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Assessment of nutritional indices in children and its relation with some factors in Abadan, Iran.

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Abstract: The prevalence of malnutrition and weight problems in children and their consequences in the world have become a major health problem. Therefore, identifying the children's' nutritional status is a critical step to ensure optimal growth and development in children. The purpose of this study was assessing prevalence of malnutrition and its related factors among 3-5 years' children in Abadan in, 2015-2016. The current study is a cross-sectional study which was conducted on 500 children. Samples were selected from 9 health clinics in the Abadan, Iran. Data were collected using interviews with mothers, filling out questionnaires and measuring children's height and weight and calculating their BMI. Also BMI of mother measured. Data was analyzed using Kruskal-Wallis and Chi-square test. The results showed that the prevalence of underweight, overweight and obesity were15.2%, 6.8 % and 5.8 % in children in Abadan. Malnutrition had relation with child's appetite and socioeconomic status ($P<0.05$). This study showed that malnutrition is a problem in children in this city among children 3-5 years old. Considering to results obtained from this study, the most important related factors was child's appetite, socioeconomic status. Therefore, the health policy, makers should pay attention to raise awareness, socioeconomic status and family health promotion to improve nutritional status of children.

Key words: Underweight; Overweight; Obesity; BMI; Children.

Introduction

Children make up a significant percentage of the world population so maintain and promote their health is the health priorities of communities (1). Since children have a rapid growth phase, their nutritional need is very important and any type of disruption occur in their diet may be causing severe damage to their growth (2). Despite increasing public awareness, the prevalence of abnormal weight problems, including malnutrition, slimness, overweight and obesity in the world is rising and children in accordance with their growth and development are the highest risk group. In many developing countries, one of the biggest feeding problems is famine and food shortages which is necessary for the metabolism of the body. However, malnutrition in all countries of the world is seen in different forms including obesity and eating disorders. According to the World Health Organization, malnutrition is the biggest cause of child mortality, because 53% of deaths in children under 5 years are attributed to malnutrition. Underweight prevalence in developed countries has been reported about 3-8 percent. According to a joint report by the World Bank and UNICEF in 2012, the prevalence of stunting in children in Africa and Asia is 36% and 56% respectively and the prevalence of underweight in Asia and Africa is 28 % and 71 % accordingly. According to the statistics 29% of the world's underweight children live in Africa, and 67 % of them live in Asia (4). In Iran statistics showed that the prevalence of stunting, underweight and slimness is 4.7%, 5.2%, and 3.7% respectively. Other concerns of malnutrition are overweight and obesity in children, as in South Africa 18 %, Asia 12 %, and in South America 7 % of 3-5 year children have overweight problem[1]. According to the Center for Disease Control and Prevention in 2002, the prevalence of overweight has been reported 6% among Iranian children[2].

Because of the formation of dietary habits and physical activity, pre-school years has been recognized as an important time to study the determinants of childhood weight problems. Therefore, targeting children in the growth ages in most studies can help to identify factors which are related with changes in weight, body mass index, and problems causing abnormal patterns of weight.

Because of variation in frequency of risk factors for malnutrition in geographic areas and socio-cultural conditions, and variety of food intake patterns, cultural beliefs, and access to health care in different societies, determining the percentage of each of the important risk factors in different populations is recommended. Therefore, this study aimed to evaluate the nutritional status based on BMI and its related factors among 3-6 years' children in Abadan.

Materials and Methods

The current study is a cross-sectional study in which 500 children of Abadan with age of 3-6 years old were studied between January to May

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2015. For sampling, at first Abadan health centers were divided into four parts, which located in the regions 1-4 of Abadan municipality. The region 1 is including two centers with a coverage of 27,140 people. region 2 is including six centers with a population of 77,680. The region 3 is including two centers with a population of 8832. region 4 is including five centers with a population of 65,339. Then nine centers randomly selected by lottery. Health numbers of 3 and 4 were selected from region 1, number 1, 5 and 9 were selected from region 2, health center number 2 was selected from region 3 and health centers number 6, 7 and 12 were selected from region 4.

The number of samples for each health center was calculated according to the proportion of the population covered by each center. One of the researchers randomly attended in selected health centers. Eligible participants have been selected according to their last digit of their health records randomly. Women and their children were asked to attend to the health center by a phone call. Inclusion criteria included children resulting from full- term pregnancy, single pregnancy and having normal birth weight. Exclusion criteria included having a child to any known systemic diseases, metabolic, autoimmune, diabetes, hypothyroidism or hyperthyroidism, or under medication with corticosteroids. Then, the weight of mothers and children were measured in the same condition as standing with minimum clothing without shoes with the standard portable digital scales (Seca brand) with an accuracy of 100 g. Height was measured in the standing position without shoes using a metal stadiometer (Seca 700) with an accuracy of 1.0 cm. For each mother and child, BMI was calculated using following formula weight (Kg)/ to the square of height in meters (m^2). Using the guideline of Center for Disease Control and Prevention, The BMI of children according to their age and gender were classified in three groups as underweight with BMI less than 50th percentile, normal with BMI between 50th-85th percentile, overweight with BMI between 85th-95th percentile, and obesity with BMI above the 95th percentile. Data were analyzed using the SPSS software (version 22), Chi-square, and Kruskal-Wallis tests at the alpha level equal to 0/05 were utilized for analysis.

