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Assessment of Nutritional Status of Adolescents: Field Experience from Rural Gujarat, India

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ABSTRACT

Background: Worldwide there are more than 1.2 billion adolescent; more than half of all adolescents live in Asia and India has the highest adolescent population than any other country. Adolescents face a range of health challenges; contributing to increased morbidity and mortality. However, the comprehensive data on status of morbidity are scarce. Present study assesses nutritional status of adolescents attended Adolescent Health Day (AHD) in one of the taluka of Gujarat.

Methods: Present study documented nutritional status of adolescents attended 16 AHD organized by health department in Talod block of Sabarkantha district. Screening of adolescents was done for Body Mass Index (BMI) and Hemoglobin estimation.

Results: Out of total 821 adolescents, 690 (84%) school-going and 131 (16%) non-school-going adolescents screened, 17% were severely thin and only about half had normal BMI. Less than a percent were overweight. Prevalence of anemia was 6% in girls and 3% in boys.

Conclusions: Present study documents poor nutritional status of adolescents in rural Gujarat; narrates an urgent need for better nutrition to combat the problem of undernutrition amongst adolescents. Present study also reinforces a need for further research and documentation of nutritional status of Adolescents to enhance current interventions in the field of adolescent health.

Key words: AHD, Adolescent, BMI

INTRODUCTION

Worldwide there are more than 1.2 billion adolescent that is roughly one in every six persons is an adolescent. More than half of all adolescents live in Asia and India has the highest adolescent population; it is home to around 243 million (21% of population) than any other country. Hence adolescent health is particular concern given the sheer number of young people especially in India[1].

Adolescents face a range of health challenges, including malnutrition and anemia, all contributing to increased morbidity and mortality not only during adolescence but also later in their lives[1]. Adolescents (age 10–19 years) are at high risk of iron deficiency and anemia to accelerated increase in requirements for iron, poor dietary intake of iron, high rate of infection and worm infestation as well as the social norm of early marriage and adolescent pregnancy (national iron). Adolescent girls also constitutes a vulnerable group especially in developing countries where they are traditionally married at an early age and exposed to greater risk of reproductive morbidity and mortality. The nutritional status of adolescent girls, the future mothers, contributes significantly to nutritional status of the community. If the nutritional needs are not met, they are likely to give birth to undernourished children, thus transmitting undernutrition to future generations[2]. Nutritional anemia is a major

public health problem in India, the National Family Health Survey 3 (NFHS 3) survey data suggests that anemia is widely prevalent among all age group and in the age group 15-19 years, 56% girls and 30% boys were anemic[3].

Overweight and obesity during adolescent period are associated with risk factors for obesity related diseases and NCDs in adulthood[4]. In India, 47% girls and 58% boys were thin, 2.4% girls and 1.7% boys were overweight[4]. The National Family Health Survey (NFHS) data reported only 15-19 age group data however the prevalence amongst the early adolescent age group is not known. Hence, the prevalence of anemia and obesity overweight will be even more than reported.

The Government of India (GoI) has put in place various programmes and policies aimed at improving national status among adolescents, especially for the girls. GoI has recently launched Rashtriya Kishor Swasthya Karyakram (RKSK) on 7 January, 2014 addressing adolescent health needs[5]. RKSK expands the scope of adolescent health programming in India - from being limited to sexual and reproductive health, it now includes in its ambit nutrition, injuries and violence (including gender based violence), non-communicable diseases, mental health and substance misuse[6]. Despite all these important consideration, there is still limited data available on prevalence of anemia, undernutrition and obesity amongst adolescents in India. Most of available data on young people combines 15-24 years old and it is not possible to get desegregate by age, for 15-19 years. More importantly data on 10-14 years old is practically nonexistent, which is a major limitation for designing programs targeting young adolescents as their need differs from 15-19 years[1].

Adolescent Health Day (AHD) under RKSK is one of the important community based strategies to achieve the objectives of the adolescent health program to improve preventive services and increase the awareness[7]. One of the major component of AHD is screening of all adolescents School Going (SG) and Non School Going (NSG), married unmarried which provides opportunity to capture the status of the school children's and non-school going children and to provide counseling based on screening results. Present study aims to document nutritional status of adolescents who attended AHD in selected villages in one of the district of Gujarat, India. Such efforts of documentation of nutritional status of adolescents will not only provide insights on prevalence of anemia and obesity, but will also give opportunity to understand the impact of existing programs on nutritional status of adolescents hence will be helpful for future direction of existing programs.

