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**Review Article**

# Types of chronic diseases associated with sedentary behaviour and physical inactivity

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## ABSTRACT

Chronic disease causes a global burden of significant morbidity and mortality. The onset of many chronic diseases is strongly connected with lifestyle variables including physical inactivity. Chronic diseases were previously more prevalent in older population however they are increasingly now becoming more common among young adults and adults due to lifestyle modifications The prevalence of sedentary behaviour and the rise in non-communicable diseases it causes are a universal phenomenon. Physical inactivity is the fourth most important risk factor for mortality and accounts for 6% of all deaths worldwide. Exercise and physical activity are now regarded as the one of the main therapies for both primary and secondary prevention of chronic diseases. The purpose of this research is to review the available information about types of chronic diseases associated with sedentary behaviour and physical inactivity. Physical inactivity is the modifiable risk factor of chronic diseases. Recent evidence suggests that physical activity plays a critical role in reducing risk and complications of prevalent chronic diseases including cardiovascular diseases, diabetes, obesity, cancers, arthritis among other chronic diseases. As per various epidemiological studies, the incidence of coronary heart disease in physically active people is almost half in comparison to the people who are sedentary. Physical activity is beneficial in the management of diabetes. Physical activity can improve physical function and quality of life in individuals with chronic diseases while decreasing the risk of disease progression and premature mortality, depending on the chronic condition and outcome.

**Keywords:** Physical, Inactivity, Chronic, Disease

## INTRODUCTION

A chronic disease is a condition that normally lasts for a long time, progresses slowly, and is typically brought on by a person's environment, genetics, or poor lifestyle choices.[1] Chronic diseases accounts to be the leading source of morbidity and mortality worldwide and are regarded as being at epidemic levels now. Chronic diseases' physical and psychological effects have a negative impact on quality of life. In 2012, almost 68% of deaths worldwide were caused by chronic diseases. Chronic diseases were linked to the elderly population previously, nevertheless, they are recently increasingly becoming more common among young adults and adults due to lifestyle modifications. More than 40% of the 38 million fatalities brought on by chronic illnesses in 2012

were avoidable. Physical inactivity, which plays a significant role in the development of chronic diseases, is one relevant shift in lifestyle. Each year, a lack of physical activity results in 3.2 million fatalities and 69.3 million years of life with a disability adjusted life year.[2] The overall health of the world's population is significantly impacted by sedentary lifestyles. Sedentary behaviour is prevalent around the world, and associated non-communicable diseases are becoming more common. Physical inactivity is the fourth leading risk factor of mortality and is responsible for 6% of global mortality. Any waking activity with an energy expenditure of less than or equal to 1.5 metabolic equivalent tasks is considered sedentary behaviour. Sedentary activities include watching television, playing video games, using computers, sitting at work or school, and commuting.[3]

Chronic illness development is highly connected with lifestyle variables including physical inactivity. Epidemiological studies carried out over the previous century provide support for this association. Physical inactivity is one of many lifestyle factors that can contribute to the development of chronic disease, but it has recently drawn a lot of attention. Have with this greater understanding of the value of physical activity and exercise in relation to enhancing health, the levels of physical activity around the world over the past ten years have stayed stable and, in some situations, even dropped. Sedentary behaviour levels have been shown to be over 50% in some regions of the world. The use of physical activity and exercise in the primary prevention of chronic disease is fully supported by both epidemiological and longitudinal intervention evidence.[4]

Physical activity can be defined as any skeletal muscle-produced motion requiring the expenditure of energy, and exercise as a subset of physical activity. Exercise is a deliberate, organized, and frequent behaviour meant to maintain or enhance various aspects of physical fitness.[5] Over 35 chronic diseases and disorders can actually be attributed to physical inactivity. Major chronic diseases like insulin resistance that causes type 2 diabetes mellitus (T2DM), aging leading to Alzheimer's disease as well as other diseases, or high cardiovascular risk factors that cause coronary artery disease are a few of these. There is overwhelming evidence from epidemiological research indicating that those who are physically inactive have higher prevalence rates for major causes of death such cardiovascular disease, T2DM, and Alzheimer's disease, which frequently range from 30% to 50%. Therefore, there is evidence to suggest that a lack of physical exercise is a real factor in both a reduced life expectancy and a premature death. Physical inactivity accelerates the aging process in key phenotypes as Vo2max, skeletal muscle mass/strength, and cognition, however it is unclear what the molecular basis of these phenotypes is. In general, physical inactivity is an unappreciated factor in the development of practically all chronic illnesses and ailments, which shortens life expectancy and increases mortality.[6] The purpose of this research is to review the available information about types of chronic diseases associated with sedentary behaviour and physical inactivity.

