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Research Article

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A Study to Assess Association Between Physical Activity Levels and Anthropometric Measurements among Adults of a Tertiary Care Teaching Hospital

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ABSTRACT

Background: Physical inactivity is a growing concern in India, contributing significantly to various health issues and lifestyle-related diseases. Once known for its active and physically demanding lifestyle, the country is now grappling with a rising trend of sedentary behaviour**.**

Methods: This descriptive cross-sectional study was conducted in Central India's tertiary care teaching institute. The study was carried out between January 2020 and October 2021. Participants in the study ranged in age from 18 to 65 and were either employed by or students at tertiary care teaching institutions. The study had 348 individuals in total. Using a random number table, each participant from their stratum was chosen at random from the list. There were 162 undergraduates, 30 interns, 52 postgraduates, 52 faculty members, and 52 nursing staff members.

Results: This study found that 8.62% of respondents had insufficient physical activity, which is lower than previous global estimates. The results showed significant associations between various anthropometric measurements and level of physical activity. Normal anthropometric measures were correlated with higher physical activity levels, while abnormal measures correlated with lower activity levels.

Conclusion: It indicates the importance of sufficient exercise to maintain a healthy body size and reduce the risk of non-communicable diseases. Workplace wellness programs can be implemented at the facility level that encourage physical activity during the workday, such as standing desks, walking meetings, and fitness breaks, on-site gyms or partnerships with nearby fitness centres walking & jogging paths.

Key-words: Physical Activity, Exercise, Anthropometric, Lifestyle, World Health Organization

INTRODUCTION

As per the World Health Organization (WHO), any body movement that is skeletal muscle-driven involves energy expenditure and qualifies it as "physically active." This covers any movement that a person does for recreation, transportation to and from locations, or employment. Physical activity, whether at a moderate or high intensity, benefits health. [1,2]

However, failing to achieve the current guidelines for physical activity recommended by the WHO is "physically inactive." This can be defined as fewer than 150–300 minutes of moderate-intensity aerobic exercise, less than 75–150 minutes of vigorous-intensity aerobic exercise, or a comparable mix of moderate- and vigorous-intensity exercise spread out over the week for adults. [1]

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Lack of exercise might raise one's risk of passing away and cause other health problems. Non-active people have a 20% to 30% higher chance of dying than appropriately active people.[3] The estimated prevalence of physical inactivity among adults worldwide in 2016 was 27.5%2. However, more recent research showed that 28% of people worldwide, or 1.4 billion people, are physically inactive, which is more than one in four people. This information was published in The Lancet Global Health in 2018. [4] There is a significantly high frequency of physical inactivity in India. Over half of the participants in a multi-centre study that was carried out across four areas of India were found to be inactive. [5] Moreover, the percentage of people who participate in recreational physical activity is less than 10%. [6]

In Madhya Pradesh, 19.6% of people (18–69 years old) reported being physically inactive in 2017–2019.[7] When compared to the Indian national average, this is comparatively lower. Physical activity and a range of anthropometric measures are tightly related. Those who are physically active typically weigh less and have lower body fat percentages. [8] The Body Mass Index (BMI) is a widely used and practical tool for determining an individual's weight. [9] It's a body fat estimation determined by a person's height and weight. A higher body mass index (BMI) may be associated with an increased risk of heart disease, hypertension, type 2 diabetes, gallstones, breathing difficulties, and some malignancies. [10]

The Waist-to-Hip Ratio (WHR), a crucial measure of body fat distribution, can provide important information about a person's overall health. A WHR greater than 1.0 may increase the risk of developing obesity-related conditions like heart disease and type 2 diabetes, even in cases when other obesity markers, such as BMI, are within reasonable bounds. [11]

Obesity and cardiovascular illnesses are two prominent health disorders for which physical inactivity is a key risk factor. [12] We can better understand the health concerns linked to physical inactivity by examining the association between anthropometric measurements and physical activity.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted in Central India's tertiary care teaching institution. The study was carried out between January 2020 and October 2021.

Study Subjects- Adult respondents studied or worked at tertiary care teaching institutes.

Sample Size and Sampling Method- The sample size was determined using the formula S= Z2 x P x(1-p)/d2. In a prior study, the prevalence (P) of physical inactivity was 27·5%. [13] In this case, it was believed that d, or absolute error, would be 5%. After adding a 10% non-respondent rate, 338 was the calculated sample size. An appropriate representative sample was selected using the stratified random sampling method based on the percentage of the entire eligible population. There were 162 undergraduates, 30 interns, 52 postgraduates, 52 faculty members, and 52 nursing staff members. The study had 348 individuals in total. Using a random number table, each participant from their stratum was chosen at random from the list.

