Correlation between Cardiorespiratory Fitness and sitting time in Desktop Workers

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Abstract-
BACKGROUND: Physical fitness is essential for all aspects of our lives. Cardiovascular and respiratory fitness are indicators of the body's ability to withstand long-term exercise. Low physical fitness and a sedentary lifestyle are the most common risk factors for cardiovascular disease and other causes of death and illness. High levels of cardiovascular and respiratory fitness provide reliable and independent information about the risk of disease and death associated with cardiovascular causes. Desktop workers must maintain a good level of physical fitness to meet their needs. However, due to a lack of focus on physical fitness, there has been a rise in Musculoskeletal disorders. This study sought to determine the physical fitness and comparison of desktop workers.
AIM: The goal of the study is to determine the relationship between Cardiorespiratory Fitness and Sitting Time in Desktop Workers.
METHODOLOGY: A survey research study of 100 convenient samplings.
RESULTS: The correlation analysis between the total sitting time in a week and the physical fitness index among the surveyed desktop workers indicates a weak positive correlation between the total sitting time in a week and physical fitness. However, this correlation is not statistically significant.
CONCLUSION: The study infers that the correlation analysis between the total sitting time in a week and the physical fitness index among the surveyed desktop workers indicates a negative correlation. Thus, it proves the null hypothesis.

Keywords: **Physical fitness, Harvard step test, Marshall D questionnaire, Desktop workers.**

INTRODUCTION

The ability to carry on a long period of activity and overall system capacity are also important factors affecting cardiorespiratory fitness. Physical fitness is required for the teaching of Physiotherapists. All our activity in society is based on physical fitness. The ability to maintain a continuous period of activity, as well as the overall capacity of the body, influences cardiorespiratory fitness levels.[1]

For cardiovascular disease as well as all other causes of morbidity and death, the most common modifiable risk factors and predictors are a sedentary lifestyle and low physical fitness. In a population-based survey, the validity and reliability of the Marshall-D were found to be sufficient to monitor sitting time during the working day. The use of the Marshall-D questionnaire is recommended to monitor weekday sitting in population surveys. In population-based surveys, Marshall-D's reliability and validity were determined to be adequate for tracking sitting time during the workday.[2]

In many adults, inactivity is a common occurrence in their working years characterised by "any waking behaviour characteristic of energy expenditure 1.5 MET while sitting or lying". Long periods of sitting, regardless of recreational physical activity, have been associated with an elevated risk of diabetes, cardiovascular disease, all-cause mortality, and cardiovascular mortality.[3]

Most computer professionals are inactive and engaged in little physical activity, PA. They're using computers every day for several hours, sitting for extended periods. It's well established that computer workers are more likely to be receiving WMSD. WMSD is an injury or condition of the muscles, tendons, nerves, joints, cartilage, and spine discs.[4]

Prolonged sitting has been linked to an increased risk of cardiovascular diseases (CVD), cardiovascular mortality (CVM), all-cause mortality, diabetes, and some cancers. Workers in occupations where there is no alternative to sitting can best be defined as “compulsory sedentary workers.[5]

The Harvard Step Test is a simple test of physical fitness for strenuous muscular exercise. It requires no special skill on the part of the subject, and it may be applied, with appropriate modifications, to healthy children, adolescents, or

adults of either sex. The "Physical fitness index" calculated from this test is useful in the allocation of individuals to duties within their physical capacity and in the assessment of response to physical training.[6]
Energy expenditure and posture simplify the term and provides researchers with a means of gathering information on what activities constitute sedentary behaviour and how long an individual might be participating in these activities each day.[7]
Reducing sedentary behaviour and increasing physical activities may promote life satisfaction, happiness, and perceived health status in this university student population.[8]
Global physical activity has been reported to rapidly decline for the first decades of the new millennium. Highly specialized industrial robots, automatic and mobile systems, and feedback have put traditional physical labor on the brink of extinction. This situation is typical for modern student communities, despite the widespread opinion that they are the leading and most active part of today's youth. [9]
There is a reduction in the amount of movement at work as well as in various everyday activities, which translates into a significant reduction in the volume and intensity of exercise. The lack of exercise and functional effort will push the body into a state of involution and atrophy, characterized by progressive "melting" of the protein tissue (muscle) and a gradual accumulation of fat.[10]
The majority of the dental professionals in this study appeared to undertake very little physical activity when assessed using multidomain GPAQ. Physically inactive health professionals, especially the male gender faculty and interns with a sedentary lifestyle, were more likely to develop obesity.[11]

