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ORIGINAL ARTICLE **OPEN ACCESS**

Functional Abilities and Physiological Variables of Sedentary Female Teachers: A Comprehensive Analysis and Implications for Health Promotion

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ABSTRACT
Sedentary lifestyles and the associated health risks pose a growing concern in contemporary society. This research paper focuses on sedentary female teachers to analyze their functional abilities and increase awareness regarding the health risks associated with a sedentary lifestyle. The study assesses various physiological and physical variables, such as body composition, functional capacity, and physical activity levels, to evaluate the overall physical fitness of the teachers. The paper emphasizes the limitations of conventional body composition measurement methods and underscores the necessity for accurate assessment of body fat percentage. Moreover, it discusses the impact of physical inactivity on older adults and the significance of early interventions in preventing functional decline. The study highlights the importance of physical fitness and the adverse effects of sedentary behaviour on cardiovascular health. It also sheds light on the prevalence of physical inactivity in India and the unique challenges faced by sedentary female teachers in incorporating physical activity into their daily routines. Through an analysis of the selected variables and the utilization of statistical techniques, the study aims to create a descriptive profile of the physiological and physical characteristics of sedentary teachers. The findings contribute to the existing body of evidence on sedentary behaviours and offer valuable insights for the development of targeted interventions.
Keywords: *sedentary lifestyle, functional abilities, physical variables, female teachers, body composition, physical activity, health risks.*

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INTRODUCTION

In today's society, the impact of sedentary lifestyles and its associated health risks have become a growing concern. Sedentary behaviours, such as prolonged sitting and lack of physical activity, have been linked to various health issues, including cardiovascular disease, obesity, and functional decline [2, 3, 5]. This research paper aims to analyze the functional abilities of physiological and physical variables of sedentary female teachers in order to raise awareness about the health risks associated with a sedentary lifestyle and improve their overall physical fitness. Body composition is an essential aspect of assessing an individual's health and wellbeing [1]. Height/weight charts are commonly used for initial screening evaluations to determine body composition. However, this method has limitations as it fails to differentiate between body fat and lean body mass. Excess body fat, especially in the abdominal region, is associated with an increased risk of cardiovascular disease. Therefore, a more accurate method of measuring body fat percentage is needed. The skinfold thickness technique has proven to be an effective method in determining body fat from lean body mass [4, 6, 9]. The study also addresses the issue of physical inactivity among older adults, who are particularly prone to a sedentary lifestyle. Functional capacity, which refers to an individual's ability to carry out daily activities independently, is greatly affected by physical decline in seniors. Functional decline not only reduces their overall well-being and quality of life but also increases their vulnerability and dependence. By assessing the functionality of this population, professionals can identify potential risks and levels of dependence, enabling the design of preventive strategies and early interventions [8, 14]. Furthermore, physical and mental well-being is fundamental rights that allow individuals to lead a fulfilling life. Sedentary behaviour and the development of an inactive lifestyle contribute significantly to poor cardiovascular health [13]. Additionally, being overweight can increase the risk of cardio-metabolic diseases, such as diabetes and hypertension. Regular physical activity has been

shown to provide numerous health benefits, including improved blood pressure and insulin responsiveness. Hence, promoting physical fitness and combatting sedentary behaviour are crucial for overall health and disease prevention [10, 15, 19]. However, the focus on occupational activity alone is insufficient to determine an individual's overall physical activity level. In many developing countries, domestic tasks contribute significantly to daily physical activity due to lower levels of household motorization. Unfortunately, lack of awareness about physical activity, pollution, and traffic are major contributors to sedentary behaviour. In India, the prevalence of physical inactivity is alarmingly high, with over 65% of the population, especially in urban areas, leading sedentary lifestyles. The study specifically targets sedentary female teachers, who face unique challenges in incorporating physical activity into their daily routines [20]. The sedentary nature of their profession, coupled with additional responsibilities as homemakers, often leaves them with limited time and energy for exercise. This neglect of personal health and well-being puts them at greater risk for various health issues [7, 17]. Therefore, it is crucial to address women's health issues in the workplace and promote early intervention to improve their functional abilities and physical fitness. In conclusion, this research study aims to analyze the functional abilities of physiological and physical variables of sedentary female teachers. By assessing their functional capacity and physical status, the study aims to raise awareness about the health risks associated with a sedentary lifestyle and motivate teachers to incorporate physical fitness into their daily routines. Ultimately, the findings of this study will contribute to the existing body of evidence on the impact of sedentary behaviours on overall health and well-being and provide valuable insights for the development of targeted interventions.

