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Prevalence of Malnutrition in Pediatric Inpatient Cases

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[AR]Conception and design, Collection and assembly of data, [I]Analysis and interpretation of the data, Statistical expertise, [AA]Final approval and guarantor of the article

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A B S T R A C T

Background: Malnutrition worsen the nutritional health and increases the disease burden in children living in underdeveloped countries. Under-nutrition is a very common issue in under developed countries where many people are starving due to unavailability of food.

Objective: The purpose of the study was to determine the prevalence of malnutrition and nutritional risk factors in hospitalized children in Lahore.

Methodology: Risk of malnutrition and nutritional status was identified in 166 hospitalized children from different hospitals of Lahore by Anthropometric measurements and Nutritional Risk Score.

Results: Total 166 children were included in the study. The frequency of overweight, obese, stunted and wasted children were 10.8%, 10%, 32.5% and 12% respectively. About (65.7%) undernourished children were prevalent with ages of 1-24 months and 52% of overweight and obese children were between 2-5 years of age. Total sixty eight percent (68.1 %) children were categorised as high nutritional risk whereas 18.1% were observed with no nutritional risk based on Nutritional Risk Score (NRS). Children having high risk of malnutrition had lower height for age (p=0.000), weight for age (0.000), and BMI percentiles (0.003) as compared to the children with lower risk of malnutrition.

Conclusion: The current study concluded a significant number (32.1%) of stunted growth in hospitalized patients indicated the poor socioeconomic status of babies with ages 1 -24 months. While fifty-two percent (52 %) of children were observed with overweight and obese between 2-5 years of ages directed the concept of unawareness of maternal knowledge about nourishing their kids. High malnutrition rates in children is alarming and often result in hospitalization of babies with increase risk of serious health complications.

Keywords: Diabetes mellitus, endocrine disorder, Thyroid dysfunction, HBA1C, Hyperglycaemia,

Introduction

Malnutrition is deficiencies, excesses or imbalance intake of nutrients and energy by a person and results in both long and short term negative health outcomes. It covers two broader terms; over-nutrition and under-nutrition. Over nutrition includes both overweight and obesity. The childhood obesity prevalence has been increased during past few decades in all over the world. Childhood obesity can result in serious health outcomes like type 2 diabetes, dyslipidemia, polycystic ovary syndrome, orthopaedic problems and psychological disorders. [1]

Under-nutrition counts underweight (low weight for age), wasting (low weight for height) stunting (low weight for age), and micronutrient deficiencies (shortage of important vitamin or mineral). Under-nutrition is a very common issue in under developed countries where many people are starving due to unavailability of food. One of the factors of under-nutrition is

a high burden of parasitic and other infections due to unhygienic practices in low economic countries. Under-nutrition has increased the mortality rate due to diarrhea, respiratory diseases and infections such as measles. Chronic diseases can contribute to secondary malnutrition due to long stay at hospital, inability to take proper food and effects of medications. Under-nutrition causes delayed recovery from disease thus increasing the load of medical services. A study conducted in 53 developing countries showed that half of the children deaths (56%) were attributable to potentiating effect of malnutrition .[2]

Assessment of nutritional status is quite difficult because a single factor is not involved in assessing the nutritional status rather many factors is involved. Malnourished people can be identified easily, but it is quite difficult to pinpoint those who are at risk of becoming malnourished. Early screening of malnutrition and provision of appropriate nutritional support can prevent short and long term serious nutritional disorders in children. Nutritional risk score (NRS) has been developed to assesses food intake (ability to eat or retain, appetite), % ideal IBW for height and stress factor (effect on nutrition by medications). It consists of a questionnaire which makes it more convenient with no laboratory records. The score can be reproducible and can be applied to both adults and paediatrics.[3]

This global average reflects a wide range of prevalence levels. The prevalence of overweight in Africa and Asia is below 10% and in the Americas and Europe, it is above 20%. In USA, prevalence of obesity in adolescents has increased dramatically from 5% to 13% in boys and from 5% to 9% in girls. If sustained at this rate over the next 10 years, the prevalence of obesity will rise by another 74%, with fully one third of the US population becoming obese by 2030.[4]

The main objective of this study was to regulate the prevalence of malnutrition in hospitalized children in Lahore and to determine the nutrition risk of children via applying nutritional risk scoring.

