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Abstract

Background: Adolescence is a transition phase through which a child becomes an adult. It is characterized by rapid growth and development; physiologically, psychologically and socially. Adolescents are an “in between group”, with some nutrition problem, some common with children and some with adults. Objective: To assess the Nutritional status of the adolescent girls residing in the Social welfare Hostel. Material and Methods: Study setting: Six social welfare hostels for scheduled caste girls in Nellore city. Study design: Descriptive cross sectional study. Study period: June 2008 –May 2009. Study population: All the girls aged between 11-19 years residing in the social welfare hostels of Nellore city. Sample size: 562 adolescent girls were registered at the time of study in social welfare hostels out of which 542 are recruited in this study. Study instruments: Pre-designed, pre-tested, semi-structured questionnaire, Weighing machine, stadiometer etc. Study methodology: Written permission was obtained from the Deputy Director of social welfare hostels of Nellore district. Nutritional Status: Assessed by Anthropometric measurements viz height, weight, BMI, biochemical markers viz haemoglobin estimation. Analysis: SPSS Version 17.0. Chi-square test was used for analysis of categorical variables. Results: The prevalence of thinness in the study subjects was 57.56%. 64.6% were underweight, A 20% sub-sample of 542 subjects i.e. 135 subjects were examined for Haemoglobin estimation. 49.6% were found to be anaemic. Conclusion: the different nutritional status indicators revealed that a large proportion of adolescents were undernourished with stunting, energy deficient and/or anemic.

Key Words: Adolescent, Nutritional status, Social welfare hostels, Stunting, Anemia

Introduction

WHO defines adolescence as the segment of life between the ages of 10-19 years. Adolescence is a transition phase through which a child becomes an adult. It is characterized by rapid growth and development; physiologically, psychologically and socially.¹

About one-fifth of India’s population is in the adolescent age group of 10–19 years.
Adolescents are an “in between group”, with some nutrition problem, some common with children and some with adults. The newer focus on RCH also has been invigorated by the continuing realization of the importance of women’s health; it is now widely accepted that if the health of women is to be improved, the health of adolescents must be given high priority in Indian policy and programme development and implementation.\(^2\)

Anaemia is a widely prevalent health problem among adolescent girls. Both the 1992 ICMR study on Iron and Folic Acid supplementation and UNICEF have reported low mean hemoglobin levels and low nutritional intake of proteins, calories, and macro/micronutrients among adolescent girls and pregnant mothers. Poor physical growth and stunting are the primary outcomes of poor nutrition. The NFHS-3 (2005-2006) reported that the prevalence of anaemia was 56% among adolescents.\(^3\)

In Andhra Pradesh, this segment constitutes approximately 5.03% of the population. The importance of this target group lies in the fact that they are going to be the mothers of tomorrow – whose wellbeing is critically important for improving the nutritional, health and educational status of women in the State. Various base line surveys also revealed that the health, nutritional and educational status of adolescent girls are at sub-optimal level\(^4\).

The girls stay more than 8 years in these hostels. As these girls have come out of their environment and are living in groups, they face special risks and need extra care for the maintenance and improvement of their health and nutrition. The data regarding the nutritional status in the social welfare hostels for the scheduled castes are sparse, despite the usefulness of such information in the management of hostels and upliftment of these groups.\(^5\) In this context, the present study was taken up among adolescent girls residing in the social welfare hostels for scheduled castes in Nellore city. This study focuses on the nutritional status of adolescent girls in the hostels.

**Objective:** To assess the Nutritional status of the adolescent girls residing in the social welfare Hostel.

**Material and Methods**

**Study setting:** Social welfare hostels for scheduled caste girls in Nellore city.

**Study design:** Descriptive cross sectional study.

**Study period:** June 2008 – May 2009.

**Study population:** All the girls aged between 11-19 years residing in the social welfare hostels of Nellore city.

**Inclusion criteria:** 1. All adolescent girls aged 11-19 years. 2. A minimum of not less than one year stay in the hostel.
Exclusion criteria: Absentees and drop outs of the subjects from the hostel during the period of survey.

Sample size: 562 adolescent girls were registered at the time of study in social welfare hostels out of which 542 are recruited in this study.

Study instruments: Pre-designed, pre-tested, semi-structured questionnaire, Weighing machine, stadiometer etc.

Study methodology: The study was conducted among adolescent girls residing in six social welfare hostels for scheduled caste students in Nellore. Written permission was obtained from the Deputy Director of social welfare hostels of Nellore district.

