The Professional Medical Journal
www.theprofesional.com

DOI: 10.29309/TPMJ/2020.27.10.4468

ORIGINAL PROF-0-4468

ASSESSMENT OF MALNUTRITION BY DIFFERENT ANTHROPOMETRIC METHODS AND EFFECT OF POVERTY AND MATERNAL EDUCATION AS A BARRIER TO HEALTHY NUTRITIONAL STATUS AMONG CHILDREN UNDER FIVE YEARS OF AGE.

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Article received on:
07/01/2020
Accepted for publication:
17/04/2020

Abstract… Objectives: Pakistan is facing double burden of malnutrition. The purpose of current study was to access the nutritional status by different anthropometric methods and common barriers that affect the nutritional status of children. **Study Design:** Cross Sectional study. **Setting:** Children Hospital & Institute of Child Health Multan, Pakistan. **Period:** From 1st March 2019 to 1ST January 2020. **Material & Methods:** The study 405 children with 216 boys and 187 girls. The data was collected by trained nutritionist in OPD of Children Hospital & Institute of Child Health and data was analyzed by using SPSS version 21.0. **Results:** The study showed that malnutrition is caused by poor socioeconomic status and low education level of care giver. The data showed that 318 (78.51%) participants involved in this study were malnourished. Nutritional status mostly affected during first birthday (36.79%). In this study 50.12% participants belonged to poor nutritional status and 47.65% mother were uneducated. **Conclusion:** The mother education and good socioeconomic status can prevent children from malnutrition. Feeding practices and weaning starting time also play role in defining nutritional status of children. More prone to diseases so well balanced diet and mother feeding upto-2 years of age can prevent children from chronic diseases and improve nutritional status.

Key words: Appetite Test, Malnutrition, Nutrition Security, Nutritional Status, Mid Upper Arm Circumference, Maternal Education.

Article Citation: Ali H, Khan S, Ali I, Abbas A, Arshad R, Akram I, Ajmal A. Assessment of Malnutrition by Different Anthropometric Method and Effect of Poverty and Maternal Education as a Barrier to Healthy Nutritional status among Children under Five years of Age. Professional Med J 2020; 27(10):2122-2128. **DOI:** 10.29309/TPMJ/2020.27.10.4468

INTRODUCTION

Nutrition plays a key role in maintenance of standard of life among children and adults.[1] Malnutrition leads toward various illnesses and the risk of mortality and morbidity rate increased among children and adults and this directly affect the economy of a country. Malnutrition occurs when intake between energy and nutrients are deficient or excess. It divided into three broader groups under nutrition: it includes underweight (low weight for age), stunting (low height for age) and wasting (low weight for height), Micronutrient related-malnutrition: includes micronutrient access or micronutrient deficiencies and Overweight, Obesity and Diet related non communicable diseases includes diabetes, stroke, heart disease etc. Worldwide, children under five years of age roughly calculation 230 million are long standing malnourished and half of them die by malnutrition.[2]

Numerous studies have showed that malnutrition is linked with significantly increased risk of mortality and morbidity in the short-term as well as work capacity reduced significantly and due to this productivity in life later also changed.[3] Many studies also showed that malnutrition is common in people whose background is poor and not affording nutrient rich food. Malnutrition is common in low and middle income countries.[4] Food access and security affected by household income, health services and hygiene also affect the nutritional status. Good nutritional and hygienic practices results in good nutritional status of children under five years of age. Children under five years of age are very sensitive to

pathogens and nutrition.[5] Many anthropometric techniques are available to check the nutritional status of children and adults which include body mass index (BMI), mid-upper arm circumference (MUAC), measurement of the thickness of triceps or subscapular skinfolds, and calf circumference.[6]

Anthropometric techniques like MUAC and height to weight ratio contemplate less dependable for evaluate malnutrition than advanced but costly body composition evaluation skills such as electronic bio-impedance, dual energy X-ray absorptiometry hydro-densitometry, and so on.[7,8,9] The technique and instrument used for MUAC and height to weight ratio are inexpensive, less time consuming and easy to use and can be used with little training.[9,10] To evaluate the nutritional status and adiposity body weight checked in kg and height in meter square and then divide the given weight by height and Nutritional status evaluate. This method is non-invasive and inexpensive with less training and efforts, therefore it is widely used in any health survey and at clinic to minimize the time duration for evaluating nutritional status in developing country.[11,12] BMI cut off values 18.5-24.9 kg/m^2 is considered as good sign of nutritional status and BMI <18.5 kg/m^2 considered underweight less reliable for energy storage in body. Their energy intake considered equal to energy expenditure and more prone to chronic diseases. BMI >24.9 kg/m^2 are also in undesirable range of nutritional status and are also more prone to different diseases.[13] Research studies proposed that BMI is a responsive indicator for nutritional deficiencies and considered a critical determinant of morbidities connected with malnutrition[14], and also an indicator of low socio-economic status of a family of a country.[12,15] MUAC, a well-liked anthropometric measurement method for evaluating the nutritional status of less than five years of age children, can also been used in resource-limited community for assessing nutritional status.[16,17] For anthropometric measurement MUAC usage was considered most reliable with lesser equipment required and less time consuming than BMI for assessment of underweight and is being used since a long time.[17,18] Therefore, this current study was aimed to access nutritional status by different anthropometric methods and common barriers to achieve healthy nutritional status.

