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Trend of Overweight and Obesity, Based on Population Study among School Children in North West of Iran: Implications for When to Intervene

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ABSTRACT

Introduction: *Childhood overweight and obesity is a major public health problem in both developed and developing countries. Overweight and obesity in children may have severe consequences later in adolescence and adulthood. The aim of current study was to determine the prevalence trend of overweight and obesity in school-aged children from 2009 to 2011.*

Methods: *The present study was a population-based study and conducted in three consecutive years, from 2009 to 2011. The study population included all of primary, secondary and high school children in rural and urban regions of West Azerbaijan province in West-North of Iran. Body mass index (BMI), the ratio of weight to height squared [weight (kg)]/ [height (m)]^2, was calculated to the nearest decimal place. Overweight and obesity were classified using CDC recommendations for age and sex: a BMI 85th–95th percentile was classified as overweight and a BMI >95th percentile was classified as obese. All statistical analyses were performed using the Excel Software. Descriptive statistics were used to characterize the sample in different time periods. The prevalence was calculated as the ratio of number present cases to a given population number in a given subgroup at a given time.*

Results: *Overall, 165740, 145146 and 146203 school children were assessed at 2009, 2010 and 2011, respectively. Prevalence of overweight in primary school children among girls were 52.83, 86.93 and 116.36 and for boys were 57.07, 53.4 and 93.55 per 1000 person in 2009, 2010 and 2011 years, respectively. The prevalence of obesity in secondary school children for girls were 22.26, 27.75 and 28.43 and 26.52, 25.72 and 35.85 for boys per 1000 person in 2009, 2010 and 2011, respectively, The highest prevalence of overweight was 77.58, 142.4 and 126.46 per 1000 person among primary, secondary and high school children, respectively, in 2011. The lowest prevalence of obesity was 12.52, 24.1 and 21.61 per 1000 person among primary, secondary and high school children, respectively, in 2009.*

Conclusion: *However, the rapid increase in both obesity and overweight should have a special attention. Research on prevalence trend of overweight and obesity in children is poorly reported in Iran. So that, future studies need to follow-up on the associations between overweight and obesity with health outcomes when children develop and reach adolescence and adulthood.*

Keywords: overweight, obesity, school children, prevalence trend, Iran

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INTRODUCTION

Childhood overweight and obesity is a major public health problem in both developed and developing countries (1-5). Increasing prevalence of childhood obesity has become a growing matter of public health concern worldwide (6-11). Obesity has increased from 4.2% in 1990 to 6.7% in 2010 worldwide and is expected to reach 9.1% in 2020. In 2010, 43 million children were estimated to be obese worldwide, out of whom, 35 million (81.4%) were from developing countries (12-14).

Overweight and obesity in children may have severe consequences later in adolescence and adulthood (15-18). Overweight and obese children are at an increased risk for numerous health conditions, including hypertension, type 2 diabetes, asthma and musculoskeletal problems, liver disease, cardiovascular diseases, and mental disorders (19-26). Childhood obesity is also associated with an increased risk for obesity and morbidity in adulthood (27-29). Many factors contribute to childhood obesity, including behavioral, genetic and environmental factors. Obesity incidence is increasing and is now accepted as one of the common childhood diseases (30). While the number of obese children is increasing in our society, the age of onset of obesity is getting younger. Childhood overweight and obesity have reached epidemic proportions worldwide, and the obesity problem is on the rise in low- and middle-income countries (31).

In Iran, like many of other developing countries, prevalence of overweight and obesity in children has been increasing (22,32,33). According to a single study performed in West Azerbaijan, Kermanshah and Isfahan provinces of Iran, prevalence of overweight was 5.1%, 4.5% and 3.7%, respectively. Also, prevalence of obesity in three provinces was 1.3%, 0.7% and 0.1%, respectively (34,35).Therefore, having an insight on the prevalence and trend of childhood overweight and obesity can provide evidence-based information for health policy-makers at national and international levels in order to implement programs for primordial and primary prevention. Also, school-based screening is an effective strategy to monitor the prevalence of overweight and obesity among school children over time, because it can support state government decisions to allocate resources and implement targeted programming and evaluation. The present study aimed to assessing the prevalence trend of overweight and obesity in West Azerbaijan in three consecutive years, from 2009 to 2011. ❑

