

The Prevalence of Malnutrition among Children under 5 Years old Referred to Health Centers in Iranshahr during 2010-2011

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Abstract

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Background: Malnutrition is still a major health problem in the developing countries. It is recognized that 60% of deaths among children under five year in these countries are associated with malnutrition. The aim of this study was to estimate the prevalence of malnutrition in children under 5 years old in Iranshahr in 2011.

Materials and Methods: This is a cross-sectional descriptive study. The sample consisted of 700 children less than 5 years old who were randomly selected by cluster and quota method among health centers. Child growth was measured based on NCHS-WHO charts. A questionnaire was used for data collection. Data were analysed by SPSS Ver.18, using chi-square, and logistic Regression tests for comparing groups.

Results: Prevalence of stunting (height for age) was 11.1%, (disorder of growth = 7.7%, severe malnutrition = 3.4%), underweight (weight for age) was 9.8% (disorder of growth = 7%). Malnutrition has significant association with birth grade, delivery type, hospitalization history, educational level of parents, parents' job, birth weight, vaccination and the regular consumption of supplementary vitamins ($p < 0/05$).

Conclusion: Although prevalence of malnutrition in this study was lower than WHO statistic report, (30%) but this is locally important and health staff and parents must be educated on nutritional values. Malnutrition is a major problem which is a reason for suppressed immune system, causing the increase of infectious diseases and infant mortality.

Key words: Malnutrition, Dwarfism, Wasting Disease, Body Dysmorphic Disorder

Introduction

The nutritional status of children is one of the well-known indicators of the economic development of a region. Growth is considered as one of the important indicators for assessment of nutritional status. It is measured as weight-for-age, weight for height and height for age indexes. The common nutritional status of children under 5 years old in each region such as underweight, stunting and wasting are considered as nutritional disorders. The

evaluation of these criteria reflects the general health status of that region [1]. Malnutrition is a clinical syndrome which the infant or child deviates from the main pattern of growth, the growth curve is downward and constantly locates under the curve of 3% of the height and weight [2].

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The malnutrition often occurs in the first years of life when the caloric intake is not able to provide the metabolic needs of the body. Consequently, the stored nutrients in the tissues will be consumed to preserve the life [3].

In children, protein-energy malnutrition is defined by measurements that fall below 2 standard deviations under the normal weight for age (underweight), height for age (stunting) and weight for height (wasting). Wasting indicates recent weight loss, whereas stunting usually results from chronic weight loss. The primary malnutrition in children occurs due to socioeconomic factors and lack of food. The secondary malnutrition is associated with the diseases with increased need for calories, calorie loss, and reduction of calorie intake or a combination of these three modes [4]. It may be caused by low food intake or impaired absorption of nutrients. Of the factors which results in impaired absorption of nutrients are bad eating habits, low foodstuff intake, and psychological factors [5], congenital disorders, diseases of impaired absorption of nutrients, appetite-reducing infections, difficulty in digesting, wasting food because of diarrhea and vomiting, food allergy, emotional issues including improper relationship between mother and children [3], lack of knowledge about how to care for the child, parental illiteracy, economic and political factors [4], Low Birth Weight (LBW) and the sequence of the child's birth [5].

The measurement of growth criteria is one of the ways to assess the health and nutrition status of children. The most important feature of the growth of children is the gradual increase of their weight which is influenced by nutrition. The growth and development before birth are influenced by genetic factors. But after the birth, the

growth process is more affected by family, economic and environmental factors. Although there is a significant relationship between malnutrition and poverty, the main cause of malnutrition in many communities is not the shortage of food in the house. Factors such as cultural poverty, lack of health services, lack of awareness on the prevention of infections and improper use of foods in the child's development are also involved. The results of a study indicated that the LBW and child spacing with previous child, socio-economic situation, family size, mother's education, age and gender are the other risk factors for malnutrition [2].

Based on the estimation of Food and Agriculture Organization of the United Nations (FAO), approximately 800 million to one billion people in the world are suffering from some degree of malnutrition. Of these, a total of forty thousand people die daily due to poor nutrition. According to the World Health Organization (WHO), 30 to 40 percent of children under 5 year are malnourished [6]. Also, according to the same organization, in The Islamic Republic of Iran in 1998, 9.5% of children were suffering from low weight for age, 20.4% short height for age, and 6.1% suffered from short height for weight [7]. In 2002, a report was released by the WHO which indicated that 9% of children under 5 years in Karaj suffered from little weight to height and 20.3% of them suffered from the short height to age [8].

