



Cross-Sectional Study on the Assessment of Awareness Regarding Nutritional Diet, Physical Activity, and Obesity: A Pre- and Post-Intervention Survey

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DOI: <https://doi.org/10.54448/mdnt26203>

Received: 02-19-2026; Revised: 04-24-2026; Accepted: 05-10-2026; Published: 05-19-2026; MedNEXT-id: e26203

Editor: Dr. Abiodun Oyinpreye Jasper MD, MHP.

Abstract

Introduction: The increasing number of university students who suffer from obesity and other lifestyle-related health issues has highlighted the necessity of successful health awareness campaigns. **Objective:**

The purpose of this study was to assess how a structured awareness program affected pharmacy students at Marathwada Mitra Mandal's College of Pharmacy in Pune's eating patterns, levels of physical activity, obesity-related factors, and health awareness.

Material and Method: A survey-based study involving 300 pharmacy students, ages 17 to 24, was carried out for three months before and after the intervention. Five components of a standardized, validated questionnaire were used to gather data: demographics, physical activity, nutritional diet, obesity and health-related factors, and behavior and awareness. For continuous variables, a paired t-test was used, and for categorical data, chi-square tests; a P-value of less than 0.05 was deemed statistically significant. **Results:** The mean scores for body weight satisfaction, physical activity, health behaviour and awareness, and nutritional diet all showed significant improvements ($p < 0.05$). Chi-square analysis showed a decrease in weight-related health problems and a substantial increase in participation in weight management programs and prior weight management attempts. **Conclusion:** At Marathwada Mitra Mandal's College of Pharmacy, the awareness intervention program effectively improved students' knowledge of body weight control, physical activity, health-related behaviours, and nutritional practices. These findings emphasize how crucial it is to put in place organized health education programs at pharmacy

schools in order to encourage young adults to lead better lifestyles.

Keywords: Nutritional Diet. Physical Activity. Obesity. Health Behaviour. Awareness Program. Pharmacy Students.

Introduction

Obesity and overweight prevalence have become major global public health issues in recent years, especially among young adults. Global obesity rates have almost tripled since 1975, according to the World Health Organization (WHO), with a significant percentage of cases occurring in adolescence and early adulthood. Type-2 diabetes, cardiovascular disease, hypertension, musculoskeletal disorders, and several types of cancer are among the chronic conditions for which obesity is linked to an elevated risk. Comprehensive approaches that include prevention, lifestyle changes, and awareness are needed to manage it [1-4].

Sedentary behaviours, inadequate physical exercise, bad eating habits, and a lack of knowledge about healthy living choices are some of the main causes of the rising obesity rates [5-11]. As they transition from childhood to adulthood, university students often experience significant changes in their eating habits and physical activity levels due to peer pressure, academic stress, erratic schedules, and financial constraints [12-19].

A healthy diet and regular exercise are essential for preventing obesity. While regular exercise helps to maintain energy balance and avoid weight gain, a

balanced diet full of fruits, vegetables, whole grains, and lean meats promotes maximum health [20-28]. People can make better health decisions if they are aware of the benefits of exercise, suggested calorie intake, and proper eating habits [29-40].

In order to fulfil this gap, the current study was carried out at Marathwada Mitra Mandal's College of Pharmacy in Pune. Its objectives were to evaluate students' knowledge and behavioural patterns regarding obesity, physical activity, and a healthy diet between the ages of 17 and 24. This study aimed to assess changes in awareness and practices by performing a pre- and post-survey over a period of three months with a planned intervention.

Methods

Study Design

This study followed the STROBE guidelines for a cross-sectional study (link: [file:///C:/Users/admin/Downloads/STROBE-checklist-v4-cross-sectional%20\(2\).pdf](file:///C:/Users/admin/Downloads/STROBE-checklist-v4-cross-sectional%20(2).pdf)). Standardized frameworks like the Food Frequency Questionnaire (FFQ), Health Belief Model (HBM), International Physical Activity Questionnaire (IPAQ), and Social Cognitive Theory (SCT) were consulted in order to create a structured questionnaire. There were five sections on the survey:

1. Demographics (Age, Gender, Educational Level, Obesity, Family History)
2. Dietary Practices for Nutrition (7 items)
3. Patterns of Physical Activity (5 items)
4. Health-Related Factors and Obesity (6 items)
5. Nutrition and Obesity-Related Behaviour and Awareness (5 items) [2,8,18], according to Table 1.

Table 1. Following questionnaires were circulated in online format.

