Research Article

The Prevalence of Obesity and Overweight and Its Relevance to Transportation Among Primary School Students: Yazd, Iran; 2015

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Abstract

Background: The prevalence of overweight and obesity in all age groups, especially in childhood, has become alarming. Identification, intervention, and prevention are important factors affecting it.

Objectives: The purpose of this study was to investigate the association the body mass index (BMI) in children and transportation to school in greater areas of Yazd during 2014 - 2015.

Methods: This is an analytical cross-sectional study. It was conducted on 2000 primary school students between six to 13 years old who lived in the greater areas of Yazd. Data were collected using a validated questionnaire. Anthropometrics were collected using standardized instruments.

Results: In this study, 2000 students were enrolled and 1700 students' information aged between six to 13 years were recruited completely. About 42% of the participants were male. The mean ± SD age of students was 9.55 (± 1.9) years old. The frequency of normal weight was 56%, overweight was 10.9%, and obesity was 20.6. Students who actively commuted to school had a lower BMI (P = 0.035).

Conclusions: The results of this study showed that the way students can travel could affect their BMI. The use of vehicle was higher in obese and overweight students.

Keywords: Overweight and Obesity, Body Mass Index, Transportation

1. Background

Non-communicable diseases (NCDs) such as cardiovascular disease, cancers, and diabetes are the leading cause of death worldwide (1). Approximately 80% of NCDs attributable deaths are occurring in low and middle-income countries (2). In many countries, the number of adolescents and young people are increasing in comparison with other age groups (3).

NCDs are associated with several risk factors. Obesity and being overweight are the most important risk factors of NCDs. The number of young people who are overweight and obese has increased, reflecting changes in social and environmental factors (4).

Low levels of physical activity and sedentary lifestyle are associated with overweight and obesity in children and adolescents (5-7). Studies in developing countries such as Iran indicated an ascending trend in childhood obesity (8-10). Childhood obesity usually continues into adulthood obesity in a way where more than 69% of obese children aged six to ten years old are also obese in their adulthood (11).

Physical activity reduces obesity and overweight in children and teens. Transportation is an important part of everyday life. Active transportation, such as walking or biking, can expend a large amount of energy. Physical activity in school, after-school programs, and day-care settings play a more important role in determining the physical activity levels of children (12). Unfortunately, the importance of obesity as one of the major aspect of growth disorder is less known and studied. Therefore, determining the prevalence of obesity and its associated risk factors in different age groups in every area seems necessary in order to plan strategies.

2. Objectives

The purpose of this study was to investigate the association between the body mass index (BMI) in children (six

to 13 years old) and transportation to school in Yazd during 2014 - 2015.

3. Methods

3.1. Study Population and Data Collection

This analytical cross-sectional study was conducted from November 2014 to October 2015 on school students aged six to 13 years (primary schools). The study was conducted in the city of Yazd with cooperation of the Yazd Diabetes Research Center and Yazd Education Organization. There are 700 primary schools in Yazd province, of which there are 100 schools in the city of Yazd. The studied samples were selected by multistage sampling from 100 primary schools in two greater areas of Yazd. Among 700 primary schools, 100 schools were selected and according to the students' name list, 20 students were selected randomly from each school, (2000 students were enrolled in the study). Written consent from the parents of each student was completed before entering the study.

Some factors such as demographic, anthropometric, behavioral, physical activity, and school attendance were evaluated. The health educators who work in schools gathered all data such as demographic, anthropometric measurements, and the way of going to school (walking or bicycle riding as active and motor vehicles as passive).

Weight was measured without shoes and wearing only light clothing by using an electronic weighing scale (Glamor, BF-1041-A), which then recorded to the nearest 100 g. Height was measured once at baseline without shoes with the subject stretching to the maximum height, and the head positioned in the plane using a portable stadiometer, which was then recorded to the nearest 0.1 cm. Body mass index (BMI) was also calculated (kg/m^2). Then, the participants were divided into four groups according to standard WHO expert committee: lean (less than the 5th percentile), normal weight (5 - 85 percentile), overweight (85 - 95 percentile) or obese (more than 95 percentile).

This study was approved by the Ethics Committee of Shahid Sadoughi University of Medical Sciences number IR.SSU.REC.1394.199 and informed consent was obtained from all participants.

3.2. Statistical Analyses

The data obtained was coded for statistical evaluations. In this study, ANOVA and chi-square tests were used. The level $P < 0.05$ was taken as the cutoff value for significance. All of the calculations were statistically analyzed using the statistical package for the social sciences (SPSS) V. 20.