The malnutrition as nutritional deficiencies is the major problem in developing countries and 60% of deaths in children under 5 years old is attributed to malnutrition [9]. About 100 million children under 5 in the world suffer from failure to thrive [1] and approximately 9% of children under 5 years suffer from underweight for height and are exposed to the risk of death or severe

impairment in physical growth and mental development [2]. According to official statistics of the Ministry of Health and Medical Education, 10.9% of children under 5 years have suffered from moderate to severe underweight, 15.4% of children with moderate to severe growth delay or short height for weight [10-11]. In our country, on average, 30% of children 1-3 years are suffering mild to moderate degrees of malnutrition. The results of children's growth in 1998 show that 15.4% of children under 5 year suffered from nutritional stunting, 10.9% had moderate and severe underweight, and 4.9 percent suffered from underweight. This number is only including moderate and severe cases, while mild cases may be added to it, the extent of the problem becomes more obvious [12-14].

The importance of malnutrition, regardless of its cause is due to its consequences, because it causes skin rashes, hair loss, impaired immune response and susceptibility to infections, digestive problems, night blindness, impaired wound healing and a change in emotional behavior [4]. On the other hand, the height and weight measurements are of important information sources for assessment of growth and nutritional status. The malnutrition can be detected in early stages before clinical symptoms by anthropometric measurements to provide suitable solutions according to the degree of malnutrition. Iranshahr is one of the cities in Sistan and Baluchestan province which has received attention regarding its urban and surrounding rural areas and prevalence of malnutrition. Accordingly, the present study aimed to determine the prevalence of malnutrition and associated risk factors in children under 5 years referred to Iranshahr health centers in 2010-2011.

Materials and Methods

This cross-sectional study was carried out in five health centers of Iranshahr located in the southeast of Iran in the central region of Sistan-Baluchestan province. According to the documents of the Iranshahr Health Centre, about 71,000 people are covered by urban health centers. Of this number, about 16,000 are children under 5 years. Generally, it seems that the nutritional status of children in Iranshahr and surrounding villages is not appropriate. However, there is not any standard research information for judgment in this regard. Therefore, these health centers are suitable to examine the prevalence of malnutrition.

The data for this study were collected from the beginning of October until the end of December 2010. Based on a similar study at Karaj in 2002 which was conducted with a sample size of 567 patients [5], and the percentage of children suffering from malnutrition (short height for age) was 20.3% ($P = 20.3\%$). Accordingly, the sample size of 307 people was calculated using ratio estimation formula. To ensure the accuracy of the sample size regarding the urban and population of children under 5 years, it increased to 700 people.

The documents of 700 children under 5 years (all children under 4 years, 11 months and 29 days old) were extracted using stratified cluster sampling among the existing documents in 5 health centers (each center as a cluster) in Iranshahr based on population size covered by each center. After that, the telephone numbers or home addresses were extracted and after obtaining informed consent from the parents, they were asked to refer to the respective health center to participate in the study. The demographic data including child's age, parental age, education and occupation of parents, eating patterns, and income levels were completed

by the researcher through present interviews with parents. The child's height and weight and the interpretation of the curve were recorded. In the present study, the nutritional status of children under 5 years was assessed using anthropometric indicators. The prevalence of low weight for age, short stature for age, and low weight for height of children under 5 years was defined and calculated according to WHO standards.

Accordingly, the prevalence of moderate and severe underweight was calculated as a proportion of children which their weights relative to their age is less than -2SD and -3SD, respectively. Similarly, the prevalence of moderate or severe low weight for height (wasting) and short height for age (stunting) was defined as the proportion of children with weight for height and height for age below -2 SD and -3 SD, respectively [15].

The tool used to measure weight was analog scales (SECA, Germany) with the accuracy of 100 g. Every morning, the scale was routinely calibrated and children were weighed without shoes with minimal clothing. The tool used to measure the height was a non-elastic tape. The height of children under two years was measured in probe state. The height of children over two years was measured standing without shoes, cap and pin with a resolution of 0.5 cm. To evaluate the nutritional status of children, the weight-for-age index according to Gomez index, and height-for-age index according to Waterloo criterion were used. The height and weight of children were compared with U.S. National Center for Health Statistics (NCHS) and the WHO international reference population [1].

To determine the boundary between the normal nutrition and malnutrition, the instructions from the Office of Health and Population of the Ministry of Health were used. Based on these instructions, if the

child's weight curve is located below -3SD, the child is severely malnourished or severely underweight. If it is placed on the top of the curve, but not parallel or upward with growth curve, the child has a growth disorder. In other words, if a child's growth curve is less than 2 standard deviations (-2SD) compared to the growth curve of 3%, it will be considered as growth disorder. If the curve is less than 3 standard deviations (-3SD) compared to the growth curve of 3%, it will be considered as severe malnutrition. When the child's growth curve is above the third percentile, parallel or above the growth curve, it is called the lack of growth disorder [16].

