

Detrimental Impact of Sedentary Behaviour on Health

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ABSTRACT

In the modern era, a sedentary lifestyle has become a serious issue with significant health consequences. Physical, physiological, and social health concerns are associated with the sedentary lifestyles of many people, particularly employees, who have been profoundly influenced by modern technology. Many people battle with obesity, diabetes, and hypertension as a result of a lack of regular exercise. Therefore, this study examined the sedentary lifestyle, its contributing variables, and its various health consequences. People should actively engage in physical activity, modify their food habits, and avoid behaviours that are detrimental to their health. Understanding the relationship between sedentary behaviour and health consequences and modifying this behaviour are essential for lowering morbidity and mortality rates. The detrimental health effects undeniably escalate as the total daily inactive time increases. The study suggests that workplaces and public spaces should be designed to encourage active and recreational activities.

Keywords: Behaviour, health, lifestyle, sedentary.

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I. INTRODUCTION

Man is intended to be dynamic and active, therefore, sedentary lifestyles are opposed to human nature. Our grandparents engaged in rigorous muscular activities, such as fishing, farming, hunting, tapping, and migration; as a result, they were stronger, healthier, and lived longer [1]. Numerous elements determine health as a measure of the quality of life; behaviour/lifestyle is one of the most influential [2]. According to Tomasi most deaths in the 20th and 21st centuries were caused by lifestyle- or behaviour-related disorders [3]. Ramazani an occupational physician, recognised that a sedentary lifestyle, with its associated physical inactivity, has a negative impact on human metabolism, cardiac output, physical function, and health [4]. Telecommunication, advanced modes of transportation, and labour-saving technology are pervasive and easily accessible, drastically reducing the need for physical activity and, consequently, energy expenditure. For adults, the most obvious change is the increased time spent sitting and engaging in other sedentary activities.

The National Health and Nutrition Examination Survey (NHANES) revealed that people in the United States spent more than half of their waking hours (55%) engaging in sedentary activities [5]. Sedentary behaviour is distinct from a lack of physical activity as the former relates to excessive sitting rather than inactivity. Sedentary individuals significantly engage in sedentary behaviour while reaching the minimum physical activity requirements [6]. On average, most adults are involved in sedentary behaviour for 7-10 hours per day, with workplace sitting accounting for most of this time. Therefore, sedentary behaviour must be assessed throughout the waking day, not just during specific

behaviours [7]. Many people in Malaysia associate sedentariness with physical inactivity, even though this perception has been disproved. According to the 2019 Malaysia National Health and Morbidity Survey, 40% of Malaysians are physically inactive [8]. Therefore, Malaysia expectedly has the highest rate of obesity in Asia due to the combination of physical inactivity and available food options. Forty-five percent of Malaysians are obese. This equates to nearly 1 in 2 Malaysians being obese [9].

II. LITERATURE REVIEW

A. Concept of Sedentary Lifestyle

"Sedentary" is derived from the Latin word "sedere," which means "to sit." Therefore, "sedentary behaviour" refers to behaviours related to low energy expenditure. Sedentary behaviour is defined as any waking behaviour with an energy expenditure of 1.5 metabolic equivalent tasks (MET) or less, such as sitting or leaning. This definition, proposed by the Sedentary Behaviour Research Network in 2012, is currently the most prevalent definition of sedentary behaviour [10]. Sedentary behaviours include watching television, playing video games, using a computer, sitting at school or work, and commuting while sitting [11]. Diverse ideas exist regarding what characterises a sedentary lifestyle. The majority of experts agree, however, that a person is sedentary if he or she does not exercise or engage in vigorous activities for at least 30 minutes three times per week; does not move from place to place while engaging in leisure activities; rarely walks for more than 10 minutes per day; spends the majority of working hours seated; and has a job that requires little physical activity. Consequently, a sedentary lifestyle refers to a lack of

regular aerobic exercise or any activity that can significantly boost the heart rate for an extended period of time [12].