METHODS

Study design and participants

The present study was a population-based study and conducted in three consecutive years, from 2009 to 2011. The study population included all of primary, secondary and high school children in rural and urban regions of West Azerbaijan province in West-North of Iran. The study was approved by the Ministry of Health and Ministry of Education and Training. Census was applied for sampling in all public and private schools in West Azerbaijan province. In Iran, The academic year runs for 10 months from September to June. Current study was conducted in October month each year because the recruitment of all children. Overall, 4535, 3213 and 4668 schools (boys and girls) assessed in 2009, 2010 and 2011, respectively. The participants were primary (1-5 grades), secondary (6-8 grades) and high school (9-12 grades) children in rural and urban (boys and girls) selected from one grade of primary, 6 of secondary and 9 of high schools in three years. In this study, children being mentally and physically retarded and having problems in terms of anthropometry were removed from the study.

Data collection

All measurements and interviews were conducted by expert of health who was trained for the data collection protocols. For each district the team of data collection selected and after training, gathering of data started in whole of districts in the same time. Overall, 165740, 145146 and 146203 school children were assessed at 2009, 2010 and 2011, respectively. Body weight was measured by a digital scale (Seca) with an accuracy of 100 g. Subjects were weighed without shoes, in their underwear. Standing height was measured without shoes to the nearest 0.5 cm with the use of a commercial stadiometer with the shoulders in relaxed position and arms hanging freely. Body mass index (BMI), the ratio of weight to height squared [weight (kg)]/ [height (m)]^2, was calculated to the nearest decimal place. We used

the cut-off points for overweight and obesity using CDC recommendations for age and sex: a BMI 85th–95th percentile was classified as overweight and a BMI >95th percentile was classified as obese.

Analysis

All statistical analyses were performed using the Excel Software. Descriptive statistics were used to characterize the sample in different time periods. The prevalence was calculated as the ratio of number present cases to a given population number in a given subgroup at a given time. ❑

RESULTS

A total of 59087, 51583 and 55070 of primary, secondary and high school children were studied in the 2009 survey, respectively, of which 44.4% were girls and 55.6% were boys. A total of 46983, 48571 and 49592 of primary, secondary and high school children were studied in the 2010 survey, respectively of which 43.75% were girls and 56.25% were boys. A total of 52370, 46705 and 47128 of primary, secondary and high school children were studied in the 2011 survey, respectively of which 45.25% were girls and 54.75% were boys.

Table 1 and 2 shows the prevalence of overweight and obesity in children by sex in different years. the results showed that in urban regions, prevalence of overweight in primary school children among girls were 52.83, 86.93 and 116.36 and for boys were 57.07, 53.4 and 93.55 per 1000 person in 2009, 2010 and 2011 years, respectively, while prevalence of overweight decreased with years among both boys and girls in rural regions. Across three years in both urban and rural regions, obesity prevalence was higher among girls of primary schools in 2010.

Among secondary school children the highest prevalence of overweight was among urban boys in 2011. The prevalence of overweight in both girls and boys in urban regions increased, as, reached from 118.26 for girls and 103.9 for boys in 2009 to 168.81 for girls and 175.86 per 1000 person in 2011. In urban regions, the prevalence of obesity in secondary school children for girls were 22.26, 27.75 and 28.43 and 26.52, 25.72 and 35.85 for boys per 1000 person in 2009, 2010 and 2011, respectively, while in rural regions the prevalence of obesity decreased from 37.73 for girls in 2009 to 19.2 per 1000 person in 2011.

As results, among high school children, overweight among urban children (girls and boys) was more characteristic of the higher two years (2009 and 2011). Also this study showed that the prevalence of obesity among boys in both urban and rural regions increased from 2009 to 2011years. Interestingly however, of the obese children the prevalence of obesity in boys versus girls was characteristic that distinguishes these two groups. The prevalence of obesity showed a similar pattern between the three grades (primary, secondary and high school). The highest prevalence of overweight was 77.58, 142.4 and 126.46 per 1000 person among primary, secondary and high school children, respectively, in 2011. The lowest prevalence of obesity was 12.52, 24.1 and 21.61 per 1000 person among primary, secondary and high school children, respectively, in 2009 (Table3, Figure 1 and Figure 2). ❑