Nutritional Status Measurement: Nutritional status of girls was assessed by: Anthropometric measurements viz height, weight, BMI. and Biochemical markers viz haemoglobin estimation.

Anthropometry Measurement: Height- Stadiometer (measuring rod) capable of measuring to an accuracy of 0.1 cm was used to assess height of the subjects. Weight- A portable weighing machine with an accuracy of 100gm was used to record the weight of the girls.

Body Mass Index (BMI) – BMI was calculated using the formula Weight in kg/height in m². The subjects were categorized into four groups based on BMI according to WHO Asian Pacific standards

Thinness- WHO defines thinness in adolescents as BMI below the 5th centile for age. In this study, 5th percentile of NCHS standards of BMI for age were considered as thin.

Wasting - Height for age less than 3rd percentile of NCHS/WHO standards. In this study, 5th percentile of NCHS standards of height for age were considered as stunted or wasted.

Laboratory Tests: Haemoglobin estimation was done by Sahli’s method on a 20% subsample of subjects, drawn by systemic random sampling. The WHO cut off levels were taken as standards to classify the haemoglobin status.

Analysis: Data collected was entered in Microsoft Office Excel and analysed by using SPSS Version 17.0. Proportions were calculated for different study variables. Chi-square test was used for analysis of categorical variables. Criteria of significance used in the study was p < 0.05.

Results

On the whole 35.79% were in middle school, 56.08% were in high school, 8.11% were in college education.

The median weight of the girl ranged from 30 ± 4.69 Kg to 45.5 ± 2.10 Kg. The median weight increased as the age increased. When compared to 50th percentile of NCHS standards the mean
weights of girls in the present study were very low (p= 0.002).

**Figure1: Line chart showing Weight for Age**

![Line chart showing Weight for Age](image1)

The median height of the girls ranged from 131 ± 6.24 cm to 154.50 ± 4.06cm. When compared to 50th percentile of NCHS the median height of girls in the present study were very low (p=0.005).

Stunting was highest 14.7% in 14-15 year age group, followed by 13.3% in 16-19 years and 8.8% in 11-13 year age group. (p>0.05) The prevalence of thinness in the study subjects was 57.56%. Thinness was highest in the age group of 14-15 year i.e., 46.7%, followed by 50.8 % in 11-13 years and 46.7% in 16 – 19 year age group (p>0.05).

**Figure2: Line chart showing Height for Age**

![Line chart showing Height for Age](image2)

According to WHO BMI staging 64.6% were underweight, 0.4% were pre-obese and 0.4% were obese. The mean haemoglobin of the girls ranged from 10.22±0.5 to 12.6±0.11 gm/dl. The mean haemoglobin level was highest in 18 year age group.

**Table 1: Distribution of study subjects according to BMI staging (n=542)**

<table>
<thead>
<tr>
<th>BMI staging</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &lt;18.5(under weight)</td>
<td>350</td>
<td>64.6</td>
</tr>
<tr>
<td>2 18.5-22.99(normal)</td>
<td>188</td>
<td>34.7</td>
</tr>
<tr>
<td>3 23-24.99(pre-obese)</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td>4 &gt;25(obese)</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>542</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

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A 20% sub-sample of 542 subjects i.e. 135 subjects were examined for Haemoglobin estimation. 49.6% were found to be anaemic.

**Table 2: Duration of stay of study subjects in the hostel and Anaemia (n=135)**

<table>
<thead>
<tr>
<th>Period of stay (years)</th>
<th>Anaemia</th>
<th></th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present (%)</td>
<td>Absent (%)</td>
<td></td>
</tr>
<tr>
<td>&lt;5</td>
<td>40(52)</td>
<td>37(48)</td>
<td>77(100)</td>
</tr>
<tr>
<td>&gt;5</td>
<td>27(46.55)</td>
<td>31(53.45)</td>
<td>58(100)</td>
</tr>
<tr>
<td>Total</td>
<td>67(49.63)</td>
<td>68(50.37)</td>
<td>135(100)</td>
</tr>
</tbody>
</table>

($\chi^2=0.2, df = 1, p = 0.65$)

Out of 77 girls who stayed less than five years in the hostel, anaemia was present in 52% whereas in those who stayed more than five years anaemia was present in 46.55% and this was found to be statistically insignificant. ($\chi^2=0.2, df = 1, p = 0.65$)