This study was approved by the Research Committee of the Iranshahr School of Nursing and Midwifery. It complies with the terms of the Ethics Committee approved by the Ministry of Health of the Islamic Republic of Iran.

The collected data were entered into the statistical software, SPSS Ver.15. The descriptive statistics (frequency, mean and standard deviation) was used to assess the prevalence of malnutrition. Logistic regression was used to examine the relationship between demographic factors and malnutrition. Chi-square test was used to investigate the significance of malnutrition in different gender and age groups. The significance level of the test was 0.05.

Results

In the present study, the records of 700 children were studied. Throughout the sample, the mean age of children and their mothers and fathers was 18.54 ± 14.79 months, 27.97 ± 5.85 and 32.28 ± 6.25 years old, respectively. The average birth weight and current weight of children was 3039.21 g and 9101.28 g., respectively. The mean

height of children was 75.26 cm. In terms of birth weight, 29.6% of children had low weight, 63.1% had normal weight and 7.3% had a weight more than normal. Table 1

shows the characteristics of the main variables of the study in terms of the gender of children.

Table 1: The main variables of the present study based on the gender of children

Gender	age (month)		Birth weight (kg)		height (cm)		weight (kg)	
	Mean (SD)	Min-Max	Mean (SD)	Min-Max	Mean (SD)	Min-Max	Mean (SD)	Min-Max
Girl	18.69(1 5.23)	1-60	3035.89 (388.36)	3042.69 (339.70)	75.6 (13.01)	75.37 (12.43)	9100.69 (2850.92)	9101.9 (2759.83)
boy	18.38(1 4.34)	1-60	2100-6200	2100- 4000	40-109	45-106	3000- 16000	3100- 16100

8.9 % (342 cases) were male and the rest (358 cases) were female. 72% of children were less than 24 months. Table 2 shows the

age distribution of children according to gender.

Table 2: The age distribution of children based on the gender

Age group	Children's gender		Total
	Girl N (%)	Boy N (%)	N (%)
1-12 months	156 (22.3)	141 (20.1)	297 (42.4)
13-24 months	105 (15)	112 (16)	217 (31)
25-36 months	48 (6.9)	54 (7.7)	102 (14.6)
37-48 months	26 (3.7)	16 (2.3)	42 (6)
49-60 months	23 (3.3)	19 (2.7)	42 (6.0)
Total	358 (51.2)	342 (48.9)	700 (100)

The statistical analysis showed that the overall frequency of malnutrition is 11.1% (95% CI: 9.12-12.1). The results showed that 7.7% (95% CI: 5.82-8.2) of children had impaired weight growth (less than -2SD), 7.1% (95% CI: 5.52-7.8) had impaired height growth (less than -2SD), 4.3% (95% CI: 3.1-4.8) of children suffered from severe

malnutrition based on weight for age curve (less than -3SD) and 7.2% (95% CI: 5.7-7.9) of them had severe malnutrition (less than -3SD) based on height to age curve. The data analysis indicated that females suffered more from nutritional disorders than males. However, this difference was not statistically significant. Tables 3 and 4 shows the

nutritional status of children in terms of gender based on weight for age and height

for age curves along with the results of Chi-square test.

Table 3: The nutritional status of children based on their weight for age

Malnutrition categories	Children gender		Total
	Girl	Boy	N (%)
	N (%)	N (%)	
Normal growth	315 (45)	307 (43.9)	622 (88.9)
Malnutrition (less than 2 SD)	27 (3.9)	27 (3.9)	54 (7.7)
Sever malnutrition (less than 3 SD)	16 (2.3)	8 (1.1)	24 (3.4)
Total	358 (51.1)	342 (48.9)	700 (100)
Statistical Test	Chi-Square= 2.40 df=2 P= 0.3		

The difference of the indicators of growth disorder (low weight for age, and short height for age) among the age groups was studied. Of 11.1% of the observed growth disorder 7.6 percent belongs to the age group

of under two years. The results of Chi-square test showed no significant difference (P=0.106 for weight for age, P=0.126 for height for age).

