Assessment of Possible Risk Factors of Malnutrition Under Five Years old Children in Orotta National Pediatric Referral Hospital

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Anthropometry; Children

Abstract

Introduction

Malnutrition is one of the leading causes of morbidity and mortality in children under the age of five in most developing countries including Eritrea. However, there is little information available on risk factors for malnutrition. Therefore, assessing the possible contributing risk factors of malnutrition is crucial.

Objective

To determine the risk factors associated with malnutrition in children under 5 years of age who visited in Orotta National Pediatric Referral Hospital from 14th April-23rd May, 2014.

Methodology

Across sectional, Hospital based study was conducted in ONPRH. Data was collected from mothers (care takers) using semi structured questionnaire developed for the purpose. In addition, anthropometric measurement and medical status of the subjects was also taken. Then data is cleaned, edited and fed to computer and analyzed using SPSS version 20. Finally statistical test for significance is employed using chi-squared (x2) where appropriate at 5% level of significance.

Results

A, N=77 (60.6%), N=127 (100%) and N=75 (59%) of children were stunted, underweight and wasted, respectively. The main associated factors of stunting were found to be ARI, birth weight, child sex, family size and monthly income. Underweight was associated with frequency of diarrhea. Birth interval, ARI, frequency of diarrhea and monthly income were the only variables associated with wasting.

Conclusion and Recommendation

Malnutrition is still an important problem among children aged 0-59 months. Therefore, special attention should be given on intervention related to factors associated with development outcomes such as monthly income, family size, birth interval, acute respiratory infection and frequency of diarrhea.

Keywords: Malnutrition; Stunting; Underweight; Wasting;

Introduction

Malnutrition remains one of the most common causes of morbidity and mortality among children throughout the World. Worldwide, almost one in four children under 5 years old were stunted in 2011. Nearly 80 percent of the world's 165 million stunted children live in just 14 countries. Stunting and other aspects of malnutrition alter a child's chance of survival, while also hindering optimal health and growth. Stunting affects the brain development, which gives way to lifelong negative consequences for cognitive ability, school performance and future earnings and this in turn affects the future development of nations [1]. Globally in 2011, an estimated 101 million children under 5 years of age were underweight, which was approximately 16 percent of children under 5 years. Underweight prevalence was highest in South Asia, at a rate of 33 percent, followed by sub-Saharan Africa, at 21 percent. South Asia had 59 million underweight children, while sub-Saharan Africa had 30 million [1]. In general, malnutrition in this age group was one of the most important public health problems in developing countries especially Sub-Saharan Africa and about 35 percent of under-five deaths in the world were associated with malnutrition [2]. A study conducted in Ethiopia showed that, 47.6%, 30.9% and 16.7% of children were stunted, underweight and wasted, respectively [3].

In Eritrea it was about 13 percent (EPHS, 2010)[4].The proportion of wasting in under five children in Eritrea had been stable at about 15 percent and there had been an increase in stunting and the underweight in the last eight years. Currently standing at 50 percent and 39 percent, respectively [4]. A comparison of nutritional status of EPHS, 2002 and EPHS, 2010 showed an increase in the proportion of children who were stunted and underweight, but no overall changes in the proportion of children who were wasted. The prevalence of

stunting increased from 43 percent in 2002 to 50 percent in 2010 reflecting an overall increase in chronic malnutrition over the past eight years and this was particularly pronounced among children 6-12 months of age.

In developing countries including Eritrea there are many cases of malnutrition and the recent survey which was conducted in Eritrea back in 2010 showed that the trend of sever acute malnutrition has increased in the past 8 years from 43% to 50%. Though malnutrition can be prevented the trends were sought to increase as indicated in the survey done in 2010 by EDHS. Since malnutrition becomes one of the most public health threats in economically transitioning countries like Eritrea, identifying contributing factors that can cause malnutrition has great role in reducing morbidity and mortality rate due to its complications. It was also hypothesized that this malnutrition or being stunted, underweight and under nutrition could have strong relationships with socioeconomic economic status, feeding practices and other medical conditions of children such as diarrhea and acute respiratory infection. The main objective of this one-month study is therefore to identify the immediate risk factors of malnutrition, determine the distribution of malnutrition among children aged 0-59 months in ONPRH, determine the underlying factors contributing to malnutrition (household factors, birth interval, number of children under 5 years, socioeconomic status, education level of care taker and access to health services).

