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## A Study of the Health Status of Early adolescent Girls residing in Social Welfare Hostels in Vizianagaram district of Andhra Pradesh State, India

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### ABSTRACT

**Background:** Adolescent girls form an important vulnerable sector of population that constitute about one-tenth of Indian population. Under-nutrition among adolescents is a serious public health problem internationally, especially in developing countries. Early adolescence after the first year of life is the critical period of rapid physical growth and changes in body composition, physiology and endocrine. The data regarding the nutritional status & morbidity status of the early adolescent girls in social welfare hostels are sparse, despite the usefulness of such information in the management of hostels and upliftment of these groups. In this context, the present study was taken up among early adolescent girls residing in the social welfare hostels in urban area of Vizianagaram District, Andhra Pradesh, India.

**Objective:** To assess the Nutritional status of the early adolescent and to study the Morbidity pattern among these adolescent girls in the social welfare hostels.

**Methods / Study Design:** Cross-sectional study was carried out over a period of four months. 420 girls of age 10-15 years were examined during that period. Data was collected by interviewing the girls using predesigned, pre tested, semi-structured schedule. Anthropometric measurements were recorded using standardized methodology as recommended by World Health Organization (WHO). Body Mass Index (BMI) – BMI was calculated using the formula Weight in kg/height in m<sup>2</sup>. The subjects were categorized into various grade based on BMI according to WHO International Standard. Grade 3 thinness (BMI < 16 kg/m<sup>2</sup>), Grade thinness (BMI 16-16.9 kg/m<sup>2</sup>), Grade 1 thinness (BMI 17-18.49 kg/m<sup>2</sup>), Normal (BMI 18.5-24.99 kg/m<sup>2</sup>), Overweight (BMI 25-29.99 kg/m<sup>2</sup>) and Obese (BMI >30 kg/m<sup>2</sup>). As per Indian Standard underweight (BMI <18.5 kg/m<sup>2</sup>), Normal (BMI 18.5-23.5 kg/m<sup>2</sup>) and Overweight (BMI >23.5 kg/m<sup>2</sup>). Statistical Analysis: Done by using SPSS 16.0 version.

**Results /Findings:** A total 420 girls were studied. 37.4% were in the age group 13 years. According to WHO reference standards 56.4 % girls were under-nourished (BMI <18.5 kg/m<sup>2</sup>). Girls suffering from chronic energy deficiency grade I, II and III were 25.2%, 15.2% and 16 % respectively. 2.9% was found to be overweight and none of the girls was found to be obese. As per new guidelines by the Government of India 56.4 % was found to be undernourished while 5.8 % was found to be Overweight (BMI >23.5 kg/m<sup>2</sup>). 30% were showed clinical anaemia, 27.1% were having dental caries, 16.7 were having reproductive problem (Dysmenorrhoea), 16% were skin problem, 4 % Eye problem (defective vision & refractive error), 2.4 % were having URTI and 2.1 % ENT problem.

**Conclusion:** It is concluded that there is a high prevalence of under nutrition, dental caries and clinical anaemia among adolescent girls in social welfare hostels in urban sector. The present study calls for Health education and nutrition interventions to reduce the serious health problem on priority basis.

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**Keywords:** BMI, Thinness, undernutrition, Hostel girls, Morbidity Pattern, dental caries, anaemia

## **Introduction/Background**

Adolescent girls form an important vulnerable sector of population that constitute about one-tenth of Indian population [1]. Under-nutrition among adolescents is a serious public health problem internationally, especially in developing countries [2]. Early adolescence after the first year of life is the critical period of rapid physical growth and changes in body composition, physiology and endocrine [3]. The Ministry of Women and Child Development is significantly involved in the issues of nutrition and development of children, particularly girl children. The scheduled castes and scheduled tribes have been identified as two most disadvantaged groups of Indian society needing special attention [4]. Empowerment of the hostel Girl is necessary to help her cope with the changes and promote awareness of health particularly nutrition and reproductive health, so as to break the intergenerational life cycle of nutritional and gender disadvantage and provide an enabling and supporting environment for self-development [5]. Social welfare department, with respect to the socioeconomic status of Scheduled Caste population and socio academic profile of the scheduled caste children, has been maintaining hostels as a pro-educational measure. These hostels serve as homes away from homes at places where schooling facilities are available. The girls stay more than 8 years in these hostels. Health care of these girls in the hostels is of utmost

