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Original Research Article

# Is Obesity a Problem among Professional College Students in North Kerala?

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**Abstract:**

**Background & Objectives:** Obesity is a growing public health issues in India and Kerala. Kerala's obesity rates surpass the national average. Though the NFHS-5 survey has highlighted the problem of obesity, more studies on the prevalence of obesity among professional college students are needed in our setting, with a focus on the risk factors. Considering the upward trajectory of obesity, our aim is to estimate the prevalence and identify the risk factors of obesity among professional college students in North Kerala.

**Methods:** A Cross-sectional study was conducted among first-year professional college students in the Kozhikode district over a period of one year (June 2017 to June 2018). Data were collected using a pre–tested semi–structured questionnaire. The data were coded and entered into MS Excel, and statistical analysis was performed using SPSS Version 18 software.

**Results:** The present study revealed a high prevalence of obesity (13.7%) among study subjects. Predominance of obesity was noted among males (21%) compared to females (10%). Male gender, upper socioeconomic status, family history of obesity, presences of co-morbidities, high consumption of sugar-sweetened beverages, dairy products and low physical activity were found to be significantly associated with obesity.

**Conclusion:** The prevalence of obesity was high among professional college students in Kozhikode district (13.7%). Risk factors of obesity are lifestyle-related. Targeted public Health intervention is needed to address the obesity epidemic and advocate the prevention of future obesity.

**Keywords:** Adolescence, NCD, Risk Factors, Obesity, Professional College Students.

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## Introduction

Obesity is the presence of excessive and abnormal amounts of fat in the body that may have serious effects on health. Obesity is often associated with many non-communicable diseases like Diabetes, Hypertension, Coronary heart disease, cerebrovascular disease, and many cancers. [1]

A dramatic rise of overweight and obesity has been observed in low- and middle-income countries recently, which means the problem is not confined to developed countries, especially in urban settings. It has now turned into a big public health challenged of the 21st century, having harmful effects on all levels of society. [2] With the globalization of food, children and adolescents in low- and middle-income countries are prone to inadequate nutrition, and at the same time these children are exposed to high- energy-dense and micronutrient-poor foods, at a low cost but lower in nutrient quality.

The rise in prevalence of overweight and obesity among children and adolescents aged 5-19 years, from 4% in 1975 to over 18% in 2016, is of concern [3]. A double burden of malnutrition is clearly visible in many low- and middle-income countries [4]. Adolescence is a phase of life where the transition of physical and cognitive development of an individual occurs. This transition is important as a child or adolescent shifts to a responsible adult in society. [3] Studies have shown that 8 in 10 obese teenagers went on to be obese as adults. [5]

Therefore, adolescence is a crucial period for establishing a healthy behaviour and lifestyle across the life course. [1,4] This transition in nutrition, along with a reduction in the level of physical activity, has given fuel to this burning issue of the double burden of malnutrition. [6]

India is also experiencing the double burden of diseases, while the country still deals with undernutrition and infectious diseases. [7] India, with 5% of its population suffering from morbid obesity, has attained epidemic proportions in terms of obesity. [8] As India experienced a rapid nutrition transition, there is an added issue of a decline in physical activity due to urbanization and the mechanization of the nation. Obesity is perhaps the most prevalent form of malnutrition in India. [9] Obesity is a major public health problem in Kerala. Kerala state has the second-highest rate of childhood obesity in the country after Punjab. [10] Considering the rising adolescent obesity in India, and most of the professional college students being adolescents, there exists a need to explore this important section of society with regard to obesity and its risk factors. There is a dearth of similar studies among professional college students in North Kerala. Against this background, we planned to estimate the prevalence of obesity and identify factors related to obesity among this group.

## Material & Methods

The study was conducted in selected professional colleges of the Kozhikode district of north Kerala. According to the educational website, a total of 36 professional colleges including Medical, Engineering, Dental, Pharmacy, Ayurveda, Unani, Homeopathy Nursing, and Architecture were identified. [11] Study subjects included first year students of both gender in the professional colleges in the Kozhikode district. The age of study subjects ranged from 18 to 25 years. A multi-stage random sampling method with stratification was used. The sample was calculated using the formula $N = Z^2 PQ \div d^2 \times D$. Taking the prevalence of obesity and overweight among medical students as 26% in Trivandrum [11] and a design effect of 1.78, the total sample size calculated was 534.

