

# Snacking Behavior and Obesity among Students in Medical College

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## ABSTRACT

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**Background:** Snacking behaviour varies across the different regions in the world. As there is a rapid change in the lifestyles of adolescents and young adults, eating habits have changed. The objective of this study is to assess the pattern of snacking behavior among professional students in a medical college and to find out the association with obesity.

**Materials and Methods:** A cross-sectional study was conducted among 217 first-year undergraduate students in a selected medical college.

**Results:** Among the students, 19.3% had poor snacking behavior. 17.1% had obesity/overweight. Eighteen (26.1%) males had overweight/obesity, compared to 19 (12.8 %) in females (OR=2.39, 95% CI. 1.2-4.9, p=0.016). There was no significant association between frequent snacking and overweight/obesity.

**Keywords:** Snacking, Obesity, Overweight

\*See End Note for complete author details

## INTRODUCTION

The increase in the prevalence of obesity across the world had led to concern about the dietary habits of young adults. The obesity “epidemic” has been attributed to a growing trend for snacking. Snack food is high in fat or sugar most of the time. In a study by Cleobury et.al, 79% of snacks consumed were high in either fat or sugar.<sup>1</sup> The snacking habit in all age groups has increased over the last 25 years. Frequent consumption of snacks in between as well as skipping major meals amounts to poor eating habits. Snacking behaviour may contribute to weight gain due to excess energy intake. Every day the trends in food habits are changing, especially in adolescent and young adults. This changing trend results in the growing prevalence of obesity, and result in many non-communicable diseases. There is an enormous shift in food in the food habits of people of Kerala during the last few decades. Westernization and modernization has led to change in trend, for opting in alternative food preferences and introducing unhealthy snacking items. The food preference of adolescents and young adults are mainly based on taste rather than healthy food. These choice preferences are there in professional students, including medical or nursing students. The children and adolescents

have the habit of skipping major meals and consuming frequent snacks, mostly unhealthy junk food, which they consider tasty. Some studies show that the amount of food eaten by the companions affects the portion size.<sup>2</sup> This is referred to as social modelling.<sup>3</sup> Students in a medical college may also have poor snacking behaviour and if identified early, is amenable to correction. There are many different definitions of a snack. In this study, snack refers to eating food or consuming caloric beverages between three regular meals (namely breakfast, lunch, and dinner). Snacking is the act of eating a snack.

The objectives of the study were to describe the pattern of snacking behavior among undergraduate students in a medical college and to find out whether there is any association with overweight/obesity

## MATERIALS AND METHODS

A cross-sectional study was conducted in January 2020, among 217 first-year undergraduate medical and nursing students in a selected medical college in Thiruvananthapuram. All first-year students of medical and nursing course present on the day of data collection included in the study. A self-administered, semi-structured proforma developed by the investigators was used for data

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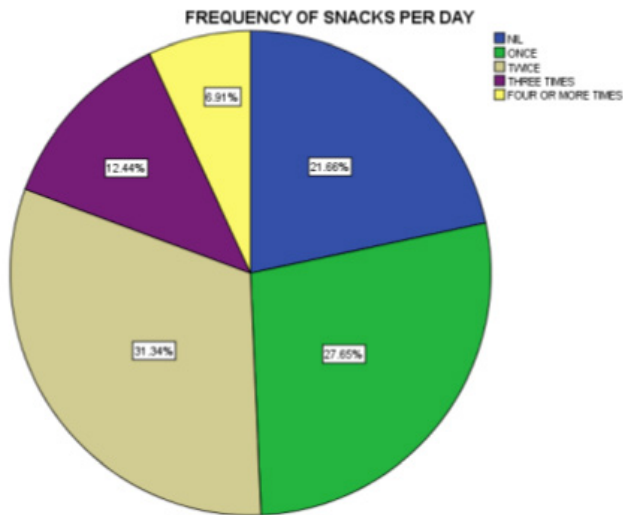


Figure 1. Frequency of snacking in a day

collection. Snacking refers to the consumption of any food and drinks other than major meals including items such as junk food, chocolates, sweets, and soft drinks. Height and Weight was measured using standardized scales. Using the anthropometric measurements, body mass index (BMI) was calculated and graded according to WHO Asia-pacific guidelines.<sup>4</sup> We considered poor snacking behaviour as 3 or more snacks per day. For testing association with obesity/overweight and poor snacking, BMI values of 18.5 to 25 taken as normal as per WHO criteria.

