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Hospital Based Prevalence of Malnutrition in Pediatrics

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ABSTRACT
Background: Malnutrition constitutes a major public health concern worldwide and serves as an indicator of hospitalized patient's prognosis. Nutritional support is an essential aspect of the clinical management of children admitted to hospital. Malnutrition has been long associated with poor quality, poor diet and inadequate access to health care, and it remains a key global health issue that both stems from and contributes to weakness, with 50% of childhood deaths due to principal under nutrition.
Methods: The present hospital based cross sectional study was conducted in Apr to Dec 2015 among 300 rural adolescents in 9–18 years age (146 boys and 154 girls) attending the outpatient department at Patna Medical College and Hospital, Bihar, India, belonging to the all caste communities. The nutritional status was assessed in terms of under nutrition (weight-for-age below 3rd percentile), stunting (Height-for-age below 3rd percentile) and thinness (BMI-for-age below 5th percentile). Diseases were accepted as such as diagnosed by pediatrician, skin specialist and medical officer.
Results: The prevalence of underweight, stunting and thinness were found to be 31%, 22.3% and 30.7% respectively. The maximum prevalence of malnutrition was observed among early adolescents (23%–54%) and the most common morbidities were diarrhoea (16.7%), carbuncle / furuncle (16.7%) and scabies (12%).
Conclusion: Malnutrition among hospitalized under five children and around suffers moderately high rates of malnutrition. Present nutrition programs attention on education for at risk children and referral to regional hospitals for malnourished children. Screening tools to classify children at risk of developing malnutrition might be helpful.

Key-words: Hospitalized children, Malnutrition, Morbidities, Prevalence, Stunting

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INTRODUCTION
Adequate nutrition is essential in early childhood to ensure healthy growth, proper organ formation and function, a strong immune system, and neurological and cognitive development. Economic growth and human development require well nourished populations who can learn new skills, think critically and contribute to their communities. Child malnutrition impacts cognitive function and contributes to poverty through impeding individuals' ability to lead productive lives.

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In addition, it is estimated that more than one-third of under five deaths are attributable to under nutrition [1-2].
Nutritional support is an essential aspect of the clinical management of children admitted to hospital [3]. Several studies have reported that poverty, inadequate access to a balance diet and underlying diseases (tuberculosis, malaria, diarrhea, etc.) contribute to high levels of malnutrition [4-6].
Death and disease in developing countries are often primarily a result of malnutrition and malnutrition remains the underlying cause of one out of every two such deaths [7–9]. A recent study by the World Health Organization (WHO) also demonstrates that child death and malnutrition have a substantial unequal, global distribution [10].

Definition of Malnutrition
Malnutrition can be defined as a state of nutrition in which deficiency or excess of energy, protein, and other nutrients causes measurable adverse effects on tissue and body form and function, and clinical outcome. Malnutrition can be of

the acute, chronic or mixed type. Acute malnutrition is the type that usually occurs in illness, but children with underlying chronic diseases who are admitted to the hospital because of an acute illness can also present with chronic malnutrition. Anthropometric variables are used to define nutritional status worldwide but various classification systems and cutoff points are used to define malnutrition. One such classification method includes kwashiorkor and marasmus. These terms were originally established to describe syndromes of protein-energy malnutrition in children in developing countries.

BMI (Body Mass Index) to described Malnutrition

Various definitions are used to describe the prevalence of malnutrition. Most commonly, for wasting or acute malnutrition, WFH SD scores are used, and for chronic malnutrition, HFA SD scores are used. The likelihood of malnutrition is defined using a cut-off point of -2 SD. One criterion that is currently used more frequently is the BMI. The BMI is a simple and reproducible index that reflects body composition and function. Since the 1960, BMI has been used to assess obesity in adults. This statistical approach does not use weight-for-height index and does not define the reference population in 1999, the World Health Organization [11].

