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Correlation between Bmi, Hamstring Flexibility and Physical Activity in Desktop Workers

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ABSTRACT

Background & Objective: "People now sit for longer amounts of time and get less exercise every day because of the prevalence of desk jobs. Increased body mass index (BMI), decreased hamstring flexibility, and an increased risk of musculoskeletal disorders may all be associated with an inactive lifestyle. Understanding how these factors are related may help guide strategies to improve the health and wellbeing of desktop workers. To examine the relationship between BMI, hamstring flexibility, and physical activity among desktop workers.

Methodology: The participants in the research ranged in age from 25 to 40 and worked as desktop workers. Those who were eligible to participate, both male and female, and who seemed to be in good health were included. Body mass index was determined by weighing and measuring the subjects. Physical activity was assessed using the IPAQ, and while hamstring flexibility was measured using the SRT. Pearson's correlation analysis was used to determine the relationships between BMI, physical activity, and hamstring flexibility.

Results: The analysis showed a significant negative correlation between BMI and physical activity level ($r = -0.826$, $p < 0.001$) and BMI was also strongly and negatively correlated with hamstring flexibility ($r = -0.957$, $p < 0.001$), while physical activity level showed a significant positive correlation with hamstring flexibility ($r = 0.760$, $p = 0.001$) among desktop workers.

Conclusion: Among desk workers, the research found that a greater body mass index was linked to less exercise and less flexibility in the hamstrings. Those who were more active, on the other hand, had more flexible hamstrings. These findings highlight the importance of maintaining an active lifestyle and a healthy body weight to support musculoskeletal health and reduce the effects of prolonged occupational sitting.

Keywords: Body Mass Index, Hamstring muscles, Desktop Workers, Sedentary behavior.

INTRODUCTION

There has been a dramatic shift in eating habits and general health due to the fast growth of sedentary jobs in recent years, particularly among office workers. A lot of people who work at desk jobs sit for lengthy periods of time without getting up, which means they don't get any exercise. This sustained inactivity contributes to musculoskeletal issues, reduced flexibility, and increased body weight, often reflected in a higher BMI, a common indicator of obesity and related health risks.[2] Musculoskeletal

problems are more common in sedentary occupations, and they manifest most often in the neck and lower back, but may also manifest in the shoulders, wrists, hands, knees, and ankles. Several physiological changes occur after extended periods of occupational immobility, which might hinder regular functional performance. These changes include a narrowed range of motion, tightened muscles, and diminished flexibility. Adaptive muscular shortening and chronic stiffness are more likely to occur in people whose occupations require them to sit for long periods of time.[3]

BMI is a simple measure used to assess body weight based on a person's height and weight. It is used to estimate weight status. It is calculated by dividing body weight in kilograms by the square of height in meters (kg/m^2).[4] Obesity and difficulties managing weight are common among those who do not exercise regularly. Reduced muscle quality, as shown by weaknesses in particular strength but not in power capacities, is a common symptom of obesity. This often manifests as reduced maximum strength, increased muscle soreness, and elevated creatine kinase levels in individuals with higher BMIs. Individuals with a higher BMI commonly demonstrate greater muscle stiffness and increased muscle tone, particularly in the lower limbs. The tissues of the body experience more physiological and mechanical stress when they are overweight. Seated people put more strain on their spinal cords because their intervertebral discs are under more tension, which means they have to use more muscle to keep their posture correct[5]

Flexibility is the muscle's ability to lengthen and allowing a joint to move through a ROM. Flexibility of muscle allow individual to move smoothly which increases both safety and optimal physical activity.[6] Shortened muscles are prevalent and include the hamstring group. It is composed of the semitendinosus and semimembranosus muscles, as well as the biceps femoris and the hamstring portion of the adductor magnus. With its many points of attachment, the hamstrings provide powerful muscular control over the lower limbs and pelvis. Tightness of hamstrings may influence pelvic tilt and rotation, sacral rotation and extension and rotation of hip resulting into faulty alignment of spine as the short hamstring muscles tends to rotate the pelvis posteriorly and disturb the normal mechanics of joint where it acts upon.[7]

