

Review On Health-Risks Related To Sedentary lifestyle among Youth

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ABSTRACT

A third of people worldwide who are 15 years of age or older do not exercise enough, which has an impact on their health. But little is known about the dangers sedentary habits cause to one's health. Because there are fewer places to exercise, more people are engaging in sedentary jobs like office work, and television and video devices are becoming more and more common in daily life, inactive lifestyles are becoming more and more commonplace worldwide. As a result, the related health issues are getting worse. The effects of a sedentary lifestyle on the human body are multifaceted. Exercise that causes inactivity lowers muscle glucose, protein transporter activities, lipoprotein lipase activity, lipid metabolism, and carbohydrate metabolism. Moreover, it stimulates the sympathetic nervous system and lowers cardiac output and systemic blood flow, which ultimately lowers insulin sensitivity and vascular function. It also alters the insulin-like growth factor axis and the circulation levels of sex hormones, which elevates the incidence of hormone-related cancers. Increased sedentary time impairs the gravitostat, the body's weight homeostat, and weight gain, adiposity, and elevated chronic inflammation caused by sedentary behaviour are risk factors for cancer. Sedentary behaviours have wide-ranging adverse impacts on the human body including increased all-cause mortality, cardiovascular disease mortality, cancer risk, and risks of metabolic disorders such as diabetes mellitus, hypertension, and dyslipidemia; musculoskeletal disorders such as arthralgia and osteoporosis; depression; and, cognitive impairment. Therefore, reducing sedentary behaviours and increasing

physical activity are both important to promote public health.

Key words: Sedentary Lifestyle, Mortality, Osteoporosis, Metabolic Disease, Physical Activity, Exercise

I. INTRODUCTION AND BACKGROUND

Sedentary lifestyles are against human nature because humans were meant to be dynamic and active beings. Because our grandparents were also physically active and participated in strenuous tasks like farming, fishing, hunting, tapping, and moving around, they were stronger, healthier, and lived longer. One of the most important determinants of health is behavior/lifestyle. Health as a quality of life is influenced by a variety of factors. Living a sedentary lifestyle means engaging in little or no physical activity. Sedentary people spend a large portion of their days sitting or lying down, doing things like reading, conversing with others, watching television, playing video games, or using a computer or mobile device. One such factor is a sedentary lifestyle.

Sedentary behavior has the potential to exacerbate health issues and other avoidable causes of mortality^[1]. The amount of time spent staring at a screen—a television, computer monitor, or mobile device—is referred to as screen time in current parlance. Negative effects on one's health are associated with excessive screen usage. Sedentary lifestyles and jobs can have direct or indirect effects. A sedentary lifestyle is associated with several negative effects, one of which is an elevated body mass index (BMI) that eventually

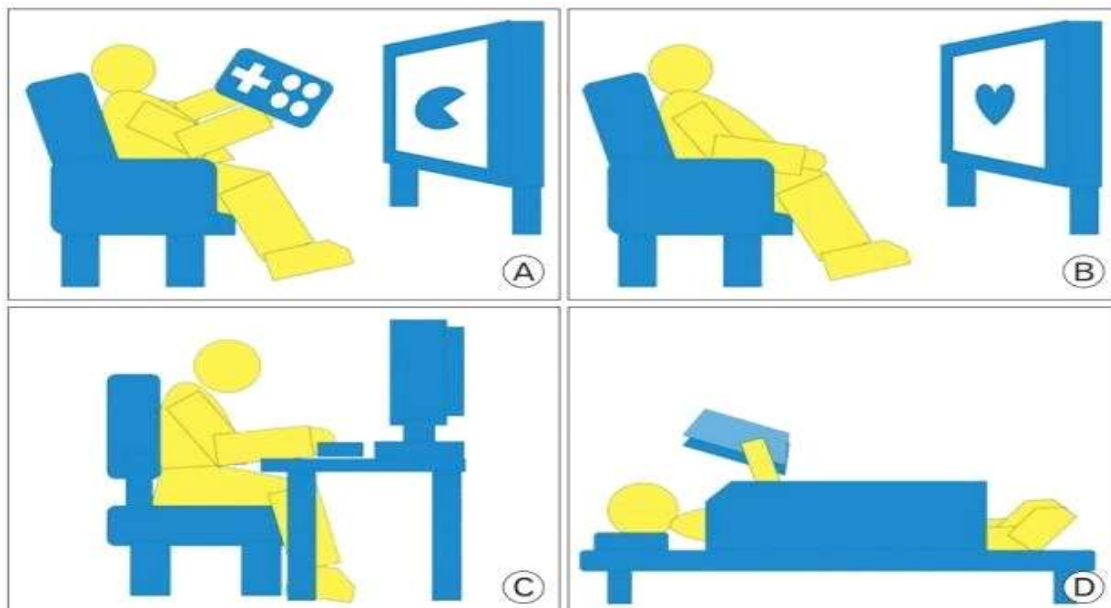
leads to obesity. One of the biggest preventable causes of death in the world is inactivity.

