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Prevalence and Associated Factors of Overweight and/or Obesity among Primary School Children in Bole Sub-City, Addis Ababa, Ethiopia

Askal T[1], Yifokr T[2], Bekri M[2] and Getachew TG[3]*

[1]Regional Quality Coordinator at Ethiopian Commodity Exchange, Addis Ababa, Ethiopia
[2]Lecturer at College of Medicine and Health Sciences, Institute of Public Health, University of Gondar, Ethiopia
[3]Lecturer at Institute of Medicine and Health Sciences, College of Health Sciences, Department of Public Health, Debre Berhan University, Ethiopia

Abstract

Background: Overweight and/or obesity impose unacceptably high health problem and economic and social costs on countries at all income levels. Reports show that the disability adjusted life year due to overweight and obesity per 1000 population in the year 2010 in the world was 25. In Ethiopia, at regional level, the highest prevalence of overweight and obesity was observed in the Addis Ababa region.

Objectives: To assess the Prevalence rate and associated factors of overweight and/or obesity among primary school children in Bole Sub-City Addis Ababa, Ethiopia, in 2014.

Methods: An institution based cross sectional study, including a sample of 845 children using multi stage sampling techniques was conducted. Body mass index was used for determining nutritional status. Descriptive statistics, bivariate analysis and multivariable logistic regression analyses was employed.

Result: The overall Prevalence rate of overweight and/or obesity among children in primary schools of the Bole Sub-City was 9.8%. Age below 12 years (AOR:0.55, 95% CI=0.33-0.99) medium monthly income (AOR:0.20, 95% CI:0.04-0.86), ownership of private car for transportation (AOR:1.84, 95% CI:1.10-3.06), single day use of soft drink per week (AOR:0.35, 95% CI:0.16-0.73), Eating while television watching (AOR: 2.33, 95% CI:1.40-3.89), family preference of feeding fat and fried foods (AOR:2.64, 95% CI:1.38-5.02) and family preference of child sedentary life style (AOR:1.98, 95% CI:1.03-3.77) were a statically significant associated with overweight and/or obesity ($p<0.05$).

Conclusion: The Prevalence rate of overweight and/or obesity was high among children in primary schools at Bole sub city. The age of the child, medium monthly income, ownership of private car for transportation, single day use of soft drink per week, eating while watching television (TV) or film, family Preferences of feeding fat and fried foods and sedentary life of the child were the predictors. Therefore interventions need to focus on attitudinal and behavioral change to towards child feeding and should target mainly families.

Keywords: Children obesity and overweight; Prevalence; Dietary factors; Physical activity and sedentary life

Introduction

Overweight and/or obesity imposes unacceptably high health problem, economic and social costs on countries at all income levels. As reports show, the disability adjusted life year due to overweight and/or obesity per 1000 population in the year 2010 in the world, developed regions, developing regions, Africa and Eastern Africa was 25, 44, 19, 24, and 11 respectively [1]. As poor countries move up the income scale and switch from traditional diets to Western food ways, obesity rates rise [2].

Once associated with high-income countries, overweight and/or obesity is now also prevalent in low and middle income countries. Children with overweight and/or obesity are more likely than non-overweight children to develop diabetes and cardiovascular diseases at a younger age, which in turn are associated with a higher chance of premature death and disability. Globally, 44% of diabetes, 23% of ischemic heart disease and 7–41% of certain cancers are attributable to overweight and/or obesity [3].

The worldwide prevalence of children overweight and/or obesity increased from 4.2 in 1990 to 6.7 in 2010 which is almost a relative increase by 60%. The Prevalence rate is also expected to reach 9.1% in 2020 for a relative increase of 36 % from 2010. The relative percentage change is higher in developing than developed ones with a relative increment of 65% and 48% respectively [4].

Children under nutrition still impose a larger burden than overweight and/or obesity, although the latter is increasing even in developing regions. The challenge for the global community, therefore, is to continue fighting hunger and under nutrition while preventing or reversing the emergence of overweight and/or obesity [1].

