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Review Article

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Deliberating Effects of Sedentary Lifestyle on Young Adults: A Review of Literature

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ABSTRACT

The term sedentary behavior means "any activity that occurs during the day that involves sitting, laying, or reclining that requires less energy than or equal to 1.5 metabolic equivalents (METs)." Six or more hours a day of sitting or lying down combined with little or no physical exercise during daily activities define a sedentary lifestyle. According to international guidelines, adults should perform at least 150 minutes of moderately vigorous physical activity each week, which equates to 30 minutes/day for five days/week. Adults also require 2 days of muscle strengthening activity every week. About one-third of adults over the age of 15 worldwide suffer from poor health due to inadequate physical activity. Negative effects of sedentary behaviors include a risk of stroke, cancer, high cholesterol, high blood pressure, cardiovascular disease, obesity, diabetes mellitus, osteoporosis and depression. Short bursts of inactivity paired with irregular physical activity contribute to improved wellbeing.

INTRODUCTION

The term sedentary behavior means "any activity that occurs during the day that involves sitting, laying, or reclining that requires less energy than or equal to 1.5 metabolic equivalents (METs)." Six or more hours a day of sitting or lying down combined with little or no physical exercise during daily activities define a sedentary lifestyle [1]. According to international guidelines, adults should perform at least 150 minutes of moderately vigorous physical activity each week, which equates to 30 minutes/day for five days/week. Adults require muscle-strengthening activities twice a week [2]. About one-third of adults over the age of 15 worldwide suffer from poor health due to inadequate physical activity. Sedentary habits have various adverse consequences for the human body. These include a high risk of cancer, cardiovascular disease, depression all-cause mortality and metabolic disorders i.e. dyslipidemia, hypertension and diabetes mellitus, musculoskeletal disorders i.e. osteoporosis and arthralgia. It is crucial to reduce sedentary behavior and encourage physical activity to improve public health [3]. According to recent data, 25% of adults and 81% of teenagers do not get enough exercise. When economies develop, the rate of inactivity rises to a staggering ratio of 70% which may partially be linked to changes in transportation, the development of technology for cultural values, business and an increase in sedentary activities [4]. The relationship between sedentary behavior and different health consequences in adults has been the result of multiple longitudinal research studies, but the findings have been conflicting. There is an association between sedentary behaviour and health impacts. It was found that adults (mean age 28.5 years) with high levels of sedentary behavior had higher BMI, waist circumference, and body fat [5]. Long-term television viewing has been linked to

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decreased cognitive function in people between the ages of 18 and 30 [6]. However, several research have found no correlation as there was no association between obesity and sedentary time in adults aged 20 to 35 [7]. The amount of time adults (mean age 33.6 years) spent sitting in work environments did not correlate with their cognitive ability [8].

This study aimed to investigate the effects of sedentary behaviors on young adults' health outcomes to serve as recommendations for future research.

The study is a narrative review focusing on the effects of a sedentary lifestyle on young adults. PubMed and Google Scholar were used to search the data. Search terms and keywords used were "sedentary lifestyle", "sedentary behaviors", "physical inactivity", "young adults", "health effects", "health risks", "risk factors", psychological impact", Boolean operators (e.g., AND, OR) were used in refining the search. In Inclusion Criteria, Peer-reviewed, open access literature was considered. Both primary and secondary studies on young adults aged 18–35, published in English language, within the last 10 years, addressing health outcomes linked to sedentary behavior. Policy documents and guidelines were also included in discussing and correlating the findings. Studies focusing on older adults, animal studies, and articles not directly addressing the effects of sedentary behavior were excluded. Ten effects of physical inactivity were found most frequently in the literature including cardiovascular diseases, stroke, high blood pressure, muscle degradation & weakness, diabetes, high cholesterol, obesity, osteoporosis, depression, and cancer (Figure 1).