The effects of a sedentary lifestyle on the human body are multifaceted. Sedentary lifestyles lower muscle glucose, protein transporter activity, lipoprotein lipase activity, lipid metabolism, and carbohydrate metabolism. Moreover, it stimulates the sympathetic nervous system and lowers cardiac output and systemic blood flow, which lowers insulin sensitivity and vascular function. Additionally, it modifies the levels of sex hormones in circulation and the insulin-like growth factor axis, which increases the risk of hormone-related malignancies.

Cancer risk factors include weight increase, obesity, and heightened chronic inflammation brought on by sedentary behavior. Sedentary behavior also compromises the gravitostat, the body's weight homeostat. Wide-ranging negative effects of sedentary behavior on the human body include elevated risk of cancer, cardiovascular disease, all-cause mortality, and metabolic disorders like diabetes mellitus, hypertension, and dyslipidemia; musculoskeletal conditions like osteoporosis and arthralgia; depression; and cognitive decline. As a result, improving physical activity levels and decreasing sedentary behavior are crucial for advancing public health.

Sedentary behavior is often defined as actions that, particularly when done during waking hours, include sitting or lying down and require little to no additional energy expenditure above resting metabolic rate. Generally speaking, the activities may be split into two groups: the first group would be leisure activities like watching TV, playing video games, and using a computer for leisure; the second category would be sitting during work or school hours. In actuality, sedentary behavior is a common occurrence among people worldwide, primarily due to new and contemporary technologies. The risk of chronic illnesses may rise significantly as a result. Overly sedentary lifestyles may be linked to a number of health outcomes, including obesity, cardiovascular disease mortality, and premature all-cause mortality. It is true that young people's excessive sedentary behavior will be detrimental to their health. As a result, numerous educational initiatives have been made with the goal of reducing sedentary behavior starting at a young age. The everyday routines of young people typically involve a lot of sedentary activities, like studying, sitting at school, and leisure time. These activities might all be the ideal focus of preventive interventions for the youth population.

Instances of sedentary behavior. (A) Engaging in video game. (B) Television watching. (C) Use of a PC. (D) Taking a book to read. Figure¹²