4. Results

In this study, 2000 students were enrolled and 1700 students' information aged six to 13 years were recruited completely. About 42% of the participants were male. The mean $\pm$ SD age of students was 9.55 ± 1.9 years old. The frequency of under weight was 12.5%, normal weight was 56%, over weight was 10.9% and obesity was 20.6% (Table 1).

Table 1. Socio-Demographic Characteristics of Studied Students at Baseline

Variable	No. (%)
Gender	
Male	720 (42.4)
Female	980 (57.6)
Mother employment	
Employed	308 (18.1)
Unemployed	1392 (81.9)
Parents smoking	
Yes	413 (24.3)
No	1287 (75.7)
Parents addiction	
Yes	68 (4)
No	1632 (96)
School transportation	
Active	1097 (64.5)
Passive	603 (35.5)

Moreover, an association was observed between the way of commuting to school (active/passive) and obesity and overweight. Essentially, those who used motor vehicles were significantly more obese and overweight than participants who walked or biked to school (11.6% overweight and 21.8% obesity versus 9.6% overweight and 18.8% obesity) (P = 0.035). In this study, 44.4% of active school transport were boys and 55.6% girls (P value: 0.105).

Based on the results of the present study, no association was revealed between the mother's job (employed/unemployed) and the incidence of overweight and obesity (P = 0.868). Another finding in the present study was that mothers' educational level impressed active transportation among their children. In detail, 32.4% of mothers with a low level of education (high school or lower) versus 13.3% of mothers with a high level of education (master or higher) let their children walk to school (P value: 0.003). Fathers' education level also had a significant association with walking prevalence among their children so that 31.9% of children with low educated fathers and 9% of children with high educated fathers walked to school (P value: 0.008) (Table 2).

Table 2. The Comparison of Studied Variables in Three Categories of BMI Categories[a]

	Normal	Overweight	Obesity	P Value
Age	9.64 ± 1.7	9.89 ± 1.7	9.84 ± 1.7	0.083
Gender				0.091
Male	495 (42.5)	66 (35.7)	159 (45.4)	
Female	670 (57.5)	119 (64.3)	191 (54.6)	
Mother employment				0.868
Employed	214 (18.4)	34 (18.4)	60 (17.1)	
Unemployed	951 (81.6)	151 (81.6)	290 (82.9)	
Parents smoking				0.128
Yes	268 (23)	46 (24.9)	99 (28.3)	
No	897 (77)	139 (75.1)	251 (71.7)	
Parents addiction				0.003
Yes	38 (3.2)	5 (2.7)	25 (7.1)	
No	1127 (96.7)	180 (97.3)	325 (92.9)	
Way of commuting to school				0.035
Passive	731 (62.7)	127 (68.6)	239 (68.3)	
Active	434 (37.3)	58 (31.4)	111 (31.7)	

[a]Values are expressed as mean ± SD or No. (%).

-Description of Table 3:

Income was categorized as; 1: no income, 2: < 6000000 R, 6000000-12000000 R, > 12000000 R (Rial)

Smoking was categorized as; 1: no smoker in home, only one of parents, both parents, other

Father and mother Job were categorized as; 1: unemployed, 2: official work, 3: worker, 4: retired

Education was categorized as; 1: elementary, 2: diploma, 3: academic education

Gender was categorized as; male and female

Watching TV was categorized as; a: < 1 h, b: 1 - 2 h, c: 2 - 3 h, d: > 3 h

Physical activity (PA) was categorized as; 1: low PA, 2: moderate PA, 3: high PA

In all variables the first categories were categorized as references. We did not have a home-to-school distance variable. Information regarding other variables will be published in other articles.

5. Discussion

5.1. Commuting Mode and Weight

In the current study that evaluated 1700 primary school students, we found that active commuting to school had a significant relationship with BMI and those who get to and back from school by walking or cycling had a lower BMI compared with passive commuters. To our best knowledge, this is the first study in Iran that evaluated the relationship between the mode of school commuting and obesity. Our results are in agreement with a cluster randomized controlled trial by Mendoza et al., (13), that reported the association between active commuting and adiposity in US youth. Other studies also showed that active commuting has favorable effects on body composition and cardiorespiratory factors among adolescents (14). Another study reported that active commuting could improve self-efficacy among school children (15). However, there is some evidence that showed lower BMI in active commuters is limited to cyclist not walkers (16).

