Primary Malnutrition Among 1-59 Months Old Children Due to Acute Infectious Diseases and Some Related Factors of Kermanshah (West of Iran), 2011

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Abstract: Malnutrition is one of the important health problems throughout the world particularly in developing countries, which has undesirable effects on mental and physical health of children. It is an underlying factor of infection and an important cause of child mortality in these countries. The aim of this study is to find out the prevalence of primary malnutrition and related factors among 1-59 months old hospitalized children due to acute infectious disease at Imam Reza Hospital in Kermanshah 2011. This cross-sectional and descriptive analytical study was done on 346 hospitalized children due to acute infectious disease at Imam Reza Hospital from May to November 2011. Data collection was done through measuring of weight, height and structural questionnaire as face to face interviews with mothers. According to WHO criteria, the SD score with a cut of less than-2 for three indices (Weight/Height, Height/Age, Weight/Age) should be used to define malnutrition. The obtained data was analyzed by SPSS software and tests of chi-square and t-test. The prevalence of malnutrition based on three criteria including "Weight for Height", "Height for Age" and "Weight for Age" were 16/8%,16/2% and 11/3%, respectively. No statistically significant correlation was found between wasting (Weight/Height) and variables (P>0.05). Stunting (Height/Age) had a significant relationship to age, duration of breast feeding and birth weight (P<0.05). Finally the index of underweight had a significant relationship to age, birth weight, hospitalization history and starting age of complementary nutrition. With regard to results of this study, the following measures to reduce malnutrition are recommended: great attention to nutrition in the first year of life, improving pregnancy care, constancy of breast feeding and timely complementary nutrition.

Key words: Malnutrition · Wasting · Stunting · Underweight · Hospitalized Children · Child Infections

INTRODUCTION

Malnutrition or failure to thrive in the early years of life has been reported almost all over the world especially in developing countries. It has been introduced as major causes of death among children worldwide. Protein-energy malnutrition is the leading cause of death among children under 5 years old [1]. Child malnutrition is a common problem in developing countries and malnourished children also have high risk of infections and non-infection illness [2-4]. Malnutrition also affects immune response of children including HIV positive patients [5]. Primary malnutrition among children is caused due to social-economic effects and lack of essential nutritious materials. Secondary malnutrition is created due to diseases associated with the increased

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need for calories, loss of energy or calorie intake or a combination of these three modes [6]. Regardless of the cause of child malnutrition, the aftermath is important, since it weakens the immune system, especially cellular immunity and increases the prevalence and severity of infectious diseases and mortality. In addition, it is associated with reduction of children's mental capacities. Children with diseases such as gastroenteritis, pneumonia and other infectious diseases, as the leading causes of hospitalization and mortality in developing countries, also suffer from malnutrition as an underlying factor [1].

Malnutrition can be investigated by 3 indexes; stunting, underweighting and wasting among children under 5 years old. Stunting represents chronic malnutrition, which causes the child to not acquire the proper height for his or her age. Underweighting represents that the current weight of the child is less than the weight for his or her age and partly represents acute and chronic malnutrition. Wasting is an acute phenomenon and occurs due to diseases or illness or crises in the recent past in which the child loses part of his or her weight to his or her height [7].

According to the World Health Organization (WHO), in 2003 over 53% of deaths among children under 5 years old is estimated to be indirectly associated with malnutrition that is the cause of about 300,000 directly deaths-about half of the child death indirectly [8]. According to UNICEF's reports, the prevalence of underweighting in some countries is as follows: Chile 7%, Bolivia 7.5%, Egypt 8.6% and Iran 3% [8]. The National survey in 2009 indicated that 4.7% of children under 5 suffer from stunting, 5.2%from underweighting and 3.7% from wasting [9].

Nutritional support is one of the important therapeutic approaches of children who are hospitalized. During the short period of hospitalization, the main focus is on the current condition of the child and little attention is paid to the nutritional status. The aim of this study is to determine the prevalence of malnutrition among children admitted to the Pediatric Infectious wardto identify the groups who are at risk of malnutrition and children with malnutrition.