OBJECTIVES

1. To assess the cardio-respiratory fitness of the desktop workers.
2. To calculate the sitting time amongst desktop workers.
3. To find the correlation between the two

METHODOLOGY

STUDY DESIGN: Cross-sectional
PLACE OF STUDY: Bangalore
SAMPLING TECHNIQUE: Convenient Sampling
STUDY SAMPLE: 100
INCLUSION CRITERIA
• Desktop worker
• Willingness to participate
EXCLUSION CRITERIA:
• Desktop worker suffering from physical or medical abnormalities like cardiopulmonary disorders, endocrine disorders, or chronic disease that affect physical fitness
• Desktop worker with recent lower limb fractures (past 6 weeks)
OUTCOME MEASURES: Harvard step test and Marshall D Questionnaire.
MATERIALS USED
A stool of 20 inches high
Pulse oximeter
Stopwatch
Sphygmomanometer

PROCEDURE

The desktop workers were screened for inclusion and exclusion criteria and basic demographic data were taken and the physical fitness index was checked by using Harvard step test. Marshall D questionnaire was used to calculate the sitting time in the desktop worker.
The apparatus required in Harvard step test was a bench 20 inches high and a stop-watch. The subject were made to step up and down from a 20-inch platform 30 times a minute for 5 minutes or until fatigue compels him to desist. Immediately after the exercise, the subjects were made to sit down, and the pulse rate was documented for periods. The physical fitness index was calculated as follows

$$\text{Physical Fitness index} = \frac{\text{Duration of exercise in seconds X 100}}{\text{2 X sum of the 3 pulse counts during recovery}}$$

RESULT

Statistical analysis of the data was performed using SPSS 20.0. The Categorical variables were presented as frequency and percentage. The continuous variables were presented as mean ± SD. The pre-post comparison was done using a paired t-test and between-group comparisons were done using an unpaired t-test. A p-value <0.05 was considered statistically significant.

Table 1: Showing age in years

		Frequency	Percent
Age	16-25	66	66.0
	26-35	29	29.0
	36-45	4	4.0
	>45	1	1.0
	Total	100	100.0

The age distribution among desktop workers in this study reveals 66% falling within the 16-25 age range. However, 29% fall within the 26-35 age group, only 4% in the 36-45 range, and 1% above 45 years old.

