Asian Journal of Advances in Research

3(1): 241-247, 2020

ASSESSMENT OF BODY MASS INDEX (BMI) AMONG ENTRY LEVEL STUDENTS IN A UNDERGRADUATE COLLEGE IN PANVEL, NAVI MUMBAI, INDIA

PRABHAKAR R. PAWAR[1*], ANIL G. ROKADE[1], SANTOSH P. SUPNEKAR[1], LEENA N. MESHRAM[1] AND NAMDEV B. PAWAR[1]

[1]Mahatma Phule Arts, Science and Commerce College, Panvel, Dist.-Raigad, Navi Mumbai - 410206, India.

AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Authors PRP, AGR, SPS and LNM designed the study, carried out all the work, wrote the protocol and managed the literature searches. Author NBP wrote the first draft of the manuscript. All authors read and approved the final manuscript.

Received: 08 May 2020
Accepted: 14 July 2020
Published: 21 July 2020

Original Research Article

ABSTRACT

College life is an important stage for adolescents where they are exposed to stress and lack of time, posing a barrier to adoption of healthy practices. Evaluation of the nutritional status of individuals and population groups is an important tool in public health and a feasible indicator of standards of living. The purpose of the present study was to assess the prevalence of overweight and obesity among entry level students in an undergraduate college in Panvel, Navi Mumbai. A pretested questionnaire was used to collect and record information on age, sex, height in meters and weight in kilograms. The body mass index (BMI) was calculated by the weight in kilograms divided by the square of the height in meters (kg/m^2). Of the total 264 students participated in the study, 128 (48.48%) were male and 136 (51.52%) were female. The result showed that the average height, weight and BMI recorded in the present study was 1.62±0.093 m (range 1.42-1.82 m), 50.75±11.976 kg (range 31-100 kg) and 19.322±3.705 kg/m^2 (range 13.10-34.00 kg/m^2) respectively. Nutritional status of the students under study reveals that 123 (46.591%) students were underweight, 123 (46.591%) were with normal weight, 12 (4.545%) were overweight and 6 (2.273%) were with obesity Class I. More male students are overweight and obese than female students. Also prevalence of significantly higher proportion of underweight in students should not be ignored. The study recommends organization of health promotion programmes to promote healthy styles on diet, physical activity and health. A nutritional education is required in order to eliminate the prevalence of overweight and obesity. Present information could be helpful as a baseline data for further study on prevalence of overweight and obesity among college and University students.

Keywords: Body mass index; entry level students; obesity; overweight; panvel; undergraduate college; underweight.

1. INTRODUCTION

Fats are a heterogeneous group of oily or greasy organic compounds containing fatty acids and glycerol. Body fats are important in storage, mobilization and utilization of energy; synthesis of prostaglandin, cytokine, hormones and bile acids; cell differentiation and growth; cell membrane structure and myelination and signal transmission [1]. Body fats are of two types: Essential fat and nonessential

**Corresponding author: Email: prpawar1962@gmail.com;*

fat/storage fat. Essential fat is needed for normal functioning and is found in bone marrow, brain, spinal cord, cell membranes, muscles and other internal organs. The level of essential fat is approximately 3% of total body weight for men and 12% of total body weight for women. Women have a higher essential body fat requirement because of gender-specific fat deposits in breast tissue, area surrounding the uterus, pelvis, hips and thighs [2].

Nonessential fat layers below the skin and is referred to as subcutaneous fat. It is also found surrounding internal organs in the abdominal cavity and this fat is referred to as visceral fat. Older people tend to have less subcutaneous fat and more visceral fat than younger people [3]. Storage fat increases when we gain weight and is what we want to lose when we lose weight [4]. Obesity is a major contributor to the global burden of chronic disease and disability. Increased consumption of more energy-dense, nutrient poor foods with high levels of sugar and saturated fats and reduced physical activity have led to obesity. Obesity and overweight pose a risk for diet-related chronic diseases like type 2 diabetes, cardiovascular disease, hypertension & stroke, and cancer of the breast, colon, prostrate, endometroium, kidney and gall bladder. Chronic overweight and obesity contribute significantly to osteoarthritis, a major cause of disability in adults [5].