III. FACTORS ENHANCING SEDENTARY LIFESTYLE

A. Technologies

Computers have become vital and ubiquitous in every part of life. Human reliance on them is increasing due to their expanding usefulness. Electronic devices, such as computers, laptops, mobile phones, and tablets, are outstanding and indispensable for communication, virtual exchanges, and human connections [13]. Routine manual labour has been drastically reduced due to technological knowledge, mechanisation, automation, and computerization. Work organisation and household chores have been simplified using computers and machines that reduce physical activity, thereby promoting sedentary lifestyles. Most people lead a sedentary lifestyle due to the hustle and bustle of daily life and the emergence of more advanced technologies (which make many things accessible at the touch of a button). This behaviour is negatively associated with health-related factors, such as life appreciation, health responsibility, social support, and exercise behaviour [14].

B. Socioeconomic Status

In order to develop public health interventions that can support health-promoting changes in sedentary and physical activity, high-quality information on the contextual elements that work as inhibitors or facilitators of behaviour change is required. Because they affect people's attitudes, experiences, behaviours, exposure to health risk factors, access to resources, and settings that are healthy, socioeconomic positions that people or groups occupy within society's structure are acknowledged as key determinants of health and well-being [15]. People who grow up in lower socioeconomic conditions have a greater risk of cardiovascular disease and death from all causes than those who live in higher socioeconomic conditions [16]. People with lower socioeconomic position backgrounds (classified by paternal/maternal education, occupation, income, and socioeconomic status) in high-income countries exhibited higher levels of sedentary behaviours (both screen-based and non-screen-based) than those with higher socioeconomic position backgrounds, whereas the opposite was observed in low-income to middle-income countries [17].

C. Education

The association between education, a major determinant of health, and sedentary behaviour is complex. Sedentary behaviour, such as computer use, becomes increasingly prevalent among highly-educated people, while television viewing declines among them. Physical activity has declined in daily travel, recreational activities, and the workplace, and sitting has increased due to the rapid growth of communication, transportation, and, most crucially, contemporary technology. Salman discovered that education degree was a major predictor of sedentary behaviour on workdays, indicating that sitting time increased by 55 minutes per day as education level increased [18]. Studies also suggested that office workers, often well educated, were more sedentary than other occupational groups during work hours

[19]. The increase in sedentary behaviour may be attributable to the availability of employment requiring longer sitting periods at higher educational levels. In a study of Finnish individuals, higher levels of education were associated with greater inactive time and a lack of mild physical activity on weekdays, but higher levels of moderate-to-vigorous physical activity throughout the week [20].

D. Pandemic COVID-19

Although the trend of rising inactivity was noticed well before 2020, the COVID-19 pandemic introduced a new obstacle [21]. The lockdown increased sedentary behaviour and reduced physical exercise among the general population. A study published in April 2020 revealed that over 40 percent of American adults sat for more than eight hours per day and that younger adults appeared to be less active than older adults [22]. Historically, travel to and from work or school and other daily activities significantly contributed to physical activity [23]. Those who regularly drive to such activities may have additional time available for physical activity during the day if they opt to stay at home. However, overall physical activity may decline if travel-related physical activity is not substituted with the activity performed at home. Moreover, pandemic restrictions frequently led to the termination of youth sports and family obligations. According to a recent article by [24] lockdown or "stay-at-home" orders significantly altered the environment, personal behaviours (i.e., screen use and dietary habits), and psychological states due to the closure of schools, offices, and industries and the prohibition of public gatherings, thereby adding additional stress and increasing perceived barriers to physical activity.