Methodology

This was a cross-sectional study. Patients admitted in pediatric departments of various tertiary care hospitals of age ranging from 1 month to 17 years were included in this study.

Exclusion criteria: Children admitted in emergency department or in intensive care unit (ICU) , children with bony deformities, oncology patients, those which are dependent on oxygen supply, patients with poor hydration status (e.g. pleural effusion, severe liver disease, ascites, cardiac insufficiency, anasarca) were excluded from study because nutritional measurements become limited in these patients.[5]

List of patients was made, who had fulfilled the inclusion and exclusion criteria. Questionnaire had fulfilled by taking the data from the patient's caregiver or parent. Consent of patient's parent or caregiver was taken prior adding in the study. The University of Veterinary and Animal Sciences in Lahore, Pakistan, has an ethical committee that approved the study. A simple questionnaire was developed consisting of eighteen questions. The questionnaire was semi close ended. Questions were asked from parents or caregiver who had been with the patient. It usually takes 3-5 minutes. Questionnaire starts from patients' name, demographic characteristics, socioeconomic status and end with eating habits of the patients assessed through NRS questionnaire. Demographic characteristics include name, gender, age, height and weight. We also have a question regarding speciality which includes two options, (General medicine and Allied, General surgery and Allied). Other option consists of duration of stay the patient in hospital which includes 3 simple options, (up to 1 Day, 1-3 Day, and more than 3 Day).

Weight and height measurements of all children were taken according to standard method. BMI of children aged 2 or more years was calculated. Anthroplus software was used to calculate z scores (weight for height z score, weight for age z score, height for age z score). Weight for age, Height for age and BMI percentiles were also calculated. Cole's standard was used to define obesity [6] while WHO criteria was used for under-nutrition. [7]

NRS screening tool was used to assess nutrition risk in hospitalized children. [3] Which consists of four categories i.e. appetite, ability to eat, stress factor and expected weight for length. These categories further consist of 3-4 options. Then options were analyzed by scoring. Scoring was classified as low risk (0-3 score), moderate risk (4-5 score); high risk (≥7 score).

Socioeconomic status was assessed by different questions including: family system (nuclear or joint), Occupation (low skilled or high skilled), housing system (Rent paid or Own), Education level (Lower Education or Higher Education) and employment status (Unemployed, Employed or Low-Employed) and monthly income of the patient's parent.

SPSS version 22 was used for data entry and analysis. Student t test and chi square was used to compare

means of continuous variables, to find the significant relation between categorical variables respectively. Descriptive statistics was used to describe anthropometric measurements and demographic characteristics of children.

Results

The study population consists of 166 children, 85(51.2%) out of 166 were male and 81 (48.8%) were female. Children of ages less than 2 years were 46 (27.7%) in table I.

Table I: Demographic characteristics of study participants (n=166)

Demographic Characteristics	Number (%)
Gender	
Male	85 (51.2)
Female	81 (48.8)
Age (year)	
0-2	46 (27.7)
2-5	62 (37.3)
5-10	48 (28.9)
10-18	10 (6.0)

Table II: Incidence of malnutrition among hospitalized children (n=120)

Anthropometric Measurements	N0. (%)
Weight for height z-score ≤2	20 (12.0)
Weight for age z-score ≤2	46 (27.7)
Height for age z-score ≤2	54 (32.5)
BMI percentile categories	
85-95	13 (10.8)
≥95	12 (10.0)

The Mean of BMI, weight for age, height for age percentiles were 27.8, 28.8 and 34.5 respectively. WHO criteria were used to classify wasted, stunted and underweight children. According to WHO criteria, 27.7% children underweight, 32.5% stunted and 12% wasted. Out of 166, children of age more than 2 years were 120 in number, whose BMI was calculated and of which 25 (15%) children were either obese or overweight. Anthropometric measurements of 166 hospitalised children had calculated, and grouped according to their levels of undernutrition (Stunting & Wasting). Those with BMI > 85% (overweight and obese) were classified in the subset of 120 kids who were 2 years old or older (Table II).