MATERIAL AND METHODS

Selection of Subjects

The study included a sample of 120 sedentary female teachers aged between 30 and 45 years. The mean age of the participants was 42.34 years (SD = 0.54), with an average height of 1.73 meters (SD = 0.70) and weight of 65.28 kg (SD = 1.17). The participants were purposively selected from different schools in the Delhi NCR region, which was further divided into four zones: Delhi, Ghaziabad, Muzaffarnagar, and Meerut, with 30 samples from each zone. All the participants had a minimum of three years of experience in the teaching profession. They were asked about their medical history and any other conditions that could affect their participation in the research. The participants were provided with information about the study's objectives and procedures, and they were assured of the confidentiality of their data. The sample selection and measurements took place between March 2022 and November 2022. Participants were given the option to withdraw from the study at any stage and were instructed to follow the protocols for data collection.

Selection of Variables

Individuals with excellent health can significantly extend their lifespan compared to those with poor health. The modern lifestyle has adversely affected people's overall well-being. Upon closer examination, it becomes clear that true happiness is unattainable unless one's physical and mental state is optimal. Maintaining good physical health and being free from diseases are crucial for leading a healthy life [12]. The sedentary behaviour of individuals is particularly concerning, as some studies have shown the detrimental effects on health, especially among female teachers in India. Researchers worldwide are currently exploring claims suggesting that certain individuals may have superior functional abilities based on physiological and physical factors, specifically among sedentary female teachers.

To identify relevant physiological and physical variables for sedentary female teachers, the research scholar reviewed scientific literature from various library sources, including Amity University, Noida, U.P, and LNIPE, Gwalior, M.P., India. Additionally, experts in the field were consulted. Taking into consideration the administrative feasibility, specific research objectives, and criteria, the following physiological and physical variables were selected for the investigation:

Physiological Variables:

- Vital Capacity
- Peak Flow Rate
- Maximum Breath Holding

Physical Variables:

- Height
- Body Mass Index (BMI)
- Weight
- Body Fat Percentage

Control variables:

The researcher controlled the following variables during the study:

- Participants agreed not to engage in any vigorous activities one day prior to data collection to avoid the influence of previous exertion.
- Testing procedures were conducted at the same time of day for each participant.
- The researcher regulated the duration of rest during the study.
- Sound inactive controls were female participants who had not experienced any severe respiratory or cardiovascular ailments within the past three years and were not engaged in regular exercise programs.

Criterion Measures

The criterion measures and tests/instruments used for the selected variables are described below: [11]

Vital Capacity:

- *Purpose:* Measure the maximum volume of air forcefully expired after maximal inspiration.
- *Equipment:* Baseline®12-1710 Lung Capacity Spirometer.
- *Procedure:* The subject takes a full breath and then exhales as much air as possible. The spirometer measures the amount of air exhaled after maximum inhalation.
- *Scoring:* Vital capacity is recorded in millilitres (mL).

Peak Flow Rate:

- *Purpose:* Measure the peak air flow.
- *Equipment:* Rossmax Peak Flow Meter.
- *Procedure:* The subject stands upright after a full breath and blows forcefully into the peak flow meter. The highest reading of three attempts is recorded.
- *Scoring:* Peak flow rate is measured in litres per minute (LPM).