It's possible that a large portion of the younger generation leads sedentary lives. Children and teenagers may watch TV, play video games, and use computers for an average of six to eight hours a day. There is strong evidence linking TV viewing to obesity, a higher body mass index (BMI), an increase in fat mass, and a decline in academic achievement. Additionally, there are new forms of sedentary behavior, such as the use of tablets, laptops, and mobile phones, which are becoming more and more common among kids and teenagers even if there isn't enough evidence to link them to obesity just yet. Moreover, a number of significant correlations have been documented between screen usage and negative behaviors, psychosocial issues, obesity, and low general self-efficiency (GSE). Excessive and compulsive internet use has also been strongly linked to negative health effects and bad habits. Thus, in future research, particular focus needs to be paid to screen time and related hazardous behaviors among teenagers. Additionally, there is research that suggests that watching television may be a reinforcing activity that takes up a significant portion of a child's free time and may be linked to an increase in the prevalence of childhood obesity. In general, studies have validated the following issues: a) A lot of teenagers may find that watching TV is their primary sedentary activity; b) they spend two to three times as much time engaging in sedentary activities on weekends as they do during the week; c) boys prefer to spend more time playing video games on their computers than girls do on the internet; d) Approximately 44% of teenagers may own a TV in their bedroom, and the majority of them disregarded public health advice to reduce their sedentary behavior. In fact, screen time was linked to unhealthy eating choices, particularly in children who were overweight or obese. Furthermore, a correlation was observed between kids' food consumption and screen time, which might be attributed to their current weight or to other variables like food accessibility and hunger that may be connected to their weight status. Hence, when treating overweight children, medical practitioners should also take screen time into account and advise kids and teens to limit their daily screen time to no more than two hours. Reducing sitting time could significantly contribute to the promotion of an active lifestyle and further potential decline in the prevention of premature mortality worldwide, given the effect of sitting time (regardless of physical activity) on the risk of all-cause death.

Causes of Physical Inactivity and Sedentary Lifestyles

A low level of physical exercise involvement may be caused by a variety of circumstances. Air pollution, absence of parks or walkways for pedestrians, lack of sports facilities, and traffic congestion are a few environmental factors^[3]. A more sedentary lifestyle is positively connected with watching television, watching videos, and using a cell phone^[4]. It is anticipated that sedentary behaviors would persist due to this socio-cultural context.

Sedentary lifestyles have a significant effect on people's general health throughout the world. Sedentary lifestyles are popular over the world, and the incidence of related non-communicable diseases is rising. It is often known that physical inactivity, or inadequate physical exercise, has a negative impact on one's health. With 6% of deaths worldwide attributed to it, physical inactivity ranks as the fourth most important risk factor for mortality worldwide^[5]. Even though being sedentary increases the risk of many diseases and puts one's health at risk, the majority of physical activity-related instruction in clinical practice focuses on increasing physical activity levels rather than reducing sedentary behavior.

Healthcare professionals from a variety of backgrounds, including clinicians, should consider the importance of sedentary lifestyles in policymaking in addition to comprehending and educating patients about their health effects. This study looked at the health consequences of a sedentary lifestyle and lifestyle modifications that can be done to support healthy living.

OVERVIEW OF SEDENTARY LIFESTYLE

1. Concept of sedentary lifestyle

Any waking behavior, such as leaning or sitting, that requires the expenditure of 1.5 metabolic equivalent tasks (MET) or less of energy is considered sedentary behavior^[6]. The most popular definition of sedentary behavior at the moment was put forth by the Sedentary Behavior Research Network in 2012^[7]. MET is defined as the ratio of work metabolic rate to standard resting metabolic rate (RMR) of 1 kcal/(kg/h) in the 2011 Compendium of Physical Activities. The RMR, or energy cost, for an individual at rest is one MET. Physical activities can be categorized numerically according to their intensities as follows: 1.0–1.5 METs (sedentary behavior), 1.6–2.9 METs (light intensity), 3–5.9 METs (moderate intensity), and

≥ 6 METs (vigorous intensity)^[8]. Sedentary behavior raises the risk of hypertension (HTN), diabetes mellitus (DM), cardiovascular diseases (CVD), endometrial, colorectal, and epithelial ovarian malignancies), and hypertension (HTN). It also raises the all-cause mortality rate. The literature has continuously provided documentation of this^[9,10]. There is no denying the link between poor disease outcomes and extended periods of total sedentary activity. The patterns of prolonged sedentary time that pose greater health risks, such as continuous sedentary behavior without a break or intermittent sedentary behavior, are not well understood, and they can vary even within the same overall amount of time^[11]. One study found that short periods of inactivity and sporadic physical activity can both have some health benefits, even in cases when the overall amount of time spent sedentary was identical.

