Assessment of nutritional status of school going girls from 11-14 years in government middle schools in Raipur, Chhattisgarh

Singh P[1*]

DOI: https://doi.org/10.17511/ijpr.2023.i06.01

[1*] Prerana Singh, Assistant Professor, Department of Paediatrics, Hitech Medical College And Hospital, Rourkela, Orissa, India.

Background: The adolescent period is a phase of human development comprising the change from childhood to adulthood. Nutritional requirements increased to a great extent during this period as compared to the previous years of growth. Adolescence may represent a window of opportunity to prepare nutritionally for a healthy adult life. The present study was intended to assess the nutritional status of school-going adolescent girls. **Materials and Methods:** This one-year community-based, cross-sectional study was conducted in private middle schools in the urban area of Raipur, Chhattisgarh among 480 adolescent girls of 11-14 years. All the selected adolescent girls were personally interviewed with the help of a pre-designed and pre-tested questionnaire regarding age, type of family, dietary habits and socio-economic status. A three-day recall method was used to assess nutrient intake. The nutrient intake was calculated using tables of nutritive value of Indian foods. **Results:** As per WHO nutritional measurement criteria, children were classified as per their anthropometric criteria as 44.58% had moderate stunting and 2.5% were severely stunted. 0.42% had severe thinness, 38.75% were thin and 2.29% were overweight. The major morbidity among study subjects were, 12.5% had conjunctival pallor(anaemia), 8.96% had dental caries, 5.83% had Vitamin B complex deficiency, 1.04% had angular stomatitis and 0.63% had Vitamin A deficiency. **Conclusion:** The present study recommends that efforts should be made to reduce the prevalence of malnutrition among adolescent girls. For this regular health check-ups should be done at schools with the help of school authorities and hospitals.

Keywords: Adolescent girls, dietary habits, nutritional requirement

Corresponding Author	How to Cite this Article	To Browse
Prerana Singh, Assistant Professor, Department of Paediatrics, Hitech Medical College And Hospital, Rourkela, Orissa, India. Email: prn1991rims@gmail.com	Singh P, Assessment of nutritional status of school going girls from 11-14 years in government middle schools in Raipur, Chhattisgarh. Pediatric Rev Int J Pediatr Res. 2023;10(6):93-100. Available From https://pediatrics.medresearch.in/index.php/ijpr/article/view/761	

Introduction

Adolescence is predominantly a complicated moment for young girls, particularly from nutritional as well as physical and mental perspectives. Adolescence in girls is considered a special period in their life cycle that requires special considerations. Adolescence is a transition period between childhood and adulthood. WHO defines adolescence as age 10-19 years [1]. There are about 243 million adolescents in India, representing 21% of the whole population in the country [2]. Early adolescence among girls is considered more crucial as far as the growth and development of reproductive systems including the health and nutritional status of individuals is concerned. Adolescence is a crucial part of life. To attain healthy reproductive outcomes and efficient physical activity, the nutritional status of adolescent girls is valuable. One way to break the intergenerational cycle of malnutrition is to improve the nutrition of adolescent girls before conception. The vicious cycle of malnutrition, if not broken, will go on resulting in more and more severe consequences [3]. During the phase of rapid growth, adolescents are at a high risk of developing malnutrition. It is common among adolescents from poor socioeconomic status and rural and urban slum areas.

Adolescent health and nutrition are important issues which have not received the attention it deserves in our country, especially in the context of a girl child. The 10-12-year-old age group is a preparatory stage in the life cycle of an individual when reservoir pools of nutrients are built up in preparation for a second growth spurt in life adolescence. A well-balanced diet is required during this phase to ensure normal growth and to maintain physical and mental fitness [4]. Undernutrition during childhood delays growth and undernutrition in the years preceding adolescence delays the appearance of the adolescent spurt. Children and adolescents are a critical resource whose growth and well-being will determine to a large extent the course of a country's social and economic future [5]. This period of adolescence transition from childhood to adulthood requires better nutritional needs rich in macronutrients and micronutrients for combating rapid growth spurt and increased physical activity [6]. The early adolescent girls as compared to boys are often more prepondent toward eating disorders such as anorexia

Nervosa or binge eating due to intervening factors like body dissatisfaction and depression [7].