Methodology

Research Design

A hospital based cross sectional descriptive prospective study was conducted from 14th April-23rd May of 2014 in Orotta National Pediatric Referral Hospital which is located in Asmaracapital city of Eritrea. Specifically it was conducted in the Out Patient Department, Emergency ward, ward B, and C, which gives services for about 60-80 patients per day who are less than 14 years of age visiting from different corners of the nation. The data was then collected through semi structured questionnaire by interviewing the mothers of interest/care givers and anthropometry data of subjects was also collected objectively.

Study Population

All children aged from 0-59 month who visited the study area within the specified period of time were eligible for the study. Besides, children whose Weight for height (<80% reference or SD score <-2), Height for age (<90% reference or SD score <-1), Weight for age (<80% reference or SD score <-2) were enrolled in the study.

Data Collection Tools and Analysis Method

Data was collected by interviewing mothers or caregiver's through semi structured questionnaire. Data was also collected by measuring weight for height, height for age, and weight for age from the subjects. Then data is cleaned, edited and fed to

computer and analyzed using SPSS version 20. Finally statistical test for significance is employed using chi-squared (x2) where appropriate at 5% level of significance.

Ethical Consideration

Ethical clearance was obtained from the Health Research Ethics and Protocol Review Committee of the Ministry of Health and Medical director of ONPRH.Verbal and written consent was obtainedfrom Mothers and care givers who take part in this study. Patient identifiers were omitted to keep confidentiality and anonymity.

Result

Socio-Demographic Characteristics of Respondents

From the total study subjects complete response was obtained for 127(100%) respondents (mothers). 86 (67.7%) were between the age of 20-35, whereas mothers who were greater than 35 years and less than 20 years were 35 (27.6%) and six (4.7%) respectively. According to their educational status, majority of the mothers got into junior and secondary being 41 (32.3%) and 51 (40.2%) respectively. However the remaining mothers were illiterate 13 (10.2%), primary 17 (13.4%) and college graduates five (3.9%). Similarly, according the data obtained from the mother (N-127) majority of the fathers got in to junior and secondary school 28 (22%) and 55 (43.3%) respectively, whereas the remaining were illiterate six (4.7%), primary 23 (18.1%) and college graduates 15 (11.8%) (Table-1).

Regarding residence of the subjects, almost equal number of respondents came from rural and urban parts of the nation 66 (52%) and 61 (48%) respectively. In accordance to marital status of the respondents, 121 (95.2%) were married, three (2.4%) single and three (2.4%) were divorced. A large percentage of fathers were governmental employees 96 (75.6%), others being merchants one (0.8%), farmers 11 (8.7%) and others covered the remaining 19 (15%), whereas 109 (85.8%) of the mothers were housewives, farmers three (2.4%), merchants two (1.6%) and 13 (10.2%) had other jobs.

Socioeconomic status

Out of 127 participants, 90 (70.9%) had no ownership, 20 (15.7%) had their own land, two (1.6%) had livestock and 15 (11.8%) had other means of ownership. Out of total 127 family 22%(28) had their own house where as 78%(99) didn't, furthermore 76.4%(99) lived in a single room, 17.3%(22) in a two room, 2.4%(three) in three rooms and 3.9%(five) lived in more than three rooms. Out of the 127 families 14 (11%) and 55 (43.3%) had one and two children under the age of five respectively and the remaining 58(45.7%) had three children under the age of five. Large number of the families 47.2%(60) had birth interval one to two years but the remaining 30(23.6%), 22(17.3%), nine (7.1%), six (4.7%) had birth interval only child, three to four years, greater than four years, less than one year respectively. from the total 127, 60.6%(77) had family size less than five but the rest 50(39.4%) had family size greater than five *(Table 2)*.

Child Biographic Information

The ages of the children recruited in the study ranged from 0 to 59 months, the mean age was (19.4) months, the mean age for females (19.77), and that of the males (19.02), the age groups were stratified into four groups shown in the table below. Out of 127 children, 53 (41.7%) were females and 74 (58.3%) were males. Majority of the children 89 (70.1%) were born in health facility whereas the remaining 38 (29.9%) were born at home. Regarding gestational age at birth, about 117 (92.1%) were born at nine month and about 10 (7.9%) were born at less than nine month of gestational age. Concerning birth weight, majority of the children 53 (41.7%) were born with birth weight between 2.5-3kg, the remaining 41 (32.3%) and 33 (26%) were born with birth weight <2.5kg and>3kg respectively (Table 3).

