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Prevalence of Obesity in Shopkeepers and Association of Their BMI With Their Physical Activity - A Cross Sectional Study

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KEYWORDS

Shopkeepers, obesity, physical activity, IPAQ, BMI

ABSTRACT:

Introduction: Obesity, characterized by excessive body fat, has emerged as a critical global health concern, significantly increasing the risk for chronic diseases such as cardiovascular diseases, diabetes, and certain cancers. Shopkeepers, due to their occupational demands involving prolonged sedentary behaviour and limited physical activity, represent a vulnerable group in society for obesity and its associated complications. Body Mass Index (BMI) remains the most practical proxy for estimating body fat and identifying individuals at risk.

Objectives: The obejective of the study is to determine the prevalence of obesity among shopkeepers in the study area and to analyse the association between physical activity levels and obesity in shopkeepers using the International Physical Activity Questionnaire (IPAQ).

Methods: A cross sectional study was conducted among 95 shopkeepers aged 30-55 years in Bangalore. BMI was used to classify obesity and overweight status. IPAQ scale was assess for physical activity. Data on working hours, days per week, physical activity intensity at work, and sedentary lifestyle factors were collected.

Results: The study revealed overall, 47.4% of participants were overweight and 36.8% were classified as obese out of the 95 participants surveyed, obesity prevalence was higher among shopkeepers working ≤9 hours per day (70.6%) compared to those working longer hours, though this was not statistically significant ($p = 0.168$). Shopkeepers working 6–7 days weekly exhibited higher obesity rates (41.2%) compared to those working fewer days (17.6%), with this difference nearing significance ($p = 0.077$). Most overweight and obese shopkeepers engaged in predominantly light physical activity at work (89.6% overweight; 94.1% obese), although this relationship was not statistically significant ($p = 0.151$). Additionally, BMI showed a weak, nonsignificant negative correlation with total MET minutes ($r = -0.108$, $p = 0.297$), suggesting slightly lower physical activity levels with higher BMI.

Conclusions: This study concluded a high prevalence of overweight and obesity among shopkeepers, no statistically significant association between BMI and self-reported physical activity levels was found.

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1. Introduction

Across most of human history, increasing weight and accumulating fat have been seen as signs of wealth as well as good health. In times of hard labour and frequent food shortages, securing an adequate energy intake to meet requirements has been the major nutritional concern. However, weight gain and obesity are becoming a greater health concern in nations all over the world as living standards increase. Obesity is a chronic illness affecting both adults and children and is common in both developed and developing nations. It has become so widespread that it is now surpassing traditional public health issues—such as undernutrition and infectious diseases—as one of the leading contributors to poor health.[1] As obesity is a key risk factor in the natural history of other chronic and noncommunicable diseases (NCDs), it is only a matter of time before the same high mortality rates for such diseases will be seen in developing countries as those prevailing 30 years ago in industrialized countries with well-established market economies. According to the World Health Organization (WHO), worldwide obesity has nearly tripled since 1975. As of recent estimates, over 1 billion people are living with obesity 650 million adults**,** 340 million adolescents**,** and 39 million children.[2]

Obesity has become a pressing public health issue worldwide, characterized by an excessive accumulation of body fat that significantly increases the risk of various health complications, including cardiovascular diseases, diabetes, and certain cancers.[4]

Obesity is defined as a medical condition where excess body fat accumulates to the extent that it may impair health. In clinical practice, body fat is most commonly and simply estimated by using a formula that combines weight and height. The underlying assumption is that fat mass contributes to the majority of weight difference within individuals of the same height, and body-mass index (BMI) is the formula that is used most frequently in epidemiological investigations. Obesity is diagnosed using a combination of anthropometric tools like BMI and waist measurements, body composition analysis using devices such as BIA and DEXA, advanced imaging techniques like MRI and CT scans, and clinical/laboratory assessments to evaluate related metabolic risks. A BMI-based classification system for overweight and obesity offers useful insights to increasing body fatness. It also makes it possible to identify people and groups at risk of morbidity and death as well as to make meaningful comparisons of weight status within and between populations. It also permits identification of priorities for intervention at an individual or community level and for evaluating the effectiveness of such interventions. A World Health Organization (WHO) expert committee has proposed the classification of overweight and obesity that applies to both men and women and to all adult age groups.[4]