2. Physiological Features

Currently, it is unknown what precise processes underlie the many negative impacts of sedentary behavior on the human body. Nonetheless, a number of theories which are discussed below have been put out to help us comprehend the general effects of sedentary behavior on the human body.

Sedentary lifestyles have been linked to metabolic dysfunctions, including decreased insulin sensitivity, increased plasma triglycerides, and high-density lipoprotein (HDL) cholesterol^[12,13]. Low levels of the protein lipoprotein lipase (LPL), which interacts with cells at the molecular level, have been shown to lower plasma HDL cholesterol levels while influencing the incidence of severe hypertension, diabetes-induced dyslipidemia, aging-related metabolic disorders, metabolic syndrome, and coronary artery diseases.

Furthermore, physical inactivity reduces LPL activity. Furthermore, skeletal muscle LPL activity is inhibited and poor lipid metabolism is quickly signaled by inactivity. Rats that participated in light walking showed a reduction in LPL activity in an experiment based on a rat model, although this reduction was only approximately 10% of the LPL activity in rats that were kept in their cages^[14]. The idea that sedentary behavior is a risk factor for many metabolic illnesses can be supported by the fact that muscle LPL activity is very sensitive to both physical inactivity and low-intensity muscular contractile action^[15].

Bone mineral density decreases with inactivity^[16]. A 12-week bed rest period reduced the mineral density of the greater trochanter, femoral neck, and lumbar spine by 1%–4% in research involving healthy adult men and women^[16]. The link between sedentary behavior and the decrease in bone mineral density is mediated by the equilibrium between bone resorption and bone deposition. Certain studies indicate that bed rest increases markers of bone resorption while having little effect on markers of bone growth^[17-19].

Limited evidence has been found in certain research to suggest that sedentary activity negatively affects vascular health. A study conducted on a group of healthy women found that 56 days of head-down rest increased endothelial cell damage while decreasing endothelium-dependent vasodilation. Aerobic exercise and muscle training mitigated these changes in vascular function^[20].

SEDENTARY LIFESTYLES AND HEALTH RISKS

1. Sedentary Lifestyles, Mortality, and Morbidity (cardiovascular diseases and Other Causes)

A sedentary lifestyle is strongly associated with CVD, DM, cancer, and premature mortality. The total daily sedentary time and television viewing time were correlated with an increased all-cause mortality risk^[21]. In a study analyzing the mortality rates of people with >10 hours and <5 hours of sitting times a day, the sitting time was significantly correlated with all-cause mortality (odds ratio [OR], 1.16; 95% CI, 1.04–1.29; $P < 0.05$)^[22].

The people who watched television for more than six hours a day had a two-fold higher risk of all-cause mortality compared to those who watched for less than two hours (hazard ratio [HR], 1.98; 95% CI, 1.25–3.15)^[23]; on the other hand, those who watched television for more than four hours a day had a 1.5-fold higher risk of all-cause mortality compared to those who watched TV for less than two hours (HR, 1.48; 95% CI, 1.19–1.83)^[24].

Sedentary behavior includes sitting, watching TV or other screens, and spending time sitting down during the day. It has been shown to be independently linked to type 2 diabetes, all-cause mortality, CVD incidence and mortality, and the incidence and mortality of specific cancers (such as endometrial, ovarian, colon, breast, and colorectal cancer). Those who were physically inactive were more likely to suffer the negative

effects of prolonged periods of inactivity than those who were physically active on a regular basis. High physical activity was associated with a 30% higher relative risk (RR) for all-cause mortality (HR, 1.16; 95% CI, 0.84–1.59) than poor physical activity (HR, 1.46; 95% CI, 1.22–1.75) [25].

2. Chances of Metabolic Diseases

a) Diabetes mellitus: Numerous studies have consistently shown that the prevalence of type 2 DM rises with increased sedentary time (HR, 1.91; 95% CI, 1.64–2.22) [25]. In a DM risk assessment that took into account both physical activity and sedentary time, the amount of physical activity did not mitigate the effect of increasing daily sedentary time (HR, 1.11; 95% CI, 1.01–1.19; $P < 0.001$), nor did it reduce the DM risk.

