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### Original article

# Prevalence of stunting and thinness among early adolescent school girls of paschim medinipur district, west bengal

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#### ABSTRACT

The study was conducted to evaluate nutritional status of early adolescent (10-14 years) school girls in rural sectors of West Bengal. A cross sectional study was carried out in six Govt. approved school of Pingla block of Paschim Medinipur district, West Bengal. Height and weight were measured using standard procedures. BMI was computed from height and weight. Height-for-age below 3rd percentile values of NCHS reference was classified as stunting. BMI-for-age below 5th percentile values of WHO recommended reference was classified as thinness. Prevalence of stunting and thinness were also estimated using Indian references values. Prevalence of stunting was 34.20% relative to NCHS reference which was reduced to almost 18.10% when compared with Indian reference. Prevalence of thinness was 40.94% relative to NCHS reference and 23.84% according to 'Indian Academy of Pediatrics' references. This study demonstrated that early adolescent school girls of study area were under serious nutritional stress indicating a public health problem.

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### 1. Introduction

Early adolescence is a period of rapid growth and maturation in human development. Unique changes that occur in an individual during this period are accompanied by progressive achievement of biological maturity [1]. Among adolescent, girls are more vulnerable, particularly in developing countries including India, due to various adverse socio-cultural and economic reasons [2]. The nutritional status of adolescent girls, the future mothers, contributes significantly to the nutritional status of the community [3]. More importantly, a very high proportion of girls (23.0%) get married at an early age and even before completing their growth [4]. Health and nutrition of adolescent girls did not receive adequate attention especially at rural sectors of India [2]. Only recently few studies have been carried out in this population group [2,3,5,6,7]. Undernutrition among adolescent girl is an important

public health problem in rural India [3,7] including West Bengal [2,5,6,8,9]. Anthropometric indices can serve only as proxies for evaluating the prevalence of undernutrition among children and adolescent [6].

The fact that the majority of the population is underprivileged and reside in the rural areas also lay credence to the significance of such investigations. The present study was conducted to address the prevalence of undernutrition among early adolescent school girls at rural sectors of West Bengal. This paper highlights the extents of stunting and thinness among early adolescent school girls using two references (WHO/NCHS references and Indian Academy of Pediatrics references). This would also provide useful datasets for national and international comparisons.

### 2. Materials and Method

#### 2.1. Study groups

A school based cross sectional study was carried out in early adolescent girls (10-14 years old), studying in Vth to VIIth standard of Pingla Block, Paschim Medinipur district, West Bengal. The area is mostly remote and comprised of twenty five secondary schools.

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Among them six schools were included in present study by simple random sampling. Anthropometric and socio-demographic information from 801 girls were collected during November 2010 to January 2011. The participation rate was over 95%. Absenteeism and illness were the main reasons for non-participation. From each school 133, 101, 177, 118, 158 and 114 girls were participated in the study. The parents of majority of these girls were small scale agriculturists belong to low socioeconomic status.

2.2. Measurements

Age of the girls were ascertained from the school registers. Height and weight were measured using standard procedure as recommended by WHO [10]. Height and weight was measured with an accuracy of 0.1 cm. and 500 gm respectively. The body mass index (BMI) was computed following the standard formula:  $BMI (kg/m^2) = Weight (kg) / Height^2 (m^2)$ .

2.3. Determination of nutritional status

Nutritional status was evaluated using anthropometric indicators recommended by WHO experts committee. Height-for-age below 3rd percentile of 2007 NCHS/WHO reference values was classified as stunting [11]. Prevalence of stunting was also estimated using Indian reference (3rd percentile height of Indian academy of pediatrics 2007 reference data) [12]. Thinness was evaluated using WHO recommended age-specific cut-off points of BMI based on 2007 WHO reference data. Thinness was defined as BMI-for-age <5th percentile of WHO/NCHS standard data [11] and <5th percentile of Indian academy of pediatrics reference data [12].

2.4. Ethical Consideration

Appropriate ethical permission for human studies was obtained from all concerned authorities before conduction of the study. School authorities consent was also obtained.

3. Results

The total 867 rural adolescents girls of age groups 10 to 14 years (Mean age: 12.2) were studied. Maximum study subjects were in the age group of 11-13 years. Majority (71%) of the subjects were from the families engaged in agriculture and 15% were engaged in labour. The overall mean height was 140.10 cm (SD ± 9.63), weight was 30.70 kg (SD ± 7.21) and BMI value was 15.43 (SD ± 2.13).