Each stream was considered a stratum. Proportionate Stratified Sampling was used to select the subjects from each stratum. Using a sampling fraction as 13.1%; number of students required in each strata was calculated by multiplying the sampling fraction with number of students in each strata. Data was collected based on the WHO STEPs' wise approach for measuring NCD risk factors. [12] Body mass index was per revised standards for Asian Indian by WHO the body mass index (BMI) was categorized. [13] Physical activity was measured using the WHO Global Physical Activity Questionnaire (GPAQ) [14]. The classification of physical activity based on METs [15]

a) Sedentary activity= <600 METs minutes / week
b) Moderate activity = 600-2999 METs minutes / week
c) Vigorous activity= > 3000 METs minutes / week

**Analysis:** All the data collected were coded and entered in a Microsoft Excel sheet and was analysed using SPSS (16) statistical software. Overweight and obesity in the subjects were measured in terms of prevalence. Similarly, the prevalence of lifestyle-associated risk factors for obesity in the population was calculated. Quantitative variables were summarized as Mean (SD) or Median (P25- P75). Association of lifestyle-related risk factors with overweight and obesity was done using chi square test, and the adjusted effect measures were estimated with multivariate analysis and logistic regression.

Ethical clearance was sought from the Institutional Ethics Committee. Informed consent was taken from students prior to the study. Students with any type of malnutrition and other issues were given necessary advice on risk factors modification. Awareness regarding the problem and NCD risk factors was given to the subjects after the study.

## Results

The current study included 540 first-year degree students from various colleges. Mean (SD) weight of male's subjects was 63(12) Kg, and females was 50 (8.3) Kg. The mean (SD) height of males was 1.7 (0.07) meters and females were 1.6(0.06) meters. The Socio-demographic profile of the study population is shown in Table no. 1. The present study revealed a high prevalence of overweight (10.0%) and obesity (13.7%), and 95% CI (11 to 16.4%) % among professional college students in the Kozhikode district. Therefore, cumulative prevalence under risk was 23.7%, (95% CI: 15.1to 32%), with higher prevalence in males 21% of males than females 10%. The prevalence of abdominal obesity based on waist circumferences (WC) was higher in female subjects (20.2%). Prevalence of abdominal obesity based on waist hip ratio (WHR) was 44.4%. Female subjects had a slightly higher prevalence of abdominal obesity 44.4% as compared to males 38.2%. The median metabolic equivalent minutes / week in the study population was 1000 Mets minutes/week with an interquartile range of (420 – 2220) Mets minutes /week. In this study, the highest vigorous physical activity was noted among medical students 31(39%) and dental students reported low physical activity 15(38%).

**Table 1: Socio- demographic profile of study population n=540**

| Socio demographic profile | | Engineering | Dental | Medical | Others | Total |
|---|---|---|---|---|---|---|
| Age | < 20 years | 217(72.3) | 20(50) | 58(72.5) | 54(45) | 349(64.6) |
| | 20-23 years | 83(27.7) | 20(50) | 22(27.5) | 60(50) | 185(34.3) |
| | ≥ 24 years | Nill | Nill | Nill | 6(5) | 6(1.1) |
| Gender | Male | 103(34.3) | 9(22.5) | 34(42.5) | 27(22.5) | 173(32) |
| Residence | Hostel | 129(43) | 36(90) | 79(98.8) | 79(65.8) | 323(59.8) |
| Religion | Hindu | 165(55) | 18(45) | 24(30) | 53(44.2) | 260(48.1) |
| | Muslim | 109(36.3) | 17(42.5) | 51(63.8) | 43(35.8) | 220(40.7) |
| | Christian | 26(8.7) | 5(12.5) | 5(6.3) | 24(20) | 60(11.1) |
| Socioeconomic status | Upper class | 35(11.7) | 6(15) | 20(25) | 6(5) | 67(12.4) |
| | Middle class | 246(82) | 31(77.5) | 60(75) | 88(73.3) | 425(78.7) |
| | Lower class | 19(6.3) | 3(7.5) | Nill | 26(21.7) | 48(8.9) |
| Type of Family | Nuclear | 266(88.7) | 34(85) | 67(83.8) | 111(92.5) | 478(88.5) |
| Family history of obesity | Yes | 44(14.7) | 10(25) | 26(32.5) | 24(20) | 104(19.3) |
| Family history of co- morbidities | Yes | 126(42) | 22(55) | 55(68.8) | 49(40.8) | 252(46.7) |

**Nb: Other groups were students of Nursing, pharmacy and Homeopathy colleges**

**Table 2: Course wise distribution of abdominal obesity (n=540)**

| Abdominal obesity | Engineering n(%) | Dental n(%) | Medical n(%) | Others n(%) | Total n(%) |
|---|---|---|---|---|---|
| Obese (WC) | 67(22.3) | 5(12.5) | 21(26.3) | 13(10.8) | 106(19.6) |
| Obese (WHR) | 129(43) | 20(50) | 34(45.5) | 46(38.3) | 229(42.4) |

