Obesity and Overweight, and Associated Factors among High School Students in Gondar Town, North West Ethiopia

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Abstract

Introduction: Overweight and obesity are defined as abnormal or excessive fat accumulation in the body that may affect health. The prevalence of overweight and obesity in children is increasing worldwide, and currently 1 child in 10 is overweight or obese. Overweight and obesity are now considered as very important risk factors for many chronic diseases which exploit high cost of medical care.

Objective: To assess the prevalence of overweight and obesity, and associated factors among high school students in Gondar town.

Methodology: Institution based cross-sectional study was conducted from April 12/2012 to April 30/2012 in Gondar town administration. A total of 800 students were included in the study. Multistage sampling strategy was applied to enroll students. Both bivariate and multivariate logistic regression analysis was done to identify associated factors.

Result: The overall prevalence of overweight and obesity in this study was 5.4% and 0.5% respectively. The prevalence of overweight among the adolescents studying in private schools was 10.1% and was higher than those studying in government schools (4%). Overweight was 4.47 times higher among girls [Adjusted Odds Ratio (AOR) =4.47; 95% CI: 1.79, 11.13], and 2.53 times higher among Students of private school [AOR =2.53, 95% CI: 1.33, 4.64]. Consuming sweet food item was significantly associated with overweight. However, moderate or vigorous sport activity for at least 10 minutes continuously was only marginally significant.

Conclusion and recommendation: This study revealed that Overweight and obesity are emerging in Gondar. School type, sex and consuming sweet food item were among the predictors that were significantly associated with overweight. Hence decreasing consumption of sweet food items and doing physical activity could reduce risk of overweight.

Keywords: Obesity and overweight; Students; Prevalence Rates; Ethiopia

Introduction

Overweight and obesity are defined as abnormal or excessive fat accumulation in the body that may affect health [1]. Overweight and obesity are the fifth leading risk for global deaths. Worldwide, about 2.8 million deaths and 35.8 million (2.3%) of global Disability Adjusted Life Years (DALYs) are caused by overweight or obesity. In addition, 44% of the diabetes burden, 23% of the ischemic heart disease burden and between 7% and 41% of certain cancer burdens are attributable to overweight and obesity [2,3].

The prevalence of overweight and obesity in children is increasing worldwide, and currently 1 child in 10 is overweight or obese [4]. Results of longitudinal study in United State suggest that obese adolescents are likely to stay obese into adulthood, and among individuals who were obese as adolescents, incident of severe obesity was 37.1% in men and 51.3% in women [5].

In lower- to middle-income countries, obesity co-exists with under-nutrition where most overweight and obese children being concentrated in urban areas and presents serious social and psychological impacts [6].

Africa is experiencing a shift from underweight to overweight along with rapid socioeconomic and nutritional transition particularly in their urban population. This transformation comes with increased access to energy-dense foods and less strenuous jobs resulting into many people having a positive energy balance and hence becoming overweight or obese [7,8].

In Ethiopia, particularly in the study area, there was no information on the adolescents’ overweight and obesity in the school. Hence, this study was able to address the by assessing the prevalence and associated factors of overweight and obesity among high school students.

Methods

Study design and period

To assess the prevalence of overweight and obesity, and associated factors among high school students in Gondar town, institution based cross-sectional study was conducted from February to June 2012.

Sample size and sampling procedure

Multistage random sampling technique was employed to recruit 800 students from the schools. From the twelve high schools in the town; four schools were selected by simple random sampling (SRS). Then from the selected schools, 800 students were randomly selected by simple random sampling. The sample size was computed using single population proportion formula by considering 23% proportion, 95%
Data collection procedure

Self administered questionnaire was deployed to collect socio-demographic, physical activity and dietary data from the students. The questionnaire was first prepared in English and translated in to Amharic and then retitranslated back to English to keep the consistency. The data was collected after pretest have been conducted on the 5% of the sample from nearby Gondar town schools using Amharic version questionnaires since the study participants were Amharic speakers. The questionnaires were adapted from the Global Physical Activity Questionnaire (GPAQ) Analysis Guide [9] and WHO steps instrument for chronic disease risk surveillance [10].

Data collection was carried out by Diploma nurses who were given two-day training with practical exercises. One teacher (BSc) for each school was assigned to supervise the data collection process and the overall coordination was handled by the principal investigators.

Measurement

Weight was measured to the nearest 0.1 kg using calibrated digital balance in standing position, and heights was measured to the nearest 0.5 cm using height measuring board in standing position when students were made to remove their heavy clothing and shoes.

Data analysis procedures

Body mass index (BMI) was computed using weight (Kg)/height (m²). Individual BMI was compared with age and sex specific BMI for age percentile cut off points of CDC growth chart and categorized as follows:-

- **Under weight**: BMI for age less than 5th percentile.
- **Normal weight**: BMI for age ≥ 5th percentile but less than 85th percentile.
- **Overweight**: BMI for age ≥ 85th percentile but less than 95th percentile.
- **Obesity**: BMI for age greater than or equal to 95th percentile [11].

