RSU LASE

LASE Journal of Sport Science • 2025/2 • Pages 12–20
https://doi.org/10.25143/lase_joss.v16i2.02

ORIGINAL RESEARCH PAPERS

Habitual Physical Activity, BMI and Aerobic Capacity Among Office Employees

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Abstract

Health impairments can compromise occupational performance, thereby diminishing productivity when individuals are unable to meet job demands. Reduced aerobic capacity is specifically associated with a diminished ability to perform prolonged tasks, as lower cardiorespiratory fitness restricts both endurance and physiological efficiency. The aim of the study is to assess the habitual physical activity and aerobic endurance and BMI of office workers and to find relationship among parameters. Methods: 51 office workers participated in the study (89% women and 11% men, with a mean age of 42.2 ± 10.1 years). Data was collected using the short version of the International Physical Activity Questionnaire (IPAQ) and the 6-Minute Walk Test (6-MWT). The questionnaire process and the collection of data

from the 6-MWT of respondents took place anonymously, with the permission of the Research Ethics Committee of Rīga Stradiņš University. Mathematical statistics (descriptive statistics and Spearman Rank correlation) were used. This research was funded by the framework of the Plan of the European Union Recovery and Resilience Facility and the State budget grant RSU/LSPA-PA-2024/1–0013. The results have shown that 41% of office workers do not participate in vigorous physical activities, while 19% participate in them two days a week. On the other hand, 19% of office workers do not participate in moderate physical activities during the week. The results of the 6-MWT study indicate that 88% are healthy people, and the average result of the 6-minute walk test (6MWT) in the group was 516.82 meters. The participants spend on average 472.92 minutes sitting per day, which corresponds to approximately 7 hours. There is a correlation between the time spent participating in moderate physical activities and the distance covered in the 6-MWT test, and the longer the employees sit, the less distance covered in the 6-MWT. Conclusions: the study examined the relationship between daily levels of moderate physical activity, sedentary time, and aerobic endurance, emphasizing the necessity for office employees to reduce prolonged sitting. The findings suggest that, moving forward, multifaceted strategies will be required to effectively encourage physical activity within workplace settings.

Keywords: physical activity, BMI, aerobic endurance, office workers

Introduction

Over the past several decades, sedentary behavior has emerged as one of the most pressing public health challenges, given its strong association with numerous adverse health outcomes. Office employees devote a substantial proportion of their working hours to sedentary desk-based activities (Maphong & Sriramatr, 2023; Ryan et al., 2011).

Prolonged sedentary behavior, when coupled with insufficient levels of physical activity, considerably increases the risk of developing non-communicable diseases and contributes to increased premature mortality among this population group (Ekelund et al., 2020; Prince et al., 2019; Stamatakis et al., 2019; León-Muñoz et al., 2013).

In 2023, the World Health Organization (WHO) indicated that cardiovascular diseases remain the leading global cause of mortality, responsible for roughly 17.9 million deaths annually, with coronary heart disease accounting for over 80% of these cases. Additionally, it is estimated that nearly 80% of premature cardiovascular-related deaths stem from modifiable and preventable risk factors, such as poor dietary habits and inadequate levels of physical activity. (WHO, 2023).

Most of the previous research has demonstrated that regular physical activity and aerobic exercise exert beneficial effects on cardiovascular health and cardiac function (Lee, 2024; Ji et al., 2022; Emerenziani et al., 2017; Mundwiler et al., 2017). Habitual physical activity has a significant positive impact on both BMI and aerobic capacity among office employees. Regular engagement in physical activity, even at moderate levels, can lead to reductions in BMI (Genin et al., 2018) and improvements in VO_2max (Amalia et al., 2022; Alkhatib, 2015), contributing to better overall health and reduced risk of chronic diseases.

Another study found that different exercises (Thanasilungkoon et al., 2022) significantly decreased BMI values within four weeks. There is a negative correlation between BMI and physical activity levels. Higher levels of physical activity are associated with lower BMI. Employees with higher physical activity levels had lower BMI compared to those with lower activity levels (Rafatifard et al., 2019; Pal et al., 2014). Lower aerobic capacity and problems with a body mass index are associated with reduced ability to sustain intensive tasks, as it limits endurance and efficiency.

However, contrasting evidence suggests that prolonged or excessive engagement in aerobic exercise may contribute to the development of cardiovascular pathologies and impair cardiac performance, potentially leading to cardiac dysfunction (Martinez et al, 2021).

It is also important to distinguish sedentary behavior from physical inactivity, as individuals may meet the recommended levels of physical activity for their age group while still spending a substantial proportion of their time engaged in sedentary pursuits (León-Muñoz et al., 2013; Patel et al., 2010).

Therefore, the aim of the research is to assess habitual physical activity, aerobic endurance, and BMI of office workers and to find relationship among parameters.

Materials and Methods

51 office workers participated in the study; 89% were women and 11% were men, with a mean age of 42.2±10.1 years.

The collecting of physical activity data was completed using the short version of the International Physical Activity Questionnaire (IPAQ: short form). The evaluation of respondents' aerobic capacity was made using the 6-Minute Walk Test (6-MWT). Additionally, BMI data was collected. Mathematical statistics (descriptive statistics and correlation) were used.