Obesity is a major public health concern globally. Striking changes in rates within countries over time and among migrating populations were found indicating diet and lifestyle as primary determinants of these diseases over genetic predisposition. Thus, worldwide considerable research is focusing on identifying modifiable determinants of chronic diseases [6]. Anderson and Good [6] reported that healthy diet contribute to a healthy BMI, could possibly lead to improved academic performances within a college course. Healthy diet and improvements in healthy eating at colleges and universities will lead to improved bodyweight and body fat percentage to improve overall academic performance.

The prevalence of overweight and obesity is commonly assessed by using body mass index (BMI). BMI is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). BMI is the metric currently in use for defining anthropometric height/weight characteristics in adults and for categorizing them into groups. It represents an index of an individual's fatness and is widely used as a risk factor for the development of or the prevalence of several health issues. It is also, widely used in determining public health policies and population based studies in defining specific categories of body mass as a health issue [7].

Emerald et al. [8] noted that student life is a dynamic phase of a person's life; wherein person's development and growth occur, in this phase most of the habits developed by the students determine their present and future health status. Practices such as skipping breakfast, negligence in taking meals at the proper time, sleep deprivation, usage of junk food as the alternative, etc. are seen commonly in university students. All these habits may increase the body weight or decrease it.

According to Kumar et al. [9] and World Health Organization (WHO), International Standard BMI categories are shown in Table 1.

Table 1. The BMI categories for a person

Category	BMI range (kg/m^2)
Underweight	< 18.5
Severe Thinness	< 16
Moderate Thinness	16-16.99
Mild Thinness	17-18.49
Normal weight	18.5-24.99
Overweight/Pre-obese	25.0-29.99
Obese	≥ 30
Obesity Class I	30.0-34.99
Obesity Class II	35.0-39.99
Obesity Class III	≥ 40

Obesity is an increase in body weight as the result of excessive accumulation of body fat [10]. Popkin et al. [11] and Peltzer et al. [12] reported that rapid urbanization, increased consumption of high calorie foods and adoption of a more sedentary lifestyle are the factors associated with overweight and obesity among university students. The rapid increase of overweight and obesity, especially in the younger generation, in many low and middle-income countries like India was due to inappropriate diet and inactive lifestyle, unhealthy diet, use of tobacco, alcohol consumption, depression/stress, poor mental health and abuse [13-18,19]. Waweru and Marete [17], Block et al. [20] and Lynn [21] documented that the introduction of fast food in almost all developing counties is evidenced by the reported rise in obesity.

College life is an important stage for adolescents, as at this time their behaviours are conducive to change, but they are also exposed to stress and lack of time, posing a barrier to adoption of healthy practices [8]. Nowadays, education is stressful throughout the whole course of training. The amount of material to be absorbed, social isolation, pressure of examination,

discrepancies between expectation and reality all can be anticipated to bring psychological stress [16].

Evaluation of the nutritional status of individuals and population groups is an important tool in public health and a feasible indicator of standards of living [17,18]. Hence the present study was undertaken to assess the prevalence of overweight and obesity among entry level students in a undergraduate college in Panvel, Navi Mumbai, India.

2. MATERIALS AND METHODS

A descriptive cross-sectional survey was conducted during January 2019 in an undergraduate college in Panvel, Navi Mumbai. The study population consisted of 264 entry level students of Arts, Commerce and Science. Both male and female students, regardless of their religious backgrounds and area of residence were targeted for the study after obtaining verbal informed consent.

A pretested questionnaire was used to collect and record information on age, sex, height in meters and weight in kilograms. The anthropometric measurements used in this study included body weight and body height, from which body mass index (BMI) was calculated. Height was measured to the nearest 0.1 cm using a locally made instrument against a wall. Weight was measured to the nearest 0.1 kg using a calibrated digital scale. Measurements were collected with participants in either thin socks or barefoot and with heavy clothing items removed. BMI was computed as weight in kilograms divided by the square of height in meters and categorized according to WHO categories as shown in Table 1.

All obtained data were statistically analyzed using the IBM Statistical Package for the Social Sciences (IBM SPSS) version 26.0 (64-bit). Descriptive statistical analysis was used to calculate minimum, maximum, mean, and standard deviation.

3. RESULTS AND DISCUSSION

Of the 264 students participated in the study, 128 (48.48%) were male and 136 (51.52%) were female. 95 (41 male & 54 females) students of Arts, 81 (44 male & 37 females) of Commerce and 88 (43 male & 45 females) of Science were involved in this survey.