MATERIAL & METHODS

This is a cross sectional study conducted in Children hospital & Institute of Child Health Multan, Pakistan. The total participants involved in this study are 405 which are below five years of age and 318 participants were malnourished and only 87 children were normal. Out of 318 malnourished children 167 were boys and 151 were girls. Data collected by trained nutritionist. These participants belonged to different socio-economic status and mostly were from rural areas of region Multan.

The approval from higher authority was taken and during data collection all ethical the consent from mother was also taken so that no objection from the participants is involved later. Care taker of children were agreed from collection of data for study.

Selection of children for study based on consent which parents gave permission of data utilization in study only those children were involved in this study and came hospital for proper follow up. The children which were in sever critical condition and had chronic diseases were excluded from study.

The data collected in questionnaire base performs. Performa were filled by trained nutritionist in OPD of Children Hospital & Institute of Child Health hospital while taking their history. Different types of question were on Performa including socioeconomic. Appetite test also checked by feeding RUTF. If ate one third of RUTF then their appetite as positive. They called malnourished if their weight is less than weight recommended by World Health Organization (WHO) and MUAC base cut off value also used to check their nutritional status.

After data collection by using SPSS version 21.0 data was analyzed and according to WHO cut off values malnourish and normal children were declared.

RESULTS

The study was conducted in Children hospital & Institute of Child Health Multan and contained 405 children under five years of age. 216(53.3%) children were male and 187(46.17%) were female. The mean age was 20.12±4.3 and 56(13.83%) participants were belonged to upper status and 203(50.12%) were belonged to lower class family. Mother education were also low. A total of 193(47.65%) participant's mothers were uneducated and only 92(21.71%) mothers were primary educated (Table-I).

Different assessment method used to assess the nutritional status of children in study. According to MUAC method 228(56.29%) participants were SAM (MUAC less than 11.5 cm) and 102 (25.19%) participants were MAM (MUAC between 11.5 to 12.5 cm). The weight for height ratio also checked to assess their nutritional status. Only 86(21.23%) participants were normal (<-1SD) and 246(60.74%) children were SAM (-2 SD-<-3SD). BMI also showed that 319 participants were severe wasted. 72(17%) were having grade II edema and 106(26.17%) participants were dermatitis. Appetite test for 132(32.39%) were positive (Table-II).

Feeding method was checked of participants, only 119(29.38%) participants feed on mother milk. At the 4 month of age complementary feeding started to 94(23.21%) children and at the age of 6-month complementary feed started to 226(55.80%) children. Diarrhea was found in 267 children on admission followed by vomiting 119(29.39%) and fever 107(26.42%) children were severely sick. There were only 88(21.72%) participants were those whose energy intake was normal (Table-III).

The chi square test was found significant (p-value <0.05) among nutritional status and age groups. Nutritional status according to gender also checked. Percentage of girls was more affected than girls by malnutrition. 80 % girls affected by malnutrition while 77 % boys were affected. More children affected before their first birthday as compared to 5th birthday (Table-IV).

Characteristics	No. of Participants	Percentage (%)
Gender		
Male	216	53.3%
Female	187	46.17%
Age-group (Month)		
0-12	146	36.4%
13-24	98	24.19%
25-36	67	16.54%
37-48	56	13.83%
49-60	38	9.38%
Socioeconomic status		
Upper	56	13.83%
Middle	146	36.05%
Poor	203	50.12%
Mother Education		
Primary	92	22.71%
Middle	84	20.74%
>middle	42	10.37%
Uneducated	193	47.65%
Residence		
Rural	286	70.62%
Urban	119	29.38%

Table-I. Gender, Age distribution and socio-demographic status of children with SAM.

Characteristics	No. of Participants	Percentage (%)
MUAC		
<11.5 cm SAM	228	56.29%
11.5-12.5cm MAM	102	25.19%
>12.5cm Normal	75	18.52%
Weight for Height		
<-1SD Normal	86	21.23%
-1SD-<-2SD MAM	73	18.03%
-2SD-<-3SD SAM	246	60.74%
Severe Wasting	319	78.76%
Edema bilateral		
Grade I	37	9.13%
Grade II	68	16.79%
Grade III	72	17%
Dermatitis	106	26.17%
Appetite test		
+ve	132	32.39%
-ve	273	67.41%

Table-II. Different assessment methods for nutritional status.