Child Medical Condition

Out of 127 children that participated in the study 48.8%, 67.7%, 62.2% were having diarrhea, fever, ARI respectively. Regarding the frequency of diarrhea of the children, 29 (22.8%) and 27 (21.3%) of the children were having three to four and greater than four episodes of diarrhea per day respectively and the rest two (1.6%) and six (4.7%) were having one and two episodes respectively. Majority of the children 68 (53.5%) stayed with illness for less than two weeks, whereas 27 (21.3%) and 32 (25.2%) stayed with the illness for two to four weeks and greater than four weeks respectively as shown in table 4.

Association of contributing factors with the three indicators of malnutrition

From the total N=127 study participants the distribution of stunting and wasting was 77 (60.6%) and 75 (59%) respectively but the distribution of under nutrition was 100%, and this is because the study participants weight for age was <80% (Figure 1)

Associated factors to stunting, underweight and wasting

Based on the analysis of the study, ARI, birth weight, child sex, family size, monthly income were found to have an association with stunting. Children with ARI and birth weight of less than 3 kg were found to have significant association with p value of 0.026 and 0.039 at 95% CI respectively. In this study male children were found to be more prone to stunting with p value of 0.001 at 95%. CI. The study result also revealed that children of family size greater than 5 were found to have an association with p value of 0.010 at 95% CI. Moreover, children of family with monthly income less than 1000 Nakfa had a p value of 0.01at 95% CI showing a significant association with stunting.

After analysis of the risk factors in relation to under nutrition, the result has revealed that frequency of diarrhea was found to be associated with under nutrition. Children with frequency of diarrhea greater than or equal to three times per day were found to have a significant association with a p value of 0.045 at 95% CI. Unlike other studies, family size, monthly income, birth interval and child sex were found to have no association with under nutrition.

After the Chi-square analysis, wasting tend to have positive association with birth interval, fever, ARI, frequency of diarrhea, and monthly income. In this study birth interval was found to have an association with wasting with p value of 0.044. Children with ARI were found to have a significant association with a p-value of 0.026 at 95% CI. And children with fever had a significant association with a p-value of 0.037 at 95% CI. Regarding the frequency of diarrhea, children with greater than three episodes per day also had a significant association with a p value of 0.028 at 95% CI. Children from family with monthly income less than 1000 Nakfa per month were found to be significantly associated with a p value of 0.011 at 95% CI (Table 5).

Discussion

The irreversible consequence as a result of poor nutrition in the childhood can make them forever stunted. The tragedy is that there are globally 165 million children were stunted who need an updated assessment on the risk factors [5]. There is no such injustice than robbing a child in the infancy and child hood, of the ability to fully develop his or her talent throughout life. So far this study has dealt with possible risk factors that contribute to malnutrition having indicators height for age, weight for age, and weight for height. A significant association was found on the factors such as child sex, family size, birth interval, birth weight, fever, frequency of diarrhea, ARI and monthly income.

As revealed in the study, out of 127 children who participated in this study the percentage distribution of stunting was 60.6%, wasting 59% and underweight 100%. Similarly a study conducted in [6] showed the prevalence of stunting, wasting and under nutrition to be 38.7%, 15.6% and 5.5% respectively. The distribution of stunting is higher in this study as compared to study done in Tigray (Ethiopia) [7] stunting (46.9%), wasting (11.6%), under nutrition (33%) respectively.

The present study shows that out of 127 participants, the level of stunted children (height for age) was more in male than female having p value of 0.001. A similar study conducted in Uganda showed an association between gender and stunting with OR 1.15-2.13 and p value of 0.004 [8]. From the reviewed literature, there seems to be a consensus that malnutrition among under-five children is greater among boys than girls. The cause of this discrepancy is not well established in the literature but it is believed that boys are more influenced by environmental stress than the girls [9,10,11]. According to a study done in Kwara state Nigeria, Babatunde (2011) reported that there was a significant relationship between sex of a child and malnutrition, Male children were more likely to be malnourished than their female counterparts. This is probably due to increased attention paid to female children unlike the male children [12]. Another study done in Botswana revealed that stunting, wasting and underweight were also significantly more prevalent among boys than girls [6]. A study by Olwedo et al.,(2008) on the factors associated with malnutrition in internally displaced persons' camps of Northern Uganda indicated that a male child was nearly two

times more likely to suffer from acute malnutrition compared to a female child (Adjusted odds Ratio of 1.56 at 95% C.I 1.15-2.13 with p-value=0.004**) [8].