Recently, Cole et al.[12] determined cutoff points for BMI to define thinness. A thinness cutoff linked to 17 kg/ m^2 was close to the wasting cutoff based on 2 SD scores. Globally, it is estimated that there are nearly 20 million children who are severely acutely malnourished, most of them live in south Asia and in sub-Saharan Africa [13]. Currently, the WHO recommended the use Z- Score or SD system to grade under nutrition. This method measured all the three indices and expresses the results in terms of Z scores or standard deviation units. Children who are more than 2 SD below the reference median (*i.e.* a Z- Score of less than -2) are considered to be undernourished i.e. to be stunted, wasted or to be underweight. Children with measurements below 3 SD (Z- Score of less than -3) were considered to be severely undernourished [14].

MATERIALS AND METHODS

Study design

This is a cross-sectional study that assesses the Hospital based Prevalence of malnutrition and associated factors among children aged 1–5 years.

Study area and period

A hospital based cross sectional study was carried out in the duration of April to Dec 2015 in the department of pediatrics, Patna Medical College and Hospital, Bihar, India. 300 children in the age group of 10-19 years attending OPD at the PMCH was examined by the team comprising of doctor, social workers and interns. Information was collected regarding any health complaints in the present. Body weight was measured (the nearest 0.5 kg) with the subject standing motionless on the weighing scale and with the weight distributed equally on each leg. Height was measured (the nearest 0.5 cm) with the subject standing in an erect position against a vertical scale and with the head positioned so that the top of external auditory meatus was level with the inferior margin of the bony orbit. Nutritional status of the adolescents was assessed through weight for age (underweight), height for age (stunting) and BMI for age (thinning) according to WHO criteria [15]. Socio-economic status (SES) was determined by using modified Prasad's scale [16]. General examination of all the adolescents was carried out in good natural light. Consent of the ethical committee was taken prior to conducting the study. Informed verbal consent was taken from the interviewed subjects. The information was collected on pre designed and pre tested Performa. Data thus generated was entered and analyzed using SPSS 22 version software package.

Criteria for age and diagnosis: Exact age of the child was established from birth certificate/ school identification card, immunization card or recall method (to the nearest month using calendar of local events). Diseases were accepted as such as diagnosed by paediatrician, skin specialist and a medical officer.

Inclusion criteria: Children of 9–18 yr attending OPD.

Exclusion criteria: Children who were seriously ill, too agitated and unwilling for anthropometric measurements were excluded from the study.

STATISTICAL ANALYSIS

The collected data was entered and analyzed using SPSS 22. Frequencies and percentages were given for qualitative variables. Chi-square test was used to test for significant association of the proportion. All reported of p-values 2-sided and < 0.5 p-value regarded as significant.

RESULTS

A total of 300 adolescents were participated in the study. Out of them 146 were boys and 154 were girls between the ages of 9 to 18 years. Early adolescents age group (9–12 years) in which the growth spurt takes place, were observed to be at highest risk of underweight i.e. 53.8% as a compared to mid adolescents *i.e.* 23.7% according to weight for age and late adolescents (23.6%), whereas thinning in more early adolescent is 37.0 % as compared to mid adolescents (31.5%) according to BMI for age.

While if we talk about the stunting among boys & girls i.e. approximately equal suffering 49.3% in boys and 50.7% in girls. The 46.3% mid adolescents were more stunted as compared to early (2.84%) and late adolescents (25.4%)

Generally prevalence of malnutrition decreases as the level of education increases. Maximum prevalence of malnutrition was observed in class IV & V socio-economic status of the subjects. Here number of normal subjects was double of the underweight subjects while number of normal subjects was quadruple of the stunting subjects. The prevalence of malnutrition was as increases as the number of socioeconomic class increases.