Growing daily inactive time also raised the risk for CVD (HR, 1.29; 95% CI, 1.27–1.30; $P < 0.001$), and while physical activity level somewhat mitigated this effect, sedentary time still markedly raised the risk (HR, 1.11; 95% CI, 1.01–1.19; $P < 0.001$). This demonstrates that the effect of extended periods of inactivity on the risk of CVD and DM is independent of physical activity level.

3. Rate of risk of cancer

Sedentary behavior is also closely related to the prevalence of cancer. According to a study that investigated the correlation between sedentary behavior and cancer prevalence, the cancer risk was 13% higher in the group with the longest sedentary time compared to that with the shortest sedentary time [25], and another study reported that sedentary time increased the overall cancer risk by 20% [26].

Prolonged sitting increases colorectal, endometrial, ovarian, and prostate cancer risks, and it has been reported to increase cancer mortality particularly in women [27]. There was a significant correlation between cancer mortality and the incidences of breast, colorectal, endometrial, and epithelial ovarian cancers [25]. An increased total sitting time was positively correlated with colon cancer (RR, 1.24; 95% CI, 1.03–1.50) and endometrial cancer (RR, 1.32; 95% CI, 1.08–1.61) [29]. Additionally, television viewing time was also positively correlated with colon cancer (RR, 1.54; 95% CI, 1.19–1.98) and endometrial cancer (RR, 1.66; 95% CI, 1.21–2.28). Occupational sitting time was positively correlated with only colon cancer (RR, 1.24; 95% CI, 1.09–1.41) [26].

Sedentary behavior leads to metabolic dysfunctions such as hyperglycemia, hyperinsulinemia, insulin resistance, perturbation

of insulin-like growth factor axis, and changes in the circulation levels of sex hormones. Altered circulation levels of sex hormones can be linked to hormone-related cancers such as breast and endometrial cancers [28]. Additionally, sedentary behavior induces low-grade chronic systemic inflammation, and sedentary time is associated with inflammation-related markers such as C-reactive protein (β , 0.18 ± 0.06 ; $P = 0.002$), interleukin 6 (β , 0.24 ± 0.06 ; $P < 0.001$), leptin (β , 0.15 ± 0.04 ; $P < 0.001$), and the leptin: adiponectin ratio (β , 0.21 ± 0.05 ; $P < 0.001$) [29]. Chronic inflammation can trigger cancer growth [30]. Adiposity can also mediate the relationship between sedentary behavior and cancer, and obesity is a risk factor for several cancers [7].

4. Chances of Osteoporosis

Sedentary behavior is known to show a negative association with the bone mineral density of the total femur and all hip sub-regions irrespective of MVPA, and the bone mineral density (g/cm²) of the total femur had a marked negative correlation with the sedentary time (β , -0.16; 95% CI, -0.24 to -0.08) in adult women [31]. Bone mineral density was correlated with the duration and not the frequency of sedentary behavior. In men, sedentary behavior was not markedly correlated with the bone mineral density of the hip and spine [31].

5. Chances of Musculoskeletal Diseases

A prolonged sedentary time was correlated with chronic knee pain. In an analysis of the correlation between chronic knee pain and the total daily sedentary time (<5, 5–7, 8–10, >10 hours), the results claimed that the incidence of chronic knee pain was higher in individuals with longer sedentary times (P for trend = 0.02) [32]. In particular, a sedentary time >10 hours a day was markedly correlated with chronic knee pain (adjusted OR, 1.28; 95% CI, 1.02–1.61; $P = 0.03$) [42]. People who engaged in greater physical activity had less chronic knee pain (adjusted OR, 0.78; 95% CI, 0.67–0.91; $P = 0.00$), but women with >10 hours of sedentary time while engaging in greater physical activity were highly likely to experience chronic knee pain (adjusted OR, 1.19; 95% CI, 1.02–1.39; $P = 0.03$). The study recommends individuals to shorten their sedentary times to <10 hours a day [32].