Table 4: The nutritional status of children based on their height for age

Malnutrition categories	Children gender		Total
	Girl	Boy	Girl
	N (%)	N (%)	N (%)
Normal growth	318 (45.4)	313 (44.7)	631 (90.1)
Malnutrition (less than 2 SD)	28 (4)	22 (3.1)	50 (70.1)
Severe malnutrition (less than 3 SD)	12 (1.7)	7 (1.0)	19 (2.7)
Total	358 (51.1)	342 (48.9)	700 (100)
Statistical Test	Chi-Square= 1.71 df= 2 P= 0.425		

Univariate and multivariate Analysis

Univariate binary logistic regression analysis was performed to examine the association between growth disorder in children aged 0-5

years old. The factors associated with growth disorder were examined in a multiple logistic regression model. A stepwise backward elimination approach was applied. At the

start variables were selected for inclusion in the model if their univariate analysis p-value was ≤ 0.25 . Only variables which were statistically associated with growth disorder ($p < 0.05$) remained in the final model. The growth index as two categories (lack of growth disorder and growth disorder) was selected as the dependent variable. The birth

weight, height and weight of the child and parental age were selected as predictor variables. Accordingly, it was found that the probability of a nutritional disorder in the presence of these factors is in the range of 9.7% to 29.5%. Table 5 summarizes data on these variables.

Table 5: Regression analysis of predictor variables and growth disorder

Predicted Variable	B	S.E.	Wald	df	P value
The age of the child	0.082	0.015	30.28	1	0.000
Birth weight	0.003-	0.000	34.57	1	0.000
Height of child	0.008	0.027	0.087	1	0.769
Baby weight	0.001-	0.000	19.09	1	0.000
The age of the mother	0.068-	0.045	2.28	1	0.130
The age of the father	0.07	0.040	3.07	1	0.080

The linear regression analysis of the other variables showed that the malnutrition in children with birth rank of three or later ($p=0.12$), parents with the education level of guidance school or less ($p=0.001$), housewives mothers ($p=0.14$), those with a history of hospitalization ($p=0.001$), children with irregular vaccination ($p=0.007$), the number of family members ($p=0.005$), irregular use of multivitamin drop ($p=0.00$) and iron drop ($p=0.001$) was significantly higher. However, father's occupation, place of residence, gender of the child, supplementary feeding time showed no relationship with malnutrition ($p>0.05$).

Discussion

According to the results of the present study, the overall prevalence of malnutrition,

regardless of its type, was 11.1%. The prevalence of malnutrition was 11.1% and 9.8% based on the weight and height curves, respectively.

Several studies have investigated the prevalence of malnutrition in Iran and its provinces. The accurate review of data from these studies indicates that the incidence of this fatal disorder is declining due to various nationwide programs done for maternal and child health. For example, a nationwide survey entitled "Evaluation of achieving the decade goals" [17] in the fall of 1995 was performed to study the anthropometric indices in children using weighing and measuring height of 11,571 children under 5 years old. The results of this study showed that 15 % of boys and 16.3% of girls under age 5 are moderately or severely malnourished according to weight-for-age index. The prevalence of moderate and

severe nutritional stunting in boys and girls was 19.5% and 18.4% respectively based on height for age index [17].

Similarly, "The nationwide survey (ANIS1) in 1998" was carried out on 34,200 children under six years old by the Office of Community Nutrition Improvement in The Department of Health of the Ministry of Health and Medical Education in order to draw an accurate picture of the epidemiology of malnutrition in rural and urban areas in different provinces of the country [18]. The results of this study showed that 11.9% of boys and 9.7% of girls under five years old had moderate and severe underweight based on weight-for-age index. The prevalence of moderate and severe nutritional stunting in boys and girls was 16.8% and 13.9 %, respectively.

The trend of malnutrition in Iran was examined with a sample size of 34,200 children in 2004 [19]. The results showed that 4.7% of children with age in the range of 0 to 60 months were suffering from nutritional stunting based on height for age index. The prevalence of nutritional stunting in girls and boys was 4.4% and 5%, respectively. A total of 5.2 % of children under 5 years old were suffering from moderate and severe underweight throughout the country. The results of nationwide studies and comparison of nutritional indicators during 1994 to 2004 indicates improved nutritional status of children under 5 years old. However, the differences between the various provinces and regions of the country which somehow arising from the differences in level of development in these areas represents a need for the design and implementation of targeted strategies to enhance the maternal and child health and development of public education. Several studies in some cities of Iran show more or less similar results. The results of a study on

children under 5 years in Karaj during 2001-2002 showed malnutrition of 13.9% and 20.3% based on weight-for-age and height for age indexes, respectively [5]. The results of a study on children under 5 years in Rafsanjan showed that 10.3% and 5.8% of children were suffering from stunting and underweighting, respectively [9]. The results of study conducted by the Ministry of Health on children under 5 years in Kerman showed that 27.9%, 8.2% and 20.2% of them were suffering from stunting, underweight and underweight, respectively [20].