Data analysis: The data analysis done by using the Statistical Package for Social Sciences (SPSS). Mean, SD estimated for quantitative variables. Frequency and Percentage used for categorical variables. Chi-square test was used as a test-of-significance. A p-value of less than 0.05 was considered significant. Odds ratio (OR) and confidence interval (CI) were used to quantify the strength of association between the overweight and obesity and covariates.

## RESULTS

The mean age of the 217 students who took part in the study was 19.02 years with a standard deviation of

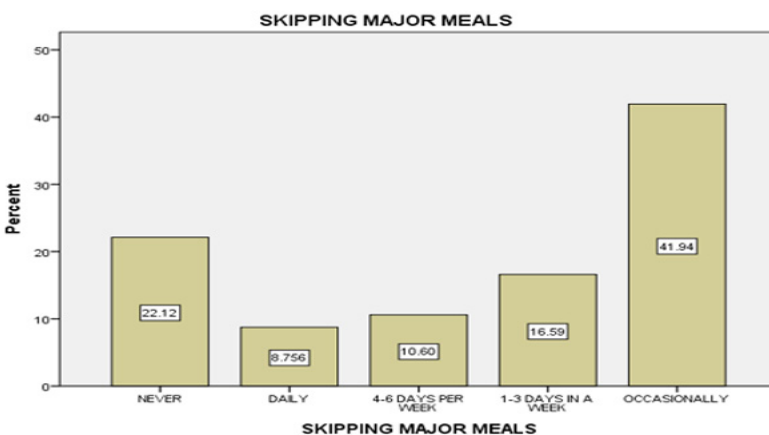


Figure 2. Frequency of skipping major meals

(0.895). The median age was 19 with an interquartile range (IQR) of 2 years. There were 143 medical students and 74 nursing students as participants and 148 (68.2%) were females and the rest 69 were males. Only 7.83% (17) consumed a vegetarian diet.

The mean height among males and females were 168.96 cm (SD 11.75) and 160.08(SD 6.43) respectively. The mean weight among males and females were 65.36Kg (SD 13.6), 55.5Kg (SD 9.08) respectively. Mean BMI among males was 22.79 (SD;3.48) and females 21.63(SD 3.0) (Figure 3). Fifteen students (6.9%) consumes four or more snacks in a day, while 12.4% consumes 3 snacks per day and the rest less than three snacks in a day (Figure 1). Overall 16.6 % students had overweight while only one student (0.5%) had obesity according to WHO criteria. Twenty eight (19.6%) of medical students had BMI>25, compared to 12.2 % nursing students.

### Preferred items of snacks

The most preferred snacks were fried items which were consumed frequently by 58.1% of participants. 52.7% of participants frequently consumed baked items, 35.1% preferred sweets and chocolates (35.1%). Only 28.4% reported fruits or fruit juices as preferred items while 14.9% preferred aerated drinks. Only 6.8% preferred steamed items.

### Reasons for frequent snacking

Common reasons for frequent snacking was reported as “snacks are tastier” by 33.2% while 35% said there is no specific reason. About 11.2% has the opinion that taking snacks are convenient than having major meals and 10.2% said that they didn’t like hostel food. About 6% of students reported that they skip major meals and take snacks to lose weight.

### Frequently missed meals

The most frequently missed meal was breakfast (39.6%) followed by dinner (14.6%). But 7.6% reported the meal missed frequently is lunch (Figure 2). While 12% reported they miss more than one major meal in a day and substitute with snacks.

### Substituting snacks with major meals

Among the participants, 30.9% reported that they substitute the snacks with major meals most of the days in a week (Figure 4). But 51.6% reported they substitute snacks with major meals only on some days. About 51.2% of students report that they consume snacks every day, while 15.2% consume snacks in 4-6 days in a week, 9.2% consumes 1-3 days in a week while 24.4% report they consume only occasionally. 35.5% reports snacks consumption is mostly