DISCUSSION

The prevalence of children overweight and obesity is increasing worldwide (36) and there is an urgent need to identify trend of overweight and obesity in children for simple and effective interventions to prevention and controlling overweight and obesity in children that may have severe consequences later in adolescence and adulthood including hypertension, type 2 diabetes, asthma and musculoskeletal problems, liver disease, cardiovascular diseases, and mental disorders. Therefore, considering the importance of overweight and obesity in school-aged children the current study performed to determine trend incidence of overweigh an obesity on 165740, 145146 and 146203 school-aged children in three consecutive years, from 2009 to 2011 in West Azerbaijan province. The present study indicated that the prevalence of overweight/obesity has increased among three grades (primary, secondary and high school children) in West Azerbaijan from 2009 to 2011. As, the prevalence of overweight increased from 59.45 for primary school children in 2009 to 77.58 per 1000 person in 2011. Similarly this grad, the prevalence trend of overweight in two grads (secondary and high school children) was increased. Overall, our findings showed that the prevalence of obesity among three grads was

region		2009			2010			2011		
		cases (n)			cases (n)			cases (n)		
		primary school	secondary school	high school	primary school	secondary school	high school	primary school	secondary school	high school
urban	overweight	869	2056	1985	934	1695	1587	1798	2743	2567
	obesity	157	387	493	431	476	485	410	462	414
population		16451	17386	20584	10745	17153	18349	15449	16249	16789
Prevalence[1]	overweight	52.83	118.26	96.44	86.93	98.82	86.49	116.39	168.81	152.90
	obesity	9.55	22.26	23.96	40.11	27.75	26.43	26.54	28.43	24.66
rural	overweight	905	459	306	598	293	151	423	356	224
	obesity	192	205	57	234	74	30	152	103	43
population		11415	5434	2324	9721	5241	2295	10217	5389	2057
prevalence	overweight	79.3	84.5	131.7	61.52	55.9	65.79	41.4	66.06	108.89
	obesity	16.81	37.73	24.53	24.07	14.12	13.07	14.88	19.12	20.9

TABLE 1. Prevalence of overweight and obesity among girls in West Azarbaijan province.

[1] Prevalence per 1000 person

region		2009			2010			2011		
		cases (n)			cases (n)			cases (n)		
		primary school	secondary school	high school	primary school	secondary school	high school	primary school	secondary school	high school
urban	overweight	989	2116	1995	873	1890	1565	1480	3135	2962
	obesity	219	540	591	498	480	545	510	639	675
population		17332	20364	27224	16346	18668	24108	15821	17827	23561
prevalence	overweight	57.07	103.9	73.28	53.4	101.25	64.92	93.55	175.86	125.72
	obesity	12.64	26.52	21.7	30.47	25.72	22.6	32.24	35.85	28.65
rural	overweight	750	802	357	656	356	356	362	417	207
	obesity	172	111	49	238	91	49	190	163	117
population		13889	8399	4938	10171	7509	4840	10883	7240	4721
prevalence	overweight	54	95.49	72.3	64.5	47.4	73.55	33.27	57.6	43.9
	obesity	12.39	13.22	9.92	23.4	12.12	10.12	17.46	22.52	24.79

TABLE 2. Prevalence of overweight and obesity among boys in West Azarbaijan province.

increased from 2009 to 2011that the findings consistent with other studies worldwide and other reports the increasing trend of overweight an obesity in Iranian children (7,9,33,37,38). Although, the findings in this study indicate that overweight and obesity are problems for children in all of the age and grads groups under consideration, clear differences were seen by age. As, the highest prevalence of overweight and obesity were observed in the high school children, while youngest children had lowest prevalence of overweight and obesity in three years. Current study showed that in both girls and boys, the urban regions comparing the rural regions had the highest prevalence of overweight and obesity (13,39) because rural regions are known to have fewer food and lowest socio-economic status that affect the nutrition status. Individual behavior patterns are also important. Evidence indicates a positive association of outside home food service and high portion of food consumption at each time. A recent study found few behavioral differences obesity and overweight prevalence between urban and rural children (5,40). Through focus groups, recent research discerned that cost,

		2009		2010		2011	
		overweight	obesity	overweight	obesity	overweight	obesity
primary school	number cases (n)	3513	740	3061	1401	4063	1262
	population	59087	59087	46983	46983	52370	52370
	prevalence	59.45	12.52	65.15	29.82	77.58	24.1
secondary school	number cases (n)	5433	1243	4234	1121	6651	1367
	population	51583	51583	48571	48571	46705	46705
	prevalence	105.33	24.1	87.17	23.08	142.4	29.27
high school	number cases (n)	4643	1190	3659	1109	5960	1249
	population	55070	55070	49592	49592	47128	47128
	prevalence	89.76	21.61	73.78	22.36	126.46	26.50

TABLE 3. Prevalence per 1000 persons of overweight and obesity in total subjects in West Azerbaijan province.

