central research area in sports medicine is the preventive and therapeutic role of physical activity for post COVID-19 syndrome.

Exercise is Medicine

The fundamentally positive effects of physical activity and exercise in the prevention and treatment of numerous chronic diseases have been scientifically proven (Class IA recommendations for physical activity in various diseases). In this context, physical activity should be classified as a medicine with the highest level of evidence. In the reality of care, however, the potential of physical activity is still far underrepresented. In this regard, there is a need for a greater focus on physical activity in health policy. Physicians are also asked to recommend physical activity and exercise to their patients. Ideally, this recommendation should be combined with a sports medical check-up and individual performance diagnostics. One potential approach could be a "prescription for movement".

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