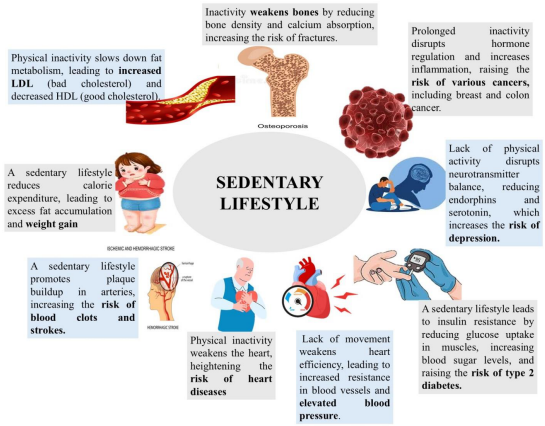

Figure 1: The effects of a sedentary lifestyle on young adults

Cardiovascular Diseases

Cardiovascular disease (CVD) is an aggregate term for various circumstances that influence blood arteries or heart. The most prevalent cardiovascular condition linked to a sedentary lifestyle is coronary artery disease. When the main blood vessels (coronary arteries) that provide your heart with oxygen, nutrients and blood are harmed or diseased, coronary artery disease occurs [4]. Physical inactivity and sedentary behavior are the major modifiable factors for cardiovascular illness and all cause demise worldwide [9]. Being sedentary can cause fat to accumulate in your arteries, which can obstruct them and cause a heart attack [10]. According to study of Wu Jingjie *et al.*, which demonstrated that those in the category with highest sedentary time (median duration: 10.2 hours/day) were more likely to die from CVD-related causes than those in the category with lowest sedentary time (median duration: 2.98 hours/day) [11]. Whitaker *et al.*, found that continuous lack of activity may raise the risk of cardiovascular disease [12]. A meta-analysis of 34 prospective study designs with 1,331,468 individuals found a non-linear relationship between total sedentary time and cardiovascular disease mortality that was independent of level of physical activity [13].

Stroke

A stroke, also referred to as a brain attack or cerebral vascular accident (CVA), occurs when a brain blood vessel ruptures or anything keeps blood away from reaching a specific part of the brain. One of the significant modifiable risk factors of stroke is inactive lifestyle [14]. Sedentary lifestyles are a global issue, particularly in Europe and North America.Unfortunately, the danger of many diseases/disorders, including cerebrovascular diseases, has increased significantly over the past few decades due to an increase in physical inactivity [15]. According to study of 2022, sedentary behavior has been associated positively to an elevated risk of stroke and the risk of stroke increased by 21% for every hour of extra sedentary time when it exceeded 11 hours per day [16].A study of 2024 concluded that a sedentary lifestyle is a significant predictor of pathophysiological changes linked to inactivity, which results in decreased muscle mass and strength, increased insulin resistance, and worse cardiac function, all of which raise the risk of cardiovascular diseases [17].

Hypertension

The changes in the cardiac output and total peripheral vascular resistance both, as well as other factors, might affect blood pressure because of sedentary lifestyle. Sedentary behaviour impacts insulin sensitivity and vascular function, promotes the low-grade inflammatory cascade, raises oxidative stress, and activates the sympathetic nervous system. [18]. The fact that 1.56 billion individuals worldwide predicted high blood pressure by 2025, based on conservative estimates, is thrilling [19]. According to a study, they found a correlation between sedentary activity and a higher incidence of high blood pressure (HR, 1.48; 95% CI, 1.01–2.18; P value < 0.03) [20]. The risk of hypertension to be higher for non-interactive habits of inactivity such as watching the television for longer periods of time and taking a nap rather than for the interactive sedentary activities such as driving a car and working on a computer. Various strategies, such as enthusiastically modifying the cardiac output and total peripheral vascular resistance, can be employed to modify

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blood pressure resulting from a sedentary lifestyle [21].

Muscle Weakness

Muscle deterioration and weakening can result from leading a sedentary lifestyle. Increased levels of inactivity are linked to several musculoskeletal disorders, including osteoarthritis, back pain, and neck/shoulder discomfort, according to epidemiological research [22, 23].The recovery of the skeletal muscle function and regeneration of the muscle cells are aided by appropriate exercise, which also promotes compensatory muscle hypertrophy, increases muscle strength and elasticity, and trains muscle coordination [24]. According to a study conducted in 2021 it is now known with strong evidence that mitochondrial dysfunction plays a significant role in aging, cancer chemotherapy, muscle degeneration and atrophy brought on by extended periods of inactivity, and muscle wasting in various diseases (including sepsis and cancer) [25]. According to a study conducted in 2016 long-term inactivity of the skeletal muscle linked to the release of calcium from sarcoplasmic reticulum, which raises the levels of free calcium in the cytosol [26].

Diabetes

Long periods of inactivity, high fat and high sugar diets, obesity, high visceral fat, and excessive eating all contribute to sedentary behavior, which negatively influences a person's health by creating diabetes mellitus [27]. Individuals who tend to watch television or work on a computer for more than 40 hours a week are three times more at risk of developing type 2 diabetes mellitus as compared to those watching less TV or using a computer. Insufficient physical activity levels constitute major public health concerns, increasing the risk of multiple diseases such as type II diabetes [28]. People with type 2 diabetes should engage in physical activity regularly and be encouraged to reduce sedentary time and break up sitting time with frequent activity breaks. Any activities undertaken with acute and chronic health complications related to diabetes may require accommodation to ensure safe and effective participation [29]. Weight management, lack of motivation and pain are key PA motives and barriers in people with obesity and should be addressed in future interventions to facilitate PA initiation and maintenance [30]. The latest Physical Activity Guidelines for Americans are applicable to most individuals with diabetes, including youth, with a few exceptions and modifications. Physical activity undertaken with health complications can be made safe and efficacious, and exercise training undertaken before and after bariatric surgery is warranted and may enhance its health benefits [29].