Sr. No.	Questions
1	Age
2	Gender
3	Educational Level
4	Do you have a family history of obesity or weight-related conditions?
Section 2: Nutritional Diet	
5	How many meals do you typically consume in a day?
6	How often do you consume fruits and vegetables?
7	How frequently do you consume sugary drinks (e.g., sodas, juices)?
8	Do you skip meals regularly?
9	How often do you eat processed or fast food?
10	On average, how many litres of water do you drink?
11	Do you follow a specific diet plan?
Section 3: Physical Activity	
12	How often do you engage in physical activity?
13	What type of physical activity do you engage in most frequently?
14	How long is your typical workout session?
15	Do you have a sedentary lifestyle (e.g., sitting for long hours)?

16	If you have a sedentary job or lifestyle, how often do you take breaks to move around?
Section 4: Obesity and Health-Related Factors	
17	Have you been diagnosed with obesity or related conditions (e.g., hypertension, diabetes)?
18	Are you currently on any weight management program?
19	How satisfied are you with your current body weight? (Scale: 1 = Not at all satisfied, 5 = Very satisfied)
20	Do you experience any health issues related to weight (e.g., breathlessness, joint pain, fatigue)?
21	What factors contribute to your current weight?
22	Have you previously attempted to manage your weight through diet, exercise, or medical intervention?
Section 5: Behaviour and Awareness	
23	Are you aware of the recommended daily calorie intake for your age and gender?
24	Do you track your food intake or physical activity (e.g., using a journal or apps)?
25	What motivates you to maintain or improve your diet and physical activity levels?
26	What barriers do you face in maintaining a healthy diet or exercise routine?
27	How confident are you in your ability to maintain a healthy lifestyle? (Scale: 1 = Not confident, 5 = Very confident)

Source: Own authorship.

Ethical Approval

This study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from Marathwada Mitra Mandal's College of Pharmacy, Thergaon, Pune, India. Written informed consent was obtained from all participants prior to enrolment.

Scoring and Interpretation

For quantitative analysis, scoring criteria were established for each section following methods comparable to those used in prior dietary and physical activity intervention studies [2, 7,18,26,40].

Nutritional Diet

Each response received a point value between 1 and 4. The possible scores ranged from 7 to 21, which were divided into: 7–12: Poor; 13–17: Average; 18–21: Good.

Physical Activity

Each item received a score between 1 and 4, with a maximum score between 5 and 15 that can be interpreted as follows: 5–9: Poor; 10–12: Average; 13–15: Good.

Behavior and Awareness

Likert-type and binary yes/no questions receive a score of 1, with a possible score range of 5 to 11: 5–6: Low; 7–9: Moderate; 10–11: High. For multiple-response questions, one point was awarded for a selected response. For questions with binary outcomes (Yes=1, No=0), such as the presence of obesity-related

conditions or previous attempts at weight management, responses were numerically coded for statistical analysis [7,9].

Awareness Program on Nutrition, Physical Activity, and Obesity Prevention

Following the pre-survey stage of the study, participants participated in an organized awareness session. In order to prevent obesity-related health problems, the program sought to teach kids the value of eating a balanced, nutritious diet and engaging in regular physical activity. Each of the three distinct PowerPoint presentations that were created and presented focused on a single main subject:

1. **Nutritional Diet Awareness:** emphasizing the importance of eating a balanced diet, the daily needs for nutrients, typical dietary errors, and healthy eating advice [1,2,3,5].
2. **Awareness of physical activity:** This includes basic activities for students, WHO-recommended levels of physical activity, and the health advantages of regular exercise [14,18,19].
3. **Obesity Awareness:** covering the causes, health risks, and preventive strategies for obesity, along with correcting myths and misconceptions [6,8,10,11,15].

Each presentation consisted of 14 slides, including graphs, images, and practical tips tailored for student lifestyles. The awareness session was conducted in a classroom setting, followed by an open discussion to clarify doubts and reinforce positive health behaviours [7,8,40].

Statistical Analysis

Data were entered and organized in Google Sheets for preliminary processing, then analysed using Microsoft Excel for statistical computation. Descriptive statistics, including mean, standard deviation (SD), and percentage distributions, were computed for each variable in both pre-survey and post-survey phases [26]. To assess the effectiveness of the intervention and compare pre- and post-survey outcomes: Paired t-tests (two-tailed, paired two-sample for means) were applied to continuous and interval-type scores (diet, physical activity, behaviour and awareness, and body weight satisfaction) [2,26]. Chi-square tests of independence were performed on categorical (binary) variables, including: Diagnosis of obesity-related conditions; Participation in weight management programs; Experience of health issues related to weight; Previous weight management attempts. A significance level of $p < 0.05$ was considered statistically significant [2,26,40].