importance because the children in the school age (10-15years) are in a period of growth and development when optimum nutritional and health care is essential. Adolescent girls health covers nutritional status, morbidity, and reproductive health. During the period of adolescence the nutrient needs are the greatest [6]. The girls are usually physically stunted a manifestation of chronic protein energy malnutrition. A large proportion of adolescent girls suffer from various gynecological problems, particularly menstrual irregularities such as menorrhagia, polymenorrhea, oligomenorrhea, and dysmenorrhea. In Andhra Pradesh, the welfare Programmes for the Scheduled Castes are looked after by the Education and Social welfare department. These institutions run on par with hostels and are being run in summer vacation also [7]. The role of these hostels in their education advancement is considerable [8]. To achieve this objective, the Government of Andhra Pradesh has started a large number of social welfare hostels and at present, there are 2313 hostels functioning in the A.P state with scheduled caste children comprising 70% of the hostel inmates [9]. Various base-line surveys also revealed that the health, nutritional and educational status of adolescent girls are at sub-optimal level [5]. The data regarding the nutritional status & morbidity status of the early adolescent girls in social welfare hostels are sparse, despite the usefulness of such information in the management of hostels and upliftment of these groups [10]. In this context, the present study

was taken up among early adolescent girls residing in the social welfare hostels in urban area of Vizianagaram District. This study focuses on nutritional & reproductive status of early adolescent girls.

## Aim and Objectives

1. To study the health status of early adolescent girls residing in social welfare hostels of Vizianagaram city, A.P.
2. To assess the Nutritional status of the early adolescent girls residing in the hostel.
3. To study the Morbidity pattern among the early adolescent girls in the social welfare hostels.

## Methods/Study Design

### Study design, study population and Sample size:

Cross sectional study was conducted from June 2010 to September 2010 among Children residing in two social welfare hostels for scheduled Caste girls. It is a field practice area of Department of Community Medicine, Maharajaha; Institute of Medical Sciences, Vizianagaram. A total of 420 girl's children formed the study subjects. Permission from the Deputy Director of Social Welfare was obtained for conducting the study. The wardens were interviewed and, hostel registers were looked into to secure information regarding the number of residential children. The medical officer along with house surgeons of the urban Health centre provides medical checkup and treatment for children once in a month. Those requiring specialist treatments will be referred to district hospital. Data regarding morbidity status was collected using a pre-tested proforma. At the first visit

during June 2010, every child was examined physically from head to toe and deviations from normal, if any, were recorded. Enquiry was made about the health ,reproductive problems and occurrence of any ailment during previous two weeks.

**Nutritional Status** → Nutritional status of girls was assessed by Anthropometric measurements viz height, weight, BMI.

**Anthropometry Height** - Stadiometer (measuring rod) capable of measuring to an accuracy of 0.1 cm was used to assess height of the subjects. The subject was made to stand without foot wear with the feet parallel and with heels, buttocks, shoulders, and occiput touching the measuring rod, hands hanging by the sides. The head was held comfortably upright with the top the head making firm contact with the horizontal head piece.

**Weight** - A portable weighing machine with an accuracy of 100gms was used to record the weight of the girls. Checking the scale with a known weight was done frequently and adjustment to zero was done every time for accurate reading. A girl were instructed to stand on the weighing machine with light clothing and without footwear and with feet apart and looking straight and weight was recorded to the nearest value.

**Body Mass Index (BMI)** – BMI was calculated using the formula ( $BMI = \text{Weight in kg} / \text{height in m}^2$ ). The girls were categorized into Various grade based on BMI according to WHO International Standard [11,12,13]. Hat is, Grade 3 thinness ( $BMI < 16 \text{ kg/m}^2$ ), Grade 2 thinness ( $BMI 16-16.9 \text{ kg/m}^2$ ), Grade 1 thinness ( $BMI 17-18.49 \text{ kg/m}^2$ ), Normal ( $BMI 18.5-24.99 \text{ kg/m}^2$ ), Overweight ( $BMI 25---29.99 \text{ kg/m}^2$ ) and Obese ( $BMI >30 \text{ kg/m}^2$ ) [14]. The girls were categorized into Various grade based on BMI according to National Standard [15], undernutrition ( $BMI < 18.5$

kg/m<sup>2</sup>), Normal (BMI 18.5-23.5 kg/m<sup>2</sup>), and Overweight (BMI >23.5 kg/m<sup>2</sup>).