In Ethiopia, the Prevalence rate of overweight and/or obesity was noticeable in urban areas (14%) while it was negligible in rural areas (2%). At regional level, the highest Prevalence rate of overweight and/or obesity was observed in the Addis Ababa region (18%) [5].

But studies conducted in the country in general and in Addis Ababa in particular are limited in this age group (primary school children). One of the factors that influence overweight and/or obesity is high intake of calorie dense foods which is usually related with high socio-economic status in communities like Bole sub city. Children from such

***Corresponding author:** Getachew TG, Institute of Medicine and Health Sciences, College of Health Sciences, Department of Public Health, Debre Berhan University, Ethiopia, Tel: +251911733157; E-mail: getas125@yahoo.com

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families particularly at school age are prone to access and consumption of calorie dense food as they want which lead to overweight and/or obesity and the extent of the problem on such social group should be known to take appropriate measure. Primary preventive measure for children obesity should start early in children and address factors for overweight and/or obesity. A fundamental step in the prevention and control of overweight and/or obesity is identification of risk factors contributing to the rapid increase of the problem. Therefore, this study enables to see the prevalence rate and factors associated to the problem among primary schools in the Bole Sub-City and enable policy makers and other concerned bodies use it as baseline information to make evidence based decisions.

Methods

Study design

An institution based cross sectional study was conducted to assess overweight and/or obesity among primary school children.

Study area and period

Bole Sub city is one of the 10 sub cities found in Addis Ababa which is the capital city of Ethiopia. The Sub city has 12 Woredas under it. It has a total population of 348,281. The sub city has 70 primary schools with full cycle from grade 1-8 among which 11 governmental 4 religious and 55 private schools. There are a total of 35,840 students attending their class in those schools. The study was conducted at Bole Sub-city from April 07, 2014-May 02, 2014.

Source population

The source populations were all children in primary schools of the Bole Sub-City.

Study population

The study populations were children aged 9-14 years in grades 4-8 in the primary schools of Bole Sub-City.

Sample size and sampling technique and procedures

Sample size: By using single population proportion formula; n= $z^2_{\alpha/2}$ P(1-P)/d^2 and taking assumptions as prevalence rate of 50%, 95% confidence interval, marginal error of 5%, non- response rate of 10%, design effect of 2 the total sample size was calculated yielding the final sample size of 845 children.

Sampling technique and procedures: Multi stage sampling technique was employed to select study subjects. All primary schools in bole sub city were classified into three categories based on their ownership into governmental, private and religious. Since students from private and religious schools share similar feature based on their family ability to pay school fee they were merged together as one stratum.

Six primary schools (2 governmental and 4 nongovernmental) were selected randomly. Government schools had two sections in each grade and we selected one section from each grade randomly and private schools had one class per each grade so that we have directly included them. After having the number of students to be selected in each section, through probability proportional to size (PPS), computer generated random number using OpenEpi software was employed to identify a total of 845 children from the selected sections.

Operational definitions

Overweight: Body mass index for age and sex greater than or equal to 85^{th} percentile and less than 95^{th} percentile according to CDC 2000, growth monitoring chart.

Obesity: Body mass index for age and sex greater than or equal to 95^{th} percentile according to CDC 2000, growth monitoring chart.

Low income: Is a monthly income of less than or equal to 817 Ethiopian Birr (ETB).

Medium income: Is a monthly income of 818 to 1968 ETB.

Higher income: Is a monthly income of greater than or equal to 1969 ETB.

Data collection procedures

The data were collected primarily from students of age 9-14 years and represent all students from grade 4, 5, 6, 7, and 8 using interviewer administered structured questionnaire for children and using self-administered structured questionnaire for parents which is adopted from various literatures reviewed, WHO step instrument questioner and Global Physical Activity Questionnaire for physical activity surveillance. The questionnaire was prepared first in English and then it was translated back to the Amharic language and anthropometric measurement of weight and height were done using standardized and calibrated measuring tools. Weight was recorded using electronic weight scale and height was measured by using the Stadiometer. Calibration of weighting scale was made at the beginning and after each measurement. Weight was measured to the nearest 0.1 kg. And height was measured to the nearest 0.5 cm.

