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Original Article

Prevalence of Underweight, Stunting and Wasting Among Children in Qazvin, Iran

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ABSTRACT

Background and Aim: *Malnutrition and growth impairment are among the most common problems in children of developing countries. The aim of present study was to determine underweight, stunting, and wasting status in children less than 2 years in Qazvin (Iran) in 2007.*

Materials and Methods: *In this study, 804 children aged between 0-24 months were evaluated. Data were collected through both family and child's health records.*

Results: *According to World Health Organization (WHO) standard underweight, stunting, and wasting were observed in 11.7%, 11.5%, and 0.7% of the children, respectively. There was a significant correlation between underweight and the family size and birth order and also between stunting and family size, birth order, and parent education ($p<0.05$).*

Conclusion: *This study revealed that the most common types of growth impairment in children under two years of age are underweight and stunting. Interventional measures are recommended.*

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INTRODUCTION

Growth is a process during which the fertilized zygote turns into mature human. Growth is a complicated process affected by various factors including nutrition, diseases, genetic and racial factors, etc (1-3). Malnutrition and growth failure are among the most common problems in children and it is also the cause of half of children's deaths in developing countries (3,4). Malnutrition is manifested by different patterns such as under

weight, stunting, wasting, marasmus and kwashiorkor (5). The presence of such conditions increases the risk of developing infectious diseases, parasitic infections, immunologic disorders, reduced functionality, etc.

The prevalence of these disorders in diverse communities is different. In a study conducted by Base the prevalence of underweight, stunting, and wasting was reported as 31%, 23.9%, and 9.4%, respectively (6). Regarding the necessity of identification and treatment of children with malnutrition and growth failure in developing countries, the present study was performed to determine primarily the prevalence of underweight, stunting, and wasting in children less than two years of age and also the factors affecting these conditions.

MATERIALS AND METHODS

In this prospective cross-sectional study, out of 20 health centers located in north, south, east, and west of Qazvin city (120 km far a way from capital of Iran, Tehran towards the northwest), 7 centers were selected based on systematic sampling. This method was carried out by probability proportional sampling in relation to the population size of each center.

Overall 808 children were selected. Four children were excluded from the study due to morbidities affecting the growth. Finally 804 children (395 boys and 409 girls) were enrolled in this prospective study. This study was carried out from 1-July 2007 to 31- December 2007.

Data were collected through both family and child's health records. Weight, height and head circumferences were measured using standard methods by experienced health workers with the same type of training. Weight measurement was performed using Seca scale with a precision rate of 500 gram with no shoes and minimum covering. The height, while in supine position, was measured from head to heel using standard scale with a precision rate of one cm. Head circumference was also measured by the same standard device as mentioned above.

The validity and reliability of instruments were checked on a regular basis. Determination of underweight, poor growth (nutritional stunting), and wasting were performed according to the classification of WHO. The indices of under-nutrition such as stunting, underweight and wasting were calculated by Z-score using the following formula of the WHO standard. The statistical equations used were (z-score WA=xi-μ) for calculation of underweight, (z-score HA=xi-μ) for stunting, and (z-score WH=xi-μ) for wasting. The cases were categorized as mild, intermediate and severe based on WHO classification protocol.

In this manner, children with Z-score at (-1SD to -2SD) from the mean were considered as mildly underweight, at (-2SD to -3SD) as intermediately underweight, and at >-3SD as severely underweight.

Similarly, children with Z- score at (-1SD to -2SD) from the mean were considered as mildly stunting, at (-2SD to -3SD) as intermediately stunting, and at >-3SD as severely stunting. Mild, intermediate, and severe wasting were defined as the ratio of a group of children with similar height in study population with a weight standing at (-1SD to -2SD), (-2SD to -3SD), or >-3SD from the mean weight of the children with comparable height in the community, respectively. The data were analyzed using SPSS, t-student and chi square tests. p-value <0.05 was considered as significant.

RESULTS

Out of 804 children aged 0-24 months, 395 (49.2%) were males and 409 (50.8%) were females. The youngest case was one day old and the oldest 24 months with a mean age of 15.10±5.01 months.