Large family size was also reported to be a risk factor by other workers from Ethiopia and Pakistan [13, 14]. Similarly the result of this study showed that the families who had members >five, had an association with stunting at significance of p-value = 0.010.

Poor maternal health and malnutrition often result in the low birth weight of infants, which predisposes many of them to malnutrition early in life [15]. Low birth weight infants were 2.5 times more likely to become stunted than those with a birth weight ≥2500 g (HR=2.50; 95% CI=1.80, 3.47; p<0.0001) [16]. Comparatively this study result revealed that there was significant association of stunting with low birth weight with p=0.039.

In another study conducted in Bangladesh, children within the first birth interval were 1.66 times more likely to be stunted and children whose preceding birth interval was less than two years were 1.32 times significantly more likely to be stunted as compared to children of a preceding birth interval 24 months or above. Similar results were observed for underweight children in Bangladesh [17]. In contrast, in case of this study as the birth interval decreases the risk of being wasted becomes higher with p = 0.044, but there is no significant association with stunting and birth interval. The WHO estimates that under nutrition is a factor in 45% of child deaths-contributing to over 3 million deaths in 2004-including 73% of child deaths due to diarrhea, 44% of pneumonia deaths, 47% of measles deaths, and 45% of deaths due to severe neonatal infections [18,19,20]. Malnourished children have lowered resistance to infection and therefore more likely to die from ailments like diarrhea and acute respiratory infections [10]. Similarly in this study, frequent diarrhea had a significant association with underweight with p = 0.045 and wasting with p = 0.028. This study also showed that wasting was associated with ARI having p value of 0.026 and stunting with p value of 0.001, similar study done in Tanzania showed that underweight was associated with 58% increased risk of ARI [95% confidence interval (CI), 1.29-1.93], wasting was associated with 54% increased risk of ARI (95% CI, 1.25–1.90) [21]. A study conducted in Ethiopia showed that the main associated factor of wasting was childhood illness indicated by fever [3]. Similarly in case of this study, fever was found to have a significant association with wasting with a p value of 0.037. Malnutrition has in some instances been actually considered, and generally is considered as a poverty indicator. Malnutrition leads to sub optimal intellectual development. Knowing that children are the future of any society, an unproductive generation shall thus be prone to be poor, completing this poverty malnutrition chain [22]. Malnutrition continues to be a significant public health problem throughout the low income countries, particularly in Sub-Saharan Africa and South Asia [23]. As the profile of socioeconomic status affects child's nutrition in a positive way this was analyzed using factors like ownership and monthly income, so is in this study. As the family monthly income increases, the level of malnutrition decreases. This was evidenced by a significant association between monthly income with wasting and stunting with p = 0.011 and p = 0.01 respectively. Congruent to this finding, a study conducted in Bangladesh reveals that monthly income was significantly associated with the three indicators of malnutrition namely stunting, wasting and underweight [24]. Unlike other studies, children brought by single parent, paternal and maternal education had no association with malnutrition. The profile of immunization coverage as cause of malnutrition is exceptional in this study, since there was 100% immunization coverage and vitamin A supplementation.

Conclusion

Malnutrition constitutes a major health problem for the individual infants, their families, and the society. At the beginning, this study set out to synthesize the available evidence on assessing the possible risk factors contributing to malnutrition and to discuss the key issues that were important to consider. Based on the findings obtained, special attention should be paid for the means of screening, diagnosing, and early intervention for the possible risk factors contributing to malnutrition in children by responsible bodies in the nutrition unit of the ministry of health of Eritrea in particular and involvement of communities in general. Moreover, the study highly recommends that focus should be given to other possible risk factors like frequent diarrhea and upper respiratory infections as they had strong statistical significance to malnutrition.