Results

This section presents the outcomes of the pre- and post-intervention survey conducted over a period of three months at Marathwada Mitra Mandal's College of Pharmacy, Pune, with a one-month interval between the two data collection points. Data were gathered from a total of 300 pharmacy students aged 17 to 24 years. Statistical analysis was performed using paired t-tests for continuous/ordinal data (Likert-scale scores) and chi-square tests for categorical variables. Descriptive statistics, including means, standard deviations, frequencies, and percentage changes, were also calculated. Results are considered statistically significant at $p < 0.05$.

Demographic Profile of Participants

Among the 300 pharmacy students, the sample comprised a higher proportion of females (55.66%) than males (44.33%). Additionally, 10.66% of respondents reported a family history of obesity (Table 2 and Figure 1).

Table 2. Demographic Profile of Participants (n = 300).

Variable	Frequency (n)	Percentage (%)
Gender: Male	133	44
Gender: Female	167	56
Family history of obesity (Yes)	32	11
Family history of obesity (No)	268	89

Source: Own authorship.

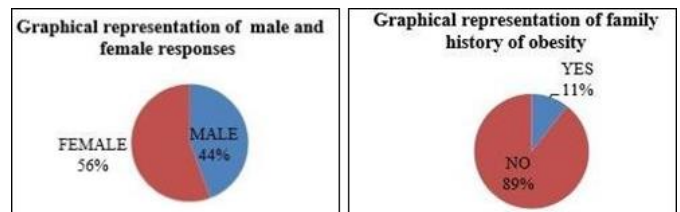


Figure 1. Demographic Profile of Participants. Source: Own authorship.

Pre & post mean comparison of nutritional diet, physical activity, and behavior & awareness

The largest change was observed in Nutritional Diet Score (mean increase of 2.49 points) with a highly significant p-value. Similar improvements were recorded in Physical Activity, Behaviour and Awareness, and Body Weight Satisfaction. These results confirm that the awareness program was effective in enhancing students' health behaviours. Distribution of Students by Category Before and After Intervention The number of students in the Good/Healthy Diet category nearly doubled from 25 to 48. Those in the High Physical Activity category increased significantly from 48 to 128. Similarly, High Behaviour & Awareness scores rose from 41 to 132 students (Table 3 and Figure 2).

Table 3. Pre- and Post-Intervention Mean Scores and Paired t-Test Results.

Variable	Pre-Mean ± SD	Post-Mean ± SD	t-statistic	df	P-value	Statistically Significant
Nutritional Diet Score	14.49 ± 2.29	16.98 ± 2.06	-16.59	299	2.72E-44	Yes
Physical Activity Score	9.38 ± 2.05	10.85 ± 2.18	-15.54	299	2.43E-40	Yes
Behaviour and Awareness Score	7.85 ± 1.48	9.12 ± 1.24	-15.10	299	1.08E-38	Yes
Body Weight Satisfaction	3.01	3.56	-9.80	299	7.79E-20	Yes

Source: Own authorship.

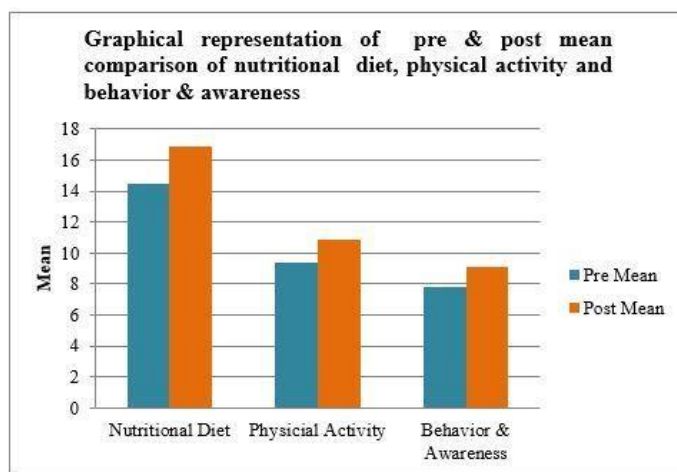


Figure 2. Pre & post mean comparison of nutritional diet, physical activity and behavior & awareness. Source: Own authorship.

