Original Article

Assessment of the Nutritional Disorders among School Going Adolescents in Rural Bankura District of West Bengal: A Cross-Sessional Study

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Abstract

Background: Adolescent is very crucial period of life for growth and development of body and mind. Nutrition influences growth and development throughout infancy, childhood and adolescents.

Aims: To find out the prevalence of nutritional deficiency disorders and dietary assessment among adolescent age group.

Materials and Methods: Community based descriptive cross- sectional study was conducted among 6 rural schools of Bankura-I community development block in Bankura district from February to May 2014. With the help of pre-designed, pre-tested, semi-structured schedule total 600 adolescent students were interviewed and clinical examinations were done.

Results: Mean age of study population was 13.2± 2.19 years. 7.0% of pupils were vegetarian and 93.0% was non-vegetarian. More than one fourth students consumed fast food /junk foods ≥ 3 serving/ week in this study. Total 442 students were eligible for mid-day meal. Out of that 5.7% student did not take mid-day meal from their school. Iron folic acid (IFA) tablet was given only to girl students. 55.6% girls consumed IFA tab but rest did not consume IFA tablets. Pallor was detected clinically in 33.5% of adolescents.

Conclusions: School based as well as Community-based adolescent-friendly health and nutrition education and services and economic development may improve the overall health and nutritional knowledge and status of adolescents.

Keywords: Adolescents, Nutritional disorders, Dietary assessment, Rural community

Introduction

Adolescent period is very crucial for growth and development of life. Adolescent is considered to be no longer a child nor an adult, as per definition by WHO includes persons aged 10-19 yaers[1]**.** It is very crucial period of life for growth and development

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of body and mind. Nutrition influences growth and development throughout infancy, childhood and adolescents. So, during the period of adolescence, nutrient needs are the greatest. Inadequate diet and unfavorable environmental condition may adversely affect the growth and developed some nutritional problems of them. The adolescent girls are more commonly affected in this situation in our society. In developing countries like India inadequate food intake, improper feeding practices, mal-distribution of food within family, improper cooking habit, excess intake of fast food / junk food, underlying diseases and low socio-economic condition affect the different nutritional disorders of adolescents. In prospective analyses, socioeconomic status, family meal frequency, and home availability of healthy food were positively associated with the vegetable and fruit and starchy food patterns and inversely associated with the fast-food pattern. Dietary enquiry for the nutritional examination for instance to detect specific nutrient deficiencies; iron, vitamin A, Vit-B complex and iodine in particular. In the same study on clinical examination; angular stomatitis, glossitis, pallor, dental caries, enlarged thyroid and eye change of vitamin A deficiency were also found[2]. Physical signs of specific micronutrient deficiencies are important to keep in mind, with emphasis on those that are likely of common occurrence in the area.

Objectives

1. To conduct dietary assessment among the adolescents.
2. To find out the prevalence of different nutritional deficiency disorders among study subjects

Methodology

Community based descriptive cross-sectional study was conducted in rural schools of Bankura-I community development block in Bankura district. Total study duration was 4 months from February to May 2014. The study population was students enrolled in class V-XII, belonging to age group 10-19 years. Total population of Bankura-I, Community Development Block were 1,12,335. Out of that 22.0% was adolescent. School going adolescents were 14,700 in this block. Study subject was selected by using inclusion / exclusion criteria (differently abled, teenage pregnant, seriously ill were excluded). Dey et al.[3] reported that on clinical examination, pallor (40%) of the population (30% female; 46% male) So taking prevalence of pallor of school going adolescents as 40%, sample size was calculated by using the formula:

$$N = \frac{Z\alpha^2 X_p X_q}{d^2}$$

Assuming non respondents as 4%, i.e., (577*0.04=23) was taken. So, the final sample was reached 577+23= 600 school going adolescents. 15% of schools i.e. (39 X0.15=6) were taken purposively for this study. Then the six schools were selected from the list of schools in the Block through simple random sampling (SRS) method. Equal number of students (i.e.,100 in numbers) was taken from each selected school. Then students of each standard were taken proportionately to the number of attendances in particular class. Finally, students in each standard were picked up for the study from their attendance register by used Simple random sampling technique. Socio-demographic variables and dietary history were taken. Outcome variable was prevalence of different nutritional deficiency signs. Ethical clearance from Institutional Ethics Committee was obtained. Then permission from the Head master/ Head mistress of the selected schools was taken and school governing body was also informed about these activities. Informed consent from Students' age more than 18 years was obtained or those who are less than 18 years their legal guardian was informed for their consent. If guardian was unavailable then assent was taken for <18 yrs. old students from head of the institution or respective class teachers. Pre-designed, pre-tested, Semi-structured schedule was used. Pretesting of schedule was done in a co-education school of nearby block. The study was done by two ways: (A) Interview of the study subjects for their socio-demographic characteristics and dietary habits, (B) Clinical examination for different nutrients deficiency signs. Clinical examinations were done to assess the different nutrients deficiency disorders like pallor; goiter; bitot's spot; vit B complex deficiency signs (Glossitis, Angular stomatitis); dental caries and skin condition. Same tools and procedures were applied for all participants to collect the data.