Figure 1: Representing age in years

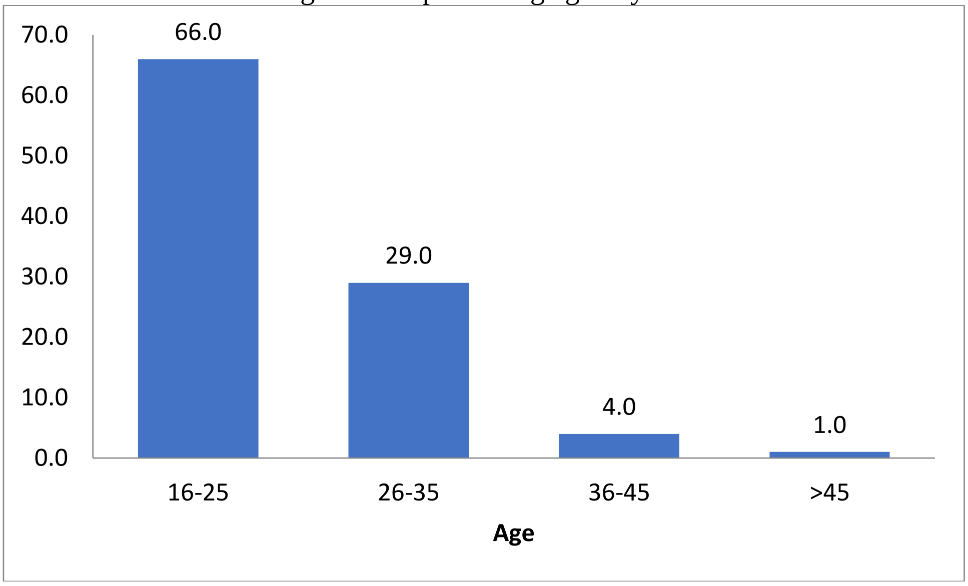

Table 2: Showing distribution based on gender

		Frequency	Percent
Gender	FEMALE	44	44.0
	MALE	56	56.0
	Total	100	100.0

The gender distribution among desktop workers is relatively balanced, with males accounting for 56% and females for 44% of the workforce.

Figure 2: Representing distribution based on gender

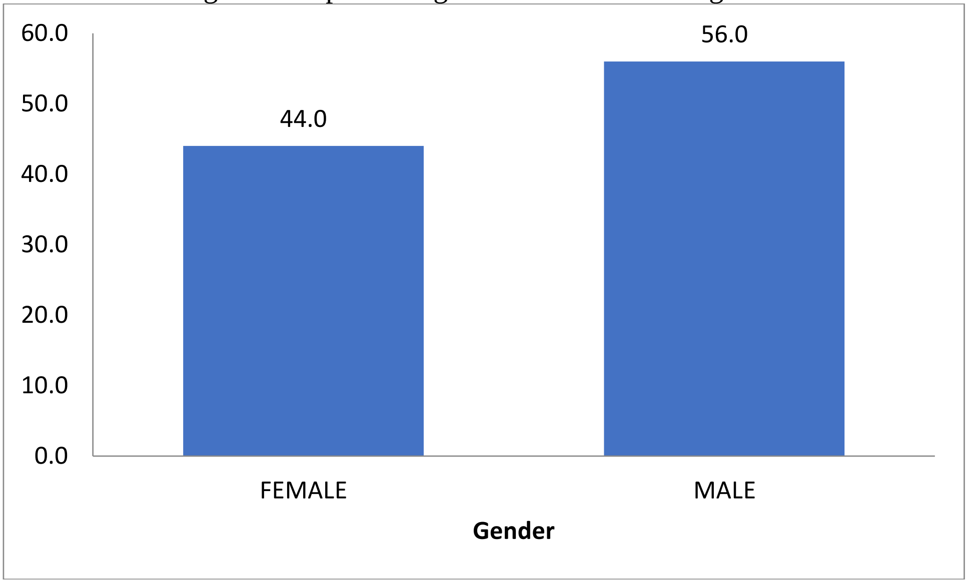

Table 3: Showing years worked as a desktop worker

		Frequency	Percent
How many years you are working as desktop worker	<1	31	31.0
	1—5	54	54.0
	6—10	14	14.0
	>10	1	1.0
	Total	100	100.0

The distribution of years of experience among desktop workers showed 31% had less than one year of experience. The majority, constituting 54%, fell within the 1-5 years of experience, 14% had 6-10 years of experience and only 1% had over 10 years of experience.