Malnutrition further leads to a devastating impact not only on the physical and mental health of female adolescents but also acts as a risk for future generations in the cycle of the continuum of care [8]. Menarche is a complex of growing up. From both medical and social perspectives, it is often considered the central event of female puberty, as it suggests the possibility of fertility [9]. The age of onset of the menstrual cycle varies from 9-18 years, with the average age in the United States being about 12 years and 8 months, whereas in India, it is slightly lower and has been reported to be around 12 years [10]. Menarche further calls for special attention because of the physical and emotional problems associated with it. The psychosocial and emotional problems associated with menarche are of considerable magnitude and they may exert a significant influence on the nutritional status [11].

The rapid increase in height and related skeletal growth and onset of menarche increases energy and nutrient demand thus leading to a deficiency of micronutrients like iron, calcium iodine etc. Unfortunately, the assessment of the nutritional status of adolescent girls has been the least explored area of research, particularly in rural India. Despite the problem of the double burden of malnutrition being so widely distributed among adolescent females, only a few studies are present in this context and minimal reliable data are available. Because of this impending public health problem, the present study was conducted to determine the nutritional status of girls of age group 11 to 14 years studying in government middle school in Raipur city.

Material and Methods

Study design: Community-based cross-sectional study.

Study duration: January 2019 to December 2019

Study setting: This study was conducted in selected government schools in the urban area of Raipur city.

Study population: A total of 480 adolescent girls attending high school and higher secondary school ranging from 11-14 years (VI-VIII Standard) in Raipur city were studied.

Inclusion criteria:
- Middle school-attending girls
- Age group 11-14 years
- Studying in Std VI-VIII

Exclusion criteria:
- Age group < 11 years and >14 years
- Girls studying in classes other than VI-VIII Std
- Girls with any genetic disease, metabolic problem or chronic
- Girls with any history suggestive of any haemoglobinopathy or any dysmorphic features suggestive of genetic
- Girls not giving consent

Methodology/ Data Collection: Girls were enrolled after obtaining proper consent from them and their school principal. Socio-demographic information was collected by using pre-tested and pre-designed structured proforma by interview technique. Nutritional status was assessed using anthropometry, clinical examination and general physical examination.

Major variables:
- Weight
- Height
- BMI- body mass index

Outcome variables:
- The proportion of adolescent girls classified as malnourished-both undernourished and overweight/obese
- The proportion of girls with moderate or severe stunting
- The proportion of clinically anaemic
- The proportion of adolescent girls with different vitamin

Confounding factors:

1. Socio-economic

2. Religious

3. Menstrual

4. Food

Statistical analysis

1. All relevant data were entered into pre-designed

Proforma and analyzed (with the help of a statistician) using Microsoft SPSS software for Windows Version 20.0 and Microsoft Excel 2010.

2. Data were expressed as a percentage and mean +/-

3. The chi-square test was used to analyze the significance of the difference between the distribution of

4. P-value <0.05 was considered as statistically significant.

Observations and Results

Out of a total of 480 adolescent girls in the study, the majority (93.13%) were Hindu, 6.87% were Muslim, 60.2% of girls had mothers who were educated up to Higher Secondary, 15.2% up to Middle School, whereas 21.04% girls had an illiterate mother. 55% of girls had fathers who were educated till Higher Secondary and 12.71% had illiterate fathers. The occupational status of the fathers' of study subjects showed that 41.45% were doing jobs either in the formal or informal sector, 30% were involved in the small scale of self business, and 28.54% were daily wage workers.

91.66% mothers of the study participants were housewives. 64.58% of girls belonged to the Upper Lower (Class IV) Class of Modified Kuppuswamy Scale, 35.2% belonged to the Lower Middle (Class III) Class and 0.2% belonged to the Lower (Class V) Class. The majority of the study subjects were living in a nuclear family i.e. 54.37% whereas 45.63% were living in a joint family. 71.25% of the study subjects had fair environmental hygiene at home, and 28.75% had poor hygiene.