Inclusion and exclusion criteria- The study only included individuals who volunteered to take part; those who were pregnant, had experienced cardiac problems in the past, had a locomotor disability, had neck deformities, thyroid diseases, or Cushing's illness were excluded.

Study tools and technique- The study instrument consists of two main parts: a pre-tested semi-structured questionnaire based on the Global Physical Activity Questionnaire (GPAQ) from the World Health Organization. It comprises sixteen items organized into three main categories: travel, occupation, and leisure activities. [14] Physical activity is measured in Metabolic Equivalent for Tasks (MET), the ratio of an individual's resting metabolic rate to their working metabolic rate. A MET, or the energy cost of sitting still, equals one kilogram of calories per kilogram hour. It has been calculated that an individual's calorie consumption increases four times during moderate activity and eight times with vigorous activity compared to sitting quietly.

For Work domain - Moderate MET value= 4.0, Vigorous MET value= 8.0.

For Transport Domain -Cycling and Walking MET value =4.0.

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For Recreation/ Leisure-Moderate MET value =4.0, Vigorous MET value =8.0.

According to the GPAQ interpretation rules, an individual was deemed physically active if, over a week, they engaged in either a) more than 150 minutes of moderately-intense physical activity or b) more than 75 minutes of vigorously-intense physical activity. c.) A comparable mix of intense and vigorous-intense exercise that results in at least 600 MET minutes per week. Based on the parameters, Physical activity was divided into three categories according to MET minutes per week. A week's worth of activity is divided into three categories: insufficiently active (600–2999 MET), moderately active (600–2999 MET), and highly active (>3000 MET).
The second part of the study instrument contains the anthropometric measurements, which include weight, height, waist circumference, waist hip ratio, and neck circumference.

Statistical Analysis- Total 348 respondents' data was gathered, and the Software Microsoft Excel 2016 was used to enter it. SPSS version 16 was employed to analyze the data. To present the data, appropriate descriptive statistics were applied.

Ethical consideration- The Institutional Ethics Committee has granted ethical clearance. Not including any information in the questionnaire that would reveal the participants' identities preserved the participants' anonymity. Participants gave their informed consent.

RESULTS

The sample consisted of 348 individuals between the ages of 18-65 years old. Over half (54.22%) of males and under half (45.78%) of females were in the 18-30 age group. Most participants had an Undergraduate education (55.46%), followed by Graduate (28.45%) and post-graduate (16.09%). Most occupational groups were Undergraduate students (46.55%), followed by Interns (8.62%), PG Students (14.94%), Faculty (14.94%), and Nursing staff (14.94%). In terms of religion, the vast majority were Hindu (89.37%), with smaller representations of other faiths. Most participants were unmarried (68.39%) compared to married (31.61%).

Table 1: Socio-demographic characteristics of the respondents (n=348)

Variables	Frequency (n=348)	Percentage (%)
Age group (years) Male		
18 -30	135	54.22
31-45	30	42.86
46-65	8	27.59
Age group (years) Female		
18 -30	114	45.78
31-45	40	57.14
46-65	21	72.41
Education		
UG	193	55.46
Graduate	99	28.45
Post-Graduate	56	16.09
Occupational Group		
UG Student	162	46.55
Intern	30	8.62
PG Student	52	14.94
Faculty	52	14.94
Nursing staff	52	14.94
Religion		
Hindu	311	89.37
Muslim	12	3.45
Christian	13	3.74
Jain	9	2.59
Sikh	2	0.57
Others	1	0.29
Marital Status		
Married	110	31.61
Unmarried	238	68.39

Table 2: Proportion of level of physical activity in Respondents

Physical activity level	Frequency (N)	Percentage (%)
Insufficient physical activity	30	8.62
Moderate physical activity	286	82.18
Vigorous physical activity	32	9.2
Total	348	100

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The results showed that most respondents had moderate physical activity (82.18%). A moderate level indicates that they engage in some activity on most days of the week. Only a small proportion reported vigorous physical activity (9.2%), characterized as participating in intensive activity regularly. Fewer respondents had insufficient physical activity (8.62%), denoting little to no activity. Over 90% of participants engaged in at least a moderate level of exercise during most weeks. While most were physically active to some degree, just under 10% can be considered insufficiently active according to the presented categories.