The malnutrition statistics in some countries are also examined. Six point seven percent, 7.1% and 4.5% of children at a school in Kuala Lumpur, Malaysia, were suffering from stunting, underweight and underweight, respectively. According to Waterloo classification, 28.8% and 9% of 4-6 year old children in Mexico were suffering from stunting and underweight [9]. In 2005, a study was carried out on children under 5 years in camps in Sudan. According to WHO standards, 56.1% of children were malnourished. Among them, 30.1%, 13.1% and 12.8% were suffering from mild, moderate and severe malnutrition, respectively [10].

Although, according to the statistics, 174 million children under 5 years in developing countries suffer from malnutrition and 230 million children are suffering from stunting [6], the results of the present study are higher or lower in some cases. The observed discrepancy can be attributed to the research method, the studied region, cultural and economic conditions and nutritional habits of that region. However, the results of the present study were higher than those obtained in 2007-2008.

In the present study, the relationship between risk factors and malnutrition was investigated using regression and chi-square tests (Table

4). There was a significant relationship between the prevalence of malnutrition and birth order, parental education, mother's occupation, a history of hospitalization, irregular injections of vaccine and irregular consumption of supplements (multivitamin and iron drops) ($P < 0.05$). Also, several previous studies have emphasized that the postnatal growth is influenced by economic, family and the environmental factors [2]. Similar studies also investigated the effect of several factors, for instance, Taheri, Sharifzadeh and Nasiri found a significant relationship between malnutrition and mother's occupation and education of parents in Birjand. The results of this study showed that the prevalence of malnutrition in the case of housewives and less literate and illiterate parents was higher [4]. Basri found a significant relationship between family size, parental occupation, parental education, pregnancy interval and malnutrition [21]. Ghorbani conducted a study on primary school children in Zanjan. He found a significant relationship between malnutrition and parental education [22].

Nakhshab and Nasiri conducted a study on children under two years old in Sari. They observed a significant relationship between malnutrition and family size, history of hospitalization and irregular use of supplementary drops [2]. The results of a study conducted on Sudanese children confirmed the effect of vitamin A deficiency and a history of hospitalization on malnutrition [10]. A similar study in Egypt confirmed the effect of health and disease history of child on malnutrition [23]. The present study indicates a significant relationship between low birth weight and malnutrition in children which is consistent with the results of Taheri and Sharifzadeh [4]. There are also numerous studies which

indicate the significant relationship between LBW and malnutrition [3-5, 24].

Although the present study showed no significant relationship between father's occupation, location of residence, birth weight, gender and supplemental nutrition beginning time and malnutrition ($p > 0.5$), some similar studies emphasize on the presence of the relationship of some factors. For instance, Naeini found a relationship between father is occupation and child gender in children under 5 years in Birjand [25]. On the other hand, Sheikh al-Islam and Taghavi in Tehran children [13], Taheri, and Sharifzadeh in Birjand [4], Nojomi and Kaffashi in Karaj [5], Nakhshab and Nasiri in Sari [2], Salem, Sheikh Fathollahi and Esmali in Rafsanjan [9] have noted the influence of gender on malnutrition. In all the cases, malnutrition is more prevalent in boys. However, the results of Ghorbai's study showed no significant difference in terms of gender. The results of Al-Sayed and Gad Mohamad revealed that children living in the suburbs suffer more from malnutrition [23]. The results of Sheikh al-Islam, Naqavi and Abdullahi showed that rural children were more malnourished [19]. In the present study, all children were residing in urban areas. The results of Taheri and Sharifzadeh study showed that whenever supplementary feeding time is later and birth weight is lower, malnutrition is more common [4]. In the present study, 98.2% of the children had begun supplementary feeding at the age of six months or less.

In total, although the nutritional status of children under 5 years in Iranshahr shows relative enhancement compared with the statistics obtained in other cities of Iran, the malnutrition is still considered as a major health problem in this city and its suburbs. This needs more attention by the health officials of Sistan and Baluchestan Province.

Of the effective and practical solutions to improve the nutritional status of children are improving parental awareness, particularly about exclusive breastfeeding until the end at age 2, and timely identification of children with growth retardation by the health network and appropriate measures.

Conclusion

The results of this present study can be useful for health policy makers and other medical professionals who are engaged in the care of children. It would also be used as basic information for examining the nutritional status of this region of the great Islamic Republic of Iran.

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Conflict of interest: Non declared

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