Table 1: Nutritional status as per WHO criteria for Height for Age

Particular	Frequency	Percentage
Severe stunting	20	4.17
Moderate	249	51.88
Normal	211	43.96
Total	480	100

Table 2: Nutritional status as per WHO criteria- BMI (Thinness)

Particular	Frequency	Per cent
Normal (-1 SD to +1 SD)	263	54.79
Overweight > +1SD	9	1.88
Severe Thinness (<-3SD)	6	1.25
Thinness (-3 SD to -1 SD)	202	42.08
Total	480	100

Table 3: Distribution of Morbidity conditions in study subjects

Disease	Frequency	Percentage
Anemia (Conjunctival Pallor)	109	22.71
Dental Caries	51	10.62
Vitamin B Complex deficiency	31	6.46
Pale nail	30	6.25
Angular stomatitis	15	3.13
Vitamin A deficiency (Bitot's spot)	5	1.04

Table 4: Determinants of thinness in study participants

Thinness	Odds Ratio	Std. Err.	z	P>z	[95% Conf. Interval]	
Age (in years)						
12 years	2.252	0.609	3	0.00	1.33	3.83
13 years	1.419	0.410	1.21	0.23	0.81	2.50
Religion						
Muslim	1.239	0.562	0.47	0.64	0.51	3.01
Mother education						
Primary	0.847	0.447	-0.31	0.75	0.30	2.38
High	3.114	2.470	0.02	0.99	0.00	.
Higher	0.367	0.194	-1.9	0.06	0.13	1.03
Father education						
Primary	4.465	2.641	2.53	0.01	1.40	14.23

High School	0.000	0.004	-0.02	0.99	0.00	.
Higher Secondary	2.727	1.649	1.66	0.10	0.83	8.92
Graduate	0.117	0.079	-3.19	0.00	0.03	0.44
Father Occupation						

Job	4.566	1.781	3.89	0.00	2.13	9.81
Self business	1.412	0.482	1.01	0.31	0.72	2.76
Mother Occupation						
Housewife	2.287	1.048	1.81	0.07	0.93	5.62
Socioeconomic status						
Upper lower	1.392	0.384	1.2	0.23	0.81	2.39
Type of family						
Nuclear	0.816	0.178	-0.93	0.35	0.53	1.25
Immunization status						
Incomplete	0.42	0.126	-2.90	0.004	0.23	0.76
Menstrual history						

Regular 4/5	1.005	0.286	0.02	0.99	0.58	1.75
Regular 5/5	0.906	0.317	-0.28	0.78	0.46	1.80
Teeth						
Carries	0.394	0.135	-2.71	0.01	0.20	0.77
icons	0.269	0.151	-2.34	0.02	0.09	0.81

Table.4. shows that as compared to an 11-year girl child; 12 year old had 2.25 times more chance of being thin (OR-2.25, p=0.00) and 13 years had a 1.41 times chance (OR 1.41,0.23) of being thin.

As compared to Hindu girl children Muslim girl children had 1.24 times more chance (OR-1.24, P=0.64).

In Parent's education, the father's education had a significant impact on their girl child's BMI. Fathers who were educated till primary school had 4.46 times more chance (OR-4.465, p=0.01) of their girl child being thin as compared to illiterate. Mothers who were educated till high school had 3.11 times more chance (OR 3.11, p=0.99)) of their girl child being thin as compared to illiterate. The father's occupation also had a significant impact on their girl child's nutritional status. Fathers who were on the job had 4.56 times more chance (OR-4.56, p=0.00) of having their girl child thin as compared to daily wagers. Mothers who were housewives had 2.287 times more chance of having their girl thin as compared to daily wagers. Girl children with upper lower socio-economic status had 1.39 times more chance of having girl child thin (OR-1.39, p=0.23) as compared to the lower middle class. Dental caries had a significant impact on girl child nutritional status, girls with dental caries had 0.39 times more chance (OR-0.394, p=0.01) of being thin as compared to those who didn't have caries.

Table.5. Determinants of stunting in study participants

Stunting	Odds Ratio	Std. Err.	z	P>z	[95%Conf.Interval]	
Age (in years)						
12 years	0.507	0.123	-2.8	0.005	0.316	0.815
13 years	0.252	0.070	-5	0.000	0.147	0.433
Religion						
Muslim	0.716	0.282	-0.85	0.397	0.331	1.550
Mother education						
Primary	0.792	0.374	-0.49	0.621	0.314	1.997
High School	0.133	0.158	-1.7	0.09	0.013	1.369
Higher Secondary	0.612	0.290	-1.04	0.3	0.242	1.550
Father education						
Primary	0.820	0.449	-0.36	0.717	0.280	2.399
Middle School	2.344	1.997	1	0.317	0.441	12.449
High School	12.879	18.702	1.76	0.078	0.748	221.790
Higher Secondary	0.938	0.522	-0.12	0.908	0.315	2.792
Graduate	0.685	0.413	-0.63	0.531	0.210	2.236
Father Occupation						
Job	0.766	0.261	-0.78	0.434	0.393	1.494