There are several tests employed to assess hamstring flexibility, such as the SRT, Chair SRT, Back Saver SRT, AKE test, and PKE test.[8] These techniques of testing are widely utilized because they are easy to understand, consistently provide reliable results, and can be used to measure outcomes linked to flexibility. Subjective measures of sitting and activity behavior in the workplace are often assessed using standardized instruments like the IPAQ, which helps in assessing intensity and physical activity levels in individuals.[9]

Most of the literature focuses on finding the relationship of BMI with either cardiorespiratory endurance or physical fitness as a whole, but only a few studies have examined the correlation between BMI and flexibility. In addition, there is a dearth of research on the topic of body mass index (BMI) and its interactions with flexibility and physical activity all at once, especially in the context of desk workers and their sedentary lifestyles. Recognizing the significance of these connections, as higher BMI may be associated with reduced flexibility due to increased mechanical restrictions and altered muscle properties and reduced levels of physical activity may further exacerbate both conditions".

This research set out to answer the question, "How does body mass index (BMI) relate to flexibility and physical activity levels in desk workers?" by looking at this very question. Through the examination of these connections, the study seeks to improve understanding of how sedentary occupational behavior influences musculoskeletal health and to support in the development of preventive strategies and

workplace interventions aimed at improving flexibility, promoting physical activity, and maintaining a healthy BMI among desktop workers.

METHODOLOGY

The study was a cross-sectional observational study conducted among 15 desktop workers. Participants were recruited using convenience sampling based on the inclusion and exclusion criteria. Everyone who took part in the research gave their informed permission before it began.

Participants ranged in age from 25 to 40 and worked long hours at a computer. The research comprised both male and female desktop workers. We sought for volunteers who were both cooperative and able to comprehend and carry out simple verbal instructions. Individuals with a recent hamstring injury, neurological disorders affecting movement or balance, musculoskeletal conditions influencing flexibility, or pregnant women were excluded from the study.

BMI was assessed by measuring each participant's height and weight. BMI was calculated using the formula weight (kg)/height (m^2) and classified according to the World Health Organization categories as underweight, normal weight, overweight, or obese.

Physical activity level was assessed using the IPAQ. Participants completed the questionnaire based on their physical activity performed during the previous seven days. Each participant was assigned a level of low, moderate, or high physical activity based on their weekly MET-minute total.

"The SRT was used to measure the flexibility of the hamstrings. The participants were told to sit with their legs fully extended and to stretch forward as far as they could without bending their knees along the measuring scale. The maximum reach distance was recorded in centimetres, and the best of three trials was used for statistical analysis.

RESULT

Table 1: Demographic and Descriptive characteristics of desktop workers (n = 15)

			Frequency	Percent
AGE	≤30 years		5	33.3
	>30 years		10	66.7
GENDER	Female		4	26.7
	Male		11	73.3
	Minimum	Maximum	Mean	SD
Weight (kg)	58.00	103.00	77.40	10.97
Height (cm)	160.00	190.00	170.87	8.49
BMI (kg/m^2)	20.90	31.00	26.41	3.11
IPAQ score (MET-min/week)	462.00	4119.0	1930.60	1277.84
Sit & reach test (cm)	10.00	35.00	20.13	8.71

Table 1 showed the demographic and descriptive characteristics of the desktop workers included in the study. Among the 15 participants, 5 (33.3%) were aged ≤30 years, while 10 (66.7%) were aged >30

years. The participants age ranged from 26 to 39 years, with a mean age of 33.00 ± 3.82 years. Regarding gender, 11 (73.3%) participants were male and 4 (26.7%) were female.

The participants had a mean body weight of 77.40 ± 10.97 kg, ranging from 58.00 to 103.00 kg. Their mean height was 170.87 ± 8.49 cm (range: 160.00-190.00 cm). The mean BMI was 26.41 ± 3.11 kg/m², with a minimum of 20.90 kg/m² and a maximum of 31.00 kg/m². The mean IPAQ score was 1930.60 ± 1277.84 MET-minutes/week, with scores ranging from 462.00 to 4119.00 MET-minutes/week. Hamstring flexibility, measured using the SRT, showed a mean score of 20.13 ± 8.71 cm, with values ranging from 10.00 to 35.00 cm.