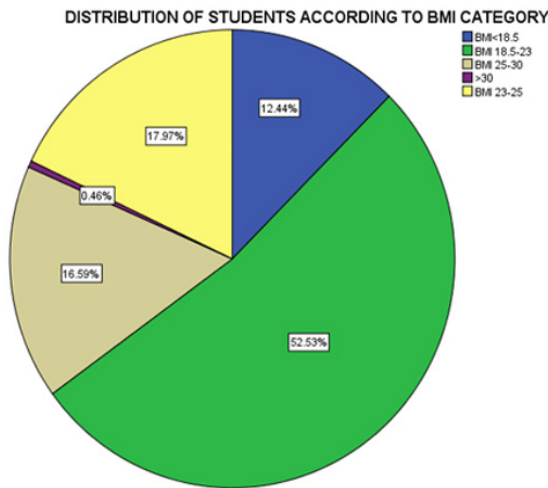


Figure 3. Distribution of Participants According to BMI (Asia Pacific guidelines)

during studying, while 30.1% reports TV watching as the common activity during which they consume snacks. But 36.7% reports no specific activity while snacking. While 97 students report taking vegetables with every three major meal, 25(11.5%) does not take vegetables regularly. 53 (24.4%) consumes vegetables with two out of three meals, 42 (19.4%) consumes vegetables with one meal in a day. Only 24(11.1%) students consume fruits daily.

**Perception regarding dietary habit**

Out of total the total 217 students; only 113 (52.1%) students perceive that they follow a healthy dietary habit.

In univariate analysis there was an association between gender and overweight/obesity. While 18(26.1%) males had overweight/obesity, compared to 19 (12.8 %) in

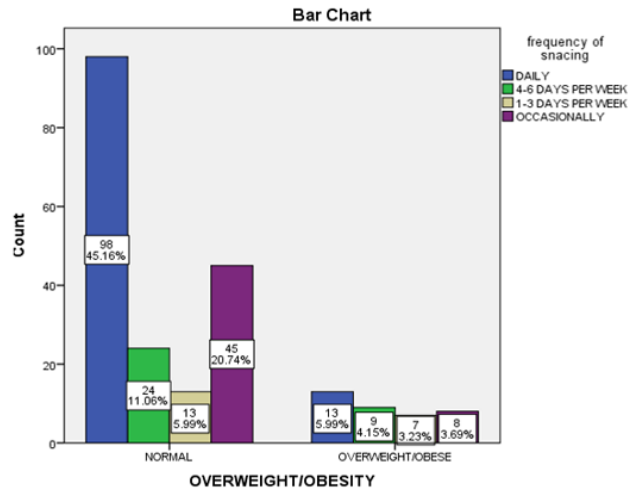


Figure 4. Frequency of Snacking In days of a Week & Overweight/Obesity

females (OR=2.39, 95% CI. 1.2-4.9, p=0.016). Those who consumed snacks more frequently per day ( $\geq 3$  snacks per day) have higher odds to be overweight/obese (OR=2.16, 95% CI: 1.06-4.43, p=0.033) when univariate analysis was done (Figure 5). There was association between skipping of major meals and overweight/obesity (chi square value: 7.71, p=0.005). Among 41 who skip meals more frequently, 53.7% had overweight or obesity, while among the 176 who skip meals less frequently, only 30.7% had obesity/overweight.

But multiple logistic regression analysis showed that there is no statistically significant association between overweight/ obesity and poor snacking behavior, skipping meals when adjusted for gender, type of diet and course of study. But the proportion of overweight/obesity is higher in males compared to females (adjusted OR=2.39, 95%CI: 1.31-4.38, p=0.004) (Figure 6).

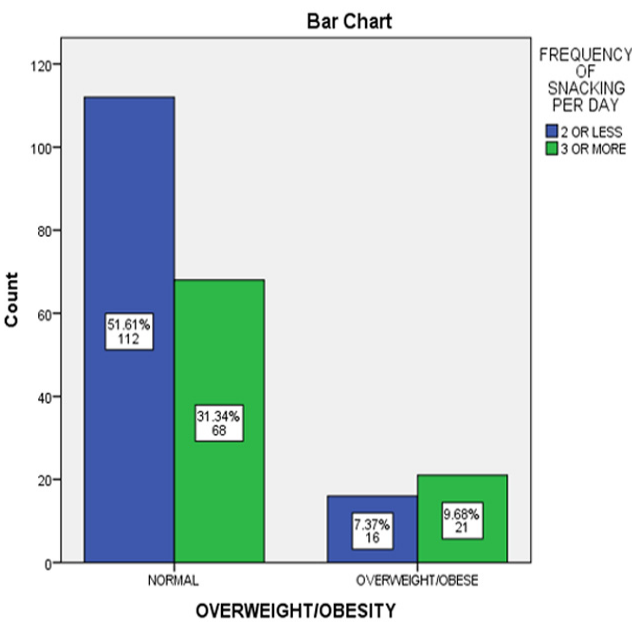


Figure 5. Association between the frequency of snacking per day among students and overweight or obesity

