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Prevalence of Overweight, Obesity and Socio-demographic Related Factors among Iranian Northern School Children

Gholamreza Veghari

Biochemistry and Metabolic Disorders Research, Center-School of Medicine,
Golestan University of Medical Sciences, Gorgan, Iran

Abstract: Obesity is the most health problem and the main aim of this study was to evaluate overweight, obesity and some related factors among Iranian northern primary school children in 2010. This is a descriptive and cross-sectional study that performed on 7399 students (3934 = male and 3465 = female) from 112 schools in urban and rural area. The schools and students were chosen by cluster and stratify sampling. Data collected by questioner for all samples through interview. Overweight and obesity were defined using age and sex specific Body Mass Index (BMI) cut of point proposed by the Center of Disease Control and prevention (CDC). Linear regression analysis revealed that weight, height and BMI increase 2.70 kg, 4.62 cm and 0.42 kg m⁻² in boys ($p < 0.001$) and 3.12 kg, 5.19 cm and 0.52 kg m⁻² in girls ($p = 0.001$) for one year increase in age, respectively. Wholly, the prevalence of overweight and obesity was 8.4 and 14.1%, respectively. Results of logistic regression analyses showed that the risk of overweight and obesity is 1.203 (1.078-1.341, CI 95%) in male compare to female, 1.382 (1.240-1.541, CI 95%) in urban compare to rural area and 2.297 (1.911-2.761, CI 95%) in good economic group compare to poor economic group. These data show that obesity and overweight are prevalent among primary schoolchildren in the north of Iran and that social differences influence on it. Obesity more common in boys than girls. The present findings highlight the important public health message of children especially in urban area and high income families in the north of Iran.

Key words: Obesity, schoolchildren, economic status, Iran

INTRODUCTION

Obesity and overweight is well known as a health problem in adult populations of developing countries (Popkin, 2001) and Iran (Veghari *et al.*, 2010a; Veghari and Mansurian, 2007; Azizi *et al.*, 2003c) but data on this problem and its social variation among children are still sparse. Adolescence seems to be one of the critical periods for the development of obesity which is related to health criteria in adulthood (Must and Strauss, 1999; Mijailovic *et al.*, 2001).

Pervious studies indicate that overweight and obesity is increasing among children and adolescents in Iran (Azizi *et al.*, 2001; Ayatollahi, 2003). One outcome of this trend is the alarming increase in prevalence of the metabolic syndrome in Iranian population (Azizi *et al.*, 2003a, c).

Some studies show the strong relationship between socio-demographic factors and obesity but it is different in place to place (Al-Nuaim *et al.*, 1997; Sibai *et al.*, 2003; Musaiger, 2004). Data on children overweight and obesity and the possible role of social inequity in this problem, help to establish preventive program regarding chronic disease in adulthood.

Of 1,600,000 populations in the Golestan province (north of Iran), 43.9 and 56.1% are living in urban and rural area, respectively. Agriculture is the main job in rural area and different ethnic groups such as Fars-native, Turkman and Sisstami are living in this region (<http://amar.sci.org.ir/>).

This research was conducted to investigate the overweight and obesity status in primary schoolchildren in the north of Iran and attempted to analyze socio-demographic related factors same as economic status, location area and gender influence in weight gain in those children.

MATERIALS AND METHODS

This is a descriptive and cross-sectional research study which was carried out on 7399 primary school children (3934 boys and 3465 girls) from 112 schools of urban and rural area in the north of Iran. The schools and students were chosen by cluster and stratify sampling. For all of children a questionnaire was filled which contain, questions on gender, location area and economic status of schoolchildren.

Economic status: The economic ranking of the families in this study, were assessed on the base of 12 items and principles. On the bases of those 12 items the children's family was divided as (1) good, (2) intermediate and (3) poor.

Anthropometric measurements of the children were performed in light dress and without shoes in the morning. Body-weight was measured to the nearest 0.1 kg using a balanced-beam scale and height was measured to the nearest 0.5 cm with standing up and head, back and buttock on the vertical land of the height-gauge.

Descriptive statistics on weight, height and BMI measurements were performed. The estimations of the prevalence of overweight and obesity were based on the cut off points of CDC values (in excess of the 85th and 95th percentiles, respectively) (Kuczmarski *et al.*, 2000).