Table1. Types of underweight among children under two years of age in Qazvin, Iran

Underweight / Age (month)	Male				Female			
	No.	Mild -1SD to -2SD	Moderate -2SD to -3SD	Severe >-3SD	No.	Mild -1SD to -2SD	Moderate -2SD to -3SD	Severe >-3SD
Birth	1	0	0	0	2	0	0	0
1	2	0	0	0	2	0	0	0
3	5	1	0	0	3	0	0	0
6	24	4	0	0	22	2	0	0
9	40	7	0	0	33	3	1	0
12	112	13	2	0	121	13	1	0
18	170	15	3	1	186	17	1	0
24	41	5	1	0	40	3	1	0
Total	395	45 (11.3%)	6 (1.5%)	1 (0.2%)	409	38 (9.2%)	4 (0.9%)	0

Fifteen children (1.9%) were premature and 789 (98.1%) mature. Of the total number of children, 634 (79%) were breast-fed, 61 (7.6%) bottle-fed, and 109 (13.4%) both. The use of food supplement before the age of six months was found in 243 children (30.2%), whereas 478 (66.2%) were given such auxiliary food after six months. Normal delivery was observed in 331 (41.1%) of cases and 473 (58.9%) with cesarean section. Vitamin intake was profound in 802 children (99.7%) and iron supplement in 703 (87.3%) of all cases.

History of repeated diseases and hospitalization was obtained in 26 (3.2%) and 23 (2.9%) of all children, respectively. The highest family size was 3 members followed by 4 and 5 members. Among the children, 446 (55.4%) were the first child of the family and 254 (31.6%) as the second child. Illiteracy and primary educational level was obtained in 95 (11.8%) fathers and 91 (10.8%) mothers and the rest had secondary, higher secondary (HS) diploma and college level education. Fathers were mostly working as employees and mothers as housewives. In 88 (10.9%) cases, the time interval between the child's birth and the preceding child was found to be more than 10 years.

Underweight, stunting, and wasting were observed in 94(11.7%), 93(11.5%), and 6(0.7%) of children with mild underweight and stunting as the most common patterns (Tables 1 and 2). There was

Table 2. Types of stunting among children less than two years of age in Qazvin, Iran

Stunting / Age (month)	Male gender				Female gender			
	No.	Mild -1SD to -2SD	Moderate -2SD to -3SD	Severe >-3SD	No.	Mild -1SD to -2SD	Moderate -2SD to -3SD	Severe >-3SD
Birth	1	0	0	0	2	0	0	0
1	2	0	0	0	2	0	0	0
3	5	0	0	0	3	0	0	0
6	24	2	0	0	22	3	0	0
9	40	6	1	0	33	2	2	0
12	112	13	3	0	121	12	1	0
18	170	11	2	4	186	13	5	2
24	41	4	2	0	40	6	1	0
Total	395	36 (11.1%)	8 (2%)	4 (1%)	409	34 (8.3%)	9 (2.2%)	2 (0.2%)

Table 3. Correlation between underweight and family size

Family size / Underweight	3		4		5		6		7		8		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	54	12.7	22	8.3	11	12.5	3	18.8	2	28.6	2	66.7	94	11.6
No	370	87.3	244	91.7	77	87.5	13	81.2	5	71.4	1	33.3	714	88.4
Total	424	100	266	100	88	100	16	100	7	100	3	100	804	100

p<0.05

a significant correlation between underweight with family size and birth order as shown in tables 3 and 4 (p<0.05). However, no statistically significant correlation was observed between underweight and gender, length of pregnancy at the time of delivery, type of milk intake, starting time of food supplement, vitamin supplement, contracting diseases, type of delivery, and parent's educational level (p>0.05).

Also there was a significant relationship between stunting and the family size, birth order, and parent's education as demonstrated in tables 5-8 (p<0.05). No significant relationship was found between stunting and gender, length of pregnancy at time of delivery, type of milk intake, vitamin supplement consumption, contracting diseases, type of delivery, and the starting time of auxiliary food (p>0.05). Out of six cases of wasted children, 5 were females and 1 male with no significant relationship between stunting and any of the parameters mentioned earlier.

DISCUSSION

This study showed that underweight and stunting are the most common types of growth impairment among children with less than two years of age in Qazvin. Malnutrition and growth failure are major causes of morbidity and mortality among children in developing countries and enormous number of such patients are being visited by Pediatricians and Pediatric endocrinologists on a daily basis (1-3).

Malnutrition is manifested by diverse patterns including underweight, stunting, wasting, marasmus, and kwashiorkor. These patients are prone to develop various bacterial and parasitic infections, immunologic disorder, learning disorder, and physical and mental growth disorder (3,5). According to existing data, there are 150,000,000, underweight and 2.5 millions stunted children in developing countries and the heights and weights of 50 million children are less than universal standard values (7,8).