Mother Occupation						
Housewife	1.321	0.580	0.63	0.526	0.559	3.123
Socio-economic status						
Upper lower	0.863	0.213	-0.59	0.553	0.532	1.402
Type of family						
Nuclear	1.289	0.257	1.28	0.202	0.873	1.905
Immunization status						
Incomplete	0.962	0.270	-0.14	0.892	0.555	1.669
Menstrual history						

Regular 3/5	0.836	0.217	-0.69	0.49	0.503	1.390
Regular 4/5	1.000	0.256	0	0.999	0.605	1.653
Regular 5/5	0.879	0.282	-0.4	0.688	0.468	1.650
Teeth						
Caries	0.756	0.246	-0.86	0.39	0.400	1.429
_cons	2.203	1.145	1.52	0.128	0.796	6.100

Table.5. shows that as compared to an 11-year girl child; 12 year old had a 0.507 times more chance of being stunted (OR-0.507, p=0.005) and 13 years had 0.252 times chance (OR 0.252,p=0.000) of being stunted. As compared to Hindu girl children, Muslim girl children had 0.716 times more chance (OR- 0.716, P=0.397). In parents' education, fathers who were educated till high school had 12.88 times more chance (OR-12.88, p=0.07) and who were educated till middle school had 2.34 times more chance of their girl child being stunted as compared to illiterate.

Mother's education did not have any significant impact on having their girl child stunted as compared to illiterate. Fathers who do job or business as their occupation did not have a significant impact on their girl child's nutritional status as compared to daily wages. Mothers who were housewives had 1.321 times more chance (OR-1.32, p=0.526) of having their girl stunted as compared to daily wagers. Girl children with upper lower socio-economic status had 0.863 times more chance of having a girl child stunted (OR-0.863, p=0.532) as compared to the lower middle class. Girls with dental caries had 0.756 times more chance (OR-0.756, p=0.400) of being stunted as compared to those who didn't have caries.

Discussion

This study was conducted in government schools of the state capital city, Raipur. A total of 480 school girls from class 6th to 8th under the age group of 11-14 years were assessed for their nutritional status and morbidity pattern. Socio-economic determinants were also assessed among study children.

In the present study, out of 480 school girls age wise maximum proportion of stunted girls against their sample was (71%) from 13 year age group followed by (55%) from 12 year age group and (40%) from 11 year age group. Whereas thinness was the maximum (51%) in 11 year age group, followed by (48%) from 13 years and 35% from

12 years age group. The mean weight in 11-year-old girls was 34.31±6.13 kg, height was 143.97±7.83 cm, in 12 years old girls 37.05±6.28 kg, height was 145.23±8.19 cm and in 13 years old girls 36.95±6.55kg, height was 144.84±7.48 cm.

A similar study by Maiti S et al (2011) in West Bengal reported that maximum stunting (39.6%) was in the 13-year age group followed by 35.7% in the 12-year age group and 28.85 in the 11-year age group.[12] Sinha S et al (2019) in Lucknow reported that the mean weight of 11-year-old girls was 37.2±4.41 kg, height 140.93±3.28 cm, in 12-year-old girl weight of 36.4±4.6 kg, height 140.98±6.29cm and 13 years old girl weight 38.4±3.7 kg and height was 143.62±4.82 cm.[13]

In the present study, out of 480 school girls religion-wise analysis of nutritional status showed that 56% of Hindu girls were stunted as compared to 61% of Muslim girls and the association between underweight and religion was statistically not significant. Whereas thinness was reported in 44% of Hindu girls as compared to 36% of Muslim girls and it was also statistically not significant. As compared to Hindu girl children Muslim girl children had 1.24 times more chance (OR- 1.24, P=0.64). A similar study by Rani D et al (2018) at Varanasi reported that 60.4% of Hindu girls had thinness compared to 57.1% of Muslim girls. [14]

In the present study, 84.79% of mothers were educated and 15.21% were not educated. Of educated mothers 69% of girl children were stunted as compared to 48% of non-educated mothers. Whereas of educated mothers 24% of girl children were thin as compared to 48% of non-educated mothers. Fathers who were educated till primary school had 4.46 times more chance (OR 4.465, p=0.01) of their girl child being thin as compared to illiterate. Mothers who were educated till high school had 3.11 times more chance (OR-3.11, p=0.99)) of their girl child being thin as compared to illiterate.