Percentage Distribution of Improvement, No change, and Decline in Nutritional Diet, Physical Activity, and Behaviour and Awareness among Students (Pre- and Post-Survey Comparison)

In terms of dietary habits, 71.33% of participants exhibited an improvement in their diet scores, while 20% showed no change and 8.60% demonstrated a decline in diet quality. Regarding physical activity levels, 68.66% of students reported increased activity levels post-intervention, whereas 24.66% remained unchanged and 6.66% experienced a decline in their activity scores. In the assessment of health-related behaviour and awareness, 70% of students demonstrated improvement in their scores, while 24.33% remained unchanged and 5.60% exhibited a decrease in behaviour and awareness post-intervention, and Chi-square Test results for categorical health-related questions (Tables 4-6 and Figure 3).

Table 4. Distribution of Students by Category Before and After Intervention.

Category	Pre (n)	Post (n)
Poor Diet	57	5
Average Diet	218	152
Good/Healthy Diet	25	48
Low Physical Activity	99	43
Moderate Physical Activity	152	128
High Physical Activity	48	128
Low Behaviour & Awareness	49	10
Moderate Behaviour & Awareness	210	158
High Behaviour & Awareness	41	132

Source: Own authorship.

Table 5. Percentage Distribution of Improvement, no change and Decline in Nutritional Diet Physical Activity and Behaviour and Awareness among Students (Pre- and Post-Survey Comparison).

Section	% Improved	% No Change	% Declined
Nutritional Diet	71.33	20	8.6
Physical Activity	68.66	24.66	6.66
Behaviour & Awareness	70	24.33	5.60

Source: Own authorship.

Table 6. Chi-square Test Results for Categorical Health-Related Questions.

Questions	Pre Yes (n)	Post Yes (n)	Pre Mean	Post Mean	Chi-square	p-value	Statistically Significant
Currently on a weight management program	32	102	0.10667	0.34	47.08	6.81E-12	Yes
Experiencing weightrelated health issues	40	20	0.1333	0.0667	7.41	0.0065	Yes
Previous weight management attempts	98	164	0.3266	0.5467	29.51	5.55E-08	Yes

Source: Own authorship.

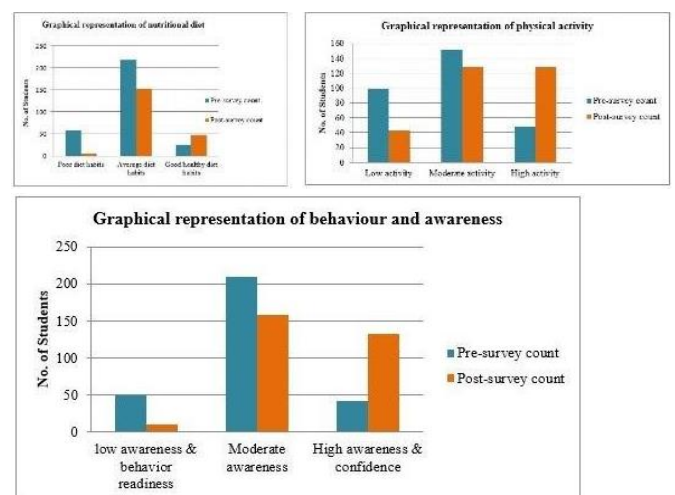


Figure 3. Distribution of Students by Category Before and After Intervention. Source: Own authorship.

Figures representation of comparison of pre- and post-intervention responses, weight management program, health issues, and behaviour & awareness

Weight management program participation more than tripled. Reported weight-related health issues have halved. Previous weight management attempts also saw a substantial increase. The extremely low p-values confirm that these changes are unlikely due to chance and reflect the program’s meaningful impact. These results confirm the effectiveness of the awareness intervention conducted at Marathwada Mitra Mandal’s College of Pharmacy in enhancing health practices and awareness among pharmacy students (Figures 4 and 5).

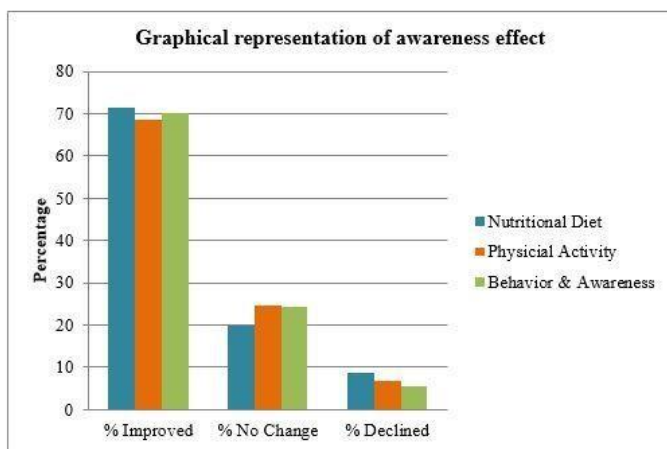


Figure 4. Percentage Distribution of Improvement, No change and Decline in Nutritional Diet Physical Activity and Behaviour among Students (Pre- and Post-Survey Comparison). Source: Own authorship.