MATERIALS AND METHODS

In this descriptive-analytical study which was performed from May to the end of November 2011, 346 hospitalized 1 to 59-month-old children in Imam Reza (AS) Hospital (child refer Centre) in Kermanshah (west of IRAN) were studied. Children were weighed by a trained resident and nurse using a German Seca scale with the precision of ±50 g. To measure the height of children under 2 years old, the length of head to the heel while the child was lying on a cot. For children older than 2 years old, standing height were measured.

In order to determine malnutrition, the criterion of the World Health Organization, the Z-score (using ANTHRO software) was applied. It indicates that Z-SCORE<-2SDrepresents moderate malnutrition and Z-SCORE<-3SD represents severe malnutrition. The collected data were analyzed using SPSS, independent t- test, ANOVA, Tukey post-hoc test and chi-square test.

RESULTS

In this study, 346 children including 52.3% boys and 47.7% girls were studied. According to three indexes of wasting, stunting and underweighting, the prevalence of malnutrition was estimated to be 16.8%, 16.2% and 11.3%, respectively (Table 1).

Based on wasting index, malnutrition was not significantly related to any quantitative and qualitative variable(Tables 2,3).

According to under weighting index, malnutrition was significantly related to age, onset age of supplementary feeding. Birth weight had a hospitalization background (P < 0.05) (Tables 2,3).In other words, children with malnutrition had lower mean age, onset age of supplementary feeding and lower birth weight than children who were not malnourished. Moreover, among children with under weighting,16.9% had hospitalization background, while 8.1% had not such background.

Regarding the severity of malnutrition, no statistically significant difference was observed according to the three indexesamong two genders (Table 2). Based on s tunting index, 19.4% of children who had consumed dried milkversus 15.3% of children who were breast-fed were malnourished butno statisticallysignificant relationship was found (P =0.399) (Table 3).

Parent's education, mothers'occupation,the current disease of the child, birth order, family size and family income had no significant correlation with any of the indexes of malnutrition (P>0.05) (Table 2, 3). Despite the high prevalence of malnutrition in rural children no statistically significant relationship with residential area was found (P>0.05) (Table 2).

Table 1: Frequency of malnutrition according to indexes of wasting, stunting and underweighting

	Wasting	`	Stunting		Underweighting	
	No	%	No	%	No	%
Moderate	28	8.1	32	9.2	26	7.5
Severe	30	8.7	24	6.9	13	3.8
Total	58	16.8	56	16.2	39	11.3

Table 2: Distribution ofmalnutritionandrelatedindicesbased onqualitativevariables.

