

## Research Article

# Assessment of nutritional status among adolescents: a hospital based cross sectional study

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### ABSTRACT

**Background:** Adolescence, a period of transition between childhood and adulthood, occupies a crucial position in the life of human beings. The primary causes of under nutrition in India are its large population, socio-economic differences and inadequate access to health facilities. Nutritional assessments among adolescents are important as they are the future parents and constitute a potentially susceptible group. Studies on the assessment of nutritional status of adolescents are less in number and a National database has not yet been developed.

**Methods:** The present hospital based cross sectional study was conducted in year 2013 among 344 rural adolescents of 10-19 years age (166 boys and 178 girls) attending the outpatient department at rural health training centre (RHTC) Dhaura Tanda, district Bareilly, Uttar Pradesh, belonging to the Muslim and Hindu 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 5<sup>th</sup> 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 32.8%, 19.5% and 26.7% respectively. The maximum prevalence of malnutrition was observed among early adolescents (28%-47%) and the most common morbidities were URTI (38.6%), diarrhea (16.8%), carbuncle / furuncle (16%) and scabies (9.30%).

**Conclusion:** The study concluded that the most common morbidities among adolescents were related to nutrition and personal hygiene. Regular health programmes should focus to educate and promote health among adolescent.

**Keywords:** Adolescent, Malnutrition, Morbidities, Rural health training centre (RHTC), Bareilly

### INTRODUCTION

Nutritional status is now recognized to be a prime indicator of the health of individuals. The World Health Organization (WHO) believes that the ultimate objective of nutritional assessments is the improvement of human health.<sup>1</sup> The prevalence of under nutrition is a major public health concern in many of the developing countries in Asia. Due to its immense population size, socio-economic disparities, illiteracy and inadequate access to health facilities, India is no exception. As a result, assessments of nutritional status have the potential to play significant roles in formulating developmental

strategies in this country. Anthropometry is the single-most universally applicable, inexpensive and noninvasive technique available to researchers for the assessment of body size and proportion.<sup>2</sup> This technique has been widely utilized to assess the nutritional status of individuals belonging to different Indian and non-Indian communities.<sup>3</sup>

In India, one of the important aims of nutritional research is to focus on the prevalence of under nutrition among adolescents. The adolescent period is a very important phase in the life span of an individual. It is defined as the period of transition between childhood and adulthood and

is characterized by an exceptionally rapid rate of growth.<sup>4</sup> It is the time when the nutrient requirements of the body are high. The nutritional status of adolescents needs to be monitored closely as they constitute the next generation of parents. The nutritional status of the adolescent girls, the future mothers, bear special significance as they contribute significantly to the nutritional status of the community.<sup>5</sup> Adolescents (10-19 years) constituted 22.8% of the total population in India as on 1<sup>st</sup> March 2000.<sup>6</sup>

Inadequate nutrition in adolescence can potentially retard growth and sexual maturation, although these are likely consequences of chronic malnutrition in infancy and childhood. Inadequate nutrition in adolescence can put them at high risk of chronic diseases particularly if combined with other adverse lifestyle behaviors the problem of malnutrition received recognition of planners and policy makers right from inception of five-year planning; a large number of national nutritional programs were implemented to combat the menace of malnutrition. However, malnutrition still persists.

OPD services provide a platform to detect the health problems early and treat them. Early detection of the morbidities through regular survey helps in prompt treatment and prevention of serious complications.<sup>7</sup>

#### **Aims & objectives**

1. To assess the nutritional status among adolescents attending the OPD at RHTC, Dhaura
2. To find out the morbidities among these adolescents

#### **METHODS**

A hospital based cross sectional study was carried out in the year 2013 in the field practice area of rural health training centre (RHTC), Dhaura Tanda, dept. of community medicine, SRMS Institute of medical sciences, Bareilly. 344 children in the age group of 10 to 19 years attending outpatient department (OPD) at the RHTC, Dhaura Bareilly 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 (to 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 (to 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.<sup>8</sup> Socio-economic status (SES) is determined by using modified Prasad's scale.<sup>9</sup> 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 proforma. Data thus generated was entered and analyzed using Epi Info 3.4.1 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 pediatrician, skin specialist and medical officer.