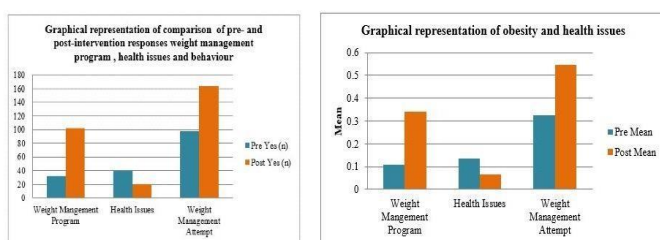


Figure 5. Graphical representation of comparison of pre- and post-intervention responses weight management program, health issues and behaviour. Source: Own authorship.

Discussion

Nutritional Diet

Following the intervention, the mean diet score among the 300 participating students increased from 14.49 ± 2.29 to 16.98 ± 2.06 . The number of students with healthy dietary habits rose from 25 to 48, while those with poor dietary patterns decreased significantly from 57 to 5. Notably, 71.33% of participants reported an improvement in their eating habits. This suggests that structured awareness programs focusing on

balanced nutrition, portion control, and reducing the intake of processed foods can effectively enhance dietary behaviors among students.

Physical Activity

Post-intervention, the average physical activity score increased from 9.38 ± 2.05 to 10.85 ± 2.18 . The number of students reporting high levels of physical activity rose from 48 to 128, while those reporting low levels declined from 99 to 43. An overall improvement rate of 68.66% was observed, indicating that awareness initiatives emphasizing motivation and time management can successfully promote physical activity, even within academically rigorous environments.

Behaviour and Awareness

Behavioural and awareness scores improved from a mean of 7.85 ± 1.48 to 9.12 ± 1.24 . The number of students classified as having high awareness increased markedly from 41 to 132. A 70% improvement rate suggests that the intervention effectively enhanced students’ knowledge, motivation, and confidence in adopting healthier behaviours. This was likely achieved through practical guidance, peer discussions, and real-life examples.

Obesity-Related Health Factors

The number of students actively engaged in weight management increased from 32 to 102 post-intervention ($\chi^2 = 47.08, p < 0.05$), while those experiencing weight-related health issues decreased from 40 to 20 ($\chi^2 = 7.41, p < 0.05$). These findings demonstrate the intervention’s success in promoting health awareness and proactive weight management, thereby reducing risks associated with obesity.

Body Weight Satisfaction

Mean body satisfaction scores rose from 3.01 to 3.56 following the intervention ($t = -9.80, p < 0.05$). This improvement reflects enhanced self-perception and body confidence, likely driven by positive changes in dietary and physical activity habits. The results underscore the value of brief, student-friendly awareness programs in promoting holistic well-being.

Conclusion

This study underscores the importance of structured health interventions in college environments. Although many students at Marathwada Mitra Mandal's College of Pharmacy demonstrate generally healthy lifestyles, a considerable proportion exhibit poor dietary habits, physical inactivity, and associated obesity risks. The health awareness campaign effectively improved students’ knowledge, attitudes, and behaviors,

especially regarding nutrition and physical activity. Sustained efforts through accessible counseling, lifestyle workshops, and regular health education are essential to reinforce positive changes and address ongoing health challenges. Continued commitment to such initiatives is crucial for enhancing student well-being and fostering healthier future generations.

CRedit

Author contributions: Conceptualization; Data curation; Formal Analysis; Investigation; Methodology; Project administration; Supervision; Writing - original draft; Writing-review & editing- All authors.

Acknowledgment

Not applicable.

Ethical Approval

This study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from Marathwada Mitra Mandal's College of Pharmacy, Thergaon, Pune, India. Written informed consent was obtained from all participants prior to enrolment.

Informed Consent

It was applicable.

Funding

Not applicable.

Data Sharing Statement

The datasets generated and analyzed during the current study are not publicly available due to participant privacy and institutional ethical restrictions but are available from the corresponding author upon reasonable request.

Conflict of Interest

The authors declare no conflict of interest.

Similarity Check

It was applied by Ithenticate®.

Application of Artificial Intelligence (AI)

Not applicable.

Peer Review Process

It was performed.

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