Table IV: Socio-demographic characteristics of undernourished and over-nourished children (n=95)

	Over-nourished (n= 25)	Undernourished (n=70)	*p-value*
Gender	N0. (%)	N0. (%)	
Female	13 (52.0)	33 (47.1)	0.911
Male	12 (48.0)	37 (52.9)	
Age categories (years)			
0-2	-	46 (65.7)	0.000
2-5	13 (52.0)	12 (17.1)	
5-10	11 (44.0)	9 (12.9)	
10-18	1 (4.0)	3 (4.3)	
Socio-economic* status			
Lower	13 (52.0)	46 (65.7)	0.000
Middle	9 (36.0)	19 (27.1)	
Upper	3 (12.0)	5 (7.1)	

***Socio-economic status: Lower = family income ≤ Rs.30, 000; Middle= family income Rs. 30,000-100000; Upper = family income > Rs.100000**

The socio-economic status, age, gender of children (95) with malnutrition were estimated by comparison between

Table III: Frequency of average dietary element occurrence in study participants (n=166)

Scores of Individuals	**N0. (%)**
Scores of Appetite	
0 (Healthy appetite)	50(**30.1**)
2 (poor intake leaves > than 1/2 food)	75(**45.2**)
3 (no appetite, NBM > 24 h)	41(**24.7**)
Ability to eat score	
0 (No vomiting or diarrhea, no difficulty taking food)	51 (**30.7**)
1 (problems handling food, regurgitation, vomiting, mild diarrhea)	71(**42.8**)
2 (needs help with feeding, moderate vomiting and/or diarrhea 1-2/day)	25(**15.1**)
3 (unable to take food orally, complete dysphagia, severe vomiting &/or diarrhea >2/day)	19(**11.4**)
Stress factors scores	
0 (admission for investigations only)	50(**30.1**)
1 (minor surgery or infection)	45(**27.1**)
2 (chronic disease, major surgery, IBD, other GI diseases)	48(**28.9**)
3 (number of wounds, broken bones, blisters, severe infection, and cancer)	23(**13.9**)
Weight percentile scores	
(Expected weight for length)	**54 (32.5)**
(90-99% EWL) 2	**20 (12.0)**
(80-89% EWL) 4	**28 (16.9)**
(79% EWL>) 6	**64 (38.6)**

undernourished and obese + overweight groups. BMI scores of children who are less than 2 years of age were not calculated. No significant relation was found between genders, undernourished, obese/ overweight and children**.** The highest number of undernourished children 46(65.7%) was in 0-2 years of age group. Whereas in the 10-18 years of age group only 1 child (4%) child was obese/overweight and 3 were undernourished. Majority of the undernourished (65.7% children) and overweight/obese (52% children) fall in low socio-economic status (Table III).

Out of 166 children, 30 (18.1%) were categorized as possessing no nutritional risk, while 113 (68.1%) were classified as high nutritional risk. According to score of individuals score majority of the children 75 (45.2%) had poor appetite i.e. they leave> than 1/2 food, majority of the children 71 (42.8%) had difficulty in ability to eat like mild diarrhea, problems handling food, regurgitation, vomiting frequently**.** However, 28.9% children had stress factor like GI diseases, major surgery, chronic disease, Inflammatory Bowel Disease. 33% children had EWL, whereas 39% children had <79% EWL (Table IV).

The background, anthropometric and demographic characteristics of hospitalized children with high and low risk was contrasted. The significant differences in mean ages (months) gender, and age categories was found in years between low risk and high risk categories (p=0.037, 0.006, 0.000 respectively). The mean weight for age, BMI, height for age percentiles were higher in low risk as compared to high risk (p=0.000, 0.003, 0.000 respectively). No significant difference in general medicine and surgery allied was found between low and high risk categories (p=0.299) in table V.