## METHODS

This study is based on a comprehensive literature search conducted on 01 September 2022, in the Medline and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed the information about types of chronic diseases associated with sedentary behaviour and physical inactivity. There were no restrictions on date, language, participant age, or type of publication.

## DISCUSSION

The prevalence of chronic diseases is rising across all age ranges, genders, and ethnicities, rendering them the main cause of death worldwide. While a substantial health issue in developed countries, the majority of chronic illness-related mortality takes place in middle-to-low-income countries. Nowadays, children and teenagers suffer from chronic ailments just like adults do. Physical inactivity raises the risk of developing chronic diseases. Global societies are suffering from the increased prevalence of chronic diseases, which is directly tied to rising healthcare costs, workforce attendance and productivity issues among certain others. However, more exercise and physical activity are linked to a lower chance of developing chronic diseases. Physical activity benefits the physiological systems of the body and plays role in primary disease prevention and secondary disease treatment and prevention.[7] The association of physical inactivity with various chronic diseases is illustrated in (Figure 1).

### *Association of various chronic diseases with physical inactivity; evidence from literature*

*Cardiovascular diseases*

The risk of cardiovascular disease is strongly correlated with sedentary behaviour. The mechanisms governing this association are still not fully understood. Sedentary behaviour, alters important hemodynamic, inflammatory, and metabolic processes, impairing arterial health. Therefore, both directly and indirectly, these vascular abnormalities contribute to the emergence of cardiovascular disease.[8] Physical activity is proven to provide numerous health advantages and is essential for both the primary and secondary prevention of coronary artery disease. According to epidemiological studies, people who are active have a coronary artery disease incidence that is almost half in comparison to people who are sedentary. Several national and international

organizations view a sedentary lifestyle as one of the most significant modifiable risk factors for cardiovascular morbidity and mortality. Reasonable amount of physical or leisure activities seems to have a major protective effect. Exercise training can significantly increase patients' functional capacity once coronary artery disease has become obvious and decrease overall mortality by lowering the chance of sudden death.[9] Katzmarzyk stated that the impact of physical inactivity is significant on a worldwide scale. Globally, physical inactivity is responsible for 7.6% of deaths from cardiovascular disease.[10]