E. Office worker

Sedentary behaviour in the form of sitting has significantly increased in the occupational sphere due to the rise in desk-based office work [25]. In fact, many office workers can work for extended periods without leaving their desks. It results in high occupational sitting [26]. The majority of office workers' total daily sedentary behaviour time is spent sitting at work, according to data from both high-income and low-income countries [27]. For instance, office workers in the United Kingdom and Australia spent over 60 percent of their daily working hours seated. In addition, European office workers often sat for more than 7.5 hours daily on the job [28]. Studies exploring domain-specific sedentary behaviour have revealed that an individual may spend more than half of a typical working day sitting for periods of 30 minutes or more [29]. Sitting at the workplace is highly reliant on the nature of the occupation and the duties performed. However, most of office-based jobs in developed nations are professional positions [30]. Approximately 50% of the Malaysian workforce comprises professionals, probably involved in high levels of sedentary behaviour at work. Multiple factors, such as personal behaviours, social conventions of desk sitting, and the availability of certain office furniture, might influence sedentary behaviour in the workplace.

IV. HEALTH EFFECTS OF SEDENTARY LIFESTYLE

A. Early muscle fatigue

Sedentary behaviour promotes deconditioning, which impairs employees' ability to handle the increasing physical demands of their jobs. Deconditioning is a type of exercise intolerance in which employees' ability to execute physical duties is diminished beyond what is expected [31]. A typically sedentary employee engaged in physical activity may acquire cardiovascular problems. The inability of the heart to rapidly pump adequate blood to the muscles for optimal oxygenation may result in premature muscular exhaustion [32]. An oxygen deficit, nutrient depletion, and lactic acid build-up may contribute to early fatigue; therefore, these employees should take breaks and engage in light activities whose energy demands can be easily met by oxidative metabolism, the process by which oxygen is used to convert glucose into adenosine triphosphate (ATP) in the mitochondria for energy [33]. Inactivity may decrease mitochondrial density in cells, thereby rapidly causing body tiredness [34]. Fatigue, characterised by a depletion of ATP and creatine phosphate, has both subjective and objective markers (e.g., feelings of exhaustion, more lactic acid, and less glucose). Sedentary personnel may be unable to satisfy the demands of an increased workload due to their incapacity to properly transition from aerobic to anaerobic respiration [35].

B. Type 2 Diabetes

Type 2 Diabetes Mellitus (T2DM), a chronic metabolic illness characterised by prolonged hyperglycaemia, is a primary cause of mortality. Patients with T2DM exhibit several pathophysiological conditions, including abnormalities in body composition. Sedentary behaviours, highly connected with increased calorie consumption and weight gain, both of which promote diabetes mellitus [36]. People who spend more than 40 hours per week in front of a screen (e.g., TV and computer) are three times more likely to develop type 2 diabetes mellitus than those who spend less time in front of a screen [37]. This is related to decreased physical activity and unhealthy eating habits linked with screen usage. It was discovered that nine out of ten cases of type 2 diabetes mellitus might be averted if certain risk factors were addressed [38]. This included obesity, a poor diet, smoking, and inactivity. A study noted that it was not a lack of activity that predisposed individuals to diabetes, but rather the amount of time spent sitting that could increase the risk of type 2 diabetes [39]. In February 2013, [40] surveyed 63048 middle-aged Australian men regarding their average daily sitting time and any related chronic disease, including type 2 diabetes. Responses varied between 4 and 8 hours of sitting time per day. A meta-analysis of 10 studies involving 505,045 participants indicated that higher levels of television viewing were associated with a 112% increased relative risk of diabetes, as compared to lower levels of television viewing [41]. Moreover, the meta-analysis of the current federal physical activity requirements in United States revealed a 1.4-fold larger pooled relative risk of diabetes among individuals not engaged in the guideline-defined categories of activity, such as brisk walking [42].