Referral services: Those who were very sick requiring emergency treatment were referred to emergency unit of SRMS IMS Bareilly.

Inclusion criteria: Children of 10-19 year attending outpatient department (OPD).

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

#### **RESULTS**

A total of 344 adolescents were participated in the study. Out of them 166 (48.26%) were boys and 178 (51.74%) were girls between the age of 10 to 19 years. 67.15% of the adolescents were found to be normal and 32.85% were malnourished as per their weight for age. Early adolescents age group (10-13 years) in which the growth spurt takes place, were observed to be at highest risk of underweight and thinning i.e. more early adolescent 46.9% as compared to mid adolescents (24.8%) and late adolescents (28.3%) according to weight for age and more early adolescent 37.0% as compared to mid and late adolescents (31.5%) each according to BMI for age. Overall 19.5% of the adolescents were stunted with boys and girls equally suffering (50.0%). 46.3% mid adolescents were more stunted as compared to early (28.3%) and late adolescents (25.4%).

According to religion, Muslims were more malnourished than Hindu in all the categories of malnutrition and according to education, illiterate and primary school children were more malnourished in comparison to other class of education.

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 socio-economic class increases.

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

Variables	Nutritional status						
	Under weight (%) N=113	Normal (%) N=231	Stunting (%) N=67	Normal (%) N=277	Thinning (%) N=92	Normal (%) N=252	
Sex	Boys (166)	60 (53.1)	106 (45.9)	34 (50.7)	132 (47.7)	43 (46.7)	123 (48.8)
	Girls (178)	53(46.9)	125 (54.1)	33 (49.3)	145 (52.3)	49 (53.3)	129 (51.2)
Adolescent	Early (169)	53 (46.9)	116 (50.2)	19 (28.3)	150 (54.1)	34 (37.0)	135 (53.6)
	Mid (102)	28 (24.8)	74 (32.0)	31 (46.3)	71 (25.6)	29 (31.5)	73 (29.0)
	Late (73)	32 (28.3)	41 (17.8)	17 (25.4)	56 (20.2)	29 (31.5)	44 (17.4)
Religion	Hindu (133)	43 (38.1)	90 (39.0)	24 (35.8)	109 (39.3)	26(28.3)	107 (42.4)
	Muslim (211)	70 (61.9)	141 (61.0)	43 (64.2)	168 (60.6)	66 (71.7)	145 (57.5)
Education	Illiterate (101)	42 (38.1)	59 (25.5)	24 (35.8)	77 (27.8)	32 (34.8)	69 (27.4)
	Primary school (107)	40 (35.4)	67 (29.0)	13 (19.4)	94 (33.9)	29 (31.5)	78 (30.9)
	Middle school (54)	16 (14.2)	38 (16.4)	9 (13.4)	45 (16.2)	8 (8.7)	46 (18.2)
	High school (32)	5 (4.42)	27 (11.7)	7 (10.4)	25 (9.02)	15 (16.3)	17 (6.74)
	Intermediate (6)	2 (1.77)	4 (1.73)	1 (1.49)	5 (1.80)	2 (2.17)	4 (1.59)
	Graduation (39)	8 (7.08)	31 (13.4)	10 (14.9)	29 (10.5)	5 (5.43)	34 (13.5)
	Post-graduation (5)	0 (0.00)	5 (2.16)	3 (4.48)	2 (0.72)	1 (1.09)	4 (1.59)
Socio-economic status	Class I (18)	4 (3.54)	14 (6.06)	5 (7.46)	13 (4.69)	4 (4.34)	14 (5.55)
	Class II (22)	5 (4.42)	17 (7.35)	2 (2.98)	20 (7.22)	2 (2.17)	20 (7.93)
	Class III (44)	12 (10.6)	32 (13.8)	7 (10.4)	37 (13.3)	8 (8.69)	36 (14.3)
	Class IV (132)	42 (37.2)	90 (39.0)	20 (29.8)	112 (40.4)	45 (48.9)	87 (34.5)
	Class V (128)	50 (44.2)	78 (33.8)	33 (49.2)	95 (34.3)	33 (35.8)	95 (37.7)