**Table 3: Multivariate analysis (Adjusted Odd's and 95% CI of various risk factors and obesity)**

| Variable | *Adj. OR | 95% CI | P value |
|---|---|---|---|
| Male gender | 2.5 | 1.5- 4.1 | **<0.001** |
| Upper SES | 2.3 | 0.88 – 6.5 | 0.08 |
| Family history of obesity | 2.8 | 1.7 -4.8 | **<0.001** |
| Family history of co-morbidities | 2 | 1.2 -3.1 | **0.002** |
| Regular food intake hostel | 1.2 | 0.78- 2.1 | 0.33 |
| Sugar-sweetened drinks ≥ twice a week | 1.9 | 1.1 -3.3 | **0.021** |
| Fish intake ≥ twice a week | 0.57 | 0.35 -0.92 | **0.024** |
| Milk product intake ≥ twice a week | 2 | 1.1-3.6 | **0.011** |
| Low physical activity | 2.1 | 1.3-3.4 | **0.001** |

***Adjusted Odd's ratio**

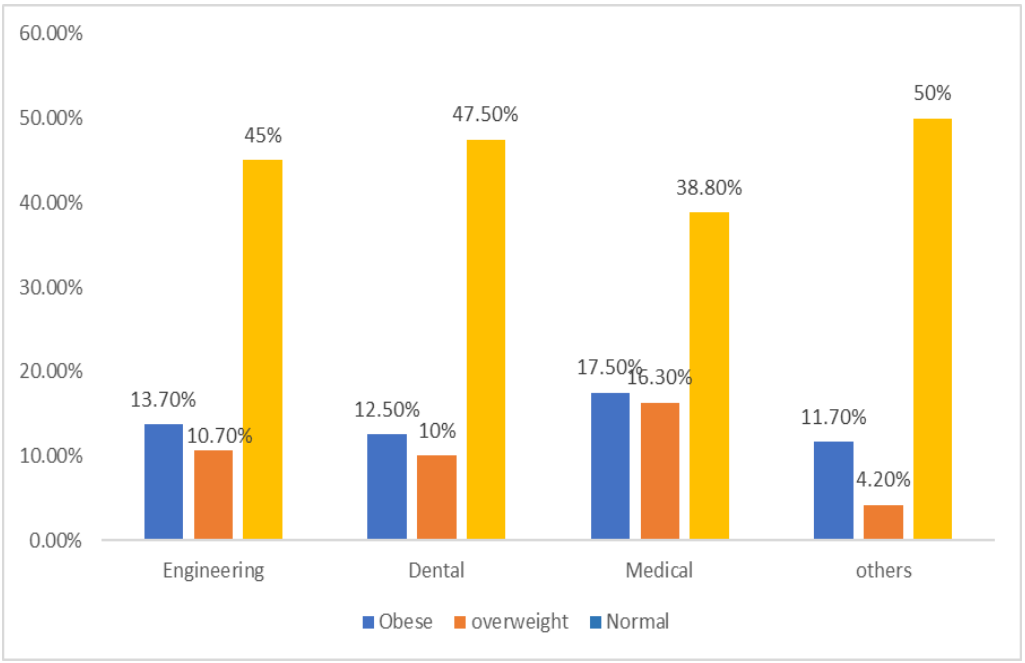


**Figure 1: Course wise distribution of BMI categories of study subjects (n=540)**

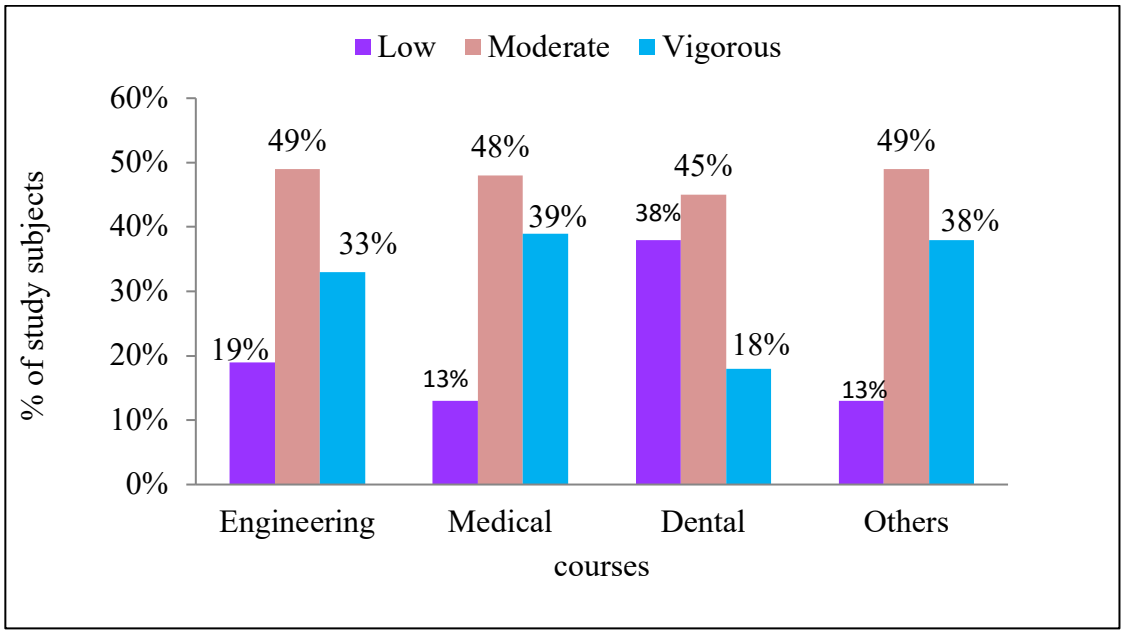


**Figure 2: Course wise distribution of physical activity (n=540)**

**Discussion:**

According to the World Health Organization (WHO), obesity is one of the most common, yet among the most neglected, public health problem in both developed and developing countries. [1] An epidemic of obesity and obesity related diseases such as diabetes and cardio vascular disease (CVD) is prevalent in many Asian countries. [6] In the present study, 13.7% of college students were obese and 10% were overweight. Nationwide studies conducted between 2009 to 2016 have reported a high prevalence of obesity. Prevalence of obesity varies from 7% to 29% across the country. [16] Prevalence of overweight and obesity was found to be high 27.3%, and 31% were underweight. This reflects the double burden of malnutrition in the study population. Various studies in India also revealed the existence of the double burden of malnutrition among adolescents and youth. [17,18] In the present study, the prevalence of obesity was higher among males than females, which is consistent with findings from studies conducted in Gujarat 2013, [19] Ujjain 2013 [16], and Tamil Nadu 2011. [20]

A positive family history of comorbidities was found to increase the risk of obesity and was significantly associated. (OR= 2.2, 95% CI = (1.5 - 3.3) and P <0.001). Similar finding of association of family history of non-communicable diseases with obesity was reported in various studies conducted across India, as cited by Purohit G et al. in Gujarat [15] Surendar J et al. in Chennai [21]. In the present study, 26.6% of the participants reported a family history of non-communicable diseases. A Family history of obesity was significantly associated with an increase the risk of obesity ($\chi^2$= 23, p value = <0.001), which was consistent with findings from other studies conducted in by Goyal RK et al in Gujarat [22] and Dhurandar NV et al. in Mumbai [23]. Higher socioeconomic status was significantly associated with an increased