The questionnaire process and the collection of data from the 6-MWT and BMI of the respondents took place anonymously, with the permission of the Research Ethics Committee of Riga Stradiņš University.

This study was part of the project "Multidisciplinary approach for the development of sustainable habit of regular physical activity among sedentary workers" (RSU/LSPA-PA-2024/1–0013), which was funded by the framework of the Plan of the European Union Recovery and Resilience Facility and the State budget (Nr.5.2.1.1.i.0/2/24/I/CFLA/005).

Results

Vigorous physical activities were performed on average 1.42 times per week (Std. Dev. 1.550), with an average duration of 47.3 minutes per session (Std. Dev. 58.9). 41% did not engage in vigorous physical activities at all.

Moderate physical activities were performed on average 2.25 times per week (Std. Dev. 2.1), with an average duration of 58.7 minutes per session (Std. Dev. 57.7). 19% of respondents did not engage in moderate physical activities.

Walking for at least 10 minutes without a break was reported on average 4.5 days per week (Std. Dev. 2.1), with an average duration of 64.7 minutes per day (Std. Dev. 55.9). However, 1.9 % of respondents did not walk for at least 10 minutes at all, and 9.4 % walked only once per week. Notably, 32 % of respondents walked at least 10 minutes every day.

Participants spent on average 472.92 minutes sitting per day, which corresponded to approximately 7 hours (Std. Dev. 183.5). A total of 58 % of respondents reported sitting for more than 7 hours each day.

The average body mass index (BMI) in the group was 26.9 (Std. Dev. 5.6), which is higher than the normal BMI range (18.5–24.99) and is classified as overweight (25–29.9). 37.7 % had a normal BMI. 5.6 % had a reduced BMI. 54.7 % had an elevated BMI.

Table 1

Aerobic endurance of the office workers

Characteristics of the functional class according to the 6-MWT	Distance covered	Number of respondents
Functional class – no physical activity limitations, with daily activities not causing fatigue, palpitations, or shortness of breath.	More than 550 m	30 %
Functional class – slight limitation of physical activity – individuals feel comfortable at rest, but ordinary physical activities may cause fatigue, palpitations, or shortness of breath.	425–550 m	57 %
Functional class – physical activity limitation – individuals feel well at rest, but even activities less demanding than daily routines may cause fatigue, palpitations, or shortness of breath.	Less than 425 m	13 %

The results of the 6-MWT study indicate that 88 % are healthy people, as the average result of the 6-minute walk test (6MWT) in the group was 516.82 meters (Std. Dev. 87.5).

Several weak but statistically significant correlations were identified among the analyzed indicators, indicating interrelationships and potential interactions between the studied variables (see Figure 1, Figure 2, Figure 3).

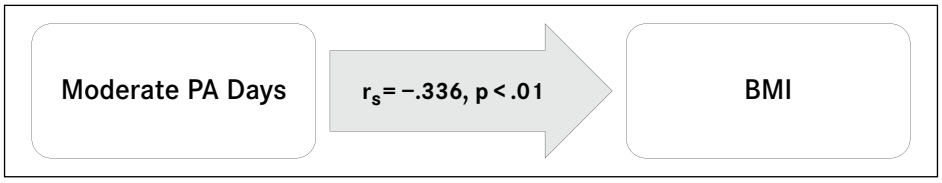

Figure 1 **Correlation between moderate physical activity days per week and BMI**

The respondents who engaged in moderate physical activity on a greater number of days per week demonstrated a more favorable body mass index (BMI). Analysis revealed that individuals engaging in moderate physical activity on more days per week exhibited significantly lower BMI values compared to those who were less active.

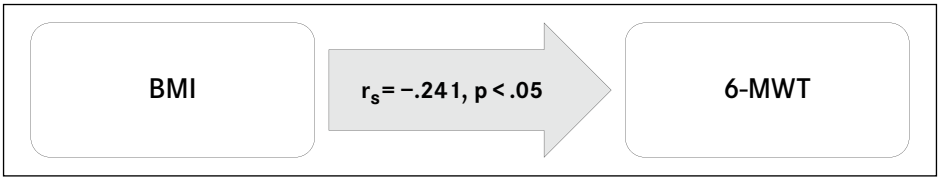

Figure 2 **Correlation between BMI and the result in 6-MWT**

Respondents with a higher body mass index (BMI) covered a shorter distance in the six-minute aerobic endurance test. Participants with higher BMI values tended to cover less distance during the six-minute endurance test, suggesting that higher body mass may be associated with reduced aerobic capacity.