Recent advances in dietary approaches to obesity treatment emphasize personalization and evidence-based strategies. Personalized nutrition uses genetic, metabolic, and gut microbiota data to tailor diets. Low-carb and ketogenic diets promote short-term fat loss through ketosis, while intermittent fasting improves insulin sensitivity. The Mediterranean and plant-based diets support long-term weight control and metabolic health. Behavioural techniques like portion control and mindful eating help address emotional eating. In severe cases, medically supervised diets or meal replacements are used. Considerable advances have been made in diet, exercise and behavioural approaches to treatment for obesity since their advent in the first half of the 20th century, and new drugs with ever-better profiles of pharmacological activity continue to be introduced on a regular basis. Gastric surgery has had the most effective long-term success in treating the severely obese. Despite this progress, however, obesity prevalence continues to increase sharply, and the challenge to public health workers and scientists has never been greater.[4]

Obesity is increasingly prevalent among shopkeepers due to the sedentary nature of their work. Most workers spend long hours often 8 to 12 hours per day sitting. This prolonged sitting, with minimal physical activity, significantly reduces energy expenditure, contributing to weight gain and fat accumulation over time. The lack of movement also impairs metabolism, reduces insulin sensitivity, and leads to poor circulation. Combined with irregular eating habits, frequent snacking, and high levels of work-related stress, this lifestyle fosters an environment conducive to obesity. Over time, excess body weight increases the risk of several serious health conditions, including type 2 diabetes, hypertension, cardiovascular disease, musculoskeletal disorders (particularly back and neck pain), and even certain

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cancers.[4] Physical activity plays a crucial role in energy balance and weight regulation, and its relationship with obesity is well-established. Low levels of physical activity are strongly associated with increased body weight and fat accumulation. When individuals engage in insufficient physical movement—especially in combination with high-calorie diets—the body stores excess energy as fat, leading to overweight and obesity over time. Regular physical activity, on the other hand, helps burn calories, improves metabolism, and maintains lean body mass, all of which contribute to healthy weight management.[6] Research consistently shows that individuals who maintain higher levels of physical activity are less likely to be obese. Moreover, physical activity improves insulin sensitivity, reduces visceral fat, and helps regulate appetite hormones, further supporting its role in preventing and reducing obesity. Sedentary behaviour, such as prolonged sitting, is an independent risk factor for obesity, regardless of overall activity levels, making it important to both reduce inactivity and promote regular exercise in obesity prevention strategies.[7]

Physical activity (PA) is any movement of the body that requires the use of energy and is generated by the skeletal muscles (Caspersen, Powell, and Christensen 1985). Physical exercise can take many forms, including work, housework, recreation, transportation, and sports. Exercise is another aspect of physical activity that is more planned, repetitive, and regimented with the goal of preserving or enhancing physical fitness. As a result, physical activity and physical fitness are positively correlated indirectly.[5]

A person who runs or owns a shop is known as a shopkeeper. In order to open and get set up for the day, shopkeepers must arrive early. They must also answer questions from clients, offer product recommendations, attend to their needs and requests, handle cash, and maintain inventory.[3]

Understanding obesity in shopkeepers is crucial for developing tailored health programs and workplace wellness initiatives that promote exercise, healthy eating, and overall well-being. Addressing obesity can help reduce healthcare costs, improve productivity, and provide better support for managing both physical and mental health.[3]

Studying obesity in shopkeepers is important because it reveals their higher risk for chronic diseases like diabetes and heart issues due to their sedentary work lifestyle. This research helps create targeted health programs that address their specific needs, including stress management and promoting healthy habits.