Figure 3: Representing years worked as a desktop worker

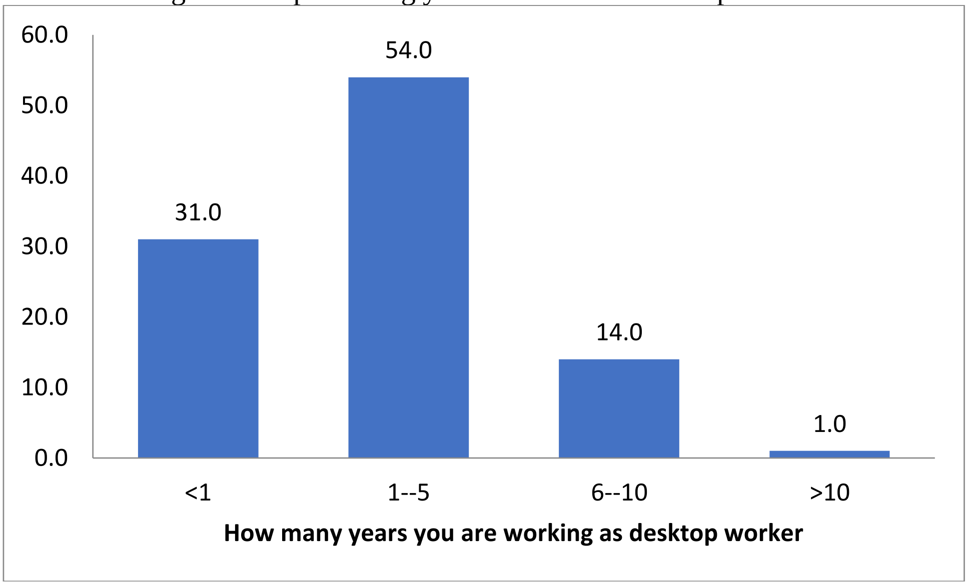

Table 4: Showing hours a day of sit and work

		Frequency	Percent
	0—5	10	10.0
	6—10	86	86.0

How many hours a day you sit and work	>10	4	4.0
	Total	100	100.0

The number of hours spent sitting and working among desktop workers reflected most workers 86% reported sitting and working for 6-10 hours a day, 10% reported sitting and working for 0-5 hours a day, while only 4% reported working for more than 10 hours daily.

Figure 4: Representing hours a day of sit and work

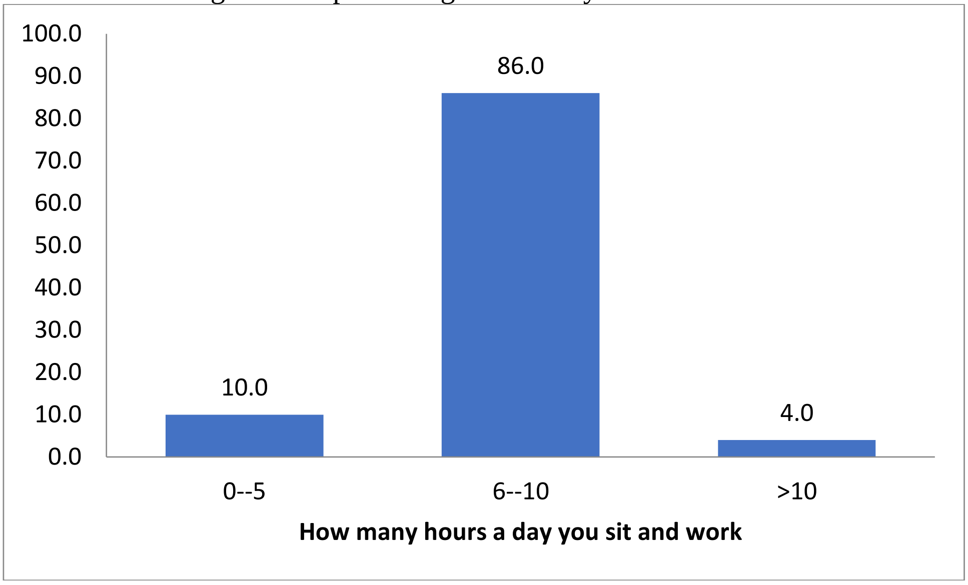

Table 5: Showing mean and standard deviation of weight, height, BMI, and Test time

	Minimum	Maximum	Mean	Std. Deviation
Weight	38.00	104.00	63.740	13.817
Height	1.30	1.90	1.660	0.098
BMI	14.69	49.11	23.119	4.752
Test time	29.00	300.00	114.320	57.795

The data revealed various mean values along with their respective standard deviations.
The average weight recorded was 63.740±13.817 kg.
Heights averaged 1.660±0.098 meters.
Body Mass Index (BMI) showed an average value of 23.119±4.752.
Test durations, on the other hand, had an average time of 114.320±57.795 minutes.

