

## Short communication

## Underweight and overweight among children in Zahedan, south-east Iran

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**Abstract**

*Objective:* The present study examined the prevalence of underweight and overweight in a group of primary-school children in Zahedan, south-east Iran.

*Design:* A cross-sectional study in a randomly selected population of schoolchildren.

*Setting:* Primary-school children in Zahedan city.

*Subjects:* A random sample of 1079 students (boys = 500 and girls = 579). Data on child's age, parental educational levels, body weight and height were collected.

*Results:* The rate of overweight/obesity among boys and girls was 8.9% and 10.3%, respectively; and of underweight among boys and girls was 22.8% and 19.9%, respectively. Prevalence of overweight increased as the boys and girls approached adolescence and it was more prevalent among girls than boys. Prevalence of overweight was directly related to maternal education in this population.

*Conclusions:* High prevalence of underweight in young children as well as increase in the prevalence of overweight in girls and boys near adolescence are of concern. Early poor growth and subsequent rapid weight gain near to adolescent stage is related to adulthood obesity.

**Keywords**  
Maternal education  
Overweight  
Underweight  
Zahedan, Iran

Recent studies indicated that the Iranian population is experiencing rapid changes in diet and physical activity<sup>(1)</sup>. Available data have shown that one-fifth of Iranian children and adolescents are overweight or obese<sup>(2,3)</sup>, and metabolic syndrome is highly prevalent among them<sup>(4)</sup>. While most of these data were taken from the developed parts of the country in urban areas, there is little information on children from the less privileged parts of Iran.

Zahedan is the centre of Sistan and Baluchestan province in south-east Iran. In the last two decades, nutritional surveys focused on children under 5 years of age and high prevalences of stunting and underweight among children were reported in this region<sup>(5)</sup>. Meanwhile, a secular trend in decreasing thinness and increasing the prevalence of overweight among adults has been reported in southern Iran<sup>(6,7)</sup>. However, few data are available on overweight and underweight in school age children in southern Iran. We therefore aimed to study the prevalence of overweight and underweight in a group of primary-school children with special focus on their maternal education in Zahedan, south-east Iran.

**Methods and subjects**

The present study was designed to evaluate the prevalence of overweight/obesity and underweight among the elementary-school children (7–11 years) in urban areas in Zahedan, southern Iran. A random sample of 1184 students was selected between October 2008 and March 2009 from all elementary schools in Zahedan. Selection of the subjects was initially made at school level, not by age of the students. As the age of 105 students was not in the range of the protocol, they were excluded and 1079 observations (boys = 500 and girls = 579) were included in the data analysis.

Information on child's age and parental educational levels were gathered using a questionnaire filled in by the parents. Anthropometric measurements were performed in lightly dressed children without shoes in the morning. Body weight was measured to the nearest 0.1 kg using a balanced-beam scale, height was measured to the nearest 0.5 cm with the children standing up, and with head, back and buttock on the vertical land of the height gauge. Age- and sex-specific BMI cut-offs proposed by the WHO were used to define

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**Table 1** Frequency of overweight and underweight in boys and girls in Zahedan, Iran

Age (years)	Girls (n 579)			Boys (n 500)		
	n	Overweight (%)	Underweight (%)	n	Overweight (%)	Underweight (%)
7	100	6.1	32.1	84	6.8	31.0
8	134	7.1	21.0	117	5.6	21.4
9	101	5.0	14.9	91	9.2	25.7
10	116	16.0	22.1	97	7.5	17.5
11	128	16.1	11.5	111	15.2	20.7

**Table 2** Prevalence of overweight and underweight by maternal educational levels in boys and girls in Zahedan, Iran

Maternal educational level	Boys		Girls	
	Low (n 217)	High (n 283)	Low (n 248)	High (n 331)
Overweight (%)	5.1	11.8*	9.1	11.2**
Underweight (%)	26.4	19.4*	17.1	22.1*

\* $P < 0.001$ ; \*\* $P < 0.05$ .

underweight and overweight/obesity. Underweight and overweight/obesity were defined as age-adjusted BMI less than 3rd and above 85th percentile of the WHO chart, respectively<sup>(8)</sup>.

All the parents gave written consent for participation in the present study. The study protocol was approved by the ethical committee of the Research Center for Children and Adolescent Health at Zahedan University of Medical Sciences and Health Services.

### Statistical analysis

The  $\chi^2$  test was used for detecting differences in the prevalence of overweight/obesity as well as underweight between groups. In data analysis, mothers' educational level was classified as either  $\leq 7$  years of schooling or  $> 7$  years of schooling.

Values are given as means.  $P$  values  $< 0.05$  were considered as the level of significance. Analyses were performed using the Statistical Package for Social Sciences statistical software package version 10.01 for Windows (SPSS Inc., Chicago, IL, USA).

### Results and discussion

These results showed that 8.9% of the boys and 10.3% of the girls were overweight or obese ( $P < 0.05$ ), and 22.8% of the boys and 19.9% of the girls were underweight ( $P < 0.001$ ).

Prevalence of overweight/obesity and underweight by age is shown in Table 1. Overweight was more prevalent at higher age groups than lower ones and it was more prevalent among the girls than the boys. Underweight was more prevalent than overweight in boys and girls except in 11-year-old girls. Table 2 shows that the prevalence of overweight was directly related to maternal education in boys and girls.

Provinces in southern Iran, including Kerman, Sistan and Baluchistan, were known to have high prevalence of

underweight and stunting among children and adults<sup>(5,6)</sup>. However, secular changes in increasing overweight/obesity, especially in women, have been documented in these areas<sup>(9)</sup>. The present study suggests that while underweight is still the main nutritional problem among young children, it might be replaced by overweight as children grow to adolescence. This is of concern because early chronic undernutrition and poor growth with subsequent rapid increase in fat mass near to adolescence may predispose this population to risk of chronic diseases in adulthood<sup>(10)</sup>. Studies undertaken in the adult population in Zahedan have shown that overweight, and especially central obesity, is not uncommon in this economically least privileged part of Iran<sup>(7)</sup>.

The present study showed that girls were more at risk of overweight than boys. This finding is concordant with the results of similar studies in other parts of Iran that showed women at any age are more prone to obesity than men<sup>(2,11)</sup>. This sex difference in the prevalence of obesity in Iran and other Islamic Arabic countries in the region calls for further studies to investigate the possible association of Islamic dressing style or other cultural beliefs with obesity prevalence. In addition, the present study showed that overweight among children is directly associated with maternal educational level. Shahraki *et al.*<sup>(7)</sup> reported that BMI was inversely related to educational level in Iranian women in Zahedan. Furthermore, in spite of a high prevalence of obesity in adult women of low educational level in northern Iran, overweight in children was directly related to maternal education<sup>(12)</sup>. In developing countries, and especially in lower socio-economic groups, heaviness may be believed as an indicator of good health for children<sup>(13)</sup>. We did not collect data on economic status of this population and further studies are needed to clarify the relation between socio-economic status and obesity in children in Iran.

In conclusion, the present study indicated that: (i) underweight is possibly the most important nutritional

problem among pre-school children in Zahedan; and (ii) weight problem of the study population varies by their age group. While most of the young children were underweight, overweight was prevalent among those near to adolescence, especially in girls. This rapid increase in fat mass near adolescence is of concern because obesity at this age is more likely to be related to adulthood obesity and metabolic diseases. More detailed studies are needed to clarify whether the current overweight adolescents are the past underweight children.

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