The result showed that the average height, weight and BMI recorded in the present study was 1.62±0.093 m (range 1.42-1.82 m), 50.75±11.976 kg (range 31-100 kg) and 19.322±3.705 kg/m^2 (range 13.10-34.00 kg/m^2) respectively. Gender wise mean anthropometric measurements and BMI of students is shown in Table 2. The result revealed that, 123 (46.591%) students were underweight, 123 (46.591%) were with normal weight, 12 (4.545%) were overweight and 6 (2.273%) were with obesity Class I (Fig. 1). Faculty wise and gender wise distribution of students according to category with BMI range is shown in Table 3.

The reported 123 underweight students were further subcategorized into 37 (14.015%) with severe thinness, 39 (14.773%) with moderate thinness and 47 (17.803%) with mild thinness (Fig. 2). The data showed that the prevalence of overweight and obesity was 6.818%. Therefore, a nutritional education is required in order to eliminate the prevalence of overweight and obesity.

Table 2. Gender wise mean of anthropometric measurements and BMI of students

	Height (m)	Body weight (m)	BMI (kg/m^2)
Male N=128	1.69±0.061 (1.52-1.82)	55.95±12.382 (35-100)	19.459±3.801 (13.10 - 33.03)
Female N=136	1.55±0.057 (1.42-1.80)	45.79±9.227 (31-85)	19.194±3.607 (13.80 - 34.00)
Total N=264	1.62±0.093 (1.42-1.82)	50.75±11.976 (31-100)	19.322±3.705 (13.10 - 34.00)

Table 3. Faculty wise and gender wise distribution of students with BMI range

Class	Male students	Female students	Total
F. Y. B. A.	20.124±3.783 (13.10 - 31.80)	18.521±2.501 (13.80 - 25.12)	19.213±3.219 (13.10 - 31.80)
F. Y. B. Com.	19.039±3.364 (13.90 - 29.70)	20.551±4.544 (14.10 - 34.00)	19.73±4.018 (13.90 - 34.00)
F. Y. B. Sc.	19.255±4.141 (13.40 - 33.03)	18.885±3.563 (14.15 - 32.00)	19.73±4.018 (13.40 - 33.03)
Total	19.459±3.801 (13.10 - 33.03)	19.194±3.607 (13.80 - 34.00)	19.322±3.705 (13.10 - 34.00)