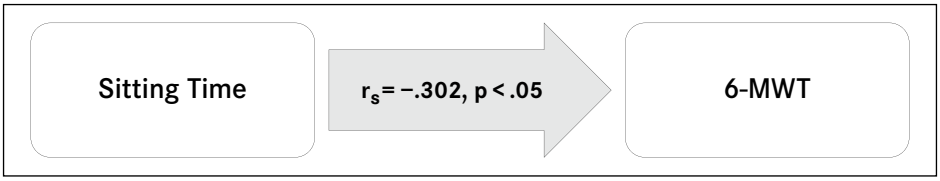

Figure 3 **Correlation between time spent sitting and the 6-MWT result**

Participants who spent more time sitting during the day covered a shorter distance in the six-minute walk test, indicating a lower level of aerobic endurance and a reduced functional capacity. The findings indicate a negative association between sedentary behavior and functional performance, reflecting diminished participants' aerobic endurance and functional capacity.

Discussion

Participants in this study reported an average daily sitting duration of 472.9 minutes (approximately 7.9 hours), and 58% of them indicated sitting for more than seven hours per day. These results are comparable with recent large-scale investigations demonstrating that office employees typically spend 8–9 hours daily in a sedentary way (Leskinen et al., 2025; Park et al., 2024). Although the average sedentary time in the current sample was slightly lower than the global mean, it still represents a substantial health concern, given the established links between prolonged sitting and increased metabolic and cardiovascular risk (Maphong & Sriramatr, 2023).

The mean distance achieved in the 6-minute walk test (6-MWT) was 516.8 meters (SD = 87.5), corresponding to a moderate level of functional aerobic performance. Compared with contemporary normative values for healthy adults, which typically range from 580 to 610 meters and show gender-related differences favoring men (Delbressine et al., 2023; Yeung et al., 2022), our results suggest slightly lower endurance levels among office workers. This difference is most likely related to the higher mean BMI and increased

sedentary behavior habits observed in this population, both of which have well-documented negative effects on cardiovascular efficiency and muscular function. The finding aligns with existing literature showing that regular moderate exercise helps maintain a healthy weight by improving metabolic rate, muscle mass, and energy balance. Encouraging more frequent moderate activity could thus be an effective public health strategy for weight management.

The mean BMI among participants was 26.9 (SD = 5.6), indicating that the majority of respondents fell into the overweight category. More than half (54.7 %) had an elevated BMI, mirroring trends observed in other occupational groups. Park et al. (2024) similarly reported that extended sitting and low physical activity were associated with a greater prevalence of overweight and obesity among workers. Consistent with this, our findings revealed that the individuals who engaged in moderate-intensity activity on more days per week tended to have lower BMI values, supporting previous evidence that regular physical activity contributes to healthier body composition (Leskinen et al., 2025). Conversely, higher BMI was linked with shorter 6-MWT distances, confirming a well-established inverse relationship between body mass and aerobic performance.

The identified negative association between sitting duration and 6-MWT outcomes aligns with existing evidence showing that prolonged sedentary behavior independently predicts lower aerobic fitness and diminished cardiorespiratory function (Strauss et al., 2021; Maphong & Sriramatr, 2023; Park et al., 2024). Similar relationships have been documented by Leskinen et al. (2025), who found that longer uninterrupted sitting periods among office workers corresponded with poorer walking capacity and reduced overall physical condition. These results suggest that not only total sitting time, but also the pattern of sedentary bouts may influence functional ability.

Recent research provides encouraging evidence that workplace-focused interventions can mitigate sedentary time and improve related health indicators. Strategies such as adjustable sit-to-stand desks, scheduled movement breaks, and computerized prompts have been shown to effectively reduce sitting time and promote light-intensity activity during working hours (Rouyard et al., 2025; Wang et al., 2024). Our findings further emphasize the importance of integrating environmental and behavioral components to encourage movement throughout the day and enhance aerobic fitness in office settings.

Taken together, the observed combination of elevated BMI, extended sedentary time, and moderate aerobic performance (Hua & Yang, 2014) underscores the necessity for multifaceted, workplace-level strategies to counteract inactivity. Systematic reviews have highlighted that interventions involving ergonomic redesign, supportive management policies, and behavioral approaches are among the most effective, reducing sedentary time by approximately 30–40 minutes per day (Rouyard et al., 2025; Wang et al., 2024). Encouraging regular movement throughout the workday, rather than relying solely on structured exercise, may therefore play a key role in improving aerobic capacity, functional ability, and overall health among office employees.

Future research should focus on identifying effective strategies to encourage regular movement and integrate physical activity throughout the workday. Specifically, studies are needed to evaluate the impact of multi-level interventions in workplace settings.

Conclusions

The relationship between daily physical activity, sedentary time, BMI and aerobic endurance highlights the critical importance of reducing prolonged sitting among office workers.

Evidence consistently indicates that extended sedentary behaviour not only diminishes physical fitness but also contributes to an increased risk of metabolic and cardiovascular complications.

Therefore, encouraging regular movement and incorporating physical activities throughout the workday can play a pivotal role in improving overall health outcomes and functional capacity within this population.

Looking ahead, the development and implementation of comprehensive, multi-level interventions will be essential to effectively promote physical activity in workplace settings. Such strategies may include ergonomic redesign of office environments, organizational policies supporting active breaks, and behavioural change programmes aimed at fostering sustainable lifestyle modifications.

Collectively, these measures could significantly reduce sedentary time and enhance employees' aerobic endurance, productivity, and well-being.

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