After collection; the data were entered in MS Excel spread sheet calculate with the help of software SPSS 22.0 version. Percentage was used to express different types of nutritional deficiency disorders that was depicted as diagram. Descriptive statistics were expressed by mean and ±SD.

Ethical approval: The study was conducted in accordance with the ethical principles that have their origin in the Declaration of Helsinki. It was carried out with patients verbal and analytical approval before sample was taken. The study protocol and the subject information and consent form were reviewed and approved by a local ethics committee according to the document number [No: PR-HC/06/115(28) Dated: 10.01.2013] to get this approval.

Results

600 school going adolescents participated in this study in the stipulated time-period. Mean age of study population was 13.2± 2.19 years (range 10 years – 19 years). Mean age of boys were 12.95± 2.24 years and girls were 13.47±2.11 years in this study. Majority of adolescents i.e., 71.5% belonged to early adolescent group (aged between 10 years-14 years) (Table 1). According to sex, boys were majority i.e. 51.2% but girls were 48.8%. Maximum of study population was Hindu by religion (64.5 %.) and Muslim was 35.5%. 63.0% of students belonged to nuclear family and rest to joint family (37.0%) in this study. 42.8% of study population was in low socio-economic condition (BPL category). About 87.5% of study population belonged to large families those family members were more than 4 in the present study. Birth order was found to be > 2 in 49.2 % of students. In this study 6.0% of study population's parent was not alive (either father or mother). Average number of family members of study subjects was 6.5± 2.22 ranges from 3 to 17 members. Average no. of brother and sister of study subjects was 3.5± 1.31. Only 7.0% of pupils were vegetarian and 93.0% was non-vegetarian in this study (Fig. 1). Milk /milk products, fruits and sugar/ jaggery consumption were less than 60% among study population (Fig. 2). Students consumed less numbers of serving of milk & milk products (ghee and butter), fruits, sugar / jaggery and fleshy food but cereal intake was sufficient that was 3.19± 0.44 servings per day in this study (Table 2). Study shows more than one fourth students consumed fast food / junk foods ≥ 3 serving/ week in this study. Total 442 students were eligible for mid-day meal. Out of that 5.7% student did not take mid-day meal from their school. IFA tab. was given only to girl students. 55.6% girls consumed IFA tab but rest did not consume IFA tab. in this study. Pallor was detected clinically in 33.5% of adolescents. Glossitis and dental problems were found in around 11.0%. Angular stomatitis (7%), Goitre only 2.0% & Bitot's spot was very less in this study (Fig. 3). 21.2 % boy and 46.4% girl students were having pallor in this study (Table 3).

Table 1: Distribution of study subjects according to Socio-demographic characteristics (n=600).

Socio-demographic characteristics	Variables	No.	Percentage
Age	Early adolescent (10 – 14 years)	429	71.5
	Late adolescent (15 – 19 years)	171	28.5
Sex	Boys	307	51.2
	Girls	293	48.8
Religion	Hindu	387	64.5
	Muslim	213	35.5
Family type	Nuclear	378	63.0
	Joint	222	37.0
SES	BPL card holder	257	42.8
	APL card holder	343	57.2

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Type of family according to no. of family members	Small family (≤ 4)	75	12.5
	Large family (>4)	525	87.5
Birth order	≤ 2	305	50.8
	>2	295	49.2
Parents' living status	Yes	564	94.0
	No	36	6.0

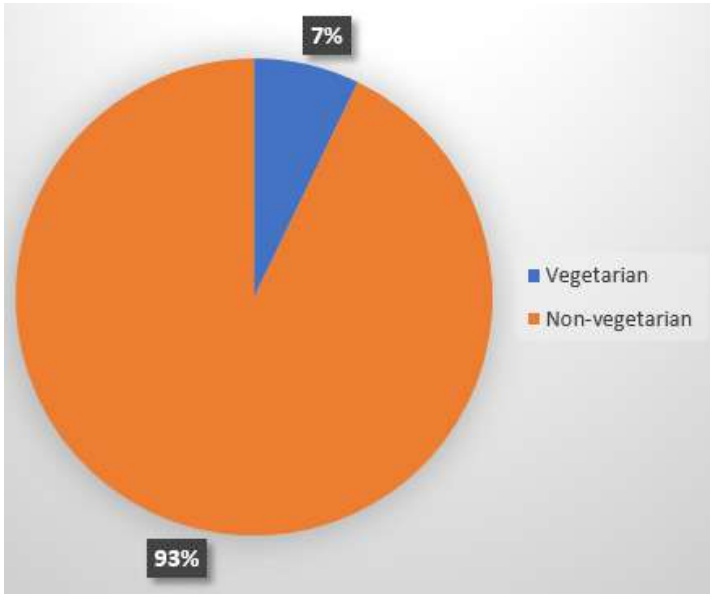

Fig 1. Study subjects according to dietary habit (n=600).