In the present study, 87.29% of fathers were educated and 12.71% were not educated. Of educated fathers, 51% of girl children were stunted as compared to 49% of non-educated fathers. Whereas of educated fathers 44% of girl children were thin as compared to 54% of non-educated fathers. The association between parental education and the nutritional status of their children was statistically significant.

A study by Kunwar R and Pillai CB (2011) on the impact of education of parents on the nutritional status of primary school children reported that of illiterate fathers 36.51% of children were undernourished and of educated fathers 30% of children were undernourished.[15] A similar study by Singh K S et al (2014) in Uttar Pradesh reported that illiterate mothers had 50% of girls whose BMI was <18.5 and who were educated had 19% of girls whose BMI was <18.5. Whereas illiterate fathers had all the girls whose BMI was <18.5 and who were educated had 28.72% of girls whose BMI was <18.5. [16]

In the present study, daily wage fathers had a high prevalence of (48%) thinness as compared to those on jobs (41%) and those doing self-business (42%). Whereas daily wage mothers had more prevalence of thinness (58%) as compared to housewife mothers (42%). Fathers who were on the job had 4.56 times more chance (OR-4.56, p=0.00) of having their girl child thin as compared to daily wagers. Mothers who were housewives had 2.287 times more chance of having their girls thin as compared to daily wagers. Similar findings were reported by Srivastava A et al (2012) that mothers who were working had 75% undernourished children as compared to those who were not working 33.8%. Mothers who were working had 6.01 times more chance [OR= 6.10(4.16-8.97)] of having their child undernourished as compared to non-working.[17]

In the present study, the lower middle class has more prevalence (57%) of stunting in girls as compared to the upper lower class (55%) Whereas the upper lower class has 44% thinness as compared to the lower middle class 43%. A girl child with upper lower socio-economic status has a 1.39 times higher chance of having a girl child thin (OR-1.39, p=0.23) as compared to the lower middle class. Nair A, et al (2017) in a study in Maharashtra reported that girls from the upper socio-economic class had less proportion of stunting as compared to the lower socio-economic class. SES-I had 33.3% of girls stunted, SES-II had 40.91%, SES-III had 42.22%, SES-IV had 47.17% and SES-V had 51.84%. Whereas thinness was high in SES-I has 33.3%, SES III had 26.67%, SES-IV had 13.58% and SES-V had 22.45%.[18]

In the present study, in the nuclear family, 45% of girls were thin and 42% were thin in joint family. 49% of girls were thin in families where environmental hygiene was poor and 41% in families where environmental hygiene was fair. Rani D et al (2018) did an Assessment of the Nutritional Status of Teenage Adolescent Girls in the Urban slums of Varanasi and reported that 53.9% of adolescent girls were undernourished in joint families as compared to 62% in nuclear families. [14]

The mean weight in 11year girls was 34.31±6.13 kg, and height was 143.97±7.83 cm, 12 years girls 37.05±6.28 kg, height was 145.23±8.19 cm and in 13 years old girls 36.95±6.55kg, and height was 144.84±7.48 cm. As per WHO criteria for Height for Age (H/A), which measures the level of stunting in girls, 51.88% were in the moderate stunting category of malnutrition, and 4.17% of girls were severely stunted. As per WHO criteria for Body Mass Index (BMI), 1.25% of girls were in severe thinness, 42.08% were in thin and 1.88% were overweight.

Anand K et al (1999) did a similar study in rural north India. The prevalence of stunting in 12 to 14 years age group girls was 51% and the prevalence of thinness was 32%. The prevalence of anemia was 8.7% in girls 12-14 years of age group.[19] Patil S N, et al(2009) did a similar study in Rural Maharashtra. As per Proposed WHO criteria, 69.3% of adolescent girls were underweight (BMI < 18.5). [20] Wasnik V et al (2010) did a study in Andhra Pradesh, according to WHO reference standards 56.4 % of girls were under-nourished (BMI<18.5kg/m2).[21] Maiti S, et al (2011) did a similar study in West Bengal. The overall prevalence of stunting and thinness among early adolescents was 32.5% and 20.2% respectively [12]. Baliga SS et al (2014) examined the nutritional status of adolescent girls in Karnataka. 63.82% of adolescent girls between 10 and 14 years were stunted.[22] Bhattacharya A et al (2015) examined the nutritional status of early adolescents girls and 58.88% were underweight and 54.21% were stunted.[23]

The major morbidity among study participants were, 22.71% had conjunctival pallor (anemia),10.62% had dental carries, 6.46% had Vitamin B complex deficiency, 6.25% pale nail, 3.13% had angular stomatitis in lips 1.04% had Vitamin A deficiency (Bitot's spot).