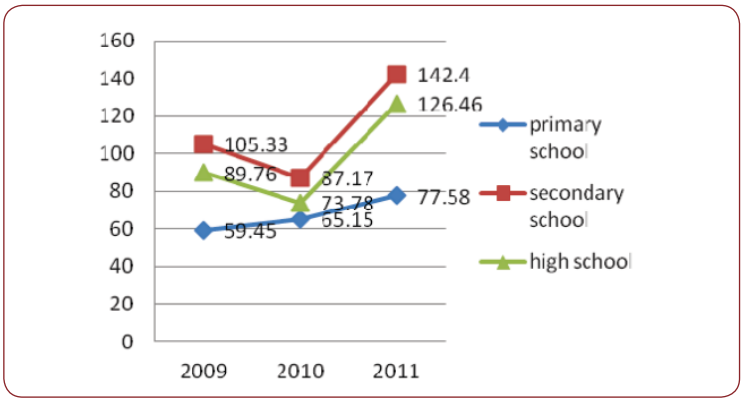

FIGURE 1. Prevalence of overweight among children in West Azarbaijan province.

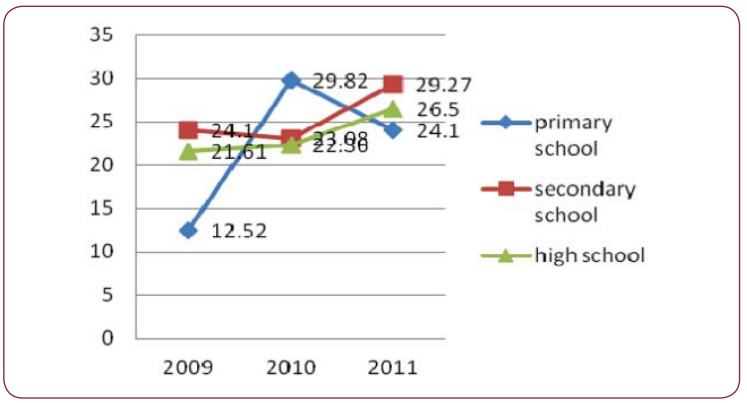

FIGURE 2. Prevalence of obesity among children in West Azarbaijan province.

travel distance, and food quality were important barriers to healthy eating in rural communities. Overall, in addition to observed differences across girls and boys, the results showed that girls were more affected than boys in both overweight and obesity prevalence (13,41).

In summary, these results showed that the overweight and obesity was increased among school children from 2009 to 2011 in West Azerbaijan Province, Iran. Increasing of overweight and obesity due to unhealthy lifestyle behaviors including decreasing lack of physical activity, overconsumption of process and fast foods and long sedentary games computers among school-aged children (1,11,42,43). Parents and children should develop the habit of cooking and serving food at home with their preferred taste and ingredients.

The main strength of the study is the large sample size of school children and the whole of urban and rural school children in three grads (primary, secondary and high school) were assessed in three consecutive years (2009-2011), so that the results of this study can be generalized the target population. In this study was used the WHO's growth references that recently released. This study did not assess the risk factors that influence on overweight and obesity in school-aged children. Unhealthy dietary pattern and physical inactivity are important factors impacting on the risk of obesity in children that our study did not gather data to assess the relationship of these variables with the risk of children overweight and obesity, we recommend further studies to assess the risk factors that influence on overweight and obesity in school-aged children. Despite limitations, the current study offers an analysis of large sample children in three years to determine the overweight and obesity pattern in school-aged children. ❑

CONCLUSION

However, the rapid increase in both obesity and overweight should be special attention. Obesity and overweight have become a threatening risk to children and adolescents. Research on prevalence trend of overweight and obesity in children is poorly reported in Iran. So that, future studies need to follow-up on the associations between overweight and obesity with health outcomes when children develop and reach adolescence and adulthood. These findings underline the importance of implementing interventions in school children to achieve consistent behavioral changes, as recommended by recent international, national and regional policies. School-based interventions, as with school-based surveillance shows promise for childhood obesity prevention and Interventions should include individual behavior change for children and parents, but also concentrate on factors in the social and physical environment that enhance or inhibit healthy lifestyle opportunities and work in partnership with local communities. Therefore, preventive measures for controlling overweight and obesity are a must for public health promotion among school children in Iran.

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