Prevalence of stunting was presented in table 1. According to 3rd percentile WHO references overall prevalence of stunting was 34.20%. Prevalence ranged from 25.73% in 10 years to 43.37% in 12 years. When Indian references data used, total frequency of stunting was reduced to 18.10%.

The prevalence of thinness was presented in table 2. The overall extent of thinness was 37.70% and thinness was more (46.32%) prevalent in 10 years of age. The proportion of adolescents below 5th percentile height of NCHS ranged from 27.18% in 14 years to 46.32% in 10 years. In respect to IAP references overall thinness was 23.84%, which is far below than WHO references data. Continuous decreasing trend of frequency of thinness was observed with the advancement of age.

Table 1: Prevalence of stunting among early adolescent school girls

Age (In years)	No of subjects	Height Mean (cm) ± SD	<3 <sup>rd</sup> percentile WHO*(%)	<3 <sup>rd</sup> percentile Indian**(%)
10	136	131.66 ± 6.49	35(25.73)	12 (8.82)
11	198	134.98 ± 8.01	78 (39.39)	49 (24.75)
12	166	139.94 ± 8.25	72 (43.37)	39 (23.49)
13	198	147.14 ± 6.91	51 (25.75)	22 (11.11)
14	103	147.80 ± 6.61	38 (36.89)	23(22.33)
Total	801	140.10 ± 9.63	274 (34.20)	145 (18.10)

\*NCHS/WHO references, WHO, 2007; \*\* Indian Academy of Pediatrics, 2007

Table 2: Prevalence of thinness among early adolescent school girls

Age (In years)	No of subjects	Mean ± SD BMI	<5 <sup>th</sup> percentile of BMI (%)	<5 <sup>th</sup> percentile Indian (%)
10	136	14.05 ± 1.52	63 (46.32)	31 (22.79)
11	198	14.74 ± 1.70	87 (43.93)	50 (25.25)
12	166	15.18 ± 1.91	66 (39.75)	48 (28.91)
13	198	16.48 ± 2.09	58 (29.29)	42 (21.21)
14	103	16.98 ± 2.12	28 (27.18)	20 (19.41)
Total	801	15.43 ± 2.13	302 (37.70)	191 (23.84)

\*NCHS/WHO references, WHO, 2007; \*\* Indian Academy of Pediatrics, 2007

4. Discussion

It is apparent from the present investigation, that there is a very high prevalence of undernutrition among rural early adolescent school girls as the prevalence of stunting and thinness was found to be 34.20% and 40.94% respectively based on WHO reference data.

In the present study, the author also evaluates stunting and thinness using Indian references (IAP) data. However, use of Indian reference data also yielded a high (18.10%) stunting and thinness (23.84%) rate among study subject. Anand et al, reported 20% prevalence of stunting at rural North India using Indian reference data [7]. In contrast, the extent of stunting was higher (50.3%) at rural area of Darjeeling district of West Bengal using WHO reference value [8]. Bose et al. reported the frequency of stunting to be 48.4% among pre-adolescent school girls [6]. A recent school based study by Bisai et al revealed 27.1% of stunting among early adolescent girl age group through Z-score analysis [9]. However, the prevalence of stunting in the present study was observed higher when compared to another study in West Bengal (25.6%) [2]. Stunting indicates long-term cumulative inadequacies of health and nutrition [10].

It is apparent from this investigation that the prevalence of thinness was high in both reference data. Das and Biswas reported much lower (17.9%) extent of thinness among early adolescent girl using BMI-for-age <5th percentile of WHO/NCHS data [2]. Khan and Ahmed reported 16.8% of thinness among adolescent female workers in urban Bangladesh [1]. But a

similar study by Maiti et al on early adolescent school girl at rural sector reported very higher prevalence of thinness (58.30%) [5]. In the present study the prevalence of thinness among the subjects was decreased with age. A similar trend has been reported by Mondal et al [8]. Thinness is an indicator of acute undernutrition, the results of more recent food deprivation [10].

It can be summarized that the rural early adolescent girl in the present investigation are facing a great risk in terms of nutritional stress. Our results provide evidence that undernutrition is a persistent problem among these future mothers. It has been suggested that since undernutrition is a function of both food deprivation and disease, which are in turn the consequences of poverty [7]. The nutritional needs of these girls had been sadly ignored in our developmental programmes; the focus had rather been only on the preschool children and the mothers [13]. It seems that there is scope for much improvement on nutritional status among adolescent girls at rural sectors of India.

## 5. Conclusion

Undernutrition in early adolescent school girl is serious problem in rural sectors. The present study calls for preventive and rehabilitative intervention programmes to reduce the prevalence of undernutrition in this population.

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