Table 2: Correlation between BMI, Physical Activity Level, and Hamstring Flexibility among Desktop Workers & Correlation between Physical Activity Level and Hamstring Flexibility among Desktop Workers (n = 15)

Variables	r-value	p- value
BMI vs IPAQ score	-0.826	<0.001
BMI vs Sit and Reach Test	-0.957	<0.001
IPAQ score vs Sit and Reach Test	0.760	0.001

Table 2 showed the correlations between desktop workers' body mass index (BMI), intervals between sets of exercises (IPAQ score), and hamstring flexibility (SRT). The results showed that there was a significant negative relationship between BMI and IPAQ score ($r = -0.826$, $p < 0.001$), suggesting that those with greater BMI were less likely to be physically active.

BMI also showed a very strong negative correlation with SRT scores ($r = -0.957$, $p < 0.001$), indicating that higher BMI was associated with reduced hamstring flexibility. Both associations were statistically significant ($p < 0.001$).

Physical activity level IPAQ score showed a strong positive correlation with Sit and Reach Test performance ($r = 0.760$, $p = 0.001$), indicating that greater physical activity was associated with better hamstring flexibility.

DISCUSSION

This study investigated the association between BMI, physical activity level, and hamstring flexibility among desktop workers. The results showed that higher BMI was significantly associated with lower physical activity levels ($r = -0.826$, $p < 0.001$) and reduced hamstring flexibility ($r = -0.957$, $p < 0.001$). In contrast, physical activity level showed a significant positive correlation with hamstring flexibility ($r = 0.760$, $p = 0.001$). These results indicate that prolonged sedentary occupational behavior may adversely affect musculoskeletal health, whereas regular physical activity may help preserve flexibility.

This study's finding that sedentary desk jobs are associated with lower energy expenditure, more time spent sitting, and slow weight increase is in line with other studies that has shown a negative correlation between body mass index and physical activity. Less mobility is a common symptom for those with a higher body mass index, increased fatigue, and lower participation in physical activity, creating a cycle of inactivity and further weight gain. Current recommendations from the WHO emphasize that reducing

sedentary behavior and engaging in regular moderate-to-vigorous physical activity are essential to maintain healthy body weight and preventing chronic diseases

A very strong negative correlation was also observed between BMI and hamstring flexibility. This research provides further evidence that mechanical and physiological factors contribute to a decrease in flexibility when body mass index (BMI) rises. An adaptation shortening of the hamstrings, a rise in passive muscular stiffness, and a decrease in joint range of motion may result from sitting for lengthy periods of time. Also, Jarral et al. found the same thing., that adults with higher BMI tended to have lower levels of flexibility. Although some studies in younger populations have reported weaker or non-significant associations, differences in participant age, occupational demands, assessment methods, and sedentary exposure may explain these inconsistencies.[10]

The findings also revealed a significant positive relationship between physical activity and hamstring flexibility. Participants with higher IPAQ scores exhibited better SRT performance, indicating greater hamstring extensibility. Regular physical activity is known to improve muscle elasticity, increase joint mobility, enhance neuromuscular function, and counteract the adverse effects of prolonged sitting. More recent research has shown that hamstring flexibility increases with exercise, and this is true for both active and inactive people.

These results may be useful for physiotherapists, occupational health professionals, and employers when planning workplace health strategies. Desk workers may benefit from more flexibility, less hamstring tightness, a healthy weight, and a decreased risk of musculoskeletal problems on the job if they participate in organized physical activity programs.

The present study has several strengths, including the use of validated outcome measures such as BMI, IPAQ, and the SRT. However, certain limitations should be acknowledged. The small sample size (n = 15), and cross-sectional nature limit the generalizability of the findings and preclude causal inferences. Future studies involving larger and more diverse populations with longitudinal designs are recommended to further explore these relationships and evaluate the effectiveness of workplace intervention programs.

Overall, the results suggest that higher BMI is linked to lower levels of physical activity and reduced hamstring flexibility, whereas greater physical activity is associated with improved flexibility. Encouraging healthy lifestyle practices among desktop workers may help improve musculoskeletal health and reduce the risk of disorders associated with prolonged sedentary behaviour".

CONCLUSION

There was a statistically significant correlation between desk workers' body mass index (BMI), hamstring flexibility, and exercise levels. Decreased hamstring flexibility and changed body mass index may be associated with more sitting and less moving about. Assessing these variables can help in identifying the impact of prolonged desktop work on physical fitness and may aid in promoting healthy lifestyle modifications and preventive strategies among desktop workers.

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