Table 3: Association between Anthropometric Measurements and Level of Physical Activity

BMI Category	Level of Physical activity			
	Insufficiently	**Moderate**	**Highly**	**p-value**
Normal	0 (0 %)	188 (86.24 %)	30 (13.76 %)	<0.0001*
High risk	30 (23.08 %)	98 (75.38 %)	2 (1.54 %)	
Waist Circumference				
Normal	14 (4.76 %)	248 (84.35 %)	32 (10.88 %)	<0.0001*
High risk	16 (29.63 %)	38 (70.37 %)	0 (0 %)	
Waist Hip Ratio				
Normal	9 (5.11 %)	143 (81.25 %)	24 (13.64 %)	0.0017*
High risk	21 (12.21 %)	143 (83.14 %)	8 (4.65 %)	
Neck circumference				
Normal	9 (4.33 %)	171 (82.21 %)	28 (13.46 %)	<0.0001*
High risk	21 (15 %)	115 (82.14 %)	4 (2.86 %)	

** Statistically Significant*

The results showed significant associations between various anthropometric measurements and level of physical activity. For BMI, 13.76% of individuals with normal BMI (between 18.5-24.9 kg/m^2) were highly active compared to only 1.54% of those with high BMI (>30 kg/m2) who were mostly moderately active (75.38%) or insufficiently active (23.08%). Similarly, 10.88% of individuals with normal waist circumference (<90 cm for men and <80 cm for women) engaged in highly active physical activity compared to 0% of those with high-risk waist circumference (>90 cm for men and >80 cm for women) who predominantly had moderate (70.37%) or insufficient (29.63%) activity levels. Moreover, compared to just 4.65% of people with high-risk waist-hip ratios (>0.9 for men and >0.85 for women), 13.64% of people with normal waist-hip ratios (<0.9 for males and <0.85 for women) had high activity levels. Comparing those with high-risk neck circumference (>37 cm for males and >34 cm for women) to those with normal neck circumference (<37 cm for men and <34 cm for women), it was found that 13.46% of the former had high activity levels. Higher levels of physical activity related to normal anthropometric measurements, but lower levels of activity were correlated with aberrant values.

DISCUSSION

This study found that 8.62% of respondents had insufficient physical activity, which is lower than previous global estimates. A 2016 study analysing data from over 1.9 million individuals in 168 countries [15] reported %

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worldwide prevalence of insufficient physical activity to be 27.5%. However, the current study surveyed a much smaller sample size of 348 predominantly younger individuals educated undergraduate students from one geographical region. Younger age is correlated with higher activity levels, while national surveys include much older populations who are generally less active.

The results of the current study differ from another previous study in India that assessed physical activity levels in 14,227 individuals. [16] That study found a higher proportion (54.4%) were inactive compared to only 8.62% inactive in the current study. Additionally, they reported a lower percentage of engaging in highly active physical activity (13.7% vs 9.2% in the present study).

55.16% of the respondents in the present study had high-risk body mass index, i.e., overweight, and obese. The percentage of high-risk body mass index was reported to be 40.12% among dental health professionals.[17] Concerning other physical measurements, 15.52% had abnormal waist circumference, 54.89% had abnormal waist-hip ratio and 40.23% had abnormal neck circumference. Hirai Gandhi *et al.* [18] reported that the physicians with abnormal waist circumference were 33% and those with abnormal waist-hip ratio were 68%, much higher than that found in the present study. Additionally, Hiral Gandhi et al. discovered a strong relationship between the sports index and the body mass index category and between leisure-time physical activity and two physical measurements: the waist circumference and the waist-hip ratio. The doctors who scored worse on the sports index were obese. The leisure-time index was greater in doctors with large waist circumferences and high waist-hip ratios.

CONCLUSIONS

The study concluded that a moderate degree of physical activity was exhibited by most of the respondents. Higher levels of physical activity were correlated with a normal BMI, waist circumference, waist-hip ratio, and Neck circumference. In comparison, abnormal anthropometric measures were associated with lower activity levels and insufficient physical activity. This indicates the importance of sufficient exercise to maintain a healthy body size and reduce the risk of non-communicable diseases. Workplace wellness programs can be implemented at the facility level that encourages physical activity during the workday, such as standing desks, walking meetings, and fitness breaks. Facilities for physical activity like on-site gyms, jogging, or walking paths can be provided.

CONTRIBUTION OF AUTHORS

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Article editing- Aditya Thakur

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