SPSS 16.0 software was used for statistical data analysis. Chi-2 test and logistic regression were used for

analysis and p-value under 0.05 included significations. Unwilling subjects excluded from this study.

RESULTS

Linear regression analysis revealed that weight, height and BMI increase 2.70 kg, 4.622 cm and 0.42 kg m⁻² in boys (p = 0.001) and 3.12 kg, 5.19 cm and 0.52 kg m⁻² for one year increase in age, respectively (p<0.001) (Table 1).

The overall prevalence of overweight and obesity in this population was 8.4 and 14.1%, respectively (Table 2). Prevalence of obesity was in male 2.7% more than female (p = 0.008), in urban area 5.5% more than rural area (p = 0.001) and in good economic status 12% more than poor economic status(p = 0.001).

Results of logistic regression analyses showed that the risk of overweight and obesity is 1.203 (1.078-1.341, CI 95%) in male compare to female, 1.382 (1.240-1.541, CI

Table 1: Mean and standard deviation of primary school children bases age in the north of Iran

Age (year)	Boy (n = 3934)			Girl (n = 3465)		
	Weight (kg)	Height (cm)	BMI (kg m ⁻²)	Weight (kg)	Height (cm)	BMI (kg m ⁻²)
6	22.22 (5.6)	119.69 (6.75)	15.45 (3.07)	20.91 (3.99)	117.54 (6.19)	15.13 (2.45)
7	24.11 (4.3)	123.99 (6.27)	15.62 (2.01)	22.70 (4.3)	121.95 (6.58)	15.20 (2.11)
8	27.53 (5.7)	130.04 (6.5)	16.19 (2.5)	26.78 (5.4)	128.64 (7.6)	16.16 (2.8)
9	30.46 (6.2)	135.36 (7.4)	16.54 (2.6)	29.69 (6.7)	133.66 (7.8)	16.53 (2.9)
10	33.23 (6.9)	139.22 (7.8)	17.07 (2.9)	33.37 (8.0)	138.73 (8.4)	17.21 (3.2)
11	34.51 (7.3)	140.84 (7.8)	17.39 (3.8)	35.30 (8.5)	142.24 (9.4)	17.33 (3.2)

Table 2: BMI distribution among primary school children based on gender, location area and economic status

Characteristics	BMI distribution			
	<5%	5-85%	85-95%	≥95%
Gender				
Male (3934)	962 (24.5)	2028 (51.6)	341 (8.7)	603 (15.3)
Female(3465)	871 (25.1)	1880 (54.3)	277 (8.0)	437 (12.6)
p-value	0.497	0.0199	0.296	0.001
Location area				
Urban(3664)	901 (24.6)	1840 (50.2)	306 (8.4)	617 (16.8)
Rural (3735)	932 (25.0)	2068 (55.4)	312 (8.4)	423 (11.3)
p-value	0.718	0.001	0.998	0.001
Economic status				
Poor (1168)	338 (28.9)	641 (54.9)	84 (7.2)	105 (9.0)
Intermediate(4502)	1142 (25.4)	2420 (53.8)	368 (8.2)	572 (12.7)
Good (1729)	353 (20.4)	847 (49.0)	166 (9.6)	363 (21.0)
p-value	0.001	0.001	0.056	0.001
Total (7399)	1833 (24.8)	3908 (52.8)	618 (8.4)	1040 (14.1)

Table 3: Odds ratio for overweight and obesity among primary school children in the north of Iran. Confidential Interval (95%)

Risk factor variable	OR (95% CI)	p-value
Gender		
Female(Ref)	(1)	
Male	1.203(1.078-1.341)	0.001
Location area		
Urban (Ref)	(1)	
Rural	1.382(1.240-1.541)	0.001
Economic status		
Poor(Ref)	(1)	
Intermediate	1.686(1.489-1.909)	0.001
Good	2.297(1.911-2.761)	0.001

95%) in urban compare to rural area and 2.297 (1.911-2.761, CI 95) in good economic group compare to poor economic group (Table 3).

DISCUSSION

The prevalence of adolescent overweight and obesity has increased during the last decade in Iran (Hosseini *et al.*, 1999). Recent evidence suggests that Iran is in the nutrition transition phase and the outcome of this trend is a rapid increase in obesity and chronic disease (Ghassemi *et al.*, 2002; Iranian Ministry of Health and Medical Education, 2000). Besides, obesity well known as an health problem in the north of Iran (Veghari *et al.*, 2010b).