Overweight and obesity were combined in the logistic regression analysis due to the limited number of participants who were classified as obese. Data was entered and analyzed using SPSS version 16. Descriptive statistics was performed. Both bivariate and multivariate logistic regression analyses were conducted. Variables whose p-values are ≤ 0.2 by bivariate logistic regression analysis were fitted to the multivariate logistic regression analysis. The crude and adjusted Odds ratios together with their 95% confidence intervals were computed to measure the association between the response and explanatory variables. A P-value ≤ 0.05 with odds ratio and 95% confidence interval were considered to identify factors associated with overweight and obesity. During the analysis, the Hosmer and Lemeshow’s goodness-of-fit test was considered to check model fitness.

Ethical consideration

Ethical clearance was obtained from the Institute of Public Health, University of Gondar Ethical Review Board. A support letter from local authorities (Gondar education office) was obtained and delivered to each selected school. After getting permission from school, verbal informed consent was obtained from each study participants and their parents. Anyone who was not willing to take part in the study and wanted to withdraw from the study was not forced.

Results

Socio-demographic characteristics of the respondents

A total of 791 students were participated in the study with a response rate of 98.9%. More than half of the respondents 423 (53.5%) were females. About 602 (76.1%) of the respondents were from government schools and the rest were from private schools. The mean age of the respondents was 16.5 years with standard deviation of 1.41 years. Most of students 530 (67%) were 9th graders and 261 (33%) were 10th graders (Table 1).

Prevalence of overweight and obesity among students

Out of the total high school students in Gondar town, 43 (5.4%) with 95%CI (4%, 7.2%) were overweight while only 4 (0.5%) with 95%CI (0.2%, 1.2%). The combined prevalence of both overweight and obesity was 5.9%. The overweight prevalence was higher among girls (8.7%) than boys (1.6%); while 0.9% girls and none of the boys were obese.

The prevalence of overweight and obesity among private high school students was 10.1% and 1.6% respectively; while 4.2% and 0.2% public students were overweight and obese respectively.

Eating habits of respondents

Among total respondents, 146 (18.5%) responded that they did not consume fruits, 347 (43.9%) consume fruits one day per week and 296 (37.4%) consume fruits two and more days per week. Eighty one (10.2%) did not consume vegetable, 47 (59.8%) consume vegetables 1-2 days per week, and 236 (29.8%) consume vegetables three and more days per week.

Table 1: Socio demographic characteristics of high school students in Gondar town, North West Ethiopia, April 2012, (N=791).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group 14-17</td>
<td>628</td>
<td>79.4</td>
</tr>
<tr>
<td>Age group 18-22</td>
<td>163</td>
<td>20.6</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
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<tr>
<td>Female</td>
<td>423</td>
<td>53.5</td>
</tr>
<tr>
<td>Male</td>
<td>368</td>
<td>46.5</td>
</tr>
<tr>
<td>School type</td>
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<td></td>
</tr>
<tr>
<td>Government</td>
<td>602</td>
<td>76.1</td>
</tr>
<tr>
<td>Private</td>
<td>189</td>
<td>23.9</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christians</td>
<td>695</td>
<td>87.9</td>
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<tr>
<td>Muslims</td>
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<td>11.8</td>
</tr>
<tr>
<td>Residence</td>
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<td></td>
</tr>
<tr>
<td>Urban</td>
<td>714</td>
<td>90.3</td>
</tr>
<tr>
<td>Rural</td>
<td>76</td>
<td>9.6</td>
</tr>
<tr>
<td>Family size</td>
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<td></td>
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<tr>
<td>&lt; Four</td>
<td>230</td>
<td>29.1</td>
</tr>
<tr>
<td>≥ Four</td>
<td>556</td>
<td>70.3</td>
</tr>
<tr>
<td>Sex of head of household</td>
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<td></td>
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<tr>
<td>Male</td>
<td>529</td>
<td>66.9</td>
</tr>
<tr>
<td>Female</td>
<td>261</td>
<td>33.0</td>
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<tr>
<td>Occupation of head of household</td>
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<td></td>
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<tr>
<td>Government employee</td>
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<td>33.5</td>
</tr>
<tr>
<td>Merchant</td>
<td>263</td>
<td>33.2</td>
</tr>
<tr>
<td>Farmer</td>
<td>153</td>
<td>19.3</td>
</tr>
<tr>
<td>Other</td>
<td>73</td>
<td>9.2</td>
</tr>
<tr>
<td>Daily labor</td>
<td>33</td>
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<tr>
<td>Education of head of household</td>
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<tr>
<td>Illiterate</td>
<td>155</td>
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<td>Primary education</td>
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<td>Secondary education</td>
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<td>21.5</td>
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<tr>
<td>College and above</td>
<td>286</td>
<td>36.2</td>
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Majority, 565 (71.4%), of participants did not consume any animal product food items frequently and the rest (28.6%) consume animal product food item frequently. On the other hand 220 (27.8%) of the students responded that they did not consume any sweet food item, 511 (64.2%) consume one sweet food item per day, and 60 (7.6%) consume two and more sweet food items per day. One hundred forty (17.7%) of participants did not use snack, 550 (69.5%) used snack once per day, 77 (9.7%) used snack two times a day and 24 (3%) used snack three and more times a day (Table 3).