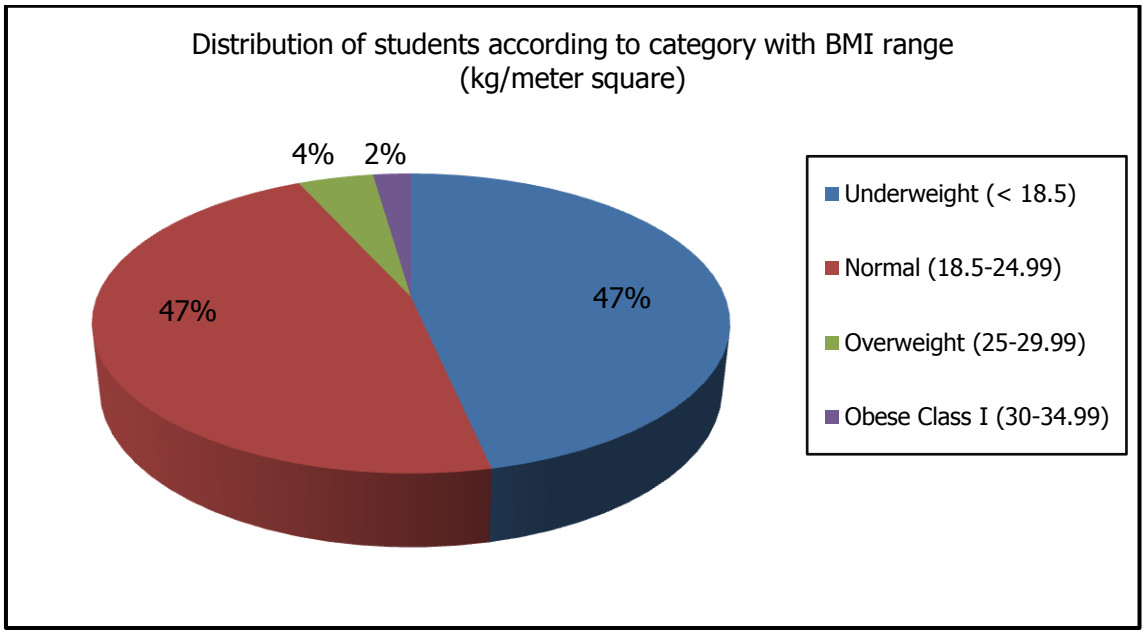

Fig. 1. Distribution of students according to category with BMI range

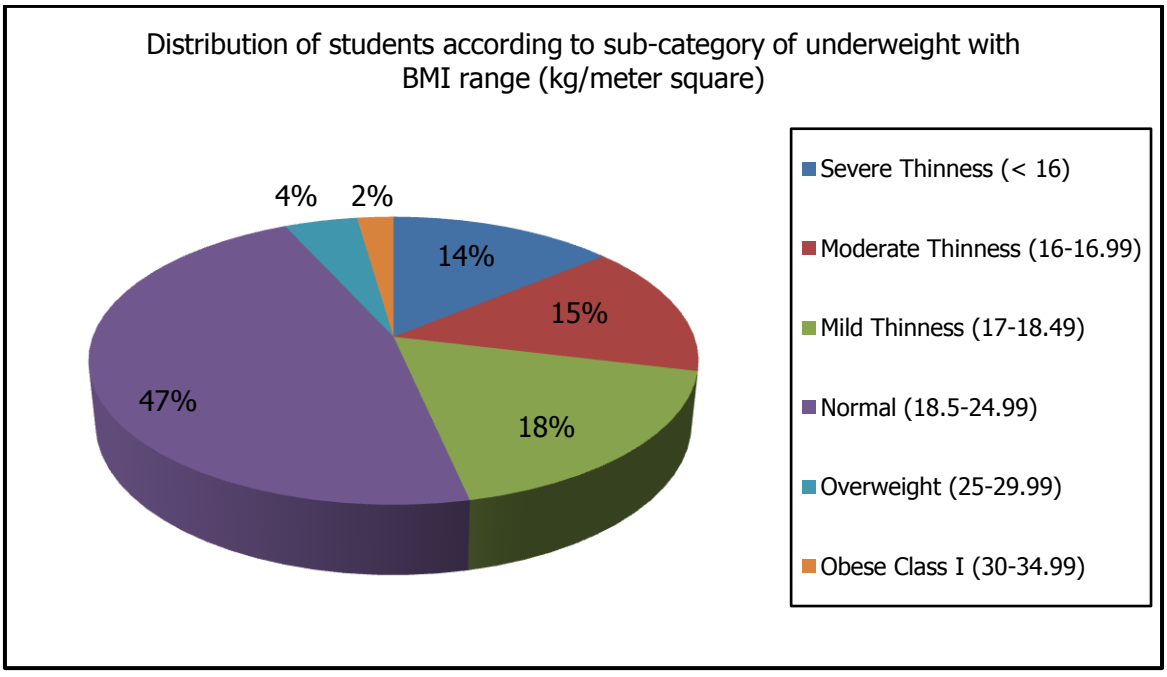

Fig. 2. Distribution of students according to sub-category of underweight

Table 4. Gender wise nutritional status of students according to BMI

Distribution based on BMI categories	Number of students			Percent
	Male	Female	Total	
Underweight	58	65	123	46.591
Normal weight	60	63	123	46.591
Overweight	8	4	12	4.545
Obesity Class I	2	4	6	2.273
Total	128	136	264	100%

Gender wise nutritional status of the overweight students reveal that of the 12 students with overweight, 8 (3.03%) were males and 4 (1.515%) were females. Moreover, among the 6 (2.273%) students in obesity class I, 2 (0.758%) were males and 4 (1.515%) were females. This indicates that the prevalence of overweight is almost double in males than females and obesity class I was reported 66.66% more in females than males (Table 4 and Figs. 3 to 5).

The purpose of the present study was to assess the prevalence of overweight and obesity and to investigate physical activity and dietary practices of entry level students in an undergraduate college in Panvel, Navi Mumbai. Literature review suggests that meagre information is available on prevalence of overweight and obesity in entry level students in an undergraduate college.

Prevalence of overweight and obesity in entry level students may be due to rapid urbanization, increased consumption of high calorie foods, adoption of a more sedentary lifestyle and more time spent using computer and mobile [10,11,22]. Significantly high prevalence of underweight recorded in the present study could be correlated to unhealthy eating habits, physical inactivity, more consumption of low calorie foods and educational and financial status of parents.