6. Sedentary Lifestyles and Other Diseases

a) Depression: Mentally passive sedentary behaviors such as television viewing (RR, 1.18; 95% CI, 1.07–1.30), sitting, listening to music, and talking while sitting were positively correlated with depression risks (RR, 1.17; 95% CI, 1.08–1.27). In contrast, mentally active sedentary behaviors such as reading books or newspapers, driving, attending a meeting, or knitting or sewing were not markedly correlated with depression risk (RR, 0.98; 95% CI, 0.83–1.15) [33]. Using a computer, which is a mentally active sedentary behavior, was not correlated with depression risk in one study (RR, 0.99; 95% CI, 0.79–1.23) [34] but was positively correlated with depression risk in another study (RR, 1.22; 95% CI, 1.10–1.34) [35], and thus its correlation with depression remains controversial. The mechanism underlying the correlation between sedentary behavior and depression may involve the following: sedentary behaviors may increase the risk for depression by blocking direct communication and lowering social interactions, or by reducing the available time to engage in physical activities that help to prevent and treat depression [33].

b) Cognitive function: The relationship between sedentary behavior and cognitive function is uncertain. A systematic review found marked alterations of cognition improved in two studies and impaired in two studies in some studies but no changes in cognitive function in some studies. However, the only long-term study included in that systematic review suggested that a less-sedentary lifestyle and less sedentary work have benefits related to cognitive function. It is believed that replacing the sedentary time with physical activity can help improve the cognitive function. In a randomized clinical trial that analyzed the cognitive changes after 30 minutes of sedentary behavior with other activities for 6 months in older adults with little physical activity, replacing the sedentary time with MVPA and sleep significantly improved cognitive functions, and replacing it with LIPA did not lead to statistically significant changes [34].

SEDENTARY LIFESTYLES AND PHYSICAL ACTIVITY

1. Discrepant Health Effects of Sedentary Lifestyle and Physical Activity

Past studies have observed that a prolonged sedentary lifestyle leads to poor health outcomes irrespective of physical activity. A sedentary lifestyle was independently correlated with mortality and was not compensated for by

physical activity [9]. The time spent in front of a screen was positively correlated with the presence of metabolic syndrome, independent of the level of physical activity (OR, 3.30; 95% CI, 2.04–5.34) [35].

2. The Attenuate Effect of Physical Activity on Sedentary Lifestyles

A few recent studies have reported that increasing physical activity can offset the adverse impacts of sedentary behavior. In particular, the offset effect was more evident in people with little physical activity.

A meta-analysis reported that mortality was not elevated in the people engaging in high levels of moderate-intensity physical activity (60–75 minutes of moderate-intensity physical activity a day) even when they had >8 hours of sedentary time a day. There was no difference in mortality between the most active people (>35.5 MET-h/wk) with <4 hours of sedentary time a day and equally active people (>35.5 MET-h/wk) with >8 hours of sedentary time a day (HR, 1.04; 95% CI, 0.99–1.10). However, television viewing for >3 hours a day increased the mortality regardless of physical activity, and the people who watched television for ≥5 hours a day showed markedly high mortalities (HR, 1.16; 95% CI, 1.05–1.28) [36].

In one study, sitting time showed a dose-response with all-cause mortality and CVD mortality risk in the least active group (<150 MVPA min/wk) [36]. In contrast, the group with at least 8 hours of sedentary time a day showed a higher mortality than the group with less than 4 hours of sedentary time a day (HR, 1.52; 95% CI, 1.13–2.03). However, the group who met the essential MVPA criterion (150–299 MVPA min/wk) or engaged in more physical activity did not show a consistent trend in the relationship between increased sitting time and CVD and all-cause mortalities.

Similarly, a study showed that a sedentary time of over 9 hours per day in the low physical activity group (<600 METs-min/wk) had a significant association with an increased CVD risk (OR, 1.29; 95% CI, 1.04–1.62). In the group with more physical activity, sedentary time was not significantly associated with CVD risk [37].