Current study clearly indicates that overweight and obesity is highly prevalence among primary school children in the north of Iran.

Most of the surveys in this region are performed in adult population; in addition, making comparison difficult because the cut-offs used and the age groups studied differ between studies; however, the few studies evaluating obesity among youth living in these countries, especially among adolescents, have shown considerably high prevalence. The study among 21111 school students aged 6-18 years according CDC cut-offs, showed that the prevalence of overweight and obesity was 8.8 and 4.5% respectively (Kelishadi *et al.*, 2008). The study among 2321 students aged 11-16 years in Tehran indicated that 21.1% of subjects were overweight and 7.8% were obese according to the CDC criteria (Mohammadpour-Ahramjani *et al.*, 2004). Another study performed on 3-18-year-old children and adolescents in Tehran (Statistical Center of Iran) showed that 5.2% of them were obese (Azizi *et al.*, 2003c). Evaluating the overweight among 2-18-year-old children and adolescents, according to the National Center for Health Statistics (NCHS) criteria, revealed the prevalence of overweight up 8% in 1999 (Kelishadi *et al.*, 2001). A study among schoolchildren, aged 11-18 years, living in three counties in central Iran showed that 10.7% of girls and 7.4% of boys were overweight and 2.2% of girls and 1.9% of boys were overweight according to CDC cut-offs (Kelishadi *et al.*, 2003).

The prevalence of obesity in Kuwait is among the highest in the Arab Peninsula (Moussa *et al.*, 1999). Study performed among 10-14-year-old adolescents in this country by using the CDC reference data, a very high prevalence of obesity (13.1% of girls and 14.7% of boys) and overweight (31.8% of girls and 30% of boys) was investigated (Al-Isa, 2004). A study among 898 adolescent girls in the United Arab Emirates reported that, according

to the CDC criteria, 14% of subjects were overweight and 9% were obese (Al-Hourami *et al.*, 2003). A study among 506 Bahraini school children found that the overall prevalence of obesity was 15% in boys and 18% in girls according to the IOTF criteria (Al-Sendi *et al.*, 2003). A survey performed in Saudi Arabian boy's schoolchildren aged 6-18years based on the CDC cut-off points, showed a prevalence of 11% of overweight and 15.8% of obesity, (Al-Nuaim *et al.*, 1996).

The prevalence of obesity was not only higher than in similar studies in the other part of Iran but also higher than from many other countries in this region especially in urban area.

In our study, the prevalence of obesity was more than overweight and this finding is contrary to most other studies. While, this situation will be consider in future studies, Al-Nuaim *et al.* (1996) in their study among schoolchildren in Saudi Arabia found similar results.

Indeed, we found that boys are more than at risk for obesity than girl. Studies in Tehran showed that overweight is more prevalent in girls than boys (Azizi *et al.*, 2001; Mohammadpour-Ahramjani *et al.*, 2004) and similar six differences in the prevalence of obesity and metabolic syndrome were also found in adult population of Iran (Azizi *et al.*, 2003b). It is difficult to explain the higher prevalence of overweight and obesity in boys in present study than girls, while social factors, ethnicity and food behavior may be play an important role. Study in this area (Gholamreza and Mohsen, 2007) showed that changing of weight and height in both gender is not similar during 1997 to 2007 and boy's weight increased but girl's weight didn't show any change. Another study (Veghari and Gopalipour, 2007) showed that secular growth of children in different ethnic groups are living in this area is not alike.

Good economic status strongly is a risk factor for obesity in the north of Iran and it may be a underlying cause of more prone to obesity in urban than rural population. Our results are concordant with the results of a similar studies in Iran (Veghari *et al.*, 2010c; Veghari *et al.*, 2009) and in other countries (Al-Nuaim *et al.*, 1997; Sibai *et al.*, 2003; Musaiger, 2004).

CONCLUSION

These data show that obesity and overweight are prevalent among primary school children in the north of Iran and that social differences in the frequency of obesity occur in this population. Obesity more common in boys than girls. It should be noted that obesity complications including cardio vascular disease, as the

first cause of mortality in Iran, are widely common in Iranian northern people. The present findings highlight the important public health message of children especially in urban area and high income families in the north of Iran.

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