Results

In this study, 500 children aged 3-6 were studied. Table 1. shows the basic characteristics of the studied mothers and children. In this study, 219 (44%) of children were female and 281(56%) were male. The average age of were as follow: children 4.4 ± 1.1 years, mothers 5.6 ± 31.3 years, and fathers 6.1 ± 34.8 years. The prevalence of underweight in children was 15.2 percent (15.1% in female and 15.3 % in males), the prevalence of overweight was 6.8% (4.6% in female and 8.5 % in male), and the prevalence of obesity was 5.8% (3.7 % in female and 7.5 % in male) And 72.2% of children were in the normal range of weight (67.7% female and 68.7% male). **Table 1**

Table 1: Socio-demographic characteristics of children and their parents

Variable	The number (percentage)	The average± SD	P-Value
Child's age(year)		4.4±1.1	0.13
Type of birth			0.475
Normal delivery	239(4.7)		
Cesarean delivery	264(52.8)		
Birth weight(kg)		3.2±0.5	
Breastfeeding in the first 6 months			0.935
Yes	411(82.2)		
No	89(17.8)		
Child's appetite status			
Poor	63(12.6)		
fair	247(49.4)		
good	190(38)		
child's BMI (kg/m^2)		14.94±2.07	
Gender			0.07
male	281(56)		
female	219(44)		
Mother's age(year)		31.37±5.67	
Mother's height (m)		161.37±6.3	
Mother's weight (kg)		68.63±12.2	
Mother's BMI (kg/m^2)		26.17±4.7	0.74
Mother's educational status			0.123
Illiterate	75(15)		
Primary	133(26.6)		
Secondary school	190(38)		
University	102(20.4)		
Smoking by mothers			0.134
Yes	7(1.4)		
No	493(98.6)		
Smoking by fathers			0.323
Yes	81(16.2)		

No	419(83.8)	
Type of Accommodation		0.552
Leased	263(52.9)	
Possessive	237(47.4)	
Socio-economic status		0.001
Low class	136(27.2)	
Middle class	281(56.2)	
High class	83(16.6)	
Mother's occupation status		0.77
Employed	62(12.4)	
Housewife	438(87.6)	

There was no statistical significance between male and female regarding prevalence of malnutrition (p=0.361). There was not also a significant relationship between the malnutrition according to BMI and age of the children (p=0.130).

Table 2: Distribution of BMI in children by gender

BMI status	n=500		
	Girl	Boy	Total
	Prevalence (Percentage)		
Underweight	33(15.1)	43(15.2)	76(15.2)
Normal	168(76.7)	193(68.7)	361(87.4)
Overweight	10(6.4)	24(5.8)	34(8.6)
Obesity	8(3.7)	21(5.7)	29(8.5)

There was a significant difference on prevalence of malnutrition in families according to their economic situation (p<0.001). The highest prevalence of child malnutrition was among low-income families and high -income families had the lowest prevalence of malnutrition **(Table 3).** Also a significant relation was found between malnutrition and ethnicity and child's appetite (p<0.001). There was not any significant relation between malnutrition and parent's education, mode of delivery, smoking and family size (p>0.05).

Table3. Distribution of risk factors associated with child malnutrition

BMI status		n= 500				
		Underweight	Normal	Overweight	Obesity	P-Value
Variable		Prevalence (Percentage)				
sociodemographic status	Low class	33(43.4)	76(21.1)	15(44.1)	12(41.4)	
	Middle class	32(42.1)	218(6.04)	16(47.1)	15(51.7)	
	High class	11(14.5)	67(18.6)	3(8.8)	2(6.9)	<0.001
Ethnicity	Arab	35(46.1)	235(65.1)	23(67.7)	17(58.6)	
	Persian	39(51.3)	106(29.4)	8(23.5)	10(34.5)	
	Lor	2(2.6)	18(4.9)	3(8.8)	1(3.4)	
	Kord	0	2(0.6)	0	0	0.05
Father 'occupation status	Unemployed	28(36.8)	17(4.7)	2(5.9)	1(3.4)	
	Worker	27(35.5)	76(21.1)	9(26.5)	6(20.7)	
	Employee	14(18.4)	83(23)	4(11.8)	5(17.2)	
	Self-employed	1(3.4)	185(51.2)	19(55.9)	17(58.6)	0.02

Discussion

This study aimed to assess the nutritional status based on BMI and risk factors related to malnutrition in children in Abadan. 15.2% of all studied children were underweight, 6.8% were overweight, and 5.8% were obese based on BMI compared to age and gender. Studies in Iran have reported the prevalence of malnutrition between 8.6 to 38% across the country (1). Our results are in line with other studies in Iran.