**Discussion**

In the present study, the median weight of subjects ranged from 30 ± 4.69kg to 45.5 ± 2.1kg and the median height ranged from 131 ± 6.24cm to 154.5 ± 4.06cm. These are very low when compared to NCHS standards.¹⁰

In the study conducted by Srinivasan the mean weights and heights of both boys and girls were below NCHS standards, reason being both the studies were conducted in social welfare hostels. In a study by Varsha Zanvar et al.¹¹ of Marathwada region, weight, height and BMI were below the NCHS standards. In a study by Banerjee in school children, the height and weight were below NCHS (50th percentile) and Indian (50th percentile) standards, 31.7% were under weight and 7.02% were of short stature when compared to 5th and 3rd percentiles of NCHS. In the present study 46.7% are having thinness and 13.3% are stunted. This high prevalence of thinness and stunting may be due to inadequate food intake.

In the study conducted by Srinivasan in Tirupati, prevalence of malnutrition was 78.4%. This high value may be due to lower age group. Chabbar et al. noted 36.7% of malnutrition in children of an observation home in Delhi.

In the study by Deshmukh thinness was higher in early adolescence (57%) than in late adolescence (48.5%) whereas in this study thinness is highly prevalent in mid adolescence (74.8%) than in early adolescence (50.8%). This
may be due to growth spurt. In a study conducted by Dilip kumar das\textsuperscript{15} in West Bengal were 37.8% stunted and 14.7% were thin.

In another study by Medhi et al.\textsuperscript{16} 52% of girls were stunted and 41% were thin when compared to NHANES standards. Studies by Raheena Begum\textsuperscript{17} in Thiruvananthapuram reported heights and weights less than NCHS standards, whereas Singh et al.\textsuperscript{18} in Lucknow in his study reported less than ICMR standards. In a study by Patil\textsuperscript{19} in Maharashtra according to WHO Asian Pacific BMI criteria, 67.8% were under weight.

In the present study according to WHO BMI staging 64.6% were having chronic energy deficiency (CED), 34.7% were normal, 0.4% obese and 0.4% preobese. In a study by Kapil et al.\textsuperscript{20} 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\textsuperscript{17} in Kerala, 53% in 14 years age group and 33% in 15 years age group were having BMI <18.5. In a study by Medhi et al.\textsuperscript{16} in adolescents of tea garden workers, median BMI was far below NCHS median and overweight was detected in only two adolescents (0.33%) which is similar to the present study.

In a study by Deshmukh et al.\textsuperscript{14}, CED was found to be 75.3%. This high prevalence of CED in other studies when compared to present study may be due to fact that they are conducted in communities and most of them have included both boys and girls. In the present study 49% of girls suffered from anaemia, 16.3% from mild, 29% from moderate, 4.4% from severe anaemia. The mean haemoglobin ranges from 10.22 to 12.6g/dl. Similar prevalence of anaemia was noted in studies by Dilip kumar et al.\textsuperscript{15} (44.8%), Varsha Zanvar\textsuperscript{9} (46.6%), Aneja et al.\textsuperscript{21} (47%), Singh et al.\textsuperscript{18} (56%) and Patel\textsuperscript{19} in Maharashtra (42%).

High prevalence of anaemia was found in studies by Srinivasan\textsuperscript{5} (80.4%), Chaturvedi et al.\textsuperscript{20} (73.7%), Pooja Trivedi\textsuperscript{22} (82%) and Satapathy et al.\textsuperscript{23} (72.7%). This high prevalence when compared to present study may be due to inadequate iron intake and relatively high incidence of worm infestation.

The median weight and height of the girls were very low when compared to 50\textsuperscript{th} percentile of NCHS standards. Stunting was highest (14.7%) in 14-15 year age group. The prevalence of thinness was 57.56%. 64.6% were underweight. The mean haemoglobin of the girls ranged from 10.22±0.5 to 12.6±0.11 gm/dl, 49.6% were found to be anaemic. The different nutritional status indicators revealed that a large proportion of adolescents were undernourished with stunting, energy deficient and/or anemic.

Considering the results of this study, it is suggested that a comprehensive strategy should be implemented in disadvantaged groups in order to prevent adolescent girl undernourishment. In view of the high prevalence of anaemia, Iron and Folate supplementation and Deworming must be done periodically. Haemoglobin estimation of inmates and facilities for treatment on the spot at school
health clinic and referral services should be organized and monitored systematically.

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Conflict of Interest: Nil

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Nutritional Status of Adolescent Girls