Data processing and analysis

Data was entered and cleaned using EPi-info version 3.5.3 statistical software and then exported to SPSS version 20.statistical software for further analysis. Frequencies and cross tabulations were used to summarize descriptive statistics of the data and tables and graphs were used for data presentation. Bivariate logistic regression analysis was used to check variables association with dependent variable one by one. Variables found to have association with the dependent variable (p-value up to 0.2) were then entered in to multiple logistic regression models for further analysis and Hosmer and Lemeshow's goodness-of-fit test done and variables having P- value less than 0.05 were considered as significantly associated with the dependent variable. The degree of association between dependent and independent variables was expressed by using odds ratio with 95% confidence interval

Ethical considerations

Ethical clearance was obtained from the Ethical Review Board of Institute of Public Health of University of Gondar. The Bole Sub City Education office was informed prior to the initiation of the study with a letter of support from the University of Gondar. Letter of permission was obtained from Bole sub city education office and the respective primary schools hierarchically.

Written consent was obtained from the participants and their parents after informing them all the purpose, benefit, risk, the confidentiality of the information and the voluntary nature of the participation in the study.

Results

Socio-demographic characteristics

A total of 828 children had participated in this study and this gave

rise to a response rate of 97.9%. The mean age of study participants was 12.4 years (12.4±1.4SD) years and the minimum and maximum ages are 9 years and 14 years respectively. From the total study participants 55.3% of them were in the age group of above 12 years (Table 1).

Dietary and related characteristics of respondents

Seven hundred sixty five (92.4%) of participants, reported to have three meals per day and 780 of participants reported (94.2%) used snack between meals. Majority 93.7% used to watch television and 38% eat while watching television (Table 2).

Physical activity related characteristics

From the total of 828 children, 506 (61.1%) reported to be involved in some sorts of moderate or high intense work outside their school for varying length of days in a week. Majority, 767 (92.7%), travel either on foot or by bicycle for at least ten minutes for some days in a week. Four hundred forty nine (54.3%) were involved in high fitness sport (Table 3).

Prevalence of overweight and/or obesity

The overall Prevalence rate of overweight and/or obesity among children in primary schools of Bole sub city was 9.8% using BMI for age and sex classification among which over weight accounted 8% and obesity accounted for the rest 1.8%. It was higher in females 6.4% (5.2% overweight and 1.2% obese) than male's 3.4% (2.8% overweight and 0.6% obese) students. The overall prevalence rate of overweight and/or obesity was also higher among private school children 8.1% (6.4% overweight and 1.7% obese) than government school children 1.7% (1.6% overweight and 0.1% obese). This Prevalence rate among private school children alone when calculated separately was 16% and among government school children alone was 3.4% (Figure 1).

Variable	Frequency	Percent
Sex		
Male	363	43.8
Female	465	56.2
Age		
12 years and less	370	44.7
Above 12 years	458	55.3
Grade level of the child		
6-Apr	464	56
8-Jul	364	44
Type of school		
Government	408	49.3
Private	420	50.7
Mothers education		
Illiterate	78	9.4
Primary school	265	32
Secondary school	236	28.5
College and above	249	30.1
Family size		
<6	462	55.8
≥6	366	44.2
Family income		
Lowest	89	10.7
Medium	114	13.8
Highest	625	75.5

Table 1: Socio Demographic Characteristics of Children in Primary Schools of Bole Sub-City, Addis Ababa Ethiopia, April, 2014.