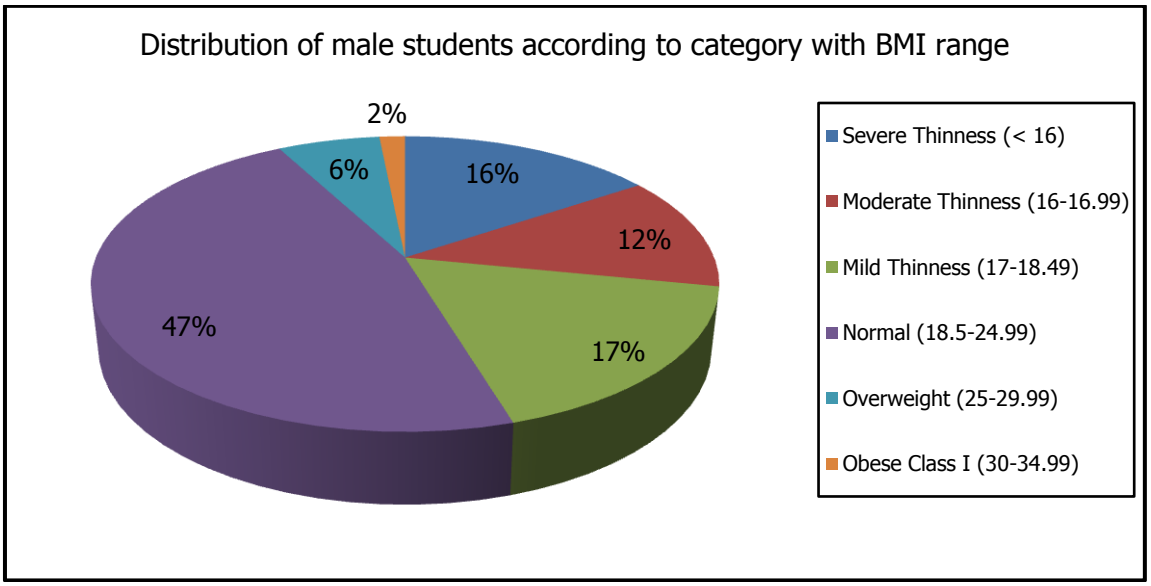

Fig. 3. Distribution of male students according to sub-category of underweight

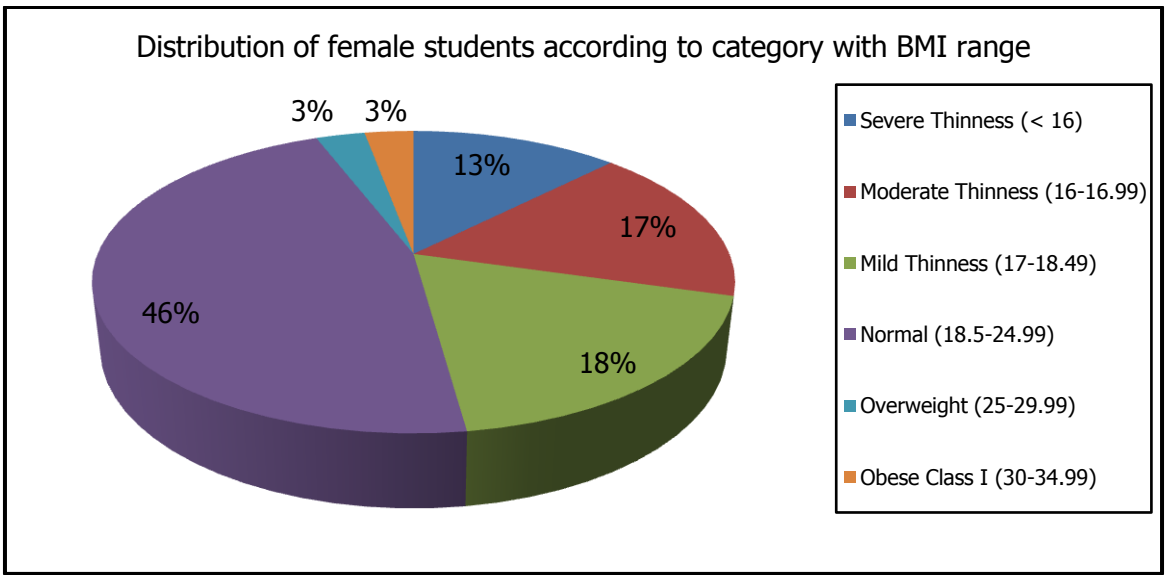

Fig. 4. Distribution of female students according to sub-category of underweight

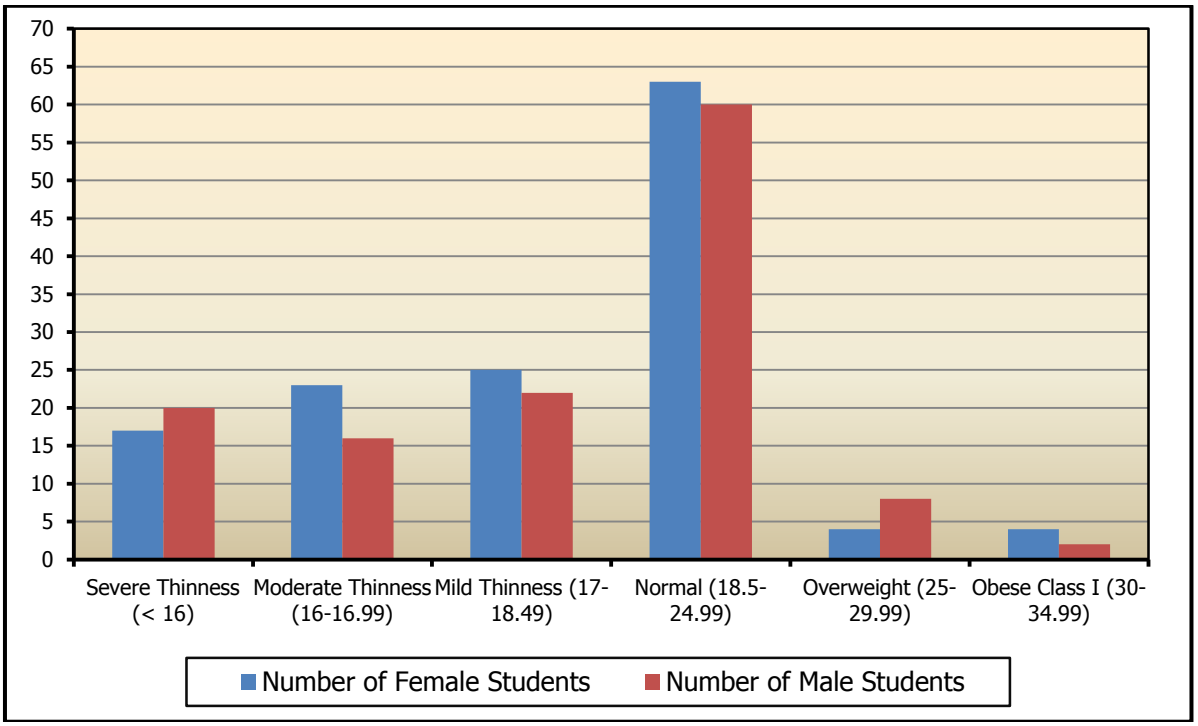

Fig. 5. Gender wise prevalence of overweight & obesity class I

The results of the study are in agreement with the study of BMI in MBBS students in medical colleges by Hamid et al. [2], Agrawal et al. [10] and Yadav et al. [18]. Similar types of results in University and college students were reported by Michael et al. [22], Mocanu [13], Sindhu [14] and Odili et al. [15].

4. CONCLUSION

The study found the prevalence of moderate overweight and obesity in entry level college students. At present, obesity is not a major problem in entry level students, but being overweight is coming up as a significant problem, both in male and female students. However, more male students are overweight and obese than female students. Also, the prevalence of significantly higher proportion of underweight should not be ignored. The study recommends organization of health promotion programmes to promote healthy styles on diet, physical activity and health. A nutritional education is required in order to eliminate the prevalence of overweight and obesity. Present information could be helpful as a baseline data for further study on prevalence of overweight and obesity among college and University students.

ACKNOWLEDGEMENTS

Encouragement and support provided by Hon. Prin. Dr. Ganesh A. Thakur, Principal, Mahatma Phule Arts, Science & Commerce College, Panvel, Dist.–Raigad, Navi Mumbai-410206 is gratefully acknowledged. Authors are thankful to The Head, Department of Zoology for providing necessary facilities for the present study. Special thanks to Mr. Prashant Patil and Mr. Avinash Javir for technical assistance in computation of the data. Thanks are due to T. Y. B. Sc. Zoology students who worked as trained volunteers for anthropometric height/weight measurements.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Caballero Benjamin. Lipids. Johns Hopkins Bloomberg School of Public Health. 2006;1-33.
2. Hamid Sajad, Arsalaan F. Rashid, Qazi Najeeb. Estimation of body mass index (BMI) in first year medical students of Skims Medical College, Bemina. International Journal of Science and Research (IJSR). 2015;4(1):2654-2657.
3. Heyward VH, Wagner D. Applied body composition assessment. Champaign, IL: Human Kinetics; 2004.