Table V: Attributes of children with high and low risk NRSs .(n=166)

Characteristics	Low risk NRS (n=53)	High risk NRS (n=113)	*p*-value
Gender	**N0. (%)**	**N0. (%)**	
Female	20 (37.7)	61 (54.0%)	0.037
Male	33 (62.3)	52 (46.0%)	
Age (months)	**Mean ±SD**	**Mean ±SD**	
	44.67 ±23.70	62.62 ±43.90	0.006
Age (years)	**N0. (%)**	**N0. (%)**	
0-2	13 (24.5)	33 (29.2)	0.000
2-5	31 (58.5)	31 (27.4)	
5-10	9 (17.0)	39 (34.5)	
10-18	0 (0.0)	10 (8.8)	
Anthropometric Measurements	**Mean ±SD**	**Mean ±SD**	
Weight for age (percentile)	49.39 ±26.09	17.35 ±23.76	0.000
Height for age (percentile)	45.41 ±29.63	20.96 ±26.54	0.000
BMI percentile	46.60 ±36.80	28.61 ±35.44	0.003
Specialty	**N0. (%)**	**N0. (%)**	
General medicine and allied	50 (94.3)	101 (89.4)	0.299
General surgery and allied	3 (5.7)	12 (10.6)	

Discussion

In clinical nutrition assessment of the dietary condition of children is a main predictor to determine development and normal growth of these children. Populations of children require accurate and adequate status of nutrition. The objective of this research is to find malnutrition status in hospitalized children in

Pakistan and has resolute high risk of malnutrition in a large population of children. Recently we have more nutrition concern from under nourished to over nourished children in Pakistan. Prevalence of obesity and overweight are common among hospitalised patients was 25% in this research. The globally prevalence of children`s high weight and obesity were 4.2% in 1990 and extended to 6.7% in 2010 and was anticipated to expand 9.1% in 2020. In the current study 27.7% children were underweight and 15% children were either overweight or obese. Majority of undernourished and obese / overweight children fall in low socio-economic status and was in age group of 0-2 and 10-18 years. As in 2004 survey of America majority of overweight girls were fall in low socio-economic status [8] and there was no relationship found between obesity and SES according to study conducted in New South Wales. [9] The frequency of undernutrition described in Australian tertiary paediatric hospital were alike to that reported in this research[10]. Children in severe condition admitted to ICU or any other clinical settings that may accommodate dietary condition of children in hospital were excluded from Research. Frequency of undernourished children admitted in hospital of developing countries is greater than this Australian data[11,12]. In this study more than half of the children were undernourished. Comparatively less number of children was determined at nutritional risk in some other studies. [13-16]

Many factors were involved to increase nutritional risk score including poor appetite affect 45.2% children, difficulty in ability to eat (vomiting, diarrhoea, regurgitation) affect 42.8% children, and 28.9% children had stress factor like GI diseases, major surgery, chronic disease, Inflammatory Bowel Disease. These results feature the relation between nutrition and severe illness during hospitalization. Those children having longer stay in hospital was at more danger of malnutrition, as in this research mean BMI, weight for age, height for age percentiles were higher in low risk as compared to high risk, which plays an important role in prolonged hospital

stay and also increased risk of infection develop from hospital during long stay which enhance the rate of malnutrition.[17-19] During hospitalization the major cause for nutritional compromise were high stress factors and low BMI. The NRS tool utilization in this study was due to its easy administration over another tool.[20]

While in different European settings further three NRS applications are available. In hospitalised children aged from 2 to 17 years the screening tool develop in Great Britain was Malnutrition in Paediatrics (STAMP) tool.[21] Second tool (PYMS) and third tool (STRONG kids) was developed for assessment and slightly different information was required by these three tools to assess nutritional risk during hospitalisation. This study provides the latest information on the frequency of malnutrition and undernutrition risk in a prospectively recruited group of hospitalised Pakistani children. Extended recruiting and monitoring intervals as well as information on the frequency of nutritional consultations throughout the study duration could have proven helpful. This was important to consider the different factors had influence on nutritional status. In conclusion, it was proved that rates of obesity and overweight in hospitalized children were different as compared to general Pakistani population and demonstrated high malnutrition risk in these children. The recommendation from the findings is that: routine nutritional assessment of hospitalized children should be done using anthropometric measurements. Initial screening at the time of admission in hospital could permit on time recognition of such children who are at high nutritional risk and also helpful to focus on further assessment and timely intervention.

Conclusion

The current study concluded a significant number (32.1%) of stunted growth in hospitalized patients indicated the poor socioeconomic status of babies with ages 1 -24 months. While fifty-two percent (52 %) of children were observed with overweight and obese between 2-5 years of ages directed the concept of unawareness of maternal knowledge about nourishing their kids. High malnutrition rates in children is alarming and often result in hospitalization of babies with increase risk of serious health complications.

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