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Original Research Article

Cross sectional study on nutritional status and prevalence of anemia in rural adolescents

Dharmalingam A.[1]*, Raju Mena[2], Raghupathy N. S.[1], Sowmiya M.[3]

[1]Department of Pediatrics, Aarupadai Veedu Medical College and Hospital, Pondicherry, India
[2]Government District Hospital, Roing, Arunachala Pradesh, India
[3]Central Research Laboratory, Aarupadai Veedu Medical College and Hospital, Pondicherry, India

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***Correspondence:**
Dr. A. Dharmalingam,
E-mail: drdharmalingama@gmail.com

ABSTRACT

Background: This study is targeted to find out the nutritional status of adolescents in rural population. Studies were done in urban areas of India on nutritional status and anemia prevalence these studies do not reveal the actual prevalence of anemia and malnutrition among adolescents in the rural areas. The purpose of this study is therefore to determine the nutritional status and prevalence of anemia in rural adolescents.
Methods: Five hundred and eight rural adolescent school going and non-school going living in villages around A.V.M.C. and H., Pondicherry of age 10 to 19 years of both sexes were chosen by systemic random sampling. Migration populations were excluded from the study.
Results: Among 24 Villages, of which 20 Camps were conducted and 508 Adolescents were included. The non-school going constituted 8.27% among male and 27.39% among female. Among the school going males were 42.2% and female were 30.5%. Among male, in the school going group, 33.96% in early, 36.14% of middle and 43.94% of late adolescents were under nourished, whereas in non-school going male, 50% in early, 58.33% of middle and 20% of late adolescents were under nourished. In case of female adolescent, in the school going group, 49.18% in early, 20.59% of middle and 18.42% of late adolescents were under nourished whereas in non-school going female, 14.29% in early, 36.84% of middle and 45.95% of late adolescents were under nourished. Stunting is more common among boys from 10 years of age to 14 years of age than girls. After 14 years of age stunting is more common in girls than boys. The average stunting was 46.18% in male and to 48.1% in females.
Conclusions: Under nutrition was found to be a significant problem in both sexes of rural adolescents. Late adolescents were more undernourished in both sexes. Under nutrition was more common in boys than in girls. Anemia was more common in female than in male in both school going and non-school going. Anemia was more common in non-school going than in school going in both sexes. Severe anemia was more common in female of non-school going group.

Keywords: Anemia, Nutritional Status, Rural Adolescents, Undernourished

INTRODUCTION

Under nutrition increases the risk of poor obstetrics out comes in teen age mothers and affects the healthy development of their future children.[1,2] As a result these children are born short, stunted, under-weight and less cognitively able than their peers. Adolescents to be included in healthy improved nutrition programmes during child bearing age, pregnancy, infants, Pre-school children in the critical year of age.[3,4]

Severe anemia in developing countries a major cause of maternal mortality and morbidity.[5-7] Severe anemia

causes 26% of maternal deaths. Severe anemia causes cardiac failure death, poor healing of wound and increased susceptibility to infections. In pregnancy, as a result of severe anemia there is an increased risk of intrauterine growth retardation, prematurity and low birth weight resulting in increased perinatal mortality.

Anemic mothers give birth to reduced iron store infants and increased infant mortality and morbidity.[5-8]

Treatment of anemia during pregnancy is key component of safe motherhood. Nutritional anemia is the commonest anemia in developing country like India.

Iron-deficiency anaemia is the most common type of nutritional anaemia which results from long-term negative iron balance and is responsible for approximately 50% of all anaemia.[9,10] Deficiency of iron usually develops slowly and is not clinically evident until anaemia becomes severe.

Accelerated development, hormonal changes, malnutrition, and starting of menstrual periods in girls are the major causes of iron-deficiency anaemia during adolescence, which may also lead to impaired perception and learning difficulties.[11]

Therefore, the objective of the study is to determine nutritional status of the adolescents residing in rural block of Pondicherry and to assess the prevalence of anemia among these adolescents.

METHODS

This is a community based cross sectional survey conducted at A.V.M.C. and H., Pondicherry during July 2008 to July 2009. The study population includes rural adolescent school going and non-school going living in villages around A.V.M.C. and H., Pondicherry.

Inclusion criteria were, being 10 to 19 years of both sexes and the residents of that area and those with valid date of birth. Migration populations were excluded.