		Malnutritionindices					
		Wasting		Stunting		Underweighting	
		Yes	No	Yes	No	Yes	No
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Sex	Male	152(84)	29(16)	149(82.3)	32(17.7)	160(88.4)	21(11.6)
	Female	136(82.4)	29(17.6)	141(85.5)	24(14.5)	147(89.1)	18(10.9)
P-Value		0.699		0.429		0.839	
Consumed Milk	mother milk	228(83.2)	46(16.8)	232(84.7)	42(15.3)	243(88.7)	31(11.3)
	dried milk	60(83.3)	12(16.7)	58(80.6)	14(19.4)	64(88.9)	8(11.1)
P-Value		0.98		0.399		0.961	
Residential area	Urban	230(84.6)	42(15.4)	230(84.6)	42(15.4)	244(89.7)	28(10.3)
	Rural	58(78.4)	16(21.6)	60(81.1)	14(18.9	63(85.1)	11!14.9)
P-Value		0.20		0.47		0.27	
Mother's occupation	Employed	20(74.1)	7(25.9)	25(92.6)	2(7.4)	24(88.9)	3(11.1)
	Housewife	268(4)	51(16)	265(83.1)	54(16.9)	283(88.7)	36(11.3)
P-Value		0.185		0.279		1	
Cause of hospitalization	Yes	102(82.3)	22(17.7)	98(79)	26(21)	103(83.1)	21(16.9)
	No	186(83.8)	36(16.2)	192(86.5)	30(13.5)	204(91.9)	18(8.1)
P-Value		0.716		0.071		0.013	
Current disease	Digestive	117(86.7)	18(13.3)	117(86.7)	18(13.3)	124(91.9)	11(8.1)
	Respiratory	81(78.6)	22(21.4)	84(81.6)	19(18.4)	89(86.4)	14(13.6)
	Kidney	25(89.3)	3(10.7)	22(78.6)	6(21.4)	23(82.1)	5(17.9)
	etc.	65(81.2)	15(18.8)	67(83.8)	13(16.2)	71(88.8)	9(11.2)
P-Value		0.301		0.622		0.379	
Father's education	Unread	16(84.2)	3(15.8)	13(68.4)	6(31.6)	15(78.9)	4(2.1)
	Preliminary	86(83.5)	17(16.5)	91(88.3)	12(11.7)	94(91.3)	9(8.7)
	Secondary	135(81.8)	30(18.2)	136(82.4)	29(17.6)	142(86.1)	23(13.9)
	Academic	5(86.4)	8(13.6)	50(84.7)	9(15.3)	56(94.9)	3(5.1)
P-Value		0.876		0.161		0.116	
Mother's education	Unread	24(82.2)	5(17.2)	24(82.8)	5(17.2)	26(89.7)	3(10.3)
	Preliminary	94(79)	25(21)	99(83.2)	20(16.8)	102(85.7)	17(14.3)
	Secondary	131(86.8)	20(13.2)	126(83.4)	25(16.6)	134(88.7)	17(11.3)
	Academic	39(83)	8(17)	41(87.2)	6(12.8)	45(95.7)	2(4.3)
P-Value		0.41		0.924		0.331	

According to stunting index,children with malnutrition had lower mean age, lower breastfeeding period and lower birth weight (P<0.05)(Table 3).

Table 3: Distribution ofmalnutritionandrelatedindicesbased onquantitativevariables.

	Malnutrition indices					
	Wasting		Stunting		Underweighting	
	Yes	No	Yes	No	Yes	No
	Mean ±Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd	Mean ±Sd
Age (month)	16.9 ± 13.49	16.48 ± 13.55	175 ± 13.87	12.92 ± 10.54	17.42 ± 13.65	12.23 ± 11.21
P-Value	0.828		0.005		0.02	
duration of breast feeding (month)	11.12 ± 8.49	11.22 ± 8.90	11.56 ± 8.62	8.94 ±7.90	11.37 ± 8.56	9.35 ± 8.33
P-Value	0.938		0.03		0.16	
Onset of supplemental feeding	4.89 ± 2.56	4.24 ± 2.92	4.87 ± 2.60	4.33 ± 2.76	4.92 ± 2.55	3.71 ±3.06
P-Value	0.117		0.16		0.02	
Birth Order	1.72 ± 0.99	1.84 ± 0.91	1.76 ± 0.99	1.64 ±0.90	1.75 ± 0.99	1.66 ± 0.89
P-Value	0.386		0.4		0.6	
Birth Weight (gr)	3180.1 ± 544.8	3193.6 ± 422.65	3217.7 ± 503.25	2999.3 ± 602.12	3231.9 ± 507.17	2792.6 ± 512.65
P-Value	0.859		0.004		0.001	
Family size	3.85 ± 1.20	4.08 ± 1.44	3.93 ± 1.30	3.71 ± 0.94	3.92 ± 1.29	3.69 ± 0.86
P-Value	0.205		0.23		0.2	
Family Income (×1000 tomans)	469.65 ± 424.05	452.59 ± 316.98	465.03 ± 384.76	475.89 ± 514.52	473.32 ± 419.18	415.38 ± 302.01
P-Value	0.772		0.85		0.4	

DISCUSSION

In this study, malnutrition indexes of wasting, underweighting and stunting among the population under studywere 16.8%,16.2% and 11.3%, respectively. Due to the factthat wastingrepresents severe acute malnutrition, the reason that in the present study it was higher than two other indexes may be probably due to the location of the research i.e. hospital. The prevalence of wasting in the current study is similar to that of Isfahan [10]. However, according to the national survey in 2004, the extent of wasting in children under 5 years was estimated 3.7%[9]. The reason can be attributed to the location of the study out of the hospital and the large sample size.