The prevalence of malnutrition in the current study was higher than the results of the Farrukh Eslamlou study in Azerbaijan which reported the prevalence of underweight in children under 5 years 4.3% (7), and were similar to Salem study in Rafsanjan which reported the prevalence of underweight 11.5% (8), and were lower than the Eftekhari's study results in Lar which reported the prevalence of underweight 29.2%(9). According to the results of Annis 2 study, the second nationwide survey in 2008, underweight, stunting, and sever slimness percentage of children in the whole country is 5.2%, 4.7%, and 3.7% respectively. Although the results show a significant reduction in the prevalence of malnutrition in the country. However, the prevalence of this problem in the provinces are heterogeneous and deprived areas received special attention.

Rural areas of Sistan and Baluchestan, Khorasan, Kerman, Fars and Khuzestan have 50% of rural children with stunting, and urban areas of the provinces of Tehran, Khorasan, Khuzestan and

Esfahan have half of urban children with stunting (5).

In the current study despite of the difference in average overweight and obesity in two groups of female and male children there was no statistically difference between genders. In Saeedlo study in Salmas, Iran also no statistically significant difference was observed between nutritional indices by gender (12). In Nojumi's research in Karaj and first Annis country study also no difference was observed between girls and boys in terms of malnutrition, stunting, and slimness (13,14). Patricia in a study on Canadian children with age of 2-5-year-old showed that in terms of the prevalence of overweight and obesity there is no significant difference between two gender and children age groups (15). But in Eftekhari's study in the Lar the prevalence of malnutrition between female and male was significant and it was due to the cultural problems and gender discrimination in the region (9). However, results of this study were not consistent with our study. On the other hand, this index was directly related to the ethnicity factor which represents the importance of the ethnic factor, and its geographical distribution.

In survey about prevalence of malnutrition at different ages, the highest prevalence of malnutrition was observed at age of five (17.5% slimness, 8.8% overweight, and 8.8% obesity) and the lowest prevalence of malnutrition was observed at age of three (12.5% slimness,5.9% overweight, and 2% obesity. According to normal pattern of growth, body mass index begins to decline after the age of 1 and this reduction will continue in early childhood and reaches the lowest at the age of 4-6 years old (pre-school age) after that return fat mass and body weight gain occurred and the child's body to be prepared for growth spurt during adolescence. This spurt or increase in BMI occurs after they have reached their lowest point and it called obesity mutation. This is a normal pattern of growth that occurs in all children. Research has shown that early obesity mutation before 4 to 6 years is associated with obesity in adolescence (16).

This matter shows the importance of this age to identify the abnormal patterns of growth. According to the findings of current study the prevalence of malnutrition among different age groups of children didn't show a significant difference ($p= 0.13$). Compare the prevalence of malnutrition at different levels of parental education showed no significant difference in this index between maternal educational level, which was consistent with Ahmadi's study results in Salmas(17). However, in Lakshman's study on children in the various countries (England, Sweden and China) a significant correlation were reported between higher levels of maternal education and lower incidence of malnutrition and stunting (18).

Also in current study malnutrition according to the family's socioeconomic status was positively associated with the nutritional status of children. So that the highest prevalence of child malnutrition was in low-income families (59.2%), and the lowest prevalence of malnutrition was in high -income families (19.3%). It seems logical conclusion since poverty and malnutrition together create a defective cycle. Because high-incomes and purchasing power improve the family nutrition status. The results of this study were consistent with Jessica and Wong's study in Nigeria and Malaysia (19, 20). The result of Ahmadi's study in Salmas and Mohammad Pourasl in Tabriz on the relationship between children's development disorder and the family's socio-economic status was consistent with the results of this study. (17,21).

Another examined factors in this study was child's appetite which according to the findings of this study showed a significant correlation with the prevalence of malnutrition. In Karandish's study in Ahvaz a significant relationship was observed between malnutrition and feeding pattern (22). In Ghiasvand's study in Shahin Shahr also a significant correlation was reported between the number of meals and child's weight percentile (23) which was consistent with the results of current study. These findings showed the importance of dietary patterns in the prevalence of malnutrition.

This study, did not show a significant relationship between the prevalence of malnutrition and growth disorder in terms of mother's job as Ahmadi's study showed (17). In Wink's and his colleagues study in 2013 among 8 European countries also found no relation between mother's occupation and child obesity (24). While Brown and colleagues in Australia reported a significant correlation between children's overweight and full-time compared with part-time mother's occupation (25). In current study the prevalence of malnutrition also examined in terms of father's job, birth, type of delivery, parents' smoking, and family size which did not shows a significant correlation in studied groups.

Conclusion

Our results showed the high prevalence of underweight in children 3-5 years old of Abadan, and its relation with variables such as child's appetites and socioeconomic status. Considering that the nutritional status of children is influenced by three main factors: food, health, and care, so promotion of family's health, socio-economic status and " upgrading nutrition priority in planning " in order to provide these factors is recommended. Also, due to the higher proportion

of underweight compared to overweight and obesity study on malnutrition indicators based on underweight, slimness and stunting is recommended.

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Ethical permission

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