Dambhare DG, et al (2010) reported that 38.89% of school-going girls had anemia. 35.34% adolescents had dental caries. 13.79% were suffering from refractive error. 7.76% had worm infestation. 6.9% had skin problems. 2.59% had tonsillitis and 2.59% had wax in the ear [24]. Bhattacharya A. et al (2015) noted that in early adolescence about 55.18% had pallor, 40.33% had dental caries, 33.49% were suffering from refractive errors, 23.11% had a history of worm infestation, 38.90% had skin problems, and 68.61% adolescents had ENT problems.[23] Hari Krishna B.N, et al (2017) reported that 34.2% had anemia, 10.5% had worm infestation, 13.3% had dental carries and 2.6% had vitamin D deficiency.[25] Goyal, N. (2018) reported that malnutrition includes nutritional deficiencies (54.03%), refractive errors (31.17%), hair problems (28.31%) and dental problems (28.18%). (15.97%) and (12.60%) were found to suffer from skin diseases and respiratory diseases respectively. [26]

Conclusion

The present study was conducted among middle school girls from government schools in Raipur city of Chhattisgarh state to evaluate their nutritional status and morbidity pattern. More than half of the (56.05%) middle school girls were stunted as they were suffering from chronic malnutrition, 43.33% had some form of thinness and 22.71% had clinical anemia.

The government of India started a school feeding programme in all government schools till the 8th standard. Chhattisgarh government has also started the Sabla Yojana programme targets adolescent girls between 11 and 18 years old and provides nutritional supplements, IFA & deworming, medical examinations and education. Under school health, RBSK programme is implemented to assess and treat children for nutritional deficiency issues. Still, half of the middle school girls from government schools are malnourished. Tackling malnutrition in government schools requires a holistic approach, especially when targeting adolescent girl children. Following interventions are

Recommended:-

1. Effective implementation of mid-day meal

2. Routine health assessment and effective infection

3. Skill-based nutrition education for the

4. Integration of other schemes.

Nutrition education can have a significant impact in promoting healthy eating habits, and schools can contribute to reducing nutrition-related problems by integrating nutrition interventions into a comprehensive school health program.

Author's contribution

Dr. Prerana Singh: Concept, study design, manuscript writing and statistical analysis.

Reference

1. T Raja ratnam and Jyoti S Hallad. Nutritional status of adolescents in Northern Karnataka, India. The Journal of Family Medicine,2012 Jun;58(1):55-67

2. Kathawate V, Ghosh S. Nutritional status of adolescents in agrarian crises-affected area of maharashtra. Indian J Community Med. 2013;38(3):180-183. doi:10.4103/0970-0218.116356

3. Dambhare DG, Bharambe MS, Nutritional status and morbidity, Online Journal of Health and Allied Sciences, 2010Apr-Jun;9(2):1- 3

4. Akhter N, Sondhya FY. Nutritional status of adolescents in Bangladesh: Comparison of severe thinness status of a low-income family's adolescents between urban and rural Bangladesh. J Educ Health Promot. 2013 Jun 29;2:27. doi: 10.4103/2277-9531.114209. PMID: 24083277; PMCID: PMC3778614.

5. Mulugeta A. Nutritional Status of Adolescent Girls from Rural Communities of Tigray, Northern Ethiopia. Ethiop J Health Dev. 2009; 23(1):5-11.

6. P.R. Kokiwar, G.S. Sai Prasad, Letter to the Editor: Anemia among Adolescent girls, Quarterly Journal of IPHA, 2007 Oct-Dec, Page No.252.

7. Kumari PS, Devadas R. Growth performance and secular trends among school children of Coimbatore. Indian J Nutr & Dietet 1990; 15:355-64.