Regular physical activity is essential for managing obesity, aiding in weight loss and improving overall health. It enhances insulin sensitivity, boosts metabolism, and supports mental health.

Recommendations include 150 minutes of moderate aerobic activity weekly, strength training twice a week, and aiming for 10,000 daily steps.

The International Physical Activity Questionnaire (IPAQ) is available in two versions: a long version with five activity domains that are asked separately and a short version with four generic items that can be used over the phone or by self-administering.[10]

Despite the high prevalence of obesity in shopkeepers, its importance is often underestimated or overlooked in clinical settings. This study aims to bridge this knowledge gap by examining the obesity in shopkeepers and their physical activity through a structured questionnaire based cross sectional study.

2.Objectives

The objective of the study is to find the the prevalence of obesity among shopkeepers in the study area and to analyse the association between physical activity levels and obesity in shopkeepers using the International Physical Activity Questionnaire (IPAQ).

3.Methods

Ethical clearance was obtained from the Yenepoya (Deemed to be university).This study was conducted among shopkeepers aged between 30-55 years in Bangalore, Karnataka. Participants who fulfil the eligibility criteria was included in the study. The study was explained , and the participant information sheet was given and signature was obtained with the informed consent of the participants for their voluntary participation. The participants was selected by using convenience sampling method.

Inclusion Criteria:

Shopkeepers aged between 30 and 55.

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Individuals currently working as shopkeepers in various types of retail settings.

Working for at least 1 year.

In Bangalore

Able to read and write English

Exclusion Criteria:

Individuals with known medical conditions affecting weight or physical activity such as heart conditions, Diabetes and stroke.

Unwilling to participate

4.Statistical Analysis

The continuous variables were summarised as mean (standard deviation). The categorical variables was summarised as frequency (percentage). The pie charts and bar charts was used to visualize the data. The association between obesity and physical activity was studied using Chi Squared test. A p value less than 0.05 is considered statistically significant. The data was analysed using SPSS (version 27) software. Data on self-reported physical activity was coded and scored according to IPAQ- SF guidelines. The METS- minutes per week of each domain was calculated by multiplying the weekly activity reported with the corresponding constant factor (3.3 for walking, 4.0 for moderate activities and 8.0 for vigorous activities.) MET mint was calculated for all. The total duration of the entire week was used in this calculation

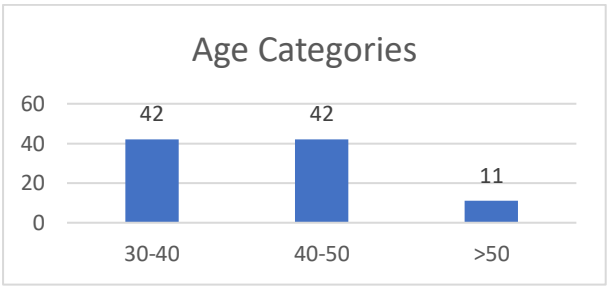
5.Result

A total of 95 participants were surveyed on shopkeepers with a significant proportion were either overweight or obese. Overall, 47.4% of participants were overweight and 36.8% were classified as obese, while a smaller percentage fell within the normal BMI range or were underweight. Although age-based differences were noted, no statistically significant association was found between age and BMI (p = 0.545), indicating that excess weight is a widespread issue across all age categories in this population. Among the participants with aged 30-40 years (n=42) had the highest proportion of underweight individuals (100%, 2 participants), with 42.9% falling under the normal category, 47.9% being overweight, and 29.4% obese. The 40–50 age group (n = 42) showed a similar trend with 43.8% overweight and 52.9% obese, while those above 50 years (n = 11) had fewer overweight (8.3%) and obese individual (17.6%). In the study, obesity was more common among those working 9 hours or less per day (70.6%) compared to those working longer hours, though this was not statistically significant (p = 0.168). Obesity rates also varied by number of working days, with the highest prevalence (41.2%) seen in those working 6 or 7 days a week, and the lowest (17.6%) in those working 5 days, with the trend nearing significance (p = 0.077). Most overweight and obese individuals reported light physical activity at work (89.6% and 94.1%, respectively), but this

association was not statistically significant (p = 0.151), partly due to the small number reporting moderate or sedentary activity.