4. Puska P, Nishida C, Porter D. Obesity and overweight. World Health Organization, Global Strategy on Diet, Physical Activity and Health. 2003;1-2.
5. Sheikh NH, Haider A, Khan FF, Khan FS, Humayun A. Body mass index and its associated factors in young medical students. Biomedica. 2014;30(4):284-288.
6. Anderson Angela S, Deborah J. Good. Increased body weight affects academic performance in university students. Preventive Medicine Reports. 2017;5:220-223. Available:http://dx.doi.org/10.1016/j.pmedr.2016.12.020.
7. Nuttall Frank Q. Body mass index obesity, BMI, and health: A critical review. Nutrition Today. 2015;50(3):117-128.
8. Emerald HS, Thomas M, Raju A, Tobina Tomy, Reena Frank, Leena KC. Body mass index and eating habits among the university students. Int J Health Sci Res. 2019;9(3):164-167.
9. Kumar Vijay D. Prachi Sathe, Abhinav Sathe. The body mass index patterns in Indian collegiate students. International Journal of Health Sciences & Research. 2018;8(7):141-145.
10. Agrawal S, Sinha V, Kachhawa P, Kumar A. Study of body mass index in first year MBBS students in a medical college of Eastern UP. Int J Med Sci Public Health. 2017;6 (Online First). DOI: 10.5455
11. Popkin BM, Adair LS, Ng SW. Global nutrition transition and the pandemic of obesity in developing countries. Nutr. Rev. 2012;70:3–21.
12. Peltzer Karl, Supa Pengpid T. Alafia Samuels, Neslihan Keser Ozcan, Carolina Mantilla, Onja H. Rahamefy, Mee Lian Wong, Alexander Gasparishvili. Prevalence of overweight/ obesity and its associated factors among university students from 22 countries. Int. J. Environ. Res. Public Health. 2014;11:7425-7441. DOI: 10.3390/ijerph110707425
13. Mocanu V. Overweight, obesity and dieting attitudes among college students in Romania. Acta Endocrinologica (Buc). 2013;IX(2):241-248.
14. Sindhu Sangeeta C. Obesity assessment based on BMI in the young adults of Haryana- a state of India. Res. J. Recent. Sci. 2013;2(ISC-2012):304-307.
15. Odili Valentine U, Florence O. Egor, Ikponmwosa M. Osarenmwinda, Anthonia O Obieche. Prevalence of overweight and obesity among pharmacy students in a university in Benin City, Nigeria. Trop J Pharm Res. 2014; 13(12):2109-2114.
16. Elhisadi Tawfeg A, Abdelhamid M. S. Flailih. Assessment of body mass index (BMI) among girl students living in Hostel University in Derna-Libya. Canadian Open Public Health Journal. 2015;2(1):1-7.
17. Waweru WR, Marete OT. Estimation of relationship between eating habits and body mass index of students in Mount Kenya University, Rwanda. Int J Community Med Public Health. 2016;3:2344-2354.
18. Yadav SS, Saini P, Khan ZA, Bachloo T, Kumar R, Singh J. Assessment of body mass index among undergraduate medical students—a cross-sectional study from the Medical College of Haryana. Int J Med Sci Public Health. 2016;5:705-708.
19. Nurul H, Ruzita A. Preliminary survey on nutritional status among University students at Malaysia. Pak. J. Nutr. 2010;9:125-127.
20. Block P, Scribner J, De Salvo K. Fast food, race, ethnicity and income: A geographic analysis. Am J Prev Med. 2004;27:211-7.
21. Lynn A. Body mass index trends and nutrition goals of college students between 2007-2011. Journal of Nursing and Health Science. 2012;4(5).
22. Michael Grasdalsmoen, Hege Randi Eriksen, Kari Jussie Lønning, Borge Sivertsen. Physical exercise and body-mass index in young adults: a national survey of Norwegian university students. BMC Public Health. 2019;19:1354. Available:https://doi.org/10.1186/s12889-019-7650-z.