8. Tanner JM. Growth in adolescent. 2nd edn. Blackwell, Oxford; 1962.

9. Kaur PN, Marwaha G, Sidhu S. Growth pattern of affluent school children of Amritsar. Anthropologist 2005;7:261-64

10. Ghirri P,Bernardini M, Vuerich M, Coccoli et al.Adrenarche ,Pubertal development, age at menarchae and height of full term,born small for gestional age (SGA) girls.Gynecol Endocrinol Vol-15, page no 91"97, 2001.

11. Khaldilkar VV, Stanhope RG, Khadilkar V, secular trends in puberty. Indian pediatr 2006; 43; 475â€"78.

12. Maiti S, Ali KM, De D, Bera TK, Ghosh D, Paul S. A Comparative Study on Nutritional Status of Urban and Rural Early Adolescent School Girls of West Bengal, India. J Nepal Paediatr Soc 2011;31(3):169-174.

13. Sinha S, Singh RB. A study on diet and nutritional status among adolescent girls in Lucknow district, India. Int J Community Med Public Health 2016;3:2019-25.

14. Divya Rani, Jitendra Kumar Singh, Mona Srivastava, Pragya Verma, Deepali Srivastava, S. P. Singh. Assessment of Nutritional Status of Teenage Adolescent Girls in Urban Slum of Varanasi. International Journal of Current Research and Review Research 2018.10202. Article DOI: http://dx.doi.org/10.31782/IJCRR.

15. Kunwar, R., & Pillai, P. B. Impact of education of parents on nutritional status of primary school children. Medical journal, Armed Forces India, 2012;58(1), 38–43. https://doi.org/10.1016/S0377-1237(02)80011-9

16. Singh SK, Garg G, Davey S, Raghav SK, Muzammil K, Singh JV. Impact of Educational Status of Parents on Nutritional Status of Adolescent Girls: A Cross Sectional Study. Natl J Community Med 2014: 5(3); 266-9.

17. Srivastava, A., Mahmood, S. E., Srivastava, P. M., Shrotriya, V. P., & Kumar, B. Nutritional status of school-age children - A scenario of urban slums in India. Archives of public health Archives belges de sante publique, 2012;70(1), 8.https://doi.org/10.1186/0778-7367-70-8

18. Nair A, Doibale MK, Kuril BM, Domple VK. Study of nutritional status of adolescent girls in a rural area of a district of Maharashtra. Int J Community Med Public Health 2017;4:4617-22

19. Anand K, Kant S, Kapoor SK. Nutritional status of adolescent school children in rural North India. Indian Pediatr. 1999;36(8):810-815.

20. Patil S N, Wasnik V, Wadke R. Health Problems Amongst Adolescent Girls In Rural Areas Of Ratnagiri District Of Maharashtra India., 2009;3(5): 1784-1790.

21. Vinod Wasnik , B. Sreenivas Rao, Devkinandan Rao (2010). A Study of the Health Status of Early adolescent Girls residing in Social Welfare Hostels in Vizianagaram district of Andhra Pradesh State, India. International Journal of Collaborative Research on Internal Medicine & Public Health.

22. Baliga SS, Naik VA, Mallapur MD. Nutritional status of adolescent girls residing in rural area: A community-based cross-sectional study. J Sci Soc 2014;41:22-5

23. Bhattacharya A, Basu M, Chatterjee S, Misra RN, Chowdhury G. Nutritional status and morbidity profile of school-going adolescents in a district of West Bengal. Muller J Med Sci Res 2015;6:10-5

24. Dambhare DG, Bharambe MS, Mehendale AM, Garg BS. Nutritional Status and Morbidity among School going Adolescents in Wardha, a Peri-Urban area.Online J Health Allied Scs. 2010;9(2):3

25. Hari Krishna B.N, M Sreedhar, Madhukeerthi. Cross sectional Study on Nutritional Status and Morbidity pattern among School going Adolescents in Rural Health Training Centre, Patancheru, Hyderabad. District–Telangana. Indian Journal of Basic and Applied Medical Research; June 2017: Vol.-6, Issue- 3, P. 5-9.

26. Goyal, N. Morbidity pattern and its correlates among adolescent girls residing in rural and urban areas of Haldwani, India. International Journal Of Community Medicine And Public Health, 2008;5(11): 4889-4895. doi:http://dx.doi.org/10.18203/2394-6040.ijcmph20184590.