Figure 5a: Representing mean of weight

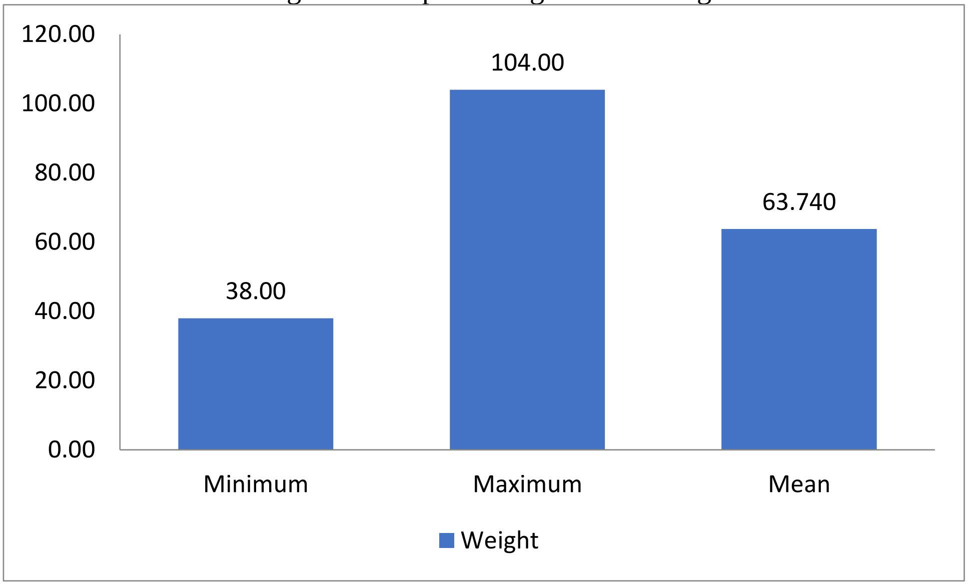

Figure 5b: Representing mean of height

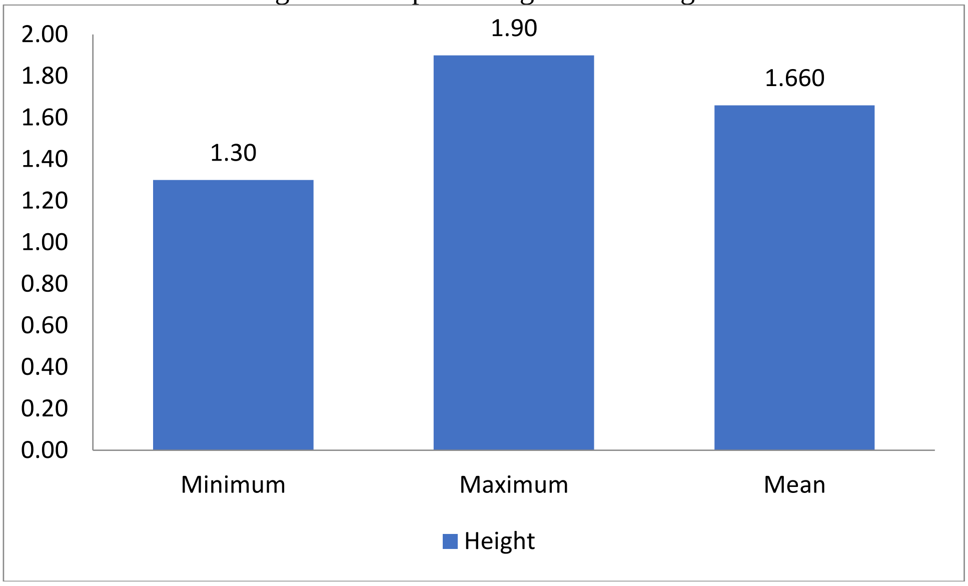

Figure 5c: Representing mean of BMI

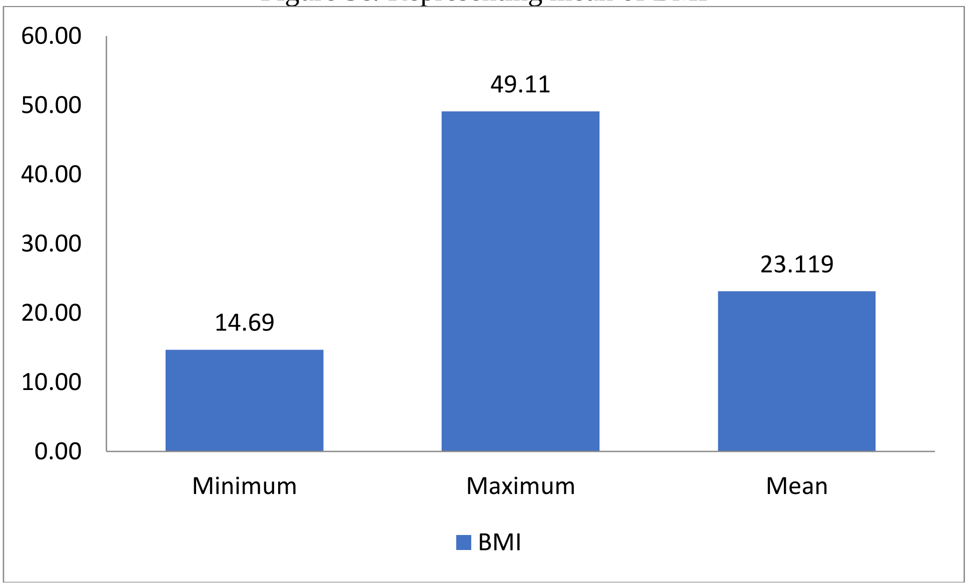