The prevalence of underweight, nutritional stunting, and wasting is different in various parts of the world and based on reports by UNICEF division of Iranian Health Ministry in 1998, the prevalence of underweight, nutritional stunting, and wasting among children under age of 5 years was 30%,

Table 4. Correlation between underweight and birth order

Birth order / Underweight	1		2		3		4		5		6		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	56	12.6	21	8.2	11	14.1	3	18.8	1	16.7	2	66.7	94	11.6
No	387	87.4	235	91.6	67	85.9	13	81.3	5	83.3	1	33.3	714	88.4
Total	443	100	256	100	78	100	16	100	6	100	3	100	804	100

p<0.05

Table 5. Correlation between stunting and family size

Family size / Stunting	3		4		5		6		7		8		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	50	11.7	23	8.6	14	15.9	3	18.7	1	16.6	2	66.7	93	11.5
No	374	88.3	243	91.4	74	84.1	13	81.3	6	85.4	1	33.3	711	88.5
Total	424	100	266	100	88	100	16	100	7	100	3	100	804	100

p<0.05

47%, and 5%, respectively (9). There are many similar reports on prevalence of underweight, nutritional stunting, and wasting in different countries including the report by Bloss (10) from Western Kenya (reporting 30%, 47%, and 70% for underweight, nutritional stunting, and wasting, respectively), Phengxay (4) from Laos (reporting 35%, 54%, and 6%, respectively), Saxena (11) from India (reporting 20.3%, 53%, and 22.5%, respectively), Gernaat (12) from Zambia (reporting 30%, 69.2%, and 4.4%, respectively), Ergin (13) from Turkey (reporting 4.8%, 10.9%, and 8.2%, respectively), Alasfoor (14) from Oman (reporting 17.9%, 10.6%, and 7%, respectively), and Badruddin (15) from Pakistan reporting (22%, 6%, and 45%, respectively). A study by Bouvier from Mali indicated a prevalence of 25% and 12% for stunting and wasting, respectively (16).

In each of the studies described earlier, the affecting factors were addressed. Bloss explained that the cause of growth disorder was due to various factors such as early feeding of children with auxiliary food, failure of timely vaccination, and lack of general health knowledge in parents (10).

Table 6. Correlation between stunting and birth order

Birth order / Stunting	1		2		3		4		5		6		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	52	11.5	22	7.7	13	17.9	4	18.7	06	0	2	66.7	93	11.5
No	39	88.5	234	92.3	65	82.1	12	81.3	6	100	1	33.3	711	88.8
Total	443	100	256	100	78	100	16	100	6	100	3	100	804	100

p<0.05

Unavailable source of meat and vegetables and also parents' low educational level were considered by Phengxay as the major causes of growth disorder in children (4). Saxena described that the most important origin of growth disorder was related to insufficient intake of protein and energy (11).

In other studies the factors associated with malnutrition were attributed to prematurity,

Table 7. Correlation between stunting and father's educational level

Educational level / Stunting	Illiterate		Elementary		Secondary		HS Diploma		College level		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	1	33.3	14	15.2	29	15.3	32	10.3	17	8	93	11.5
No	2	66.7	78	84.8	160	84.7	276	89.7	195	92	711	88.5
Total	3	100	92	100	189	100	308	100	212	100	804	100

HS- Higher Secondary, p<0.05

Table 8. Correlation between stunting and mother's educational level

Educational level / Stunting	Illiterate		Elementary		Secondary		HS Diploma		College level		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	1	16	14	16.3	23	16.4	37	10.4	18	8.2	93	11.5
No	5	84	71	83.7	117	83.6	318	90.6	200	91.8	711	88.5
Total	6	100	85	100	140	100	355	100	218	100	804	100

HS- Higher Secondary, $p<0.05$

Intrauterine Growth Retardation (IUGR), Small Gestational Age (SGA) (12), lack of appropriate and sufficient feeding of infants by mothers' milk and colostrum (13), and inadequate health education (15).

In our study, a relationship between underweight and both the family size and birth order was established. Also, there was a significant correlation between stunting and the family size, birth order and parents' educational level. It seems that such factors in our region to be associated with the occurrence of growth impairment.

In some studies, the rate of malnutrition was found to be higher in males (4), while in other reports higher figures for malnutrition rate were attributed to females (6). This difference appears to be linked with gender distribution in the community. Comparison of values found for prevalence of underweight, stunting, and wasting in this study with those obtained previously by UNICEF in Iran (published in 1998), shows that the severity of underweight, stunting, and wasting has decreased, which could be due to improvement in family economic condition, improved nutritional status, reduced population growth, expansion of health care centers in the country, increased health surveillance for children by local health houses, propagation of breast-feeding, and vaccination. Reducing the rate of malnutrition in the country more effectively requires serious cooperation between the liable organizations such as Ministries of Health, Education, Agriculture, and so forth.

CONCLUSION

This study revealed that the most common types of growth impairment in children less than two years of age are underweight and stunting, respectively. Interventional measures are recommended.

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