In other words, while increased sedentary time increases the mortality among people who engage in little physical activity, adequate physical activity seems to offset the impact of increased sedentary time on mortality [38].

A study analyzed the correlation between all-cause mortality and net uncompensated

sedentary behavior metabolic equivalent hours (USMh=MET/h [sedentary time]-MET/h [MVPA time]), which was computed by subtracting METs for MVPA from METs for sedentary behavior throughout a day. USMh was independently associated with all-cause mortality when it was greater than 7 MET/h, and for television viewing, when it was greater than 3 MET/h. The mean increase in mortality per USMh was 1% (RR, 1.01; 95% CI, 1.00–1.02; P=0.01), and the mean increase in mortality per USMh for TV watching was 7% (RR, 1.07; 95% CI, 1.04–1.10; P<0.001). In other words, physical activity as well as sedentary time should be assessed, and therefore, USMh was revealed to be a more practical index for assessing sedentary behavior^[39].

Replacing the sedentary behavior with physical activity also has an impact on cancer-related mortality. A recently published study showed that sedentary behavior was independently associated with cancer mortality risk, where a higher sedentary time led to a greater cancer mortality risk. In this study, the individuals in the top 1/3 of the sedentary group showed a substantially higher cancer mortality risk than those in the bottom 1/3 (adjusted HR, 1.52; 95% CI, 1.01–2.27)^[40]. However, replacing 30 minutes of sedentary time with LIPA reduced the cancer mortality by 8% (HR, 0.92; 95% CI, 0.86–0.97) and replacing it with MVPA reduced it by 31% (HR, 0.69; 95% CI, 0.48–0.97).

II. SUMMARY

It is well-documented that a sedentary lifestyle leads to poor health outcomes. The great news is that even small changes to the amount of activity a person gets can lead to more significant changes in overall health. Simply walking more, parking farther away, or doing household chores positively impacts health. Adding a fitness routine to your lifestyle, whether cardio, swimming, or resistance training, can lead to significant health improvements.

III. CONCLUSION

Studies have indicated that sitting for extended periods of time may account for approximately 3.8% of global deaths. Consequently, preventive initiatives aimed at this demographic should concentrate on the primary factors influencing their daily routines, since this might potentially lower millions of lives worldwide. Furthermore, it has been suggested that increased sitting time each day may be linked to a

higher risk of all-cause mortality; therefore, moderate-to-vigorous physical exercise may mitigate this relationship. Given the benefits of physical activity, an hour spent sitting down each day may generally result in a 2% increase in the chance of dying from all causes. In a similar vein, sitting for longer than seven hours a day could greatly raise the risk. Furthermore, a significant rise in the BMI-measured prevalence of obesity has occurred in recent decades, particularly in children and adolescents. This information is crucial since children with higher BMIs are more likely to experience metabolic and cardiovascular issues in the future. Obesity may also be linked to a number of grave health issues in childhood, including an increased risk of stroke, cardiovascular disease, asthma, and some types of cancer in later life. One theory regarding the rising trend in obesity blames sedentary

lifestyles. Research has indeed shown that sitting time might be responsible for about 3.8% of all deaths worldwide; thus, strategies for prevention among target population must focus on main determinants of the entire daily activities, which may affect to reduce millions of deaths across the world. In addition, it has been reported that higher risk of all-cause mortality may be associated with greater daily sitting time; thus, moderate-to-vigorous physical activity might be attenuate this association. Efforts to prevent increasing sedentary behavior from childhood to adolescence can reduce the potential number of children and adolescents whom classified as obese. Both cross-sectional and longitudinal studies have reported an association between obesity and lower aerobic fitness in young people and spending too much time with sedentary behavior, particularly screen-based sedentary behavior. In addition, insulin sensitivity and clustered metabolic risk in young population were associated with more time spent in sedentary behavior cross-sectionally but not longitudinally.

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