Figure 5d: Representing mean of Test time

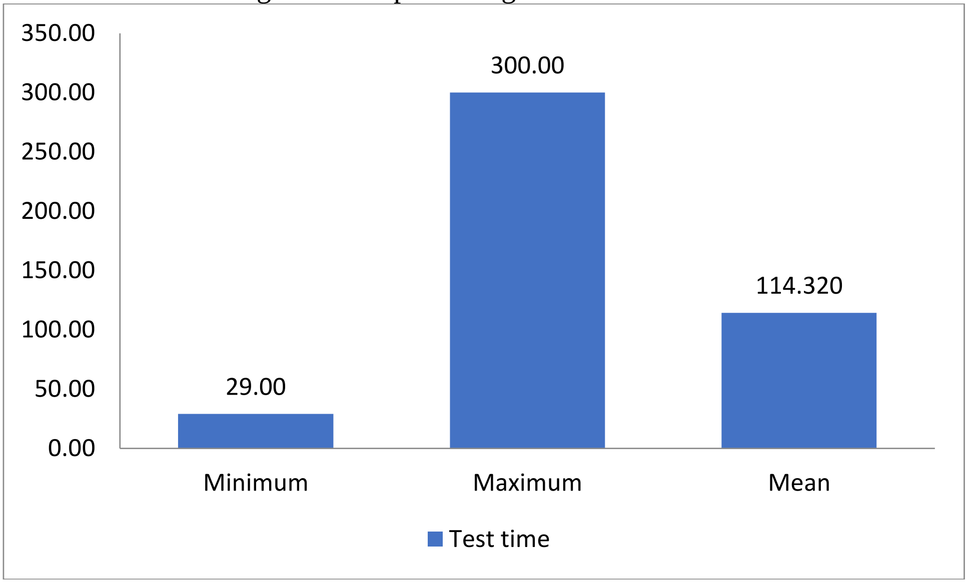

Table 6: Showing the correlation between physical fitness index and Total Transport, Total Work/school/education, Total Leisure: Screen time in a week, Total Leisure: Other in a week