**Data Analysis:** Data collected was entered in Microsoft Office Excel and analysed by using SPSS Version 16.0.

**Study instruments:** Pre-designed, pre-tested, semi-structured questionnaire, stethoscope, Weighing machine, measuring tape etc.

## Results / Findings

A total 420 girls were studied. Of that 37.4% (157) were in the age group 13 years. Followed by 26.9% were in age group 14 years, 18.6% were in age group 12 years, 9.8% were in age group 15 years and very few that is 5% and 2.4% in the age group 11 and 10 years. (Table -I)

In the present study according to WHO reference standards, 56.4% (237/420) girls were under-nourished (BMI ≤ 18.5). The Girls suffering from chronic energy deficiency grade I, II and III were 25.2%, 15.2% and 16 % respectively. 12 (2.9%) was found to be overweight and none of the girls was found to be obese. According to the new guidelines by the Government of India as per the diagnostic cut-off values the 56.4 % was found to be undernourished while 5.8 % was found to be Overweight (BMI >23.5 kg/m<sup>2</sup>). (Table-II)

126 out of 420 ( 30%) were showed clinical anaemia, 114/420 ( 27.1%) were having dental caries , 70/420 ( 16.7 ) were having reproductive problem (dysmenorrhoea), 67/420 ( 16% ) were skin problem, 4 % Eye problem( defective vision & refractive errors) , 2.4 % were having URTI and 2.1 % ENT problem. (Table III)

## Discussion

Undernutrition is documented public health problem contributing substantially to children's survival. There is scanty information on the nutritional status of girls residing in social welfare hostels. Therefore, there is a need to study the health problems among these girls and to develop a database from different parts of the country.

The results of the study are discussed below.

The underfed still outnumber the overfed in the developing world among Asian, African and Latin American populations. In spite of the economic development in the region, undernutrition remains an important public problem in many Asian countries [16]. Undernutrition is a significant problem and continues to be a cause of morbidity and mortality among children in developing countries like India [17, 18]. The recent study of Cole et al [13] has stated that undernutrition is better assessed as thinness (low body mass index for age) than as wasting (low weight for height). Prior to this report, there were no suitable thinness and overweight/obesity cut-offs for 2-18 years age group [12, 13]. The uses of these new cut-off points are suggested to encourage direct comparison of trends in childhood thinness and overweight/obesity worldwide. Moreover, these cut-offs provide a classification of thinness and overweight/obesity for public health purposes at the National and International level.

In the present study according to WHO reference standards [11]. 56.4% girls were under-nourished (BMI ≤ 18.5 kg/m<sup>2</sup>). Girls with thinness grade I, II and III were 25.2%, 15.2% and 16 % respectively. Out of the total 420 girls, 12 (2.9%) was found to be overweight and none of the girls was found to be obese. According to the new guidelines by the Government of India (ICMR) [15] as per the diagnostic cut-off values the 237/420 (56.4%) was found to be undernourished while 5.8 % was found to be Overweight. In a study conducted by Kapil et al. [19] 8.1% were CED grade I, 6.65% were CED grade II

and 78.8% were CED grade III. In a study by Raheena Begum [20] in Kerala, 53% in 14 years age group and 33% in 15 years age group were having BMI  $<18.5 \text{ kg/m}^2$ . In a study by Deshmukh et al. [21] CED was found to be 75.3%. In a study by Meenakshi Kalhan, 80% of the girls were under-nourished (BMI  $<18.5 \text{ kg/m}^2$ ) [22]. The study of urban slum girls in Dhaka reported prevalence of thinness 17% [23]. Various authors have reported the prevalence of thinness among adolescent girls to be 14.7% [23], 30.1% [24], 41.3% [25] and 59% [26]. In a study among adolescent girls in Rajasthan, 6.5% of the girls were found to have a BMI of more than 18.5 [27]. Nurul Alam et al. found out that 26% of the girls were thin, with body mass index (BMI)-for-age  $<15^{\text{th}}$  percentile), 0.3% obese (BMI-for-age  $>95^{\text{th}}$  percentile), and 32% stunted (height-for-age  $\leq 2 \text{ SD}$ ) [28]. According to Lazzeri G et al., the prevalence of thinness declined from 9.8% to 8.7%, and the prevalence of normal weight from 77.0% to 71.6%, while the prevalence of overweight rose from 13.3% to 19.7% [29]. In a study by Pascal Bovet et al. prevalence of thinness was 21.4%, 6.4% and 2.0% based on the three IS cut-offs and 27.7%, 6.7% and 1.2% based on the WHO cut-offs [30]. Saxena Y et al. prevalence of thinness was 56.25% [31]. Study conducted by Shivaramakrishna, 73.3% girls were under-nourished (BMI  $< 18.5$ ). The prevalence of chronic energy deficiency based on BMI (grade I, II and III) were 23.0%, 28.3%, and 22.2 % respectively. [32] Study by X Du H Greenland et al Using a modified Chinese reference, the rate of low body weight (BMI  $<18$ ) was 32.2% [33]. Yustina Anie Indriastuti Kurniawan et al. about 50% were underweight and stunted indicating the presence of acute and chronic malnutrition. [34] Reports from India, Bangladesh, Nepal and Myanmar show that 32%, 48%, 47% and 39% adolescents respectively are stunted, and 53%, 67%, 36%,