In the current study, we observed that 30.4% of parents chose walking as the mode of school transportation for their child, 67.7% chose private transport facility, 1.2% used public transportations, and just 0.8% selected bicycle for their elementary school children as the mode of transportation. Landsberg et al. evaluated the associations between active commuting and adiposity in 14-year-old adolescents and suggested that cycling or walking per se cannot affect BMI until considering the distance to the school (17). The study by Heelan et al., that examined the role of distance to school in active commuters and its associations with childhood BMI showed that distance and frequency of active transportation to and from school is related to BMI (18).

Table 3. Overweight and Obesity Predictors in Students (Regression Model)[a]

Variables	B	Standard Error	P Value	95% Confidence Interval for Exp (B)	
				Lower Bound	Upper Bound
Overweight					
Income	0.013	0.234	0.954	0.640	1.605
Method transportation school	-0.615	0.364	0.091	0.265	1.104
Smoking	-0.610	0.442	0.167	0.229	1.291
Father job	-0.386	0.184	0.036	0.474	0.975
Mother job	-0.933	0.522	0.074	0.141	1.095
Mother education	0.068	0.153	0.658	0.793	1.443
Father education	-0.201	0.142	0.157	0.619	1.080
Gender	0.370	0.345	0.283	0.737	2.845
Watching TV daily	0.115	0.081	0.155	0.957	1.315
PA	-0.553	0.243	0.023	0.357	0.927
Obese					
Income	-0.109	0.126	0.385	0.700	1.147
Method transportation school	-0.141	0.200	0.479	0.587	1.284
Smoking	0.017	0.131	0.896	0.787	1.316
Father job	-0.193	0.093	0.038	0.688	0.989
Mother job	0.018	0.136	0.892	0.781	1.329
Mother education	0.118	0.080	0.142	0.961	1.317
Father education	-0.078	0.075	0.294	0.799	1.070
Gender	-0.132	0.185	0.474	0.610	1.258
Watching TV daily	0.045	0.058	0.438	0.933	1.173
PA	-0.195	0.122	0.111	0.647	1.046

[a] The reference category is normal.

5.2. Differences in Commuting Behavior in Girls and Boys

Despite the favorable effects of active commuting for physical activity, fitness, cardiorespiratory function, and self-efficacy, most of the school children prefer passive transportation to and from school (19). In our study, 68.9% of elementary school children were passive commuters, and we found that there was no significant difference between boys and girls. Regarding gender, studies showed that girl propensity to choose active transportation is more than that of boys (19), and desire for walking is different among age-levels. High school girls are less likely to walk relative to elementary girls; however, high school boys prefer walking more relative to elementary boys (20). We showed that boys prefer riding a bicycle more than girls. This difference might be secondary to the cultural background in our region where girls have some limitations for cycling.

5.3. Barriers of Active Commuting

Evaluating the possible effective factors on walking behavior showed that distance, car ownership, number of licenses in households, family income, and parent education play important roles for choosing active commuting (18). In Iran, in distances of less than 1.6 kilometers from school 67% of children have an active mode of transportation. Moreover, travel time has a strong correlation with active commuting. We observed that parent's level of education had a significant impact on the mode of transportation, and educational level of either mothers or fathers had an inverse relationship with the rate of children walking to and from school. This showed that when the educational status of parents improved, the propensity to choose active commuting for children, decreased. It is observed that in families with higher parental educational levels, the priority for choosing a school for children is the quality and facilities of school. This concept leads to choosing schools that are far from their region and incite them to use motor

vehicles for commuting. However, Samimi et al. reported in their study from Tehran, the capital of Iran, that in families where the parents have a middle level of education, school child active transportation is more prominent relative to families with higher and lower parental educational levels.

The low level of interest in cycling among children in this study can be a sign of the parents' concern in regards to safety. In our region, there are no special roads for cyclists and it is a strong barrier for parents to choose this suitable mode of transportation for their child.

5.4. Study Strength and Limitations

This study provides the first report regarding the correlation of active commuting and BMI in elementary school children in Iran with a good sample size that evaluated other possible influential factors on children obesity such as TV viewing and food consumption style. However, the current study has some limitations. We do not have information regarding the children's distance from school, car ownership, and travel time, which are very important for the assessment of the adequacy of physical activity and selection of transportation mode.

5.5. Conclusions

Active commuting to and from school has favorable effects on childhood BMI and policymakers should encourage parents to select their child school considering to distance from the house, travel time, and mode of transportation.

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