Variable	Frequency	Percent
Days fed on fruits in a week		
No fruit	104	12.6
1-2 days	449	54.2
3 and above	275	33.2
Days fed on Vegetables in week		
No vegetable	56	6.8
1-2 days	375	45.3
3 and above	397	47.9
Number of meal per day without snack		
One	2	0.2
Two	61	7.4
Three	765	92.4
Number of soft drink per week		
No soft dink	212	23.7
Once per week	262	33.6
2-3 times	255	30.8
4 and above times	99	12
Eating while watching TV or film		
Yes	322	38.9
No	506	61.1
Family preference on fat and fried foods		
Yes	557	67.3
No	271	32.7

Table 2: Dietary Habits and Behavior of Primary School Students at Bole Sub-City, Addis Ababa, Ethiopia, April, 2014.

Variable	Frequency	Percent
Number of days per week in work		
No work	322	38.9
0ne to two	235	28.4
3 and above	271	32.7
Days traveled on foot or by bicycles for 10 min		
No(zero days)	61	7.4
1 to 6	350	42.3
7 days	417	50.4
Minutes per day on high intense sport		
No sport	379	45.8
10-30 minutes	272	32.9
more than 30 minutes	177	21.4
Minutes for moderate sport		
No sport	229	27.7
10-30 minutes	381	46
more than 30 minutes	218	26.3
Mode of transportation		
On foot or Bicycle	584	70.5
Vehicles	244	29.5
Family preference on sedentary life of the child		
Yes	106	12.8
No	722	87.2

Table 3: Physical Activity Related Factors of Primary School Children at Bole Sub-City, Addis Ababa, Ethiopia, April 2014.

In the multivariate logistic regression analyses age of child, monthly income, and ownership of private car for transportation, number of days soft drink used per week, eating while watching television or film ,family preference on fat and fried foods and family preference on sedentary life of the child were remained significantly associated with overweight and/or obesity (Table 4).

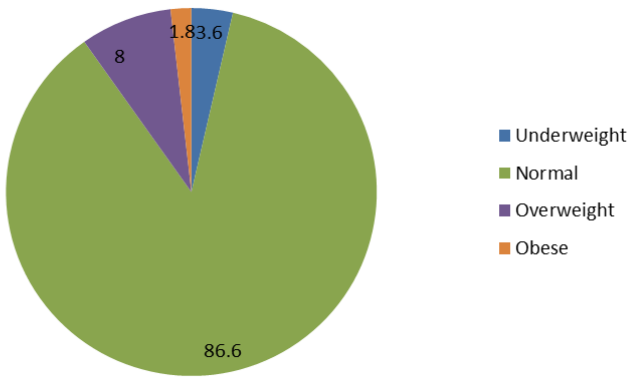

Figure 1: BMI Category of Primary School Children in Bole Sub-City, Addis Ababa Ethiopia, April, 2014. Associated Factors with Overweight and/or Obesity.