Table 1: Nutritional status of adolescents (underweight, stunting and thinning)

Variables		Under weight (%) N=93	Normal (%) N=207	Stunting (%) N=67	Normal (%) N=233	Thinning (%) N=92	Normal (%) N=208
Sex	Boys (146)	40 (43.0)	106 (51.2)	33 (49.3)	113 (48.5)	43 (46.7)	103 (49.5)
	Girls (154)	53 (57.0)	101 (48.8)	34 (50.7)	120 (51.5)	49 (53.3)	105 (51.0)
Adolescent	Early (159)	50 (53.8)	109 (52.7)	19 (2.84)	140 (60.1)	34 (37.0)	125 (60.0)
	Mid (93)	22 (23.7)	71 (34.3)	31 (46.3)	62 (26.6)	29 (31.5)	64 (30.8)
	Late (48)	21 (23.6)	27 (13.0)	17 (25.4)	31 (13.3)	29 (31.5)	19 (9.13)
Religion	Hindu (140)	43 (46.2)	97 (46.9)	27 (40.3)	113 (48.5)	36 (39.1)	104 (50.0)
	Muslim (160)	50 (53.8)	110 (53.1)	40 (59.7)	120 (51.5)	56 (61.0)	104 (50.0)
Education	Illiterate (100)	40 (43.0)	60 (29.0)	24 (35.8)	76 (32.6)	32 (34.8)	68 (32.7)
	Primary school (85)	29 (31.2)	56 (27.1)	13 (19.4)	72 (31.0)	29 (31.5)	56 (26.9)
	Middle school (50)	10 (10.8)	40 (19.3)	9 (13.4)	41 (17.6)	8 (8.7)	42 (20.2)
	High school (30)	6 (6.45)	24 (11.6)	7 (10.4)	23 (9.87)	15 (16.3)	15 (7.21)
	Intermediate (10)	3 (3.23)	7 (3.38)	4 (5.97)	6 (2.58)	2 (2.17)	6 (2.88)
	Graduation (20)	5 (5.38)	15 (7.25)	7 (10.4)	13 (5.58)	5 (5.43)	15 (7.21)
	Post-graduation (5)	0 (0.00)	5 (2.42)	3 (4.48)	2 (0.86)	1 (1.09)	4 (1.92)
Socio-economic status	Class I (12)	3 (3.23)	9 (4.35)	5 (7.46)	13 (5.58)	4 (4.34)	8 (3.85)
	Class II (20)	4 (4.30)	16 (7.72)	2 (2.98)	20 (8.58)	2 (2.17)	18 (8.65)
	Class III (34)	10 (10.8)	24 (11.6)	7 (10.4)	37 (15.9)	8 (8.69)	26 (12.5)
	Class IV (110)	26 (28.0)	84 (40.6)	20 (29.8)	112 (48.1)	45 (48.9)	65 (31.2)
	Class V (124)	50 (53.8)	74 (35.7)	33 (49.2)	95 (40.8)	33 (35.8)	91 (43.8)

Table 2: Gender wise morbidities among adolescents

Common diseases	Boys (N=146)	Girls (N=154)	Total (%) (N=300)
Abdomen pain	4 (2.74)	11 (7.14)	15 (5.00)
Carbuncle / furuncle	26 (17.8)	24(15.58)	50 (16.7)
Defective vision	3 (2.05)	4 (2.60)	7 (2.33)
Dental caries	1 (0.68)	5 (3.25)	6 (2.00)
Diarrhea	27 (18.49)	23 (14.9)	50 (16.7)
Hernia	2 (1.37)	0 (0.00)	2 (0.67)
Measles	2 (1.37)	0 (0.00)	2 (0.67)
Ottitis media	3 (2.05)	3 (1.95)	6 (2.00)
Scabies	26 (17.8)	10 (6.49)	36 (12.0)
TB	2 (1.37)	2 (1.30)	4 (1.33)
Trauma	2 (1.37)	1 (0.65)	3 (0.10)
URTI	42 (28.8)	60 (39.0)	102 (34.0)
Vitilago	2 (1.37)	6 (3.90)	8(2.67)
Vomiting	1 (0.68)	3 (1.95)	4 (1.33)
Worm infestation	3 (2.05)	2 (1.30)	5 (1.67)

Various morbidities observed among the adolescent at the time of examination are given in Table 2. The 34.0% of the adolescents had upper respiratory tract infections (URTI) with girls suffering more 39.0% as compared to boys 28.8%. 16.7% adolescents had diarrhoea with boys (18.49%) sufferings more than girls (14.9%).