In the study of malnutrition among 1 to 36 months old children admitted to the pediatric ward of Imam Ali Hospital (AS) of Zahedan [11], wasting had a significant relationship with children's gender and cause of hospitalization.In addition, in the study of children under 6 years old of South Khorasan [12], wasting was significantlyassociated with gender and residential area. However, in the present study, wasting was notsignificantly related to any quantitative and qualitative variable.This may be due tosmall sample size of the study.

The prevalence of stunting (indicator of chronic malnutrition) in this study is similar to that of South Khorasan[12], but it is higher than that of the national surveyreported in 2004 with 4.7% [9] and the study of

Isfahan with 4.9% [10]. However,regarding the predictions, based on the decreasing rateof the prevalence ofnutritionalstunting among children in developing countries, from 29.8% in 2000 to 16.3% in 2020, the prevalence of stunting in this study seems to be acceptable.

In the present study, stunting was significantly related to variables of age, birth weight and duration of breastfeeding. In other studies conducted in Zahedan andBirjand [11,13], stunting was related to birth weight, residential area and parents' educational level. A study carried out in Khorasan[12] has revealed that it was related to age, residential area, mothers' occupation and parents' educational level. The mean age of 12.92 confirms the importance of nutrition in child development in the first year of life because the highest rate of children's growthhappens in the first year of their life.

The association of stunting with birth weight confirmsthe role of intrauterine malnutrition in later steps of life and it seems that appropriate interventions during pregnancy for preventing low birth weightis a good method to preventmalnutritionand other inappropriate complications that may happen later on.

In the case of the relationship between duration of breastfeeding and stunting, children who were not malnourished had passed 11.56 months period.This confirms the role of breastfeeding in reducing malnutrition. Breast milk is the natural food for breastfed infants in the first year of life [1].

In this study, underweighting was significantly related to age, birth weight, history of hospitalization and the onset age of supplementary feeding. In other studies, underweighting has been associated with residential area, mothers' occupation and education level of parents, duration of breastfeeding and birth weight. Since underweighting indicates the chronic and acutemal nutrition, in the case of the correlation among age,birth weight and underweighting, the same reasons mentioned for wasting can be addressed.

The average age of starting complementary feeding for underweight children was 3.71 months, whichsuggests theimportance of initiating complementary feeding at 6 months of age because before this age the child's ability to digest and absorb nutritious materialsis not perfect and mother's milk is the only source of recommended food in the first 6 months of life. In the case of the relationship of underweighting and history of hospitalization, the triangle complications-malnutrition-disease can be noted based on which malnourished children are more prone to infection and therefore more likely to hospitalization.With the knowledge of this fact,child malnutrition can be diagnosed and treated in the early stages through nutritional assessment to reduce malnutrition in order to increase the likelihood of hospitalization.

The conduction of the study in May-June, due to the beginning ofthe summer and seasonal diarrhea in children, may estimate the frequency of some forms of malnutrition, such as underweightinghigher than the actual situation. However, to avoid this problem, patients who were admitted with diarrhea were studied after treatment of dehydration.

CONCLUSION

Considering the results of the present study, the most important v ariables associated with malnutrition indexes include age, birth weight, duration of breast feeding, onset age supplementary feeding and the history of hospitalization. Therefore, paying more attention to child feeding during the first year of life, adequate care duringpregnancy,continued breastfeeding and detecting the appropriate timeof supplementary feeding will be effective in reducing malnutrition.

ACKNOWLEDGMENT

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