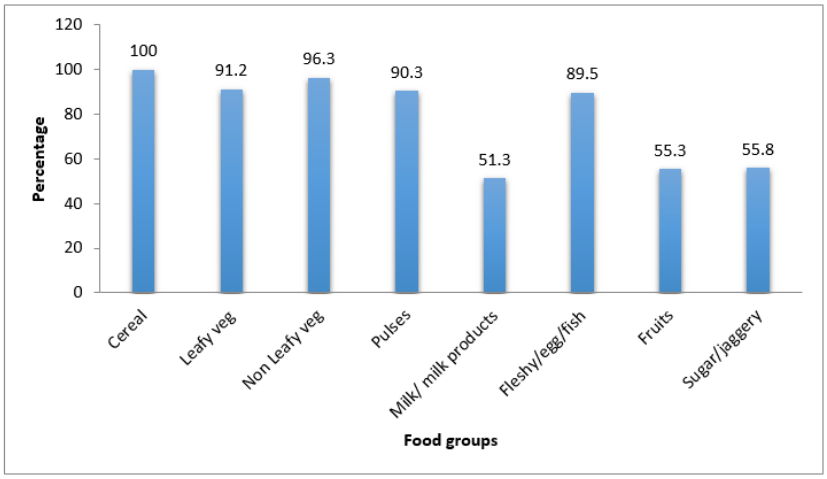

Fig. 2. Bar diagram of distribution of study subjects according to consumption of different food items (n=600).

Table 2: Distribution of average number of serving per day and per week of different food items

Food items	Average no. of serving/day	Average no. of serving/week
Cereal	3.19± 0.44	22.32± 3.07
Green leafy vegetable	0.50± 0.69	5.06± 4.00
Other vegetables	1.75± 1.06	12.82 ± 6.53

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Pulses	0.77 ± 0.87	6.66 ± 5.19
Milk &milk products (ghee and butter)	0.30 ± 0.52	2.83 ± 3.55
Fleshy food/egg/fish	0.29 ± 0.59	3.94 ± 3.50
Fruits	.05 ± 0.24	1.44 ± 1.89
Sugar & jaggery	0.03 ±0.17	1.29 ±1.63

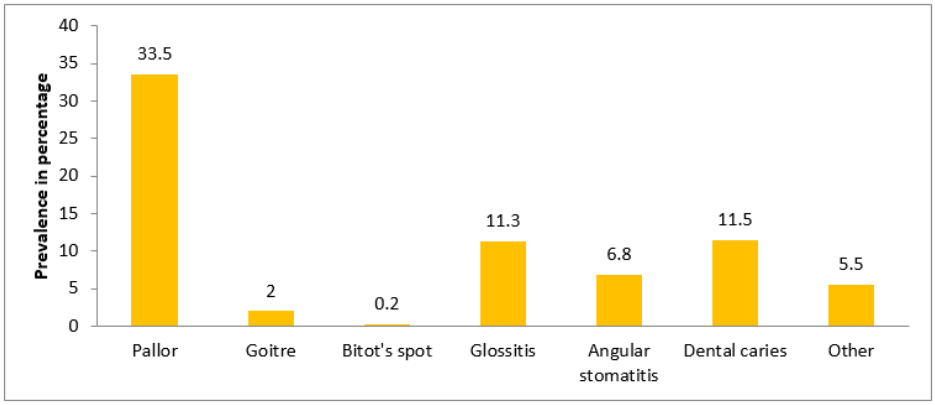

Fig. 3. Bar diagram of different nutritional problems clinically detected among the study subjects.

Table 3: Sex wise distribution of study subjects according to pallor (n=600).