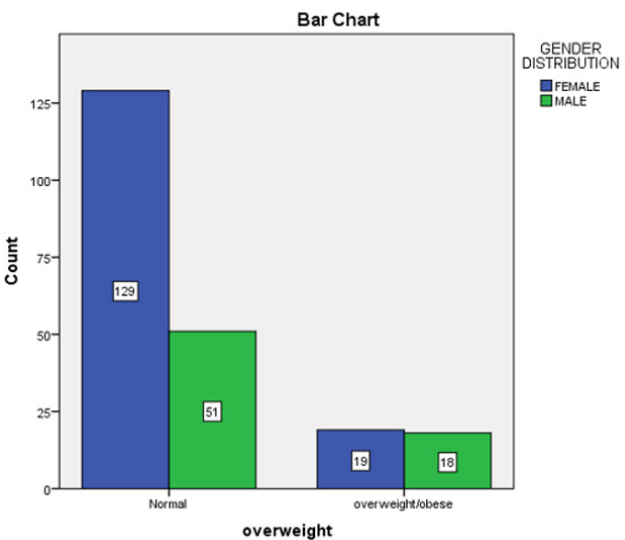


Figure 6. Overweight/Obesity according to gender

## DISCUSSION

In our study, the most frequently missed meal was breakfast (39.6%) and there was no association between poor snacking behavior and gender. In a study by Prasanna Mithra et al.<sup>5</sup> conducted a study among college-going students, found that the breakfast was the most skipped meal (26.2%). A significantly larger proportion of males had a higher frequency of snacking per day (69.3% versus 57.2%), skipped meals more often (58.6% versus 50.6%). And 78.7% did not have any specific timing for snacking. 51.1% of the students were snacking while watching TV and 31.9% of them snacked while studying. We have found snacking behaviour to be more among undergraduate medical students compared to nursing students. The overall prevalence of overweight and obesity was 16.6% and 0.5% in the current study. In a previous study among medical students, the prevalence of overweight and obesity was 9.4% and 2.4%.<sup>6</sup> In another study conducted in Bengaluru, prevalence of overweight and obesity was 14.62% and 11.32% among the medical students.<sup>7</sup>

Even though there was an association of overweight/obesity with snacking behavior and skipping of meals in univariate analysis, they were not found to be significant factor associated with overweight /obesity in multiple logistic regressions when adjusted for gender, type of diet, exercise and course of study. Many studies have reported that the behavior of frequent snacking was associated with higher BMI or odds of overweight, while some studies finds no relation.<sup>8-16</sup> Faizi et al reports that adverse eating behaviors shows high and statistically significant association with obesity and overweight among adolescents in Aligarh, India.<sup>17</sup> But Boon TY, et al., reported that there was no significant association between snacking patterns and BMI in his study conducted in students in Kuala Lumpur.<sup>13</sup> Nuru et al also concludes that though Snacking has an influence in the children's diet intake, it is not an important independent factor which contributes to weight gain among children.<sup>8</sup> Sebastian et al. in his study among 4357 adolescents 12–19 years of age said that there is no association with obesity.<sup>17</sup> Also, he also suggests that snacking may enhance the intake of vitamin, increases the likelihood of meeting fruit recommendations. M. Steiner-Asiedu, et al. found that a higher weight gain among those who frequently consume foods high in sugar such as fruit drinks, cake and chocolate as snack.<sup>18</sup>

Kong A et al. suggest that snack meals can be a source for additional fruits, vegetables, and fiber-rich foods; however, snacking patterns might also reflect unhealthy eating habits.<sup>19</sup> Larson<sup>et al.</sup> also concludes that that even though snack consumption is a risk factor for poor diet, unless energy-dense foods are consumed, snacking won't contribute to overweight in adolescents.<sup>20</sup>

## CONCLUSION

Overweight and/or obesity were higher in males than in females. Even though there was no significant association observed between frequent snacking and overweight/obesity among students; unhealthy eating habits are observed among students. The major limitation of this study is the sample selection is from a single institution. Total energy intake was not assessed and thus leads to underestimation of the effect of snacking on obesity. Students should be encouraged to have healthy snacks and these should be made available at affordable rates in institutional canteens and cafeterias.