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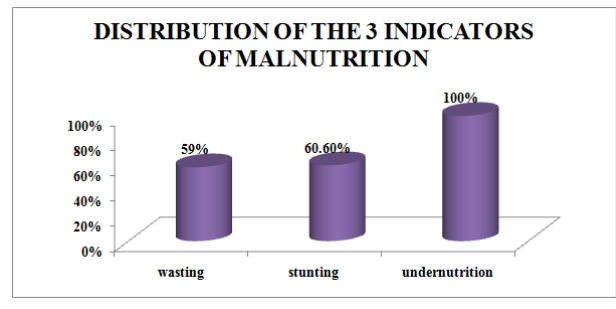
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Characteristics	Frequency	Percentage (%)
Age of Mother		
<20	6	4.7
20-35	86	67.7
>35	35	27.6
Address		
Rural	66	52
Urban	61	48
Maternal Education Level		
illiterate	13	10.2
primary	17	13.4
junior	41	32.3
secondary	51	40.2
college	5	3.9
Fathers' educational level		
primary	23	18.1
junior	28	22.1
secondary	55	43.3
Illiterate college	6	4.7
	15	11.8
Marital status		
single	3	2.4
married	121	95.3
divorced	3	2.4
Occupation of Father		
governmental employee	96	75.6
merchant	1	0.8
farmer	11	8.7
other	19	15
Occupation of Mother		
house wife	109	85.8
farmer	2	1.6
merchant	3	2.4
other	13	10.2

Table 1: Distribution of respondents of malnourished children under 5 years by socio demographic variables in Orotta National Referral Pediatric Hospital, 14th April-23rd May 2014 (N=127)

Characteristics	Frequency	Percentage (%)
Home		
Privately owned	28	22
Rented	99	78
Ownership		
land	20	15.7
livestock	2	1.6
none	90	70.9
other	15	11.8
Number of rooms		
1	97	76.4
2	22	17.3
3	3	2.4
>3	5	3.9
Number of children < 5 years		
1	14	11
2	55	43.3
3	58	45.7
Birth interval		
<1 year	6	4.7
1-2 years	60	47.2
3-4 years	22	17.3
>4 years	9	7.1
only child	30	23.6
Family size		
<5	77	60.6
> 5	50	39.4
Monthly income		
<1000	99	78
>1000	28	22

Table 2: Distribution of respondents of malnourished children under 5 years by socio-economic and family size variables in Orotta National Referral Pediatric Hospital, 14th April-23rd May 2014 (N=127)

Characteristics	Frequency	Percentage (%)
Child Sex		
male	74	58.3
female	53	41.7
Child age in month		
<6 months	12	9.4
6-12 months	19	15
12-36 months	89	70.1
36-59 months	7	5.5
Place of delivery		
Home	38	29.9
health facility	89	70.1
Gestational age at birth		
<9 month	10	7.9
at 9 month	117	92.1
Birth weight in kg		
<2.5 kg	41	32.3
2.5-3 kg	53	41.7
>3 kg	33	26

Table 3: Distribution of malnourished children under 5 years by demographic variables in Orotta National Referral Pediatric Hospital,14th April-23rd May 2014. (N=127)

Characteristics	Frequency	Percentage (%)
Does the child have diarrhea?		
Yes	62	48.8
No	65	51.2
Frequency of diarrhea for those who says yes		
1	2	1.6
2	6	4.7
4-Mar	29	22.8
>4	27	21.3
Does the child have fever now?		
Yes	86	67.7
No	41	32.3
Does the child have acute respiratory infection now?		
Yes	79	62.2
No	48	37.8
Duration of the present illness?		
<2 weeks	68	53.5
2 weeks - 1 month	27	21.3
>1 month	32	25.2

Table 4: Distribution of malnourished children under 5 years by medical condition in Orotta National Referral Pediatric Hospital,14th April-23rd May 2014. (N=127)

Figure 1: Distribution of the 3 indicators of malnutrition in under 5 years in Orotta National Referral Pediatric Hospital,14th April-23rd May 2014. (N=127)

Back ground and Medical Condition			Stunting		Wasting		Underweight	
	Frequency	%	95% CI	P-value	95% CI	P-value	95% CI	P-value
Male Child sex	74	58.30%	-	0.001	-	-	-	-
Family size≥5	50	39.40%	-	0.01	-	-	-	-
Monthly income<1000 nkf	99	78%	-	0.01	-	0.011	-	-
Freq.Diarrhea≥3 times per Day	56	44.10%	-	-	-	0.028	-	0.045
ARI	79	62.20%	-	0.026	-	-	-	-
Fever	86	67.70%	-	-	-	0.037	-	-
Birth weight≤3 kg	94	74	-	0.039	-	0.026	-	-

Table 5: Summary of the Multivariate analysis that test the association of selected background characteristics and Medical conditions with malnutrition

Acknowledgment

Conflict of Interest

Authors declare that they have no conflict of interest.

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