Variables	Overweight and/or obesity		COR (95%)	AOR (95%)
	Yes	No		
Age				
12 years and less	30	340	0.704(0.439,1.130)	**0.557(0.336,0.992)**
Above 12 years	51	407	1	**1**
Type of school				
Government	14	394	0.187(0.103,0.339)	
Private	67	353	1	
Grade level of the child				
6-Apr	39	425	0.704(0.444,1.114)	
8-Jul	42	322	1	
Education of Mother				
Illiterate	5	73	0.464(0.174,1.236)	
Primary school	21	244	0.584(0.327,1.042)	
Secondary school	23	213	0.732(0.415,1.292)	
Collage and above	32	217	1	
Family income				
Lowest	3	86	0.252(0.078,0.817)	0.422(0.125,1.424)
Medium	2	112	0.129(0.031,0.533)	**0.205(0.048,0.866)**
Highest	76	549	1	1
Private car				
Yes	231	28	2.684(1.685,4.276)	**1.839(1.103,3.065)**
No	597	72	1	1
Days fed on fruits per a week				
No fruit	8	96	0.591(0.264,1.322)	
1-2 days	39	410	0.674(0.414,1.097)	
3 and above	34	241	1	
Days fed on Vegetables in a week				
No vegetable	11	45	2.309(1,103,4.836)	
1-2 days	32	343	0.881(0.538,1.443)	
3 and above	38	359	1	
Number of soft drink per week				
No soft dink	16	180	0.311(0.155,0.625)	0.558(0.257,1.209)
Once per week	17	261	0.228(0.115,0.451)	**0.350(0.168,0.731)**
Two to Three times	26	229	0.397(0.213,0.741)	0.607(0.308,1.197)
4 and above times	22	77	1	1
Eating while watching TV or film				
Yes	50	272	2.817(1.757,4.516)	**2.339(1.404,3.897)**
No	31	475	1	**1**
Family preference on fat and fried foods				
Yes	68	489	2.760(1.496,5.090)	**2.641(1.388,5.026)**
No	13	258	1	**1**
Number of days travel by foot or bicycle for 10 min				
No(zero days)	3	58	0.438(0.132,1.458)	
1 to 6	34	316	0.912(0.569,1.462)	
7 days	44	373	1	
Minutes for moderate sport				
No sport	21	208	0.714(0.391,1.305)	
10-30 minutes	33	348	0.671(0.392,1.149)	
more than 30 minutes	27	191	1	
Mode of transport				
On foot or Bicycle	44	540	0.456(0.286,0.726)	
Vehicles	37	207	1	
Family preference of sedentary life of the children				
Yes	16	90	1.797(0.996,3.241)	**1.981(1.039,3.776)**
No	65	657	0.557(0.309,1.004)	**1**

Significantly associated: P-value<0.05.

Table 4: Bivariate and Multivariate Logistic Regression Output of Determinants of Overweight and/or Obesity among Primary School Students of Bole Sub-City, April 2014.

Discussion

The overall prevalence rate of overweight and/or obesity among children in primary schools of Bole Sub-City was 9.8%.This Prevalence rate is lower when compared to studies in US [6-8], Canada [9], Greek [10], Spain [11], Rome[12], India [13] India [14,15], Iran[16], Pakistan [17], Pkistan [18], Saudiarabia [19,20], South Africa [21], Ghana [22], Kenya [23] and Ethiopia [24].

The difference could be due to Socio economic status difference between those countries. It may result in a relatively less exposure to over consumptions of energy dense foods and high consumption of the cheap high fiber diet in the study area. This variation could also be due to difference in physical activity since there is habit of using on foot travel in the study area than the developed Nations due to less access to vehicles. Whereas the reason why the Prevalence rate was less than that of Hawassa study in Ethiopia could be due to nearly 50% of the children included in this study were selected from governmental school where the Prevalence rate was low (3.4%) because these children are from families with low monthly income. This low Prevalence rate in turn pulled down the Prevalence rate of 16% among private school children to only 9.8% average among both groups mixed. On the other hand the Prevalence rate in this study is higher than the findings of study done in Ethiopia [25,26]. This variation could be due to the socio economic, cultural difference and life style difference between the two areas where there could be a better socio economic status in the study area.

The odds of overweight and/or obesity was 45% less likely among children below 12 years of age as compared to their counter parts (AOR:0.557, 95% CI:0.336-0.992).This finding goes in line with the findings of studies in Canada [9] and Ethiopia [27]. This might be due to the dependency of younger children on their family in the consumption of foods. Therefore children's tendency to get money to spend independently decreases. As a result of this, they may not use extra high calorie dense foods by themselves or with peer pressures outside the control of their parents compared with those older than 12 years. It can also be due to their tendency to be involved in outdoor playing and games requiring involvement of better physical activity

than those older than 12 years. It could also be due to hormonal influence where accumulation of fat and muscle mass tends to be more as their age increases than younger ones.