Correlation	Physical Fitness Index	
	r value	p-value
Total Transport	0.135	0.182
Total Work/school/education	0.016	0.874
Total Leisure: Screen time in a week	0.085	0.4
Total Leisure: Other in a week	0.139	0.167

The correlation analysis conducted among the surveyed desktop workers revealed the relationship between different activities and their physical fitness levels. The study showed positive correlations yet none of them were statistically significant. There was a weak positive correlation between engagement in transportation activities and physical fitness, as well as between screen time during leisure activities and physical fitness, these correlations did not show statistical significance. Similarly, the time spent on work, school, or education, as well as other leisure activities, showed weak correlations with physical fitness.

Table 7: Showing correlation between physical fitness index and Total sitting time in a week

Correlation	Physical Fitness Index	
	r value	p-value
Total sitting time in a week	0.125	0.214

The correlation analysis between the Total sitting time in a week and the Physical Fitness index among the surveyed desktop workers indicates a weak positive correlation between the total sitting time in a week and physical fitness. However, this correlation is not statistically significant.

DISCUSSION

Table 1 and Graph 1 show that out of 100 subjects, the age distribution among desktop workers in this study is 66% falling within the age range of 16–25 years. However, 29% fell within the age group of 26–35 years, only 4% fell within the age group of 36–45 years, and 1% of the sample population was above the age of 45 years.

Table 2 and Graph 2 show the gender distribution among desktop workers, which is relatively balanced, with males accounting for 56% and females for 44% of the workforce.

Table 3 and Graph 3 show the distribution of years of experience among desktop workers, which showed 31% had less than one year of experience. The majority, constituting 54%, fell within 1–5 years of experience; 14% had 6–10 years of experience; and only 1% had over 10 years of experience.

Table 4 and Graph 4 show the number of hours spent sitting and working among desktop workers, which reflects that most workers (86%) reported sitting and working for 6–10 hours a day, 10% reported sitting and working for 0–5 hours a day, and only 4% reported working for more than 10 hours daily.

Table 5 and Graph 5 show various mean values along with their respective standard deviations. The average weight recorded was 63.740±13.817 kg. Heights averaged 1.660 ± 0.098 meters. Body Mass Index (BMI) showed an average value of 23.119±4.752. Test durations, on the other hand, had an average time of 114.320±57.795 minutes.

Table 6 shows the correlation between physical fitness index and Total Transport (r-value = 0.135, p-value = 0.182), between physical fitness index and Total Work/School/Education (r-value = 0.016, p-value = 0.874), between physical fitness index and Total Leisure: Screen time in a week (r-value = 0.085, p-value = 0.4), and between physical fitness index and Total Leisure: Other (r-value = 0.139, p-value = 0.167) in a week.

Table 7 shows the correlation between physical fitness index and total sitting time in a week (r value = 0.125, p value = 0.214).

The correlation analysis conducted among the surveyed desktop workers revealed the relationship between different activities and their physical fitness levels. The study showed positive correlations, yet none of them were statistically significant. There was a weak positive correlation between engagement in transportation activities and physical fitness, as well as between screen time during leisure activities and physical fitness; these correlations did not show statistical significance. Similarly, the time spent on work, school, or education, as well as other leisure activities, showed weak correlations with physical fitness.

The correlation analysis between the total sitting time in a week and the physical fitness index among the surveyed desktop workers indicates a weak positive correlation between the total sitting time in a week and physical fitness. However, this correlation is not statistically significant.

CONCLUSION

The study infers that the correlation analysis between the total sitting time in a week and the physical fitness index among the surveyed desktop workers indicates a negative correlation. Thus, it proves the null hypothesis

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