Physical activity characteristics of respondents

Of the total respondents, 340 (43%) were engaged in moderate or vigorous intensity work beside learning, 261 (33%) do moderate to vigorous intensity sport for at least 10 minutes continuously, however, 125 (15.8%) of participants responded that they spent 3 or more hours sitting and watching TV. Most students, 633 (80%), got to and from school on foot and 158 (20%) traveled by car (Table 3).

In this study, some 77 (9.7%) of respondents had alcohol drinking experience, 14 (1.8%) had smoking experience.

Factors associated with overweight/obesity

Socio demographic (Age, sex, grade, residence, religion, school type, family size, occupation of head of household, education of head of household, eating habit (consumption of sweet food item, frequency of snack, frequency of meal, number of days per week fruits consumed, number of days per week vegetables consumed, frequency of consumption of animal product ), and physical activity and sedentary life style (working besides learning, moderate or vigorous sport activity for at least 10 minutes, time spent in watching TV per day, number of walking or bicycling days for at least 30 minutes per week, mode of transportation) factors in relation to overweight/obese were analyzed using bivariate and multivariate logistic regression.

In the bivariate logistic regression analysis, overweight was significantly associated with school type, sex and grade level, number of sweet food item, moderate or vigorous intensity sport and mode of transportation (get to and from school) at a p-value of 0.2.

However in the multivariate analysis which was done to adjust for potentially confounding variables, only three explanatory variables (i.e. school type, sex and number of sweet food item consumed) were significantly associated with overweight, but moderate or vigorous sport activity turned out to be marginally significant at 0.05 significance level (Table 4).

Hosmer and Lemeshow's goodness-of-fit test produce chi-square of 2.95 with p-value of 0.815 hence the model was good for the data.

Discussion

This study disclosed the prevalence and associated factors of overweight and obesity among high school students in Gondar town. Accordingly, the prevalence of overweight and obesity were 5.4% and 0.5% respectively. The sex specific prevalence of overweight was 8.7% among girls and 1.6% among boys, while the prevalence of obesity was 0.9% among girls but none of the boys were obese. The overall prevalence of overweight and obesity in this study is comparable with the prevalence reported in Addis Ababa in 2007 in which 7.6 % and 0.9% of adolescent were overweight and obese respectively [12]. However it was also lower than the prevalence reported from Sudan (14.8% overweight, 10.5% obese) [13], One of the possible reasons for the differences in prevalence of overweight and obesity could be due to cultural difference in dietary intakes.

The prevalence of overweight among the adolescents studying in private schools was 10.1% and was higher than those studying in government schools (4%). This finding in line with the studies in Addis Ababa (12) and Hyderabad, India [14]. This could be due to a difference in income; higher in families of private school students.

The sex specific prevalence of overweight was similar with findings from Nigeria of which 0-8.1% males and 1.3-8.1% females were overweight [15], Ghana and Uganda (10.4% girls, 3.2% boys were overweight while 0.9% females and 0.5% males were obese) [16] and Raichur district, India of which 6.17% of students were overweight in the year 2007 [17].

As can be noted from findings of multivariate analysis, school type had a remarkable impact on overweight. Students from private school were 2.48 times more likely to become overweight as compared to students from government school. This result is consistent with the
Factors associated with overweight/obesity among high school students, Gondar town, North West Ethiopia, April 2012. (N=791)

Europe [22,23] revealed that increasing fruit intake and decreasing coffee consumption did not have significant association with overweight. In contrast, previous studies in Turkey [20], Saudi Arabia [22], and in Europe [22,23] revealed that increasing fruit intake and decreasing coffee consumption did not have significant association with overweight. In this study, sex and use of sweet food item were significantly associated with overweight. Thus, Health and nutritional education should be given through school media and schools need to keep students active for most of physical education class time.

Conflict of interest

The authors declare that we have no conflict of interests.

Authors’ contribution

Gebremedhin Berhe gebregergs, wrote the proposal, participated in data collection, analyzed the data and drafted the paper. Melkike Endris Yesuf and Taressa Kisi Beyer approved the proposal with some revisions, and participated in analysis. All authors participated in the preparation of the manuscript and approved the final manuscript.

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