Table 1: AGE DISTRIBUTION

	Age Categories	Valid Percent
30-40	42	44.2
40-50	42	44.2
>50	11	11.6
Total	95	100



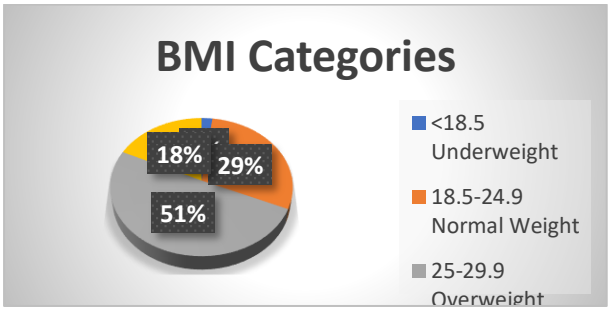


Table:2 BMI DISTRIBUTION

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	BMI Categories	Valid Percent
<18.5 Underweight	2	2.1
18.5-24.9 Normal Weight	28	29.5
25-29.9 Overweight	48	50.5
>=30 Obese	17	17.9
Total	95	100

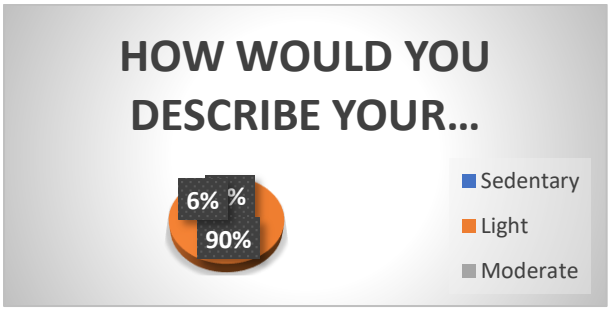

Table 3: DESCRIPTIVE STATISTICS

	N	Mean ± SD	Median (IQR)	Range
AGE	95	42.28 ± 7.06	42(37,48)	30 - 55
HEIGHT (CM)	95	164.54 ± 8.59	165(158,170)	149 - 180
WEIGHT(KG)	95	71.55 ± 9.35	70(66,78)	51 - 95
HOW MANY HOURS PER DAY DO YOU TYPICALLY WORK AT THE SHOP	95	9.23 ± 1.63	9(8,10)	6 - 12
HOW MANY DAYS PER WEEK DO YOU WORK AT THE SHOP?	95	6.37 ± 0.75	7(6,7)	5 - 7
DO YOU HELP IN ASSISTING CUSTOMERS OR USUALLY SIT AT THE COUNTER?	95	0.98 ± 0.14	1(1,1)	0 - 1
How much time did you usually spend doing vigorous physical activities on one of those days?	95	0 ± 0	0(0,0)	0 - 0
During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.	95	0.12 ± 0.32	0(0,0)	0 - 1
During the last 7 days, on how many days did you walk for at least 10	95	0.69 ± 1.96	0(0,0)	0 - 7

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minutes at a time?				
How much time did you usually spend walking on one of those days	95	6.87 ± 2.19	7(5,9)	3 - 12
During the last 7 days, how much time did you spend sitting on a week day?	95	4.8 ± 2.22	4(3,7)	1 - 9
BMI	95	26.56 ± 3.84	26.73(23.51,29)	16.28 - 34.48

Table 4: ASSOSIATION BETWEEN BMI & PHYSICAL ACTIVITY

Pearsons Correlations

		N	Correlation	Sig.
Pair 1	BMI & Total sum of MET minutes	95	-.108	.297

The analysis of paired samples revealed no statistically significant correlation between BMI and total MET minutes (r = -0.108, p = 0.297, N = 95).