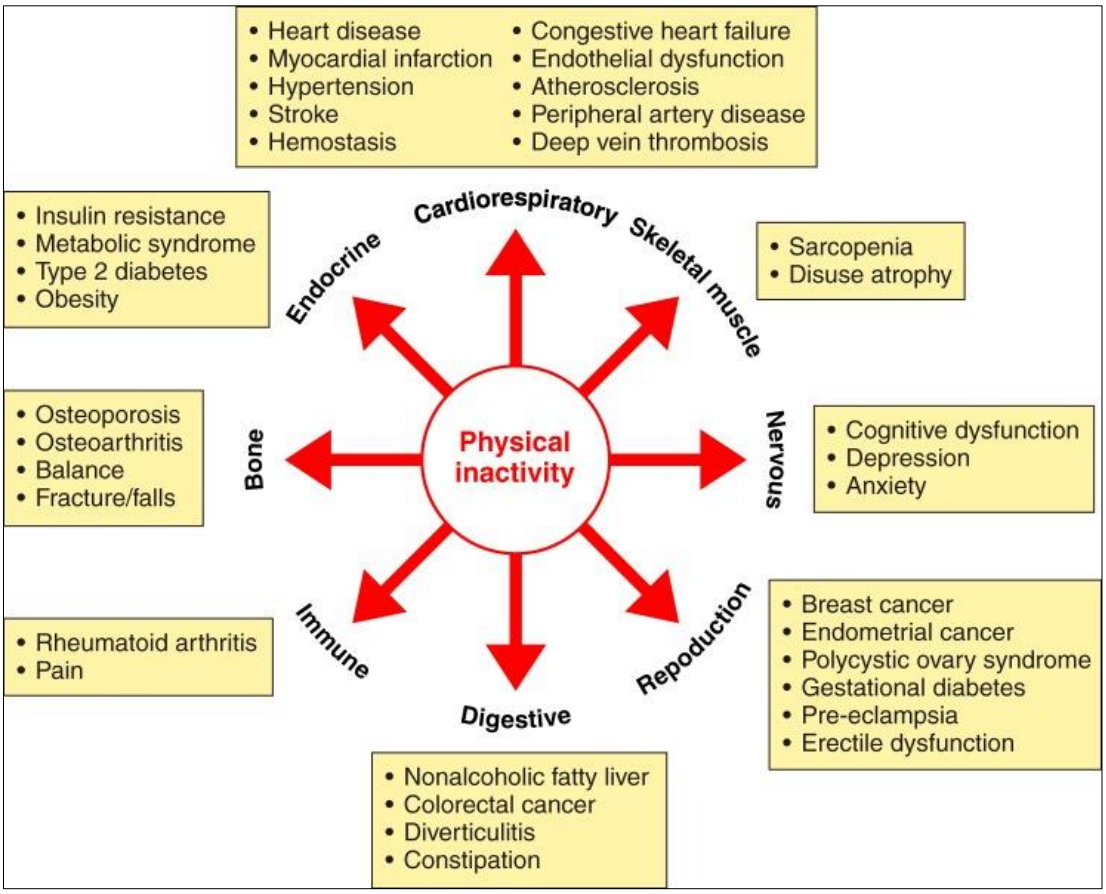


**Figure 1: Association of physical inactivity with various chronic diseases.[6]**

Findings of a meta-analysis concluded that high levels of leisure-time physical activity and moderate levels of occupational physical activity have a positive impact on cardiovascular health. High and moderate levels of leisure time physical activity have a positive impact on cardiovascular health by lowering the overall incidence of incident coronary heart disease and stroke among men and women by 20% to 30% and 10% to 20%, respectively.[11] Findings of a systematic review reported that being physically active and achieving other health behaviour goals reduced the risk of incident cardiovascular disease events, cardiovascular disease-related deaths, and all-cause mortality by at least 50% compared to those who were classified as physically inactive and did not achieve other healthy lifestyle goals.[12] Findings of a prospective urban rural epidemiological study concluded that people from low-income, middle-income, and high-income nations all had decreased mortality and cardiovascular event rates when they engaged in more recreational and non-recreational physical activity. Increasing physical activity is a straightforward, broadly applicable, and affordable worldwide strategy that could lower middle-aged deaths and cardiovascular disease.[13]

*Diabetes mellitus*

Hamasaki stated that in people with T2DM, exercise enhances glycaemic management and lowers mortality and cardiovascular disease risks. To manage T2DM, physical activity ranging from moderate to vigorous is advised. A minimum of 30 minutes of daily walking has been demonstrated to cut the risk of T2DM by about 50%.[14] Physical activity remains a crucial component of therapy as the prevalence of diabetes mellitus and obesity rises. Exercise affects blood glucose levels, insulin action, and cardiovascular risk factors, among other aspects of diabetes. Beyond the immediate effects of exercise, sustained exercise habits have consistently been linked to lower incidence of T2DM.[15] There is broad consensus that habitual physical activity has less of an impact on obesity and cardiorespiratory fitness than supervised frequent moderate to vigorous physical activity. Furthermore, it is

noted that physical activity at various intensities increases insulin sensitivity and lowers daily insulin requirements.[16]

It is well-documented, that engaging in moderate-to-vigorous physical activity has positive health benefits that may reduce the higher risk of complications in individuals with T2DM and risk of diabetes in those who have prediabetes. Additionally, recent studies demonstrate positive associations between light-intensity exercise and cardiometabolic biomarkers as well as negative health correlations with sedentary behaviour. In the prevention and management of insulin resistance, prediabetes, gestational diabetes, T2DM, and health issues associated with diabetes, physical activity is significant. By enhancing glycaemic control, exercise is employed in the prevention and treatment of T2DM and is a thorough component of managing diabetes.[17] Findings of clinical trial concluded that exercise performed for about 30 minutes following a meal is beneficial for people with T2DM to maintain better glycaemic control.[18] Boyer concluded in his meta-analysis findings that physical activity has significant role in prevention of T2DM.[19] The important role of physical activity is well-explained although, studies discussing the effects of physical inactivity in diabetic population are limited.