16.7% adolescents were found to be suffering from carbuncle/furuncle. 12% adolescents had scabies. The 5% adolescents had abdominal pain. 2.67% adolescents had vitilago. The 2.33% adolescents had defective vision. 2% adolescents had dental carries & ottitis media each, and 1.67% adolescents had worm infestation (on history) etc.

DISCUSSION

It is apparent from this investigation that there is a high prevalence of malnutrition among rural adolescents as the prevalence of underweight, stunting and thinness was found to be 31%, 22.3% and 30.7% respectively. The extent of under nutrition was much more similar to those reported among Nepali refugees by Woodruff *et al.* [17].

From Table 1, it can be observed that the prevalence of stunting was slightly more among the girls (50.7 %) than boys (49.3%). The observation of the prevalence of stunting among boys as per the finding of the WHO Report on Regional Consultation on the nutritional status of adolescents [18]. A low prevalence of stunting has been reported by Anand *et al*. [19].

The basic reason behind stunting indicates the long term cumulative inadequacies of health and nutrition and an insufficient intake of nutrients during the early stage of childhood. It had been opined earlier by Measham and Chatterjee [20] that one of the key causes of under nutrition among Indian communities was the lack of access to insufficient foods and resource amenities.

In the present study, BMI-for-age was utilized as an indicator of thinness and overweight. The WHO expert Committee 2 has been recommended that it is the best indicator for the adolescents to assess under nutrition (thinness) or overweight. There are a number of studies reporting the prevalence of thinness utilizing BMI-for-age as an indicator among adolescents in India [18,21-23]. It was evident from Table 1 that the prevalence of thinning and normal subjects among boys were 46.7% and 49.5% respectively, while among girls were 53.3% and 51.0% respectively, where the prevalence of thinness was slightly higher among girls than boys.

The prevalence of thinness was significantly higher in the early age groups in most of the cases, but decreased with age. A similar trend has been reported by Sahabuddin *et al.* [24] WHO opined that the prevalence of thinness decreased with age. Low prevalence thinness among adolescent girls (30.6%) has also been reported from North India16 and this finding is more similar to present study. These problems can be solved by school based programs, health education, and food fortification.

In this study, muslim patients (53.8%) were more than

Hindu patients (46.2%). The prevalence of malnutrition among Muslim patients was between 50%–59.7% and among Hindu patients was between 39%–46.2%%. In which if we talk about stunting this is found more in Muslim patients 59.7% as compare to Hindu patients i.e. 40.3%. Education level of the study subjects was inversely proportional to malnutrition. According to socio-economic status, majority of the malnourished subjects were belonging to class IV (28%–48.9%) and V (35.8%–53.8%). The major health problems among study subjects were Patna Medical College and Hospital, Bihar, India, diarrhoea, carbuncle/ furuncle and scabies (34%, 16.7%, 16.7% & 12% respectively). These health problems need to be tackled with education, routine anthelminthic, ORS therapy and treatment of other chronic infections. Otherwise these problems would have long-term ill effects on the nutritional status and morbidity pattern among adolescents in rural area PMCH.

CONCLUSIONS

The present study has been successfully demonstrated the prevalence of malnutrition in the terms of under nutrition, stunting and thinness among at Patna Medical College and Hospital, Bihar, India. There were a high prevalence underweight, stunting and thinness among boys and girls. The poor nutritional status of adolescents, especially girls has important implications in terms of physical work capacity and adverse reproductive outcomes. Infant mortality and long term effect (unknown) in children is a burning issue. Our results have been concluded that this study is useful for policy makers in their endeavor to formulate various developmental and health care programmes. Nutritional intervention is also necessary to ameliorate the nutritional status among the studied adolescents.

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