There was no statistically significant correlation between BMI and total MET minutes (r = -0.108, p = 0.297).

6.Discussion

The study aimed to assess the prevalence of obesity among shopkeepers and find its association with their physical activity levels. A total of 95 shopkeepers from Bangalore were evaluated, where obesity was assessed via BMI and physical activity was quantified using the International Physical Activity Questionnaire (IPAQ).The results revealed that shopkeepers exhibited a notable prevalence of overweight and obesity, with over half (50.5%) classified as overweight and 17.9% as obese. These findings resonate with previous studies highlighting a concerning trend of rising obesity within occupational groups characterized by prolonged sedentary behavior. The high prevalence of obesity in this study group aligns with research by Biswas et al. (2018), which showed significant associations between sedentary occupational patterns and elevated BMI, suggesting shopkeepers' inherent vulnerability due to the sedentary nature of their profession.Interestingly, obesity prevalence was higher (70.6%) among those working shorter hours (≤9 hours/day) compared to those with longer working hours, although this difference was not statistically significant. Similarly, higher obesity rates were noted among shopkeepers who worked 6-7 days a week compared to fewer days, with results nearing statistical significance. This could indicate that fewer working hours might inadvertently lead to increased sedentary leisure time, possibly contributing to greater obesity prevalence. However, additional research would be needed to clarify these dynamics conclusively. Among all risk factors of dementia like age, sex, genetics; physical activity is a modifiable risk factor.

Physical activity could be in the form of occupation, household, leisure time, transportation, or sports. Exercise is also one of the components of physical activity which is more structured, planned and repetitive, which is aimed to maintain or improve the physical fitness. Therefore indirectly physical activity is also positively associated with physical fitness.

Regarding physical activity, the majority of obese and overweight individuals engaged in predominantly light activities, suggesting limited physical exertion during work hours. Despite this clear trend, the association between obesity and physical activity was not statistically significant, a finding consistent with previous research such as Shook et al. (2015) and Wiklund (2016), both emphasizing that physical activity alone does not fully explain variations in obesity, as dietary habits and energy intake also significantly impact weight management[13].The weak negative correlation found between BMI and total MET minutes (r = -0.108, p = 0.297) suggests that higher BMI values are associated with slightly lower levels of

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physical activity, although not significantly. This observation aligns with Shikha et al. (2019), who reported that obesity in urban populations is closely linked to lifestyle choices and sedentary behaviors rather than just physical activity levels[7].The study utilized IPAQ-SF, previously validated by Rai et al. (2018) among Indian populations, showing reliable results with moderate to high ICC values[14]. This choice enhances confidence in the accuracy of the physical activity assessments. Nevertheless, the absence of a strong association between physical activity and BMI underscores the importance of considering other factors, such as dietary intake, stress, and genetic predisposition, in obesity research.

Limitations: This study had several limitations, including its cross-sectional design, which restricts causal inferences. Moreover, the relatively small sample size and the self-reported nature of IPAQ data might introduce biases and inaccuracies. The snowball sampling method could have introduced selection bias, limiting generalizability to broader populations.

7.Conclusion

This study investigated the prevalence of obesity among shopkeepers and assessed its association with their physical activity levels using the IPAQ questionnaire. Findings indicated a notably high prevalence of overweight and obesity among the studied shopkeepers. However, no significant association between BMI and physical activity levels was observed. Despite the lack of statistical significance, the high prevalence underscores the occupational vulnerability of shopkeepers due to their sedentary nature of work. Further research, particularly involving larger samples and incorporating additional lifestyle factors like dietary habits and stress, is essential to comprehensively understand obesity determinants among this occupational group. This study highlights the importance of targeted workplace wellness interventions aimed at improving overall health and preventing obesity-related complications in shopkeepers.

Author Contribution:

Author 1: Ameer Ahammed: Concept, Intellectual content , Design Literature search, Manuscript preparation

Author 2: Aastha Neupane:Manuscript design and editing

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Conflict of interest: No Conflict of interest.

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