and 32% adolescents from these countries are thin. [35]

In the study by Renuka Jayatissa et al., it was observed that the prevalence of overweight, thinness and stunting among the adolescent school girls in Sri Lanka were 4.0%, 22.1% and 18.1% respectively [36]. In a study by Garba and Mbofung, the severe malnutrition was higher in girls (23.8%) than in boys (22.3%), while moderate malnutrition was higher in boys (93.1%) than in girls (86.7%) [37]. Mital Prajapati et al. also found out that the prevalence of thinness was equal to 41.3% [38]. The comparison of prevalence of undernutrition among the adolescents in India and other countries is presented in Table IV. Most of the studies reported lower prevalence of undernutrition than present study [28,29,30,33,36,38,45]. On the other hand, some other studies had almost similar prevalence of undernutrition [44,34,32], whereas some other studies showed a higher prevalence than present study [32,37].

**Morbidity profile:** The health problems of adolescent girls vary from place to place and several studies conducted in India and abroad revealed that the main morbidity conditions include malnutrition, dental caries, and diseases of skin, problem of Eye & Ear and reproductive problems.

In the present study, the leading causes of morbidity were undernutrition 56.4%, dental caries (27.1%), skin diseases (16%), dysmenorrhoea (16.7%), defective vision (4%), URTI (2.4%), ENT (2.1%) and clinical anaemia (pallor) 30%.

In a study conducted by Srinivasan [10] (2000), in Tirupati in 598 children aged 6-17 years, the common morbid conditions found were skin disorders 25.7%, dental caries 21.5%, ARI 1.7% and diarrhoea 1.2%.

In the present study, the morbidity due to skin diseases is 16%. In the study by Srinivasan [10], scabies accounted for 29.9%. In a study



by Singh et al. [39] scabies accounted for 16.2%.

In the present study, the prevalence of dental caries is found to be 27.1%. In the study by Srinivasan dental caries was 21.5%. 13.33% of dental caries was seen in the study conducted by Choudhary et al [40] in adolescent girls of rural area of Varanasi. The high prevalence of dental caries in the present study may be due to poor oral hygiene.

In the present study defective vision was 4%, whereas in other studies [10, 39] the prevalence of defective vision was 4.7% and 4.5% respectively. This difference may be due to inadequate indoor lighting.

In the present study dysmenorrhea is present in 16% of study subjects. In a study conducted by Deo et al. [41] dysmenorrhea was present in 31.64%. In a study conducted by Srinivasan dysmenorrhea was noted in 3.5%. The low prevalence of dysmenorrhea in the other studies may be due to the reason the study subjects comprised of different age groups. In a study by Geetha et al [42] in rural south India, dysmenorrhea was noted in 21%. Study by N Rema found that common deficiency diseases prevalent among the school going children were anemia and skin infections 10.6% & 67%. The chief cause of anemia could be contributed to the lack of proper iron, vitamin B12 and folic acid in the diets of these children [43].