Children from families with moderate income level were 80% less likely to be overweight and/or obese as compared to those from families with higher monthly income. (AOR: 0.205, 95% CI: 0.48-0.866). This finding is in agreement with the study findings in Pakistan [28], US [29] and Ethiopia [24]. This could be due to the fact that as income increases, there is a tendency to shift life styles in dietary habits as well as level of physical activities. Having a better income results in increased availability and consumption of food that result in excess fat accumulation. In addition, better income results in a reduced physical activity level in the form of mode of transportations as they tend to use vehicles instead of travel on foot or by bicycles or in the form of lesser extra activities at home for work in assisting their families as they tend to use recruited manpower. His in turn promotes sedentary life style resulting in less energy expenditure and leads to overweight and/or obesity.

The odds of overweight and/or obesity among children whose families owe private car for transportation was 1.84 times than their counter parts. (AOR: 1.84, 95% CI: 1.103-3.065) This could be due to the fact that ownership of private car for transportation may show less of physical activities like on foot walking and more of sedentary life style than those who do not have private car for transportation. It may also show better income status of the family as ownership of private car is left for those with a better income status in our country; and the better the income may mean the increased access and consumption of foods resulting in overweight and/or obesity. So it can agree with the fact that "wealth and weight are linked" [2].

Children who drink soft drinks one day per week were 65% less likely to be overweight and/or obese than children who drink soft drinks four or more days per week. (AOR: 0.35, 95% CI: 0.168-0.731). This is in line with the findings from Ethiopia [26,27] where consumption of sweets was reported to have associations with overweight and/or obesity. This could be due to sweet foods like soft drinks are full of energy. Therefore increased consumption of such foods may provide our body with excess calories than required for our daily life. This in turn results in the accumulation of excess calories in the form of fat in the body and results in overweight and/or obesity.

Eating during television watching was another variable found to be associated with overweight and/or obesity. Children who eat while watching television were 2.33 times more likely to be overweight and/or obese than those who do not eat while watching television (AOR: 2.33, 95% CI:1.49-3.89). This finding is supported by the findings of studies in Canada [9], Ghana [30], Romania [12] and Ethiopia [24] where television viewing is associated with overweight and/or obesity. This might be due to watching televisions result in a sedentary physical activity state which reduces energy expenditure and increases accumulation of excess energy in the form of fat. On top of which eating while watching television increases further excess energy accumulations and fat deposition in the body. Therefore the body may get extra calories which are excess for the already sedentary life style.

The odds of overweight and/or obesity were 2.64 times more likely among children whose families prefer them to eat fatty and fried foods than their counter parts (AOR: 2.64, 95% CI:1.38-5.02). This finding is similar with the findings of studies conducted in Canada [9] and Romania [12] where the consumption of junk foods were found to be associated with overweight and/or obesity. This may be due to families preference may increase children uptake of fats and fried foods which are high energy dense foods resulting in excess accumulation of fat in the bodies to end up with overweight and/or obese child.

Children whose families prefer them to have sedentary life style were 1.98 times more likely to be obese as compared to those whose families prefer them to be involved in physical activities. (AOR: 1.98, 95% CI: 1.03- 3.77). This finding is in line with different literatures [8,9,24,26,31,32] where physical activity and overweight and/or obesity has reported to have inverse relationships. This might be due to families' preference to make their children in a sedentary life style may dictate children physical activity level resulting in reduced physical activities including restricted playing outside of their home. This in turn result in reduction in energy expenditure which leading to overweight and/or obesity.

Limitations

This study has the following limitations. First, due to nature of cross-sectional study we cannot infer causality. Second, there is a possibility of recall bias and social desirability bias by participants on variables like the frequency of dietary habits, sedentary and behaviors physical activity. Third, other factors which can affect excess body weight like genetic factor, health condition and drug use of participants were not addressed in this study

Conclusion

The prevalence rate of overweight and/or obesity among primary school students in Bole sub city is relatively high.

Age of the child, family income, ownership of private car for transportation, number of days per week where soft drinks used, eating while watching TV or film, family preference on fat and fried foods and family preference on sedentary life of the child, were found to be predictors of overweight and/or obesity among primary school children at Bole sub city.

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