Maximum Breath Holding:

- *Purpose:* Measure the capacity to hold the breath for a longer time.
- *Equipment:* Stopwatch.
- *Procedure:* The subject inhales deeply and holds their breath for as long as possible while the stopwatch measures the time. The subject is instructed not to let air escape through the mouth.
- *Scoring:* The duration of breath holding is recorded in seconds.

Height:

- *Purpose:* Measure the standing height of the subject.
- *Equipment:* Stadiometer (Bio+Plus®).
- *Procedure:* The subject stands barefoot on a flat surface of the stadiometer, with their heels touching the ground. The height is measured by adjusting the crossbar of the stadiometer to touch the top of the subject's head.
- *Scoring:* Height is recorded in centimetres.

Weight:

- *Purpose:* Measure the body weight of the subject.
- *Equipment:* Weighing machine (Digital Weighing Machine Glass Heuer HD 201).
- *Procedure:* The subject stands barefoot on the weighing machine, ensuring an erect posture and equal weight distribution. The weight is measured and recorded.
- *Scoring:* Weight is recorded in kilograms.

Body Mass Index (BMI):

- *Purpose:* Calculate the body mass index of the subject.
- *Equipment:* Stadiometer, weighing machine.
- *Procedure:* The subject's height is measured in meters, and weight is measured in kilograms. The BMI is calculated using the formula: BMI = Weight (kg) / Height (m)2.
- *Scoring:* The calculated BMI value is used for analysis.

Body Fat Percentage:

- *Purpose:* Measure the percentage of body fat.
- *Equipment:* Skinfold calliper (Innovare 4).
- *Procedure:* Measurements are taken from specific sites on the right side of the body, including biceps, triceps, subscapular, and supra-iliac. Skinfold thickness is measured using the calliper, and the measurements are recorded.
- *Scoring:* The skinfold measurement from different sites was used to calculate body fatness.

The procedures outlined above allow for the accurate measurement of physiological and physical variables in the selected subjects. These measurements provide valuable data for the research investigation.

Statistical Package for Social Science (SPSS): Version 20.0 of IBM SPSS Statistics for Windows (Chicago: SPSS Inc.) was employed for data tabulation, calculation, and statistical analysis.

By utilizing these equipment, tests, and software, the researchers were able to gather and process the data necessary for their investigation.

Collection of Data

To facilitate the study, the participants were gathered at the research laboratory, where they received detailed information about the study's purpose, procedure, and significance. They were provided with thorough orientation regarding the testing conditions. The sample for data collection consisted of 120 sedentary female teachers selected from various schools in the Delhi NCR region. The Delhi NCR region was divided into four zones, namely Delhi, Ghaziabad, Muzaffarnagar, and Meerut, with 30 samples collected from each zone.

Statistical Technique

The data analysis in this study was conducted by using Descriptive statistics to describe the characteristics and nature of the data. Graphs were used to visually represent the descriptive statistics (mean and standard deviation) of the selected physiological and physical variables, at 95% confidence level.

By employing these statistical techniques and confidence level, the study aimed to analyze the data, and develop a descriptive profile to understand the physiological and physical characteristics of sedentary teachers.

RESULTS

Analysis of Data and Result

Table – 1: Provides the descriptive statistics of the selected variables.

	Mean		Std. Deviation	Variance	Skewness	Kurtosis
	Statistics	Std. Error				
Height in cm	158.7498	.81413	8.91835	79.537	-2.519	7.997
Weight in Kg	67.1358	1.08135	11.84555	140.317	1.077	1.149
Body Mass Index	26.5133	.39421	4.31836	18.648	1.022	1.308
Body Fat Percentage	38.1236	.33068	3.62238	13.122	-.246	-.159
Vital Capacity	1.6668	.03340	.36592	.134	.160	.062
Peak Flow Rate	256.2000	6.96144	76.25880	5815.405	.143	-.112
Maximum Breath Holding	28.1650	.89706	9.82684	96.567	.279	.341

A descriptive analysis was conducted on several variables measured in the sample. The mean height of the participants was 158.7498 cm (M = 158.7498, SD = 8.91835), with a standard error of .81413. The height data displayed positive skewness (Skewness = 79.537) and a leptokurtic distribution (Kurtosis = -2.519).