## Conclusions

The following are the conclusions from the present study:

A total 420 girls were studied. Of that 37.4% were in the age group 13 years. According to WHO reference standards 56.4% girls were under-nourished ( $BMI \leq 18.5$ ). Girls suffering from chronic energy deficiency grade I, II and III were 25.2 %, 15.2 % and 16 % respectively. Out of the total 420 girls, 12 (2.9%) was found to be overweight and none

of the girls was found to be obese. According to the new guidelines by the government of India as per the diagnostic cut-off values the 56.4% was found to be undernourished while 5.8 % was found to be Overweight ( $BMI > 23.5 \text{ kg/m}^2$ ). However 30% were showed clinical anaemia, 27.1% were having dental caries, 16.7% were having reproductive problem (dysmenorrhoea), 16% were skin problem, 4 % Eye problem (defective vision & refractive error), 2.4% were having URTI, and 2.1% ENT problem. In view of the high prevalence and incidence of morbidity among adolescent girls in the hostels, regular periodic medical examination and facilities for treatment on the spot at school hostels and referral services should be organized and monitored systematically. Health education programmes on hygiene and common diseases have to be carried out regularly in hostels in consultation with concern health authorities.

**Ethical Considerations:** The study protocol was submitted to the Institutional Ethical Committee and clearance was obtained. Written informed consent from the heads of the institutions and assent from the selected adolescents was also obtained, before initiation of the study in the respective Institutions.

**Conflict of Interest:** There does not exist any conflict of interest what so ever.

**Role of Funding Source:** There does not exist any role of funding source what so ever.

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## References

1. Das DK, Biswas R. Nutritional Status of adolescent girls in rural areas of norths 24 Parganas district .West Bengal. *Ind J Pub Health*. 2005;49(1): 18-20.
2. Venkaiah K, Damayanti K, Nayak MU, Vijavaraghvan K. Diet & Nutritional Status of rural adolescent in India. *Eur J Clin Nutr* 2002; 56(1) 119-25.
3. Khan MR, Ahmed F. Physical Status, nutrient intake and dietary pattern of adolescent female factory workers in Urban Bangladesh. *Asia Pac J Nutr*. 2005;14(1): 19-26.
4. Introduction of scheduled caste education; file://H:/introduction of sc educ.htm (Accessed on 21-10-08).
5. Govt of AndhraPradesh.2003. *Declaring the year 2003 as the year of the adolescent girl*. Department of women development and child welfare, Government of Andhra Pradesh.
6. WHO. Nutrition in adolescence: Issues and challenges for the health sector: *Issues in adolescent health and development*, 2005.
7. Department Of Social Welfare: Commissionerate of Social Welfare:G:\downloads\APonlineorganisati on\_schostels.2.mht. (Accessed on 25-12-08).
8. WHO. *Adolescent Nutrition: A Review of the Situation in Selected South-East Asian Countries*, 2006.
9. Department of Social Welfare, Government of Andra Pradesh. 3 Feb 2011.
10. Srinivasan K, Prabhu GR. A study of the morbidity status of the children in social welfare hostels in Tirupati town. *Indian Journal of Community Medicine*. 2006;31(3): 170-172.
11. The International Classification of underweight, overweight and obesity according to BMI *Source: Adapted from WHO, 1995, WHO, 2000 and WHO 2004*.
12. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a Standard definition for child overweight and obesity worldwide: International survey. *BMJ*. 2000;320(7244): 1240-1243.
13. Cole TJ, Flegal KM, Nicholls D, Jackson AA. Body mass index cut offs to define thinness in children and adolescents: international survey. *BMJ*. 2007; 335(7612): 194-198.
14. World Health Organization. *Nutritional status of adolescent girls and women of Reproductive age*. Report of Regional consultation, Geneva, World Health Organization, SEA / NUT / 141.1998; 3)
15. The Health Ministry has reduced the diagnostic cut-offs for body mass index (BMI) to 23 kg/m<sup>2</sup> and the standard waist circumferenc to deal obesity. (Published on 11/26/2008 - 12:40:52 PM) India.
16. Wickramasinghe VP, Lamabadusuriya SP, Atapattu N, Sathyadas G, Kuruparanantha S, Karunaratne P. Nutritional status of schoolchildren in an