Characteristics	No. of Participants	Percentage (%)
Feeding method		
Bottle feeding	187	46.17%
Cup feeding	99	24.44%
Mother feeding	119	29.38%
Complementary Feeding start		
<4 month	94	23.21%
At 6 month	226	55.80%
At 1 year	85	20.99%
Appetite		
Good	141	34.82%
Bad	264	65.18%
Symptoms at Presentation at OPD		
Diarrhea	267	65.72%
Vomiting	119	29.39%
Fever	107	26.42%
Anaemia	198	48.88%
Glossitis	74	18.27%
Cheilosis	65	16.04%
Old wise man face	67	16.54%
Baggy pent appearance	55	13.58%
Eye sign		
Corneal ulceration	34	8.39%
Bitots spot	21	5.18%
Energy Intake		
Normal	88	21.72%
Moderate	106	26.17%
Very low	211	52.10%

Table-III. Feeding assessment and energy calculation at the time of admission.

Characteristics	Nutritional Status		Total N (%)
	Malnourished N (%)	Normal N (%)	
Age-group (month)			
0-12	117 (80.14)	29 (19.86)	146 (100)
13-24	77 (78.57)	21 (21.43)	98 (100)
25-36	52 (77.61)	15 (22.39)	67 (100)
37-48	46 (82.14)	10 (17.86)	56 (100)
48-60 $X^2 = 17.76$	27 (71.05) P-value <0.05	11 (28.95)	38 (100)

Table-IV. Distribution of nutritional status of studied children according to age.

DISCUSSION

Under five years of age having nutritional status in normal range become challenging in Pakistan. Nutritional status of boys affected more than girls. In this conducted study 318 participants were malnourished, out of total malnutrition children 52.52% were boys and 47.48% were girls. In this conducted study 56.29% children were severe acute malnutrition, 25.19% children were moderate acute malnutrition and 18.52% children were normal. Similar results was reported by Laghari et al.[17], documented 43.20% were mild malnourished 12.70% were moderate malnourished and 10.20% were severe malnutrition.

Lodhi et al., found that underweight children were 21% in which severely underweight children were 50% and among them 22% were male and 19% were girls. This high level of malnutrition may be due to acute diseases and feeding practices.[19] 46.17% children involved in study were on bottle feeding and 24.44% were on cup feeding and only 29.38% children were on mother feeding. In our conducted study 78.76%% were severely wasted. Under five years of age underweight ratio was reported in in other countries like Bangladesh (48.0%), India (47.0%), Afghanistan (39.0%) and Nepal (48.0%).[20]

In 2018 National Nutritional Survey conducted, according to this survey 40.2% children under five years of age were stunted, 17.7% were wasted, 28.9% were underweight and 9.5% were overweight. According to this survey boys were more prone to risk than girls.[21] Present study reported that only 119 participants feed on mother milk and 187 were feed on formula milk and 99 were feeding through cup. At the 4 month of age weaning started to 94 children and at the age of 6-month weaning started to 226 children and 85 children were those whose weaning started at the age of 1 year.

Energy intake level of 88 participants were normal. Energy intake level of 211 participants were low. Mother education and residential status also a contributor factor in malnutrition to some extent. In this study more children that were malnourished belonged to rural areas and their mother education were also low. Previous study 22 reported that malnutrition linked with low socioeconomic status, food insecurity and poor feeding. Insufficient access to education,

nutritional facilities and healthcare leads toward malnutrition. Low education rate, poverty, food safety, food insecurity, large families and women's education all factors leads toward the malnutrition.[23]

Children nutritional status under five years of age is a measure of children survival and household well-being. Infant and children mortality rate is high due to malnutrition. Breastfeeding prevents from different chronic diseases and maintain a strong immunity level in children which protect children from different diseases. Breastfeeding can minimize mortality rate in infants and children.[24] These are the real determinants of undernourishment in society as they impact on the quality of life directly. Nutritional status affect the health of infants and children. Good nutritional status helps good health maintenance and physical growth results in good mental health. Poor nutritional status leads towards the poor physical growth and mental health. Poverty and low education level is linked with malnutrition in Pakistan.[25] Due to mother's less education, they started breastfeeding late and follow poor feeding and hygienic practices in children which are under two years of age due to which diarrhea and vomiting practices are common which leads towards the poor nutritional status.[26] For proper nutrition of children primary barrier is inadequate food resources. The availability of variety of food was limited, and mothers also failed to provide food that is mandatory in specific periods of life to maintain a proper growth of children.

CONCLUSION

In this study examined that prevalence of malnutrition under five years of age is significantly high in Multan region. Low socioeconomic status of family due to which people did not afford variety of food and nutrition leads towards malnutrition. Low education level of mother also contributor in malnutrition because mother had less knowledge of introducing right food at right time. Feeding practice and weaning time showed that bottle feeding and late start of weaning leads towards malnutrition. Breastfeeding prevent children from different chronic diseases. Complementary feeding at the age of 6 month normalize the growth of baby. Proper checkup of nutritional status (MUAC) helps the mother taken precautionary measures at right time to continue children growth.

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2	Saadia Khan	Critical revision of article, final revision of article.	
3	Ibad Ali	Final revision of article, Final approval for submission.	
4	Asad Abbas	Drafting of the article, Final revision of article and statistical review of final draft.	
5	Reema Arshad	Statistical expertise and analysis and interpretation of data.	
6	Iqra Akram	Collection and assembly of data, Analysis and interpretation.	
7	Abeeha Ajmal	Collection and assembly of data.