In terms of weight, the participants had an average weight of 67.1358 kg (M = 67.1358, SD = 11.84555). The standard error was estimated at 1.08135. The weight data exhibited positive skewness (Skewness = 140.317) and a slightly platykurtic distribution (Kurtosis = 1.077).

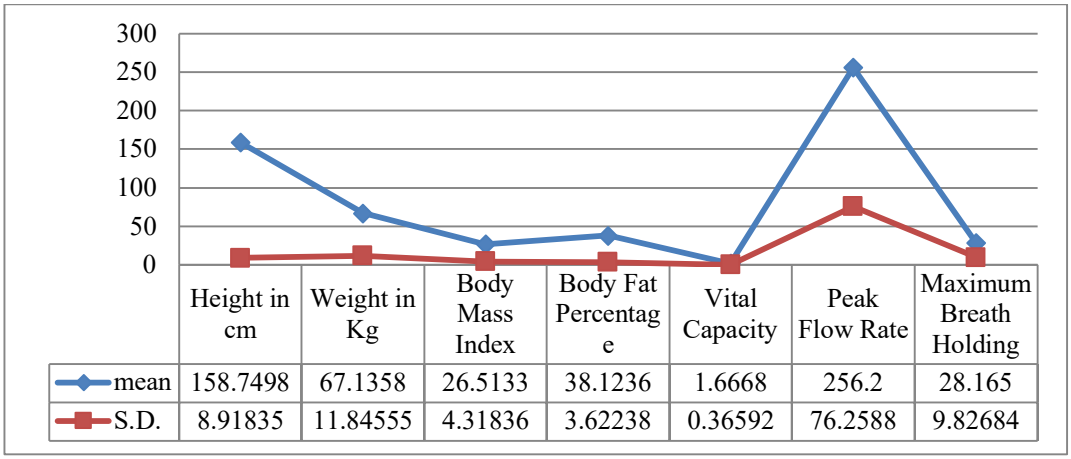
For body mass index (BMI), the mean was calculated as 26.5133 (M = 26.5133, SD = 4.31836) with a standard error of .39421. The BMI distribution showed positive skewness (Skewness = 18.648) and slightly leptokurtic characteristics (Kurtosis = 1.022).

The average body fat percentage was 38.1236% (M = 38.1236, SD = 3.62238), with a standard error of .33068. The body fat percentage data exhibited positive skewness (Skewness = 13.122) and slightly negative kurtosis (Kurtosis = -.246).

Vital capacity had a mean value of 1.6668 mL (M = 1.6668, SD = .36592) and a standard error of .03340. The skewness was estimated at .134, indicating a slightly positively skewed distribution, and the kurtosis was .160, suggesting a mesokurtic distribution.

Peak flow rate had an average value of 256.2000 LPM (M = 256.2000, SD = 76.25880), with a standard error of 6.96144. The skewness for peak flow rate was .143, suggesting a slightly positively skewed distribution, and the kurtosis was -.112, indicating a platykurtic distribution.

Unfortunately, no specific information regarding the maximum breath holding variable was provided, preventing further analysis and discussion.



	Height in cm	Weight in Kg	Body Mass Index	Body Fat Percentage	Vital Capacity	Peak Flow Rate	Maximum Breath Holding
mean	158.7498	67.1358	26.5133	38.1236	1.6668	256.2	28.165
S.D.	8.91835	11.84555	4.31836	3.62238	0.36592	76.2588	9.82684

Figure – 1: graphical representation of the Selected variables using mean and standard deviation (S.D.)

DISCUSSION

The present study aimed to examine various physiological and physical variables among a sample of 120 sedentary female teachers. The variables investigated encompassed height, weight, body mass index (BMI), body fat percentage, vital capacity, peak flow rate, and maximum breath holding.