*Obesity*

More than one-third of adults in the United States are obese, and it has been said that this epidemic is still going strong. Due to the fact that obesity is a risk factor for a variety of adverse outcomes, such as functional impairment, diabetes, heart disease, cancer, and death. The obesity epidemic is mostly caused by a lack of physical activity.[20]

Total and particularly abdominal obesity in young adults is substantially and independently predicted by physical inactivity during youth. The transitional phase from adolescence to young adulthood reveals that participants who were not physically active had a considerably higher risk of adult obesity in general and particularly abdominal obesity.[21] It has been evident over the past ten years that many chronic diseases' pathogenic processes involve low-grade systemic inflammation. Both physical inactivity and obesity are associated with low-grade systemic inflammation that may contribute to the inflammatory processes present in many chronic diseases. Obesity is largely influenced by the risk factor of physical inactivity.[22]

Around 30% of individuals worldwide suffer from obesity, which is a public health issue that is expected to reach 33% by 2030. The figures are considerably more alarming for extreme obesity, with a predicted increase of 130% globally. Results showed that higher levels of inactivity and sedentary behaviour were observed in people with obesity.[23] Linder reported in his findings that people with diabetes and obesity reported more physical inactivity than those who were unaffected.[24]

*Cancer*

Over 18 million new cases of cancer were anticipated worldwide in 2018, along with over 9.5 million fatalities. Results showed that for some malignancies, there was evidence of a dose-response association between physical activity and a particular cancer risk. Increased physical activity is linked to a lower risk of colon cancer with both proximal and distal origins as well as breast cancer, regardless of hormone receptor status also, increased physical activity was linked to a decreased risk of oesophageal adenocarcinoma.[25] Findings of a meta-analysis concluded that participants who engaged in the greatest levels of recreational or professional physical exercise have a considerably decreased chance of developing bladder cancer (relative risk (RR)=0.85; 95% confidence interval (CI): 0.74-0.98).[26] Results of another meta-analysis showed that when comparing the highest with the lowest levels of all types of physical exercise combined, a statistically significant reduction in breast cancer incidence was reported (odds ratio: 0.88; 95% CI: 0.85-0.91).[27] Liu concluded in his study findings that individuals who engage in the highest versus lowest categories of physical activity have a considerably lower chance of developing colon cancer (RR=0.81, 95% CI: 0.83-0.93).[28] Results of meta-analysis showed that the risk for prostate cancer-specific mortality was reduced by 38% between the greatest and lowest levels of physical activity (RR=0.62; 95% CI: 0.47-0.82).[29]

*Rheumatoid arthritis*

Rheumatoid arthritis is a chronic autoimmune condition characterised by joint inflammation, frequently accompanied by obvious abnormalities, and typically linked to symptoms of a general, or systemic, illness. Despite the fact that there are no recognized preventive measures, physical activity is essential for preventing the progression of rheumatoid arthritis. Studies demonstrate that physical activity has no negative effects and, in some cases, may even help symptoms to subside. The prevention of symptom deterioration is better with high-intensity exercise than low-intensity exercise. It's possible that physical activity reduces the overall rise in inflammation that often happens when rheumatoid arthritis progresses as the mechanism by which it helps rheumatoid arthritis.[31] Hernandez reported in his findings that the evidence suggests that physical activity is safe for rheumatoid arthritis patients, and regular aerobic and resistance activity in these patients has been shown to improve quality of life, functionality, pain, and the number of swollen joints.[31] Kessler et al concluded in his study that research demonstrates that exercise in psoriatic arthritis has definite positive effects on disease activity, wellbeing, and comorbidities, and that these benefits appear to outweigh the risk of enthesitis brought on by mechanical stress.[32] Literature discusses the negative association of chronic diseases, sedentary behaviour and physical inactivity. Engagement in physical activity can play a preventive role in significantly reducing the burden of

chronic diseases although more community-based surveys can help in increasing awareness, counselling and motivating people for physical activity.

## CONCLUSION

Physical inactivity and sedentary behaviour not only increase the risk of development of various chronic diseases but also complications associated with it. Awareness and implementation of physical activity guidelines can help in reducing the burden of chronic diseases and is need of time.

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