High Cholesterol

Visceral and abdominal fat grow due to a sedentary lifestyle. The risk of being overweight and gaining belly fat tends to increase with every hour of inactivity. The release of the pro inflammatory cytokines and reduction of anti-inflammatory signals from the adipose tissue can be facilitated by an increase in the visceral and intermuscular fat, which would catabolize muscle tissue [31]. Inactivity triggers this process, which is considered a stressor mechanism. It causes the muscles to use less glucose, become more insulin resistant, and use less energy when the muscles are not working. These fat-packed adipocytes activate their metabolism and generate anti-inflammatory chemicals while inhibiting release of adiponectin, which is an anti-inflammatory substance [32]. Sedentary behavior hindered the activity of lipoprotein lipase enzyme, and this was associated with less levels of HDL as well as lower levels of plasma triglyceride uptake. Still, prolonged treatments are necessary to modify the levels of lipids. Consequently, it proves that an inactive lifestyle and a lack of exercise are bad for the metabolism of lipids in the body. Over time, these factors may cause visceral and central abdominal fat to accumulate, which increases the risk of developing several cardiovascular illnesses [33].

Obesity

An abnormal or excessive build-up of fat that puts at risk one's health is referred to as obesity. It is a body mass index also known as BMI more than the value of 30 [34]. An excessive or abnormal amount of fat negatively affects an individual's health. Obesity and other co-morbidities are on the rise due to rapid urbanization and industrialization, which has revealed hidden predisposing genetic features through physical inactivity. Changing calorie intake as well as energy expenditure is necessary to reduce obesity. Physical activity will help to better match energy expenditure and intake at lower body weights [35]. The risk of being overweight and belly fat increases with every hour of physical inactivity [36]. According to a study of 2024 by Musijowska and Edyta, they concluded that students who were enrolled in physical education showed highest levels of physical activity and the lowest percentage of obesity. Furthermore, this study also highlights the necessity of putting preventive measures and programs in areas with high rates of sedentary behavior to help prevent obesity [37]. Research performed at Silesian Medical University revealed that the percentage of 19.2 students do not participate in the necessary amount of physical activity [38].

Osteoporosis

Osteoporosis develops when bone mass and bone mineral density decrease. This can weaken the bones, leading to an increased risk of fractures. Because it is often undetected until a symptomatic fracture occurs, osteoporosis is referred to as a "silent disease" [39]. The amount of 20% to 40% of an adult's peak bone mass is thought to be influenced by lifestyle factors, and adverse lifestyle choices can result in inadequate bone deposition, which raises the risk of osteoporosis and related fractures [40]. Maintaining bone mass can be achieved with regular exercise, hence maintaining physical activity is favorable to establishing a sedentary lifestyle [41].

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Depression

One common mental health condition is depression. It is estimated that around 5% of adults worldwide suffer from this condition. Its prominent features are long-term sorrow and a loss of excitement or delight in once satisfying or enjoyable activities. It can also disrupt your sleep and appetite.Fatigue and difficulty concentrating are also common [42]. Sedentary behavior may increase the risk of depression by reducing social gatherings and reducing engagement in physical activities. These are some possible mechanisms for the relation between sedentary behavior and depression [43]. Kim J *et al.*, stated that a positive association found between the prevalence of depression and sedentary habits [44].

Cancer

Cancer occurs when certain cells in the body grow and attack other areas of the body. As the human body consists of trillions of cells, cancer can occur almost anywhere. Sedentary behavior is an independent risk factor, being active lowers your risk of cancer. You are still more likely to develop cancer even if you exercise for at least half an hour each day if you spend many of your days sitting down [45]. One-third of the global population aged fifteen years and above executes insufficient physical activities, which affects health on general. Sedentary behaviors lead towards a variety of adverse effects on the human body including but not limited to increased all-cause mortality and cancer risk [46]. In 2020, World Health Organization provided guidelines for Physical Activity based on the latest evidence on sedentary behavior and health, along with interactions between sedentary behavior and Moderate to Vigorous Physical Activity [47].

CONCLUSIONS

Sedentary lifestyles have several detrimental implications on health, such as increased risk of cancer, cardiovascular disease, obesity, diabetes mellitus, high cholesterol, high blood pressure and musculoskeletal conditions like osteoporosis. Longer daily inactive periods have a more detrimental influence on health. This is why it is critical to minimize the amount of time spent inactively. The results of research identifying the worst kind of sedentary behavior differed from study to study. According to studies, short bursts of inactivity paired with irregular physical activity, basic muscle training or minimal exercise, periodic breaks from inactivity during rest, and work when combined with physical activity all contribute to improved wellbeing.

Authors Contribution

Conceptualization: HI, MM, VA, MQ
Methodology: HI, MM, VA
Formal analysis: HI, MM
Writing review and editing: HI, MM, WP

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

All the authors declare no conflict of interest.

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