C. Hypercholesterolemia

The sedentary lifestyle led to abdominal and visceral fat growth. One hour of daily sedentary activity raised the risks of being overweight and accumulating belly fat [43]. Possibly, the increase in visceral and intermuscular fat promotes the release of proinflammatory cytokines and the decrease in anti-inflammatory signals from adipose tissue, resulting in a catabolic effect on muscle tissue. This process, considered a stressor mechanism, occurs as a result of inactivity, resulting in decreased glucose utilisation by the muscles, increased insulin resistance, and decreased energy consumption by inactive muscles [44]. This energy, transferred to the liver, promotes the creation of lipids, preferentially deposited in the central abdominal adipose tissue. When packed with fat, these adipocytes become metabolically active, releasing inflammatory chemicals while concurrently suppressing the release of the anti-inflammatory adiponectin. The reduction of high-density lipoprotein (HDL) cholesterol was also associated with sedentary behaviour. In adults aged 30 to 50, sedentary time was related with decreased HDL cholesterol levels, but not with other lipid profile markers or arterial hypertension [45]. Sedentary behaviour inhibited the activities of the lipoprotein lipase enzyme, and this inhibition was related to lower plasma triglyceride uptake and decreased plasma HDL levels. Nonetheless, long-term therapies are required to alter lipid levels. Therefore, it can be concluded that both sedentary behaviour and physical inactivity are detrimental to lipid metabolism; their long-term effects may result in the build-up of visceral and central abdominal fat, a risk factor for various cardiovascular diseases [46].

D. Hypertension

Sedentary behaviour influences blood pressure through a variety of mechanisms and alters blood pressure as a result of changes in cardiac output and total peripheral vascular resistance. By stimulating the sympathetic nervous system, sedentary time affects insulin sensitivity and vascular function, increases oxidative stress, and promotes the low-grade inflammatory cascade [47]. A study found a link between sedentary behaviour and an increased risk of hypertension (HR, 1.48; 95% CI, 1.01–2.18; P value < 0.03) [48]. Non-interactive sedentary behaviours like watching television and napping have been found to increase the risk of hypertension compared to interactive sedentary behaviours like driving and using a computer.

V. PRACTICAL IMPLICATION

A. Intervention

Teaching materials might place a greater emphasis on short-term benefits, including mental health benefits, to ensure that interventions are better matched with the viewpoints of office workers. In addition, it is crucial to educate office workers on the health risks associated with prolonged sitting, as this appears to be a significant knowledge gap [49]. Interventions could include motivational interviewing or utilising the Disconnected Values (Intervention) Model to help office workers explain their values towards physical activity and sedentary

behaviour. It can empower them to make more active, value-aligned decisions [50]. A health promotion implication can be to structure physical activity messaging so that opposing values are regarded as compatible with physical exercise rather than in conflict with it.

B. Role of Employer

Given that a significant amount of sedentary activity happens in the workplace, businesses can encourage their employees to stand, walk, or move creatively. The workspace can be altered to encourage more activity. For instance, standing desks and active-sitting chairs enhance muscular activity throughout a workday. Stairs or exercise equipment, such as dumbbells or yoga mats that are easily accessible in a house or the workplace, might facilitate exercise. Employers might also restructure virtual meetings. Work meetings lasting more than 30 minutes may include standing, walking, or activity breaks. When images are not required, returning to voice calls instead of video meetings or making it acceptable to disable video during virtual meetings enables talks to occur while standing, moving, or even strolling outside. Lastly, suggestions for establishing a culture that supports healthy behaviours, such as physical activity, when working in the office are likely to have a comparable effect on remote work. Effective top-down leadership allows standing during meetings, mobility breaks, and flexible schedules and encourages physical activity by providing the required knowledge and modelling the behaviour.

VI. CONCLUSION

Understanding the relationship between sedentary behaviour and health outcomes and modifying these behaviours are critical for reducing the morbidity and death rates caused by linked health problems. The detrimental health effects undeniably escalate as the total daily inactive time increases. Therefore, it is essential to limit sedentary time as much as possible. Increasing community, especially office workers', awareness of the health concerns associated with extended sitting may motivate them to sit less. Despite the importance placed on health, other values, such as social and work-related values, are occasionally prioritised. Providing information regarding the health effects of sedentary behaviour and the short- and medium-term advantages of physical activity, including mental health benefits, can enhance interventions designed to minimise sedentary behaviour and increase physical activity among office employees. In addition, interventions can regard physical exercise as consistent with values and facilitate value-aligned decisions. Lastly, it is essential that the workplace encourages physical activity and breaks from sedentary behaviour.

CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

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