METHODS

Cross sectional study was conducted to document nutritional status of adolescents who participated in AHD organized in one of the block of Sabarkantha District, Gujarat. Sixteen schools from Talod block of Sabarkantha district were randomly sampled for nutritional assessment of adolescents attended AHD. All adolescent both SG and NSG boys and girls, who all came to present on the day of AHD organized in sixteen schools were included in the study. The selected SG adolescents were studying in 6th to 10th standard. Total 812 adolescents were enrolled in the study.

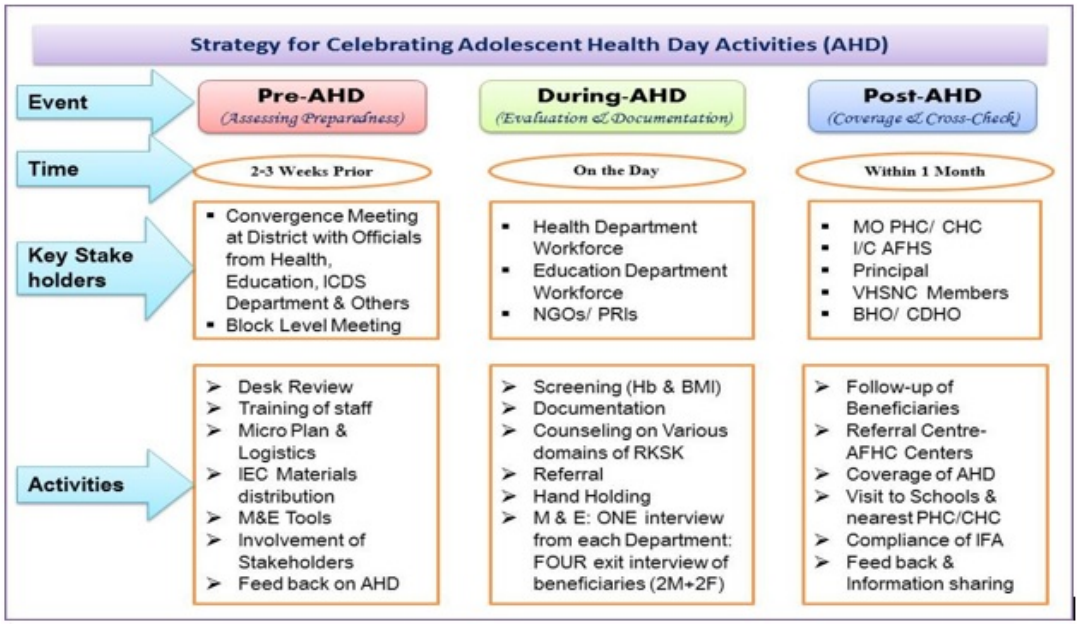

Figure 1: Strategy for Celebrating Adolescent Health Day Activities (AHD)

Permission for the study was obtained from the Institutional Ethics Committee of Indian Institute of Public Health Gandhinagar (IIPHG-IEC) and Government of Gujarat. **Pre AHD Activity**

Training of healthcare staff and other concerned staff including teachers were organized 2-3 days prior to the AHD ***(figure 1)***. Details strategy for celebrating AHD is published elsewhere.

Screening during AHD

Registration of adolescents was carried out by school teachers. After registration height and weight of each participant was measured. Validated/ Calibrated adult weighing scale and measuring tapes were used to measure height and weight as per the WHO guidelines with the help of schools teachers, Accredited Social Health Activists (ASHAs), Anganwadi Workers (AWWs) and peer volunteers .

Body Mass Index (BMI) was calculated using flex showing table of height, weight and corresponding BMI. Peer volunteers also participated under supervision of school teachers for calculation of BMI. This BMI was entered in the register and card for further follow up. Growth of adolescent was interpreted using WHO BMI for age charts for adolescent boys and girls. After calculating BMI, students participated in categorization from flex showing graph age and corresponding BMI of adolescents and based on their age and categorized in following categories: 1) Overweight: >+1SD (equivalent to BMI 25 kg/m2 at 19 years); 2) Obesity: >+2SD (equivalent to BMI 30 kg/m2 at 19 years); 3) Thinness: <-2SD; and 3) Severe thinness: <-3SD

HB estimation was done by Lab technicians of PHCs/ FHW or MPHW by Acid Hematic Sahli's method[8]. Adequate timing between taking samples and reading was ensured using multiple tubes for HB estimation. Categorization of anemia was done as per the National Iron Plus Initiative guidelines[9] as narrated: 1) Severe Anemia –<8 gm %; 2) Moderate Anemia – 8-10.9 gm %; 3) Mild Anemia – 11-11.9 gm %; and 4) No Anemia - ≥12 gm%.