- urban area of Sri Lanka, *Ceylon Med J*. 2004;49(4): 114-8.
17. Nandy S, Irving M, Gordon D, Subramanian SV, Smith GD. Poverty, child undernutrition and morbidity: new evidence from India. *Bull World Health Organ*. 2005;83(3): 210-6.
  18. UNICEF, *Report Progress for Children – A report card on nutrition*. 2006. UNICEF.
  19. Chaturvedi S, Kapil U, Gnanasekaran N, Sachdev HP, Pandey RM, Bhanti T. Nutrient intake amongst Adolescent girls belonging to poor socioeconomic group of rural area of Rajasthan. *Indian Journal of pediatrics*. 1996;33(3): 197-201.
  20. Begum MR. Prevalence of malnutrition among adolescent girls: a case study in Kalliyoor panchayat, Thiruvananthapuram. Kerala research programme on local level development; *Centre for development studies*. 2001.
  21. Deshmukh PR, Gupta SS, Bharambe MS, Dongre AR, Maliye C, Kaur S, Garg BS. Nutritional status of adolescents in rural Wardha. *Indian Journal of Pediatrics*. 2006;73(2): 139-141.
  22. Kalhan M. Nutritional Status of adolescent girls of rural Haryana. *The Internet Journal of Epidemiology*. 2010;8(1): 1540-2614.
  23. Khan MR, Ahmed F. Physical status, nutrient intake and dietary pattern of adolescent female factory workers in urban Bangladesh. *Asia Pac J Clin Nutr*. 2005; 14(1): 19-26.
  24. Delpuech F, Cornu A, Massamba JP, Traissac P, Maire B. Is body mass index sensitively related to socio-economic status and to economic adjustment? A case study from the Congo. *Eur J Clin Nutr*. 1994; 48 Suppl 3: S141-7.
  25. Anand K, Kant S, Kapoor SK. Nutritional status of adolescent school children in Rural North India. *IndianPediatr*. 1999;36(6): 810-815.
  26. World Health Organization. Nutritional status of adolescent girls and women of Reproductive age. *Report of Regional consultation, Geneva, World Health Organization, SEA / NUT /1998*; 141: 3.
  27. Chaturvedi S, Kapil U, Gnanasekaran N, Sachdev HP, Pandey RM, Bhanti T. Nutrient intake amongst adolescent girls belonging to poor socioeconomic group of rural area of Rajasthan. *Indian Pediatr* 1996;33(3): 197-201.
  28. Alam N, Roy SK, Ahmed T, Ahmed AMS. Nutritional Status, Dietary Intake, and Relevant Knowledge of Adolescent Girls in Rural Bangladesh, *J Health Population Nutr*. 2010;28(1): 86-94.
  29. Lazzeri G, Rossi S, Pammolli A, Pilato V, Pozzi T, Giacchi MV. Underweight and overweight among children and adolescents in Tuscany (Italy). Prevalence and short-term trends. *J Prev Med Hyg*. 2008;49(1): 13-21.
  30. Bovet P, Kizirian N, Madeleine G, Blössner M, Chiolero A. Prevalence of thinness in children and adolescents in the Seychelles: comparison of two international growth references. *Nutrition Journal*. 2011;10: 65.
  31. Saxena Y, Saxena V. Nutritional status in rural adolescent girls residing at hills of Garhwal in India. *Internet J Med Update*. 2011;6(2): 3-8.

32. Shivaramakrishna HR, Deepa AV, Sarithareddy M. Nutritional Status of Adolescent Girls in Rural Area of Kolar District - A Cross-Sectional Study *Al Ameen J Med Sci.* 2011;4(3): 243-246.
33. Du X, Greenfield H, Fraser DR, Ge K, Zheng W, Huang L, Liu Z. Low body weight and its association with bone health and pubertal maturation in Chinese girls. *European Journal of Clinical Nutrition.* 2003;57(5): 693-700.
34. Kurniawan YA, Muslimatun S, Achadi EL, Sastroamidjojo S. Anaemia and iron deficiency anaemia among young adolescent girls from peri urban coastal area of Indonesia. *Asia Pac J Clin Nutr.* 2006;15(3): 350-356.
35. Improvement of Nutritional Status of Adolescents, Report of the Regional Meeting Chandigarh, India. *World Health Organization, Regional Office for South-East Asia New Delhi.* 2002.
36. Jayatissa R, Piyasena CI, Warnakulasuriya I, Mahamithawa A. Overweight, thinness and stunting among adolescent schoolgirls in Sri Lanka: prevalence and associated factors. *Department of Nutrition, Medical research institute, Colombo.* 1997.
37. Garba CMG, Mbofung CMF. Relationship between Malnutrition and Parasitic Infection among School Children in the Adamawa Region of Cameroon. *Pakistan Journal of Nutrition.* 2010;9(11): 1094-1099.
38. Prajapati M, Bala DV, Tiwari H. A study of nutritional status and high risk behavior of adolescents in Ahmedabad: A Cross Sectional Study. *Healthline.* 2011;2(1): 21-27.
39. Singh J, Singh V, Srivastava A.K, Suryakant. Health status of adolescent girls in slums of Lucknow – *Indian Journal of Community Medicine.* 2006; 31(2):11-15.
40. Choudhary S, Mishra CP, Shukla KP. Nutritional status of adolescent girls in rural area of Varanasi. *Indian Journal of Preventive and Social Medicine.* 2003;34(1-2): 54-61.
41. Deo DS, Ghattargi CH. Menstrual problems in Adolescent school girls: A comparative study in urban and rural area. *Indian Journal of Preventive and Social Medicine.* 2007;38(1-2):64-68.
42. Joseph GA, Bhattacharji S, Joseph A, Rao PS. General and reproductive health of adolescent girls in rural south India. *Indian Journal of Pediatrics.* 1997;34(3): 242-245.
43. Rema N, Vasanthamani G. Prevalence of nutritional and lifestyle disorders among school going children in urban and rural areas of Coimbatore in Tamil Nadu, India. *Indian Journal of Science and Technology.* 2011;4(2): 72-75.
44. Mulugeta A, Hagos F, Stoecker B, Kruseman G, Linderhof V, Abraha Z, Yohannes M, Samuel GG. Nutritional Status of Adolescent Girls from Rural Communities of Tigray, Northern Ethiopia. *Ethiopian J Health Dev.* 2009;23(1): 5-11.
45. Bisai S, Bose K, Ghosh A. Nutritional Status of Lodha Children in a village of Paschim Medinipur district, West Bengal India. *Indian J Public Health.* 2008;52(4): 203-206.