**Table 2: Gender wise morbidities among adolescents.**

Common diseases	Boys (n=166)	Girls (n=178)	Total (%) (n=344)
Abdomen pain	4 (2.41)	11 (6.18)	15 (4.36)
Carbuncle / furuncle	31 (18.67)	24 (13.48)	55 (15.99)
Defective vision	5 (3.01)	4 (2.25)	9 (2.62)
Dental caries	1 (0.60)	5 (2.81)	6 (1.74)
Diarrhea	31 (18.67)	27 (15.17)	58 (16.86)
Hernia	2 (1.20)	0 (0.00)	2 (0.58)
Measles	2 (1.20)	0 (0.00)	2 (0.58)
Otitis media	3 (1.81)	3 (1.68)	6 (1.74)
Scabies	22 (13.25)	10 (5.62)	32 (9.30)
TB	2 (1.20)	2 (1.12)	4 (1.16)
Trauma	2 (1.20)	1 (0.56)	3 (0.87)
URTI	55 (33.13)	78 (43.82)	133 (38.66)
Vitilago	2 (1.20)	8 (4.49)	10 (2.91)
Vomiting	1 (0.60)	3 (1.68)	4 (1.16)
Worm infestation	3 (1.81)	2 (1.12)	5 (1.45)

Various morbidities observed among the adolescent at the time of examination are given in Table 2. 38.66% of the adolescents had upper respiratory tract infections (URTI) with girls suffering more 43.82% as compared to boys 33.13%. 16.86% adolescents had diarrhea. 15.99%

adolescents were found to be suffering from carbuncle/furuncle. 9.30% adolescents had scabies. 4.36% adolescents had abdominal pain. 2.91% adolescents had vitilago. 2.62% adolescents had defective vision. 1.74% adolescents had dental carries & otitis media each, and 1.45% 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 32.8%, 19.5% and 26.7% respectively. The extent of under nutrition was much more similar to those reported among Nepali refugees by Woodruff et al.<sup>10</sup>

From Table 1 it can be observed that the prevalence of stunting was slightly more among boys (20.5%) than girls (18.5%). The observation of the prevalence of stunting in this study among boys was also similar to the finding of the WHO Report on Regional Consultation on the nutritional status of adolescents (20.0%).<sup>11</sup> A low prevalence of stunting has also been reported by Anand<sup>12</sup> et al. 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<sup>13</sup> 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<sup>2</sup> 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.<sup>12,14-16</sup> It is evident from Table 1 that the prevalence of thinning and normal subjects among boys were 46.7% and 48.8% respectively while among girls were 53.3% and 51.2% respectively, where the prevalence of thinness was slightly higher among girls (27.5%) than boys (25.9%).

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<sup>17</sup> et al. WHO opined that the prevalence of thinness decreased with age. Low prevalence thinness among adolescent girls (30.6%) has also been reported from North India<sup>16</sup> 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 (61.3%) were more than Hindu patients (38.7%). The prevalence of malnutrition among Muslim patients was between 61%-71% and among Hindu patients was between 28%-38%. 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 (30%-49%) and V (36%-49%).

The major health problems among study subjects were URTI, diarrhea, carbuncle / furuncle and scabies (38.6%, 16.8%, 15.99% & 9.30% respectively). These health problems need to be tackled with education, routine antihelminthic, 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 Bareilly.

## CONCLUSION

The present investigation has successfully documented the prevalence of malnutrition in terms of under nutrition, stunting and thinness among a rural adolescent sample from Bareilly district of UP. There was 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.

Among morbidity factors, recurrent infections like URTI, diarrhea and passing of round worms in stool were significantly associated with high prevalence of PEM.

There is a definite interaction of nutrition and infection. For conditioning infection, numerous factors may be responsible either singly or together like decreased intake from poor appetite, diminished absorption or customs restricting food intake during illnesses increased loss from diarrhea and vomiting, increased needs both for the human host and for the responsible organism or parasites.

The results of the present investigation will be 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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