Reading of each participant was entered into the card and register for further counseling and treatment or referral.

Statistical Analysis: Data was generated and entered in excel and analyzed using SPSS software version 20.

RESULTS

Total 821 adolescents participated in sixteen AHDs celebrated in different villages as mentioned in the ***Table-1***. Majority (84%) of adolescents were school going and rest 131 (16%) were out of school adolescents. Amongst NSG adolescents, presence of boys was less as compared to girls; 85% girls attended AHD and only 14 % NSG boys participated in AHDs.

Out of total 821 adolescents, 30.8% of adolescents were thin. Total 14.8% boys and 18.9% girls were severely thin. Out of total 386 boys, 34.7% were thin whereas out of total girls, 27.4% girls were thin. However, percentage of obese and overweight adolescent was low, 1.2% of adolescents were obese and overweight. Total 217 (26.4%) adolescents out of 821 required referral on the basis of BMI.

Table-1 Gender wise distribution of participants of AHDs

Type	Girls N (%)	Boys N (%)	Total N (%)
SG	323 (46.8)	367 (53.2)	690 (84)
NSG	112 (85.5)	19 (14.5)	131 (16)
Total	435 (53)	386 (47)	821 (100)

SG: School Going, NSG: Non-school going, AHD: Adolescent Health Day

Table -2: Distribution of Adolescents as per BMI for age WHO standard

Category	Severe Thinness	Thinness	Normal	Over weight	Obese	Total
Boys						
SG	57 (15.5)	126 (34.3)	175 (47.7)	8 (2.2)	1 (0.3)	367 (100)
NSG	0	8 (42.1)	11 (57.9)	0	0	19 (100)
Total	57 (14.8)	134 (34.7)	186 (48.2)	8 (2)	1 (0.3)	386 (100)
Girls						
SG	70 (21.7)	94 (29.1)	157 (48.6)	2 (0.6)	0	323 (100)
NSG	12 (10.8)	25 (22.2)	75 (67)	0	0	112 (100)
Total	82 (18.9)	119 (27.4)	232 (53.3)	2 (0.4)	0	435 (100)
Total boys & girls	139 (16.9)	253 (30.8)	418 (50.9)	10 (1.2)	1 (0.12)	821 (100)

SG: School Going, NSG: Non-school going, BMI: Body Mass Index, WHO: World Health Organization

Table-3: Distribution of adolescent boys and girls as per their Hemoglobin status

Hb levels	Severe Anemia (<8 gm %)	Moderate Anemia (8-10.9 gm %)	Mild Anemia (11-11.9 gm %)	No Anemia (≥12 gm %)	Total
Boys					
SG	9 (2.5)	304 (83.1)	29 (7.9)	24 (6.6)	366 (100)
NSG	2 (10.5)	11 (57.9)	2 (10.5)	4 (21.1)	19 (100)
Total	11 (2.9)	315 (81.8)	31 (8.1)	28 (7.3)	385 (100)
Girls					
SG	20 (6.3)	279 (87.5)	13 (4.1)	7 (2.2)	319 (100)
NSG	5 (4.5)	89 (79.5)	12 (10.7)	6 (5.4)	112 (100)
Total	25 (5.8)	368 (85.4)	25 (5.8)	13 (3)	431 (100)
Total Boys & Girls	36 (4.4)	683 (83.7)	56 (6.9)	41 (5)	816 (100)

SG: School Going, NSG: Non-school going

Table 4: Distribution of adolescents based on BMI and status of anemia

BMI categorization	Anemia				Total
	Severe Anemia	Moderate Anemia	Mild Anemia	No Anemia	
Severe Thinness	4 (2.9)	119 (86.2)	8 (5.8)	7 (5.1)	138 (100)
Thinness	13 (5.2)	211 (83.7)	22 (8.7)	6 (2.4)	252 (100)
Normal	19 (4.6)	346 (83.4)	25 (6.0)	25 (6.0)	415 (100)
Over weight	0 (0.0)	6 (60.0)	1 (10.0)	3 (30.0)	10 (100)
Obese	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	1 (100)
Total	36 (4.4)	683 (83.7)	56 (6.9)	41 (5.0)	816 (100)

BMI: Body Mass Index

Mean weight of the SG adolescents was 31.62 ± 8.4 Kg and for Out of school adolescent was 41.12 ± 7.2. As shown in the ***Table-2***, as per WHO standards, total 17% in the surveyed sample were severely thin. It shows that only about half of all the adolescents were normal whereas rest of half adolescents falls in categories of either severe thinness, thin, overweight and obese.