The study is conducted at Bahoor commune with total population of 54,430 including adolescents 10,866 and the sample being 508 by systemic random sampling. Height, weight, hemoglobin and body mass index were evaluated.

RESULTS

Totally 508 Adolescents (Male-278 and Female-230) from 24 villages and 20 camps were included in the study. Of which non-school going constituted 8.27% among male and 27.39% among female. Comparing both the male and female school going children, Males were more (42.2%) undernourished than female (30.5%) and in non-school going children also, Males were more (47.8%) undernourished than female (39.7%).

Thus, males were significantly more undernourished than female in both the school going and non-school going group (P-Value 0.07, 0.003 respectively) (Table 1).

In the school going male group, 33.96% of early adolescents, 36.14% of middle adolescents and 43.94% late adolescents were under nourished. Among the non-school going male group, 50.0% of early adolescents, 58.33% of middle adolescents and 20.0% late adolescents were under nourished. In both the groups undernourished was more common in early and middle adolescents (Table 2).

Table 1: Nutritional status undernourished.

	Male			Female			P-Value
	Total	**N**	**%**	**Total**	**N**	**%**	**0.00**
School Going	225	95	42.2	167	51	30.5	0.02
Non-School Going	23	11	47.8	63	25	39.7	0.00
Total	**248**	**106**	**42.7**	**230**	**76**	**33.04**	
P-Value	0.07			0.0003			

Table 2: Undernourished male.

Age	Male		Undernourished					
	S	N. S.	S			N. S.		
			N	%	95% C. I	N	%	95% C. I
10-13	106	6	36	33.96	18.53, 49.47	3	50.00	-6.58, 106.58
14-16	83	12	30	36.14	18.82, 53.18	7	58.33	21.44, 94.56
17-19	66	5	29	43.94	25.93, 62.07	1	20.00	-

Female school going children belonging to early adolescents were 49.18%, middle adolescents 20.59% and late adolescents 18.42% of female were under nourished whereas in non-school going children Early

adolescents were 14.29%, Middle adolescent 36.84% and late adolescent 45.95% of female were under nourished (Table 3).

Distributing the hemoglobin status among study population in various stages of adolescence in male, in school going; mild anemia was 25.8%, 32.6% and 15.4% among early, middle and late adolescence and severe anemia were 46.4%, 17.9%, 5.6% among early, middle and late adolescence. Non-school going mild anemia were seen among 1.7%, 3.1% and 1.4% early, middle and late male adolescence and severe anemia were seen among 1.7%, 8.4% and 1.4% early, middle and late male adolescence (Table 4).

Table 3: Undernourished female.

Age	Female		Undernourished					
	S	N. S.	S			N. S.		
			N	%	95% C. I	N	%	95% C. I
10-13	61	7	30	49.18	31.11, 66.89	1	14.29	-
14-16	68	19	14	20.59	-0.34, 42.34	7	36.84	1.23, 72.77
17-19	38	37	7	18.42	-10.46, 46.46	17	45.95	22.31, 69.69

Table 4: Distribution of haemoglobin among study population various stages of adolescence in male.

Age	Total no. of male	> 12 Grams		7-12 Grams				< 7 Grams			
		S	N. S.	School going		Non-school going		School going		Non-school going	
				N	%	N	%	N	%	N	%
10-13	112	25	2	29	25.8	2	1.7	52	46.4	2	1.7
14-16	95	35	1	31	32.6	3	3.1	17	17.9	8	8.4
17-19	71	51	3	11	15.4	1	1.4	4	5.6	1	1.4

Table 5: Distribution of hemoglobin among study population various stages of adolescence in female.

Age	Total no. of female	> 12 Grams		7-12 Grams				< 7 Grams			
		S	N. S.	School going		Non-school going		School going		Non-school going	
				N	%	N	%	N	%	N	%
10-13	68	34	4	22	32.3	2	2.9	5	7.3	1	1.4
14-16	87	28	10	35	40.2	5	5.7	5	5.7	4	4.6
17-19	75	16	16	15	20.0	18	24	7	9.3	3	4.0

Table 6: Prevalence of stunting.