## END NOTE

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**Conflict of Interest:** None declared

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## REFERENCES

1. Cleobury L, Tapper K. Reasons for eating "unhealthy" snacks in overweight and obese males and females. *J Hum Nutr Diet.* 2014 Aug;27(4):333–41.
2. Prins S, de Ridder DTD, de Vet E. Eating by example. Effects of environmental cues on dietary decisions. *Appetite.* 2013 Nov;70:1–5.



3. Hermans RCJ, Herman CP, Larsen JK, Engels RCME. Social modeling effects on young women's breakfast intake. *J Am Diet Assoc.* 2010 Dec;110(12):1901–5.
4. World Health Organization. The Asia-Pacific perspective: redefining obesity and its treatment. 2000
5. Mithra P, Unnikrishnan B, Thapar R, Kumar N, Hegde S, Mangaldas Kamat A, et al. Snacking Behaviour and Its Determinants among College-Going Students in Coastal South India [Internet]. Vol. 2018, *Journal of Nutrition and Metabolism*. Hindawi; 2018 [cited 2020 Aug 23]. p. e6785741.
6. Manojan KK, Benny PV, Bindu A. Prevalence of obesity and overweight among medical students based on new Asia-Pacific BMI guideline. *Int J Prevent Therap Med.* 2014;2(1):1-3
7. Gudegowda KS, Vengatesan S, Sobagiah RT. Prevalence of overweight and obesity among medical college students, Bengaluru. *International Journal Of Community Medicine And Public Health.* 2018 Apr 24;5(5):1881–6.
8. Nuru H, Mamang F. Association between snacking and obesity in children: a review. *Int J Community Med Public Health* 2015;2(3):196-200.
9. Dubois L, Farmer A, Girard M, Peterson K. Social factors and television use during meals and snacks is associated with higher BMI among pre-school children. *Public Health Nutr* 2008;11:1267–79.
10. Nicole I Larson, Jonathan M Miller, Allison W Watts, Mary T Story, Dianne R Neumark-Sztainer Adolescent Snacking Behaviors Are Associated with Dietary Intake and Weight Status *J Nutr.* 2016 Jul; 146(7): 1348–1355.
11. Toschke AM, Kuchenhoff H, Koletzko B, von Kries R. Meal frequency and childhood obesity. *Obes Res* 2005;13:1932–8.
12. Gubbels JS, Kremers S, Goldbohm R, Stafleu A, Thijs C. Energy balance-related behavioral patterns in 5-year-old children and the longitudinal association with weight status development in early childhood. *Public Health Nutr* 2012;15:1402–10.
13. Boon TY, Sedek R, Kasim ZM. Association between snacking patterns, energy and nutrient intakes, and body mass index among school adolescents in Kuala Lumpur. *Amer J Food Nutrition.* 2012;2(3):69-77.
14. Francis LA, Lee Y, Birch L. Parental weight status and girls' television viewing, snacking, and body mass indexes. *Obes Res* 2003;11:143–51.
15. Cheah WL, Chang C, Rosalia S, Charles L, Yll S, Tiong P, Yeap K. The relationship between media use and body mass index among secondary students in Kuching South City, Sarawak, Malaysia. *Malays J Med Sci* 2011;18:33–42.
16. Faizi N, Shah MS, Ahmad A, Ansari MA, Amir A, Khaliq N. Adverse eating behavior and its association with obesity in Indian adolescents: Evidence from a nonmetropolitan city in India. *J Family Med Prim Care.* 2018;7(1):198-204
17. Sebastian RS, Cleveland LE, Goldman JD. Effect of Snacking Frequency on Adolescents' Dietary Intakes and Meeting National Recommendations. *J Adolescent Health.*
18. Steiner-Asiedu M, Jantuah JE, Anderson AK. The Snacking Habits in Junior High School Students: The Nutritional Implication-a Short Report. *Asian J Med Sci.* 2012;4(1):42-6.
19. Kong A, Beresford SAA, Alfano CM, Foster-Schubert KE, Neuhaus ML, Johnson DB, et al. Associations between snacking and weight loss and nutrient intake among postmenopausal overweight to obese women in a dietary weight-loss intervention. *J Am Diet Assoc.* 2011 Dec;111(12):1898–903.
20. Larson NI, Miller JM, Watts AW, Story MT, Neumark-Sztainer DR. Adolescent Snacking Behaviors Are Associated with Dietary Intake and Weight Status. *J Nutr.* 2016;146(7):1348-1355.