**Table I: Details age wise distribution of study sample**

Age in Years	Frequency	Percent
10	10	2.4
11	21	5.0
12	78	18.6
13	157	37.4
14	113	26.9
15	41	9.8
Total	420	100.0

**Table II: Nutritional Status of Study population as per National & International Classification of underweight, overweight and obesity according to BMI**

WHO standard*		
n = 420		
Grade of Undernutrition	BMI Cutoff Value Kg/m <sup>2</sup>	No. of Girls n (%)
Grade 3 Thinness	< 16	67 (16)
Grade 2 Thinness	16.0---16.99	64(15.2)
Grade 1 Thinness	17---18.49	106(25.2)
Normal	18.5---24.99	171(40.7)
Overweight	25---29.99	12(2.9)
Obese	>30	Nil

Indian Standard**		
Underweight	< 18.5	237 (56.4)
Normal	18.5—22.9	159( 37.8)
Overweight	23 and Above	24( 5.8)

\*WHO The International Classification of underweight, overweight and obesity according to BMI.2004

\*\* Indian Council of Medical Research, 2009

**Table III: Morbidity status of hostel Girls**

Morbidity Status	Frequency	Percent
URTI	10	2.4
skin problems	67	16.0
Eye problems	17	4.0
ENT problems	9	2.1
Dental problems	114	27.1
Reproductive	70	16.7
NAD	7	1.7
Anaemia	126	30.0
Total	420	100.0

**Table IV: Comparative Frequency of Thinness among the adolescent girls of different countries**

Reference Study	Area Population	Sex	Date of Survey	Undernutrition
NurulAlam et al 2010	Bangladesh	Girls	2003-2004	26%
Lazzeri G et al 2008	Tuscany,Italy	Both	2002-2006	17.9%
Pascal Bovet et al June 2011	Seychelles ( African Region)	Both	1998-2004	29.8%
Afework Mulugeta et al ,2009	Ethiopia	Girls	2004-2005	58.3%
Saxena Y et al 2011	Dehradun, India	Girls	2010	56.25%
Shivaramakrishna et al 2011	Banglore, India	Girls	Jan-Feb 2009	73.5%
X Du et al 2003	China	Girls	2001	32.2%
Yustina Anie Indriastuti Kurniawan et al 2006	Indonesia	Girls	2005	50%
Renuka Jayatissa et al 1997	Sri Lanka	Girls	August to December 1997	22.1%
<u>A. K. M. Shahabuddin</u>	Bangladesh	Both	December 1996 and January 1997	67%
Bisai et al 2008	West Bengal, India	Both	May 2008-March 09	44.5%
CMG Garba et al 2010	Cameroon	Both	-	86.7%
Mital Prajapati et al 2011	Gujarat India	Both	July 2008-December 2008	41.3%
Vinod Wasnik 2011	(Present study)	Girls	January 2010-Augest 2010	56.4%