Age	< 3rd Percentile			
	Male		Female	
	%	N	%	N
10	76.9	25	69.80	10
11	33.60	6	63.08	6
12	65.04	25	54.10	12
13	56.60	12	46.94	10
14	63.80	17	59.02	14
15	10.09	3	52.28	16
16	36.50	15	30.69	10
17	31.30	8	30.69	8
18	29.06	6	29.66	9
19	29.0	8	29.0	6

Among female school going adolescence, mild anemia was 32.3%, 40.2% and 20.0% among early, middle and late adolescence and severe anemia were 7.3%, 5.7%, 9.3% among early, middle and late adolescence. Non-school going mild anemia were seen among 2.9%, 5.7% and 24.0% early, middle and late female adolescence and severe anemia were seen among 1.4%, 4.6% and 4.0% early, middle and late female adolescence (Table 5). There was a decreasing trend of severe anemia from early

adolescents to late adolescents in both school going and non-school going.

Among boys, prevalence of stunting declining trend from 76.9% at 10 years of age to 29% at 19 years of age. Among girls, prevalence of stunting declining trend from 69.8% at 10 years of age to 29% at 19 of age. Stunting is more common among boys from 10 years of age to 14 years of age than girls. After 14 years of age stunting is more common in girls than boys. High prevalence of stunting is more common in girls than boys.

High prevalence of stunting in age group 10 in both between male and female and showing decreased trend as age advances probably indicate an element of constitutional delay. The average stunting was 46.18% in male and to 48.1% in females (Table 6).

DISCUSSION

India is a signatory of millennium development goals (MDG) by 2020. In spite of generous allocation of funds neonatal mortality rate and low birth weight in India are still at a very high level. This puts a question mark over the ability of our country MDG by 2020. It has already been recognized that malnutrition and anemia among the adolescents is the major contributory factor of low bright weight. This study was an attempt to estimate the prevalence of malnutrition and anemia among the adolescents living in rural areas.

Overall prevalence of anemia in this study in school going adolescence was 51.7% among male and 38.6% in females whereas prevalence of anemia non-school going adolescence was 6.1% among male and 14.3% in females. Under nutrition is almost 50% in both sexes. Stunting was 46.18% in males and 48.1% in females. But in the study conducted by Anand et al the prevalence of anaemia 38%, 43.8 % in boys and girls respectively.[12] Under nutrition was 43.8%, 30.8% in boys and girls respectively, stunting in their study was 43.8% in boys and 30.1% in girls. This difference could be due to that the study done by them was only in school going adolescents. But we have included non-school going also which were more in numbers as the age advances. In a study done by Rajarathnam et al. shows that the prevalence of anemia among girls was 45% which is equal to our study.[13] 50 % of rural adolescents' female were undernourished in our study, which is similar to the study done by Srivastava et al.[14]

Malnutrion seems to be rampant among adolescents in all the developing countries (Massawe S) and this study also highlights the same.[15] This study also confirms that nutritional status of adolescents continues to be poor in this part of country as in other parts of country (Choudary S et al and Anand et al) and the pattern of under nutrition was not related to literacy.[12,16] There was a group in which literacy seems to have played were bit a tiny role only among girls. This difference may be due to the increased workload burden on non-school going adolescent girls rather than literacy. This study has shown that shown that under nutrition was more common in boys than girls.

A study by Dr. C. Ravichandran et al in-pre-adolescent age group (unpublished) also established that under nutrition was more in the male.[17,10] This difference may be due to the onset of pubertal growth velocity at a later age in the males when compared to girls.

This study reflects the general pattern of anemia is more among girls than in boys and the general trend of anemia 45 to 55% as per NFHS-II date.[11] Though the cause of anemia not within the purview of this study. It can be safely assumed that majority of them are nutritional and mostly iron deficiency type as derived from other studies (shards Sidhul et al Jolly Rajarathnam et al and Sabita Basu et al).[13,18,19]

The significant number of anemic is in the middle adolescent age group, could be explained by the fact that menarche is attained around 12 years and the first few cycles are irregular with increased blood loss. So, any policy towards low birth weight and neonatal mortality needs the policy makers to make a note of this alarming trend of anemia among adolescent girls. It is disheartening to note that even adolescent boys are anemic. In rural areas, adolescent pregnancy is more common due to early marriage in adolescent girls. Hence the interventions have to be done against anemia and under nutrition among the adolescent girls. Thereby preventing low birth weight and neonatal mortality.

CONCLUSION

Under nutrition was found to be a significant problem in both sexes of rural adolescents. Late adolescents were more undernourished in both sexes. Under nutrition was more common in boys than in girls. Anemia was more common in female than in male in both school going and non-school going. Anemia was more common in non-school going than in school going in both sexes. Severe anemia was more common in female of non-school going group.

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