risk of obesity (OR 2.8: 95% CI= 1.1-7.3) and p<0.005. Studies from low-income countries suggest that obesity is more prevalent among affluent individuals, possibly due to the low cost and high palatability of energy -dense, sugar- and fat- rich food. [24-27] Consumption of sugar – sweetened drinks more than twice a week was found to be significantly associated with obesity (OR 2: 95% CI = 1.2- 3) and p< 0.005) in the current study. Goyal et.al study's showed consumption of snacks outside and carbonated drink daily as contributing to higher risk of overweight and obesity [22]. Nitin Joseph et al., Mangalore [28] study revealed that majority of participants were introduced to fast foods through television commercials and developed this habit. Low physical intensity was found to have an increased risk of obesity and showed a significant association ($\chi^2$ = 8 with P < 0.005). Our findings were consistent with the study conducted by Singh A et al in Bhopal [16] and Gurung T et.al. in Belgaum city [29] Kotian M et.al. in Karnataka [30]. A study by Jain S et al. in Meerut revealed that the introduction of sedentary lifestyle, media, and junk food eating has shown contributions toward the causation of obesity in adolescents. [31]

**Conclusions**

The present study revealed a high prevalence of overweight (10.0%) and obesity (13.7%) among professional college students in Kozhikode district. Risk factors of obesity revealed were lifestyle-

related factors, which are completely modifiable. It is a complex problem with serious social and psychological dimensions that affects all age and socioeconomic groups. Therefore, there is a need to assess and develop strategies to tackle this socio-environmental issues to improve the quality of life and also the economic impact of obesity and its health consequences. Although obesity and related NCDs are preventable, there is no single or simple solution to the obesity epidemic, and there has to be a multifaceted approach at all societal levels.

**Recommendation:** Based on our findings in the current study following recommendations are offered, particularly among adolescents:

1. Create awareness of the seriousness of obesity and related health consequences
2. Primordial prevention: by inclusion of a healthy lifestyle and a healthy diet in the school curriculum.
3. School health promotion: periodic screening and early detection of overweight and obesity
4. Provide more nutritious food and keep a check on the calorie intake of the students, especially in college canteens and hostels.
5. Provide spaces for physical activity on the campus, like playgrounds and gymnasiums
6. Policy makers need to take bolder, more decisive steps to tackle the obesity epidemic
7. Use of mass media for promotion of key messages on healthy diet and lifestyle

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