Sex	Pallor		Total
	Present No. (%)	Absent No. (%)	
Boys	65(21.2)	242(78.8)	307(100.0)
Girls	136(46.4)	157(53.6)	293(100.0)
Total	201(33.5)	399(66.5)	600(100.0)

Discussion

In the present study 600 school going adolescents participated. The number of boys and girls included in the study were found 51.2% and 48.8% respectively. These findings were similar to the study conducted by B.Das & S.Bisai[4]. Mean age of students was 13.2± 2.19 years (range 10 years – 19 years). The finding was more or less similar to the findings of Dambhare DG et al. In their study they have divided adolescence period in to two groups, early and late adolescence[5]. Mean age of boys and girls were 12.95±2.24 years and 13.47±2.11 years respectively in this study. Present study, showed that majority of adolescents i.e. more than 70.0% belonged to early adolescent group aged between 10 years-14 years because students of were less in numbers. Maximum of study population was Hindu by religion about two third (64.5%). More than 60.0% of students belonged to nuclear family and 42.8% of students were from low socio-economic condition (BPL category). 87.5% of students belonged to large families. Near about half of students' birth order were more than 2.

In this study, 6.0% of the study population was found having no parent alive at the time of data collection (either father or mother). Average number of family members of study subjects was 6.5± 2.22 (ranging from 3 to 17). In present study only 7.2% of pupils were of vegetarian and 92.8% students having non-vegetarian were found but remarkable number of adolescent girls (21.25%) having vegetarian diet was found in a study conducted by Baliga, *et al* [6].

Using a seven-day food-frequency questionnaire of different food items, it was revealed that milk / milk products, fruits and sugar/jaggery consumption were less than 60% among the students and it was also found that the number of serving/wk of milk &milk products (ghee and butter), fruits, sugar / jaggery and fleshy food were less but numbers of serving / day of cereal was adequate. More than one fourth students consumed fast food /junk foods (≥ 3 serving/ wk) in this study.

Alam N et.al. found their study that consumption of staple food (rice or wheat) in the last seven days was universal with no difference between the asset

quintiles. Consumptions of non-staple food items, such as meat, eggs, *dal* (lentils), fruits, and leafy vegetables, were not frequent in rural areas. Half of them did not eat meat and milk each, and 40% did not eat eggs at all[7]. About 6% students did not eat mid-day meal though they were eligible for mid-day meal from their school. IFA tablets were given to girl students but 55.6% girls consumed it in this study but all adolescents were included under NIPI.

Pallor was detected clinically 33.5% of adolescents while 21.2 % boy and 46.4% girl students were having pallor in this study. On clinical examination, pallor was present in 40% of the population (30% female; 46% male) that was found in a study in Darjeeling[8]. Similar prevalence was reported by CMS Rawat *et al.* at Meerut[9]. Overall, 28.45% of the school going adolescents had anaemia with girls suffering significantly more 38.89% ($p < 0.05$) as compared to boys 23.75%[5]. Panda et al.[10] also observed the similar results for anaemia among adolescents. Several studies had reported anaemia almost similar to the present study**.** A higher prevalence was noted by J Rajaratnam *et al.* in Tamil Nadu[11]. Toteja GS *et al.* found 90.1% prevalence of anemia among adolescent girls from 16 districts of India, with 7.1% having severe anemia[12]. Bulliyy *et al.* found 96.5% prevalence among non-school going adolescent girls in three districts of Orissa, of which, 45.2%, 46.9%, and 4.4% had mild, moderate, and severe anemia[13].

Vitamin B complex deficiency manifested in the form of glossitis (11.0%) angular stomatitis (7%), was found in this study. More or less similar finding of angular stomatitis and glossitis (6%) was found in a study in Darjeeling[8]. Goitre (2.0%) was found in the present study

Prevalence of dental caries was found in more than10.0% in the present study. In a study of Vaishnav, *et al*. reported that 287(25%) adolescents have dental caries.[14] While Paul et al, and Chaudhary S et al. were found 22,6% and 13.3% of dental caries among adolescents respectively in their study[15,16].

Bitot's spot was observed only in 0.2% of adolescents in this study but a study by Chaudhary S *et al*, 3.3% adolescents have bitot's spots while Pathak P *et al*, found more (15.9%) adolescents with bitot's spots[16,17].

Conclusions

Recently adolescent health including adolescent' nutrition is an issue of discussion. Their nutrition is very essential for growth and development. A community based descriptive cross- sectional study was done among adolescent students. Most of the students were non -vegetarian. They consume cereals adequate amount but fruits, vegetables, fleshy food milk and milk products were less. One third of students suffered from pallor followed by Vitamin B complex deficiency manifestation in the form of glossitis, angular stromatitis etc. Measures which can be implemented in order to improve the nutritional disorders of school going adolescents are to reduce micronutrient deficiency disorders, it is essential to educate and create awareness among adolescent students through their school health programmer as well as at the community levels. Healthy eating practices are to be promoted among the students like to consume of adequate amount of locally available and seasonal food and fruits, to increase consumption of protective foods and to reduce intake of fast food / junk food.

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Institutional Review Board Statement: Ethical review and approval was taken from Institutional Ethics Committee.

Conflicts of Interest: All authors have no conflicts of interest.

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