Height measurements for the participants ranged from 124.90 cm to 179.83 cm, with an average height of 158.7498 cm. The standard deviation of 8.91835 cm indicated a moderate level of height variability within the sample. These findings provide valuable insights into the height distribution of sedentary female teachers, serving as a reference for future studies or comparisons.

In terms of weight, participants' measurements varied from 48.00 kg to 104.10 kg, with an average weight of 67.1358 kg. The standard deviation of 11.84555 kg indicated some weight variability within the sample. These results shed light on the weight distribution among sedentary female teachers, enabling an assessment of overweight or obesity prevalence within this population.

BMI, a commonly used indicator of body composition, was calculated for the participants and ranged from 19.30 to 40.60, with an average BMI of 26.5133. The standard deviation of 4.31836 indicated some BMI variability within the sample. On average, the sedentary female teachers in this study fell within the "overweight" category. These findings underscore the importance of monitoring BMI and implementing interventions to promote healthy weight management among sedentary female teachers.

Body fat percentage, which provides insight into the proportion of fat mass relative to total body weight, ranged from 28.14% to 45.79% in this study, with an average of 38.1236%. The standard deviation of 3.62238% suggested limited variability in body fat percentage within the sample. The relatively high average body fat percentage suggests that sedentary female teachers in this study may face an increased risk of health issues associated with excess body fat. Strategies aimed at promoting healthy body composition and reducing body fat may prove beneficial in this population.

Vital capacity, a measure of lung function representing the maximum volume of air forcefully expired after maximal inspiration, varied from 0.50 mL to 2.40 mL, with a mean of 1.6668 mL. The standard deviation of 0.36592 mL indicated some variability in vital capacity within the sample. These findings provide information about the respiratory health of sedentary female teachers and can serve as a baseline for comparison with physically active individuals or other populations.

Peak flow rate, which indicates the maximum air flow rate during expiration, ranged from 10.00 LPM to 440.00 LPM, with a mean of 256.2000 LPM. The standard deviation of 76.25880 LPM suggested variability in peak flow rate within the sample. These results provide insights into the respiratory performance of sedentary female teachers and can be used to assess lung function and respiratory health status.

No information regarding the maximum breath holding data, including the minimum and maximum values, was provided. Consequently, further analysis and discussion concerning this variable are not feasible at this stage.

Overall, the findings of this study highlight the range of physiological and physical characteristics present in sedentary female teachers. The results indicate a relatively high prevalence of overweight/obesity, elevated body fat percentage, and potential respiratory health issues within the sample. These findings emphasize the importance of promoting regular physical activity and healthy lifestyle behaviours among sedentary female teachers to improve their overall health and reduce the risk of associated health conditions.

CONCLUSION

In conclusion, the present study examined a sample of 120 sedentary female teachers to investigate various physiological and physical variables. The findings provided valuable insights into the height, weight, body mass index (BMI), body fat percentage, vital capacity, and peak flow rate of this population. The results indicated a moderate level of height variability and some weight variability within the sample. Based on BMI calculations, sedentary female teachers were generally categorized as overweight. Furthermore, the study revealed a relatively high prevalence of elevated body fat percentage and potential respiratory health issues among the participants.

These findings underscore the importance of implementing interventions to promote healthy weight management, monitor BMI, and improve respiratory health among sedentary female teachers. Encouraging regular physical activity and adopting healthy lifestyle behaviours are critical in enhancing their overall health and reducing the risk of associated health conditions. By increasing awareness and implementing targeted strategies, such as promoting healthy body composition and reducing body fat, educators and policymakers can contribute to the well-being and quality of life of sedentary female teachers.

Further research is necessary to explore additional variables, including maximum breath holding, and to broaden the investigation by including a larger and more diverse sample. Conducting such research would lead to a more comprehensive understanding of the physiological and physical characteristics of sedentary female teachers, enabling the development of tailored interventions and policies that address their specific health needs. Ultimately, the objective is to improve the overall health and well-being of sedentary female teachers, supporting them in leading healthier and more active lives.

Conflict of Interest Statement

The author declares no conflicts of interest.

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