Table-3 shows the gender specific distribution of HB status as per the National Iron Plus Initiative guidelines[3]. Only 816 had consented for Hb estimation, 5% adolescents had normal Hb % (Table- 3). Out of all adolescent girls, only 3% had normal HB. Rest of adolescents were either severely anemic, moderate or mild anemia. The proportion of severe anemia amongst all adolescents was 4.4% (Hb < 8 gm %). Compared to boys (3%), severe anemia was slightly higher amongst girls (6%). HB ranged from 5 - 14%. Two adolescents had 5% HB. Majority of girls (85.4%) and boys (81.8%) were moderately anemic. Interestingly, it was observed that prevalence of severe anemia and moderate anemia was higher amongst school going girls compared to non-school going girls.

While status of HB% and BMI was compared ***(Table -4)***, it was found that only 6% of adolescents had normal nutritional status based on growth and HB%. 3% of adolescents were severely thin and also had severe anemia and large percentage (86.2%) of adolescents were moderately anemic and had severe thinness which require urgent referral and management.

DISCUSSION

In the present study, the nutritional status of adolescents participating in AHD was evaluated in rural area of Gujarat using BMI for age (WHO classification) and HB estimation (National Iron Plus Initiative guidelines). High prevalence of anemia and under nutrition amongst adolescents was documented. It was revealed that only 6% of adolescents had normal nutritional status based on WHO standards and had normal HB%. About 3% of adolescents were severely thin and also had severe anemia. A large percentage (86.2%) of adolescents were moderately anemic and had severe thinness, this reflects undernutrition amongst adolescents.

About half of the adolescents were either thin (30%) or severely thin (17%). Other studies also reported high prevalence of thinness amongst adolescent. A study of rural Wardha reported 53.8% of adolescents were thin[10]. Another study reported 68.5% of adolescent had BMI less than 18.5 Kg/ Square meter in rural Varanasi[11].

Present study estimated overall prevalence of anemia as 95%, of which 4.4% were severe anemia, 83% moderate anemia and 6.9% mild anemia. Only about 5% of adolescents were non anemic (≥12 gm %). Amongst girls, 97% were anemic. Previous study found 90% prevalence of anemia among adolescent girls from 16 districts of India, with 7.1% having severe anemia[12]. Finding of present study shows urgent need to improve HB% of ado-

lescents and to ensure adequate consumption of IFA tablets. To improve iron deficiency anemia amongst adolescents various programs like Weekly IFA tablet Supplementation (WIFS) have been introduced but present study shows that still it has not shown desired results which also highlight a need for further research on various barriers for improving nutritional status of adolescents especially girls. Over weight and obesity percentage amongst adolescent was low, 1.2% and 0.12% respectively. However, several cross sectional studies have been published from north India reporting the childhood obesity prevalence in the range of 3.6 – 7.0%.[13,14]

The limitation of present study includes: not captured socioeconomic background, adolescents who attended AHD were recruited in study, some adolescents may be missed out due to design of the study. In present study WHO standard classification was used however Indian Academy of Pediatrics classification can be used for that.

Present study is probably the first study that highlights the opportunity to monitor nutritional status of adolescents during AHD sessions organized under RKSK which was later on linked to need based approach. Patients who were severe anemic and thin were referred to higher center/or at AHFCs. Those having moderate anemia they were given IFA tablets along with nutrition counselling. Such type of documentation is useful for district specific intervention where data on prevalence of anemia and under nutrition is not available. As the Weekly Iron and Folic Acid Scheme (WIFS) is given by teachers in schools and ASHAs in anganwadi, the data was also shared with principal of the school and taluka officer for further intervention at the field level.

CONCLUSION

With various efforts of Government of India to improve nutritional status and reducing iron deficiency anemia amongst adolescents in India, more focus is given to nutritional supplementation and administration of IFA tablets to adolescents. However, present study shows that despite of implementation of various programs, nutritional status of the adolescent has not improved considerably, which suggests that urgent action needed to document the nutritional status of adolescents which can provide insights for betterment of implementation of existing programs. New programs like RKSK provides platform for screening all adolescents (SG and OS, male and female) which provide opportunity to record and monitor the nutritional status of adolescents in rural area and hence can provide need based counselling, treatment, referral and preventive services.

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