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Original Research Article

Anganwadi based nutritional survey of children in Attappadi

K. K. Rakesh Raju[1]*, V. T. Ajithkumar[1], T. P. Ashraf[1], A. Riyaz[1], N. C. Cherian[1], K. C. Rajagopalan[1], K. P. Aravindan[2], Geeta Govindraj[1]

[1]Department of Pediatrics, IMCH, Calicut Medical College, Calicut, Kerala, India
[2]Department of Pathology, Calicut Medical College, Calicut, Kerala, India

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***Correspondence:**
Dr. K. K. Rakesh Raju,
E-mail: rakeshrajukk@gmail.com

ABSTRACT

Background: Malnutrition and anaemia form major public health problems among the school age children, particularly in the developing countries.
Methods: A cross sectional study was conducted among children between 6 months and 18 years, in randomly selected 25 Anganwadis of Attappadi area. Objective of the study was to estimate the prevalence of anaemia and malnutrition among the children of Attappadi. Children were divided in to tribal and nontribal. Anthropometric measurements, haemoglobin estimation by cyanmethemoglobin method and peripheral smear examination were done.
Results: 65.5% tribal and 54.1% non-tribal were anaemic. Among males 65.9% tribal and 56.4% non-tribal were anaemic. Among females 65.1% tribal and 52.6% nontribal were anaemic. In the age group less than 6 years, 9% tribal females, 8.9% nontribal females, 12% tribal males and 5.8% nontribal males were severely stunted. Above 6yrs it was 3.3% tribal females, 2.7% nontribal females, 2.4% tribal males and 7.4% nontribal males. In the age group less than 6 years, 12.5% tribal females, 3.9% nontribal females, 15.9% tribal males and 4.3% nontribal males had severe underweight. Above 6 years it was 8.3% tribal females, 0% non-tribal females, 19% tribal males and 3% non-tribal males.
Conclusions: Anaemia and malnutrition are common among children of Attappadi. Tribal children are more affected than non-tribal children. Anaemia is more common among two age groups, less than 5 years and more than 11 years. Among females' adolescent girls are more affected. Periodic assessment of growth parameters and early detection and treatment of anaemia are needed.

Keywords: Anaemia, Malnutrition, Tribal, Non-tribal, Attappadi

INTRODUCTION

Under nutrition, which is due to the deficiency of calorie and proteins are common among children of developing countries. It is associated with nutritional anaemia most of the times.

Anaemia is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development.[1] The world health organization defined anaemia as a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs which vary by age, sex, altitude, smoking, and pregnancy status.[2] Anaemia is a major cause for maternal and perinatal mortality; and chronic anaemia leads to secondary organ damage such as congestive heart failure.[3-5] Anaemia in children is an important health problem in almost all the developing countries of the world with an estimated prevalence of 43%.[6] Anaemia has a variable impact on physical development and children show poor attentiveness, memory and academic performance.[7]Children who suffer from anaemia have delayed psychomotor development

and impaired performance; in addition, they experience impaired coordination of language and motor skills, equivalent to a 5-10-point deficit in intelligence quotient.[7-10]

Anaemia is common in tribal population. Despite the fact that Kerala's health indicators are way ahead as compared to the rest of the country, it's tribal population is still lagging behind in this regard.[11] Poverty, poor nutrition, illiteracy, adverse cultural practices, lack of awareness of the disease, lack of adequate geographic connectivity, lack of health personnel and services may be some of the factors contributing to higher prevalence of anaemia in these tribals.[12] Attappadi is a tribal block in Mannarkkad taluk of Palakkad district of Kerala. It covers an area of about 745 sq km. It is a part of Nilgiri biosphere reserve, which covers parts of three states Kerala, Tamilnadu and Karnataka. Attappadi block is divided into three grama panchayaths-Agali, Pudur, Sholayur.

Malnutrition and anaemia form major public health problems among the school age children, particularly in the developing countries.[13] In India too, the problems of malnutrition and anaemia exist in a greater dimension among the young children.[14,15] It also affects physical and mental development, resulting in lower levels of educational attainment.[16] The preschool children being the most vulnerable segment, their nutritional status will indeed reflect the health status of this population.[17]

Main nutritional problems in Attappadi are severe anaemia and malnutrition in children and pregnant women. By this study, we can estimate the burden of iron deficiency anaemia and malnutrition in children below 18 years. Such anaemic children can be identified and treated properly through Anganwadi centres and sub centres. Severe anaemia and infections being the major causes of morbidity and mortality in children, this survey and subsequent interventions will reduce the infant mortality as well as the under-five mortality among the tribal children in Attappadi.

We can also know the extent of anaemia in adolescent girls who are future mothers. Treatment of iron deficiency in adolescent girls will result in reduction of maternal and neonatal mortality.

Aims and objectives of the study include estimation of prevalence of anaemia and under nutrition among the children of Attappadi in selected Anganwadi of three panchayaths, according to age group, gender and tribal/nontribal community.

METHODS

A cross sectional study was conducted among children between 6 months and 18 years of age in 25 randomly selected Anganwadi areas of 3 panchayaths in Attappadi. Study was conducted for 6 days per month for three months, from February 2014 to April 2014.

Children between 6 months and 18 years, in the selected Anganwadi areas of 3 panchayaths in Attappadi were included in the study. Children not accompanied by parents, not willing for finger prick and outside the panchayath areas were excluded. Ethical committee approval was obtained from ethics committee, Calicut medical college. A total of 25 Anganwadis in Attappadi area were selected by random selection.

A brief class was given to parents and children regarding anaemia and under nutrition. Importance of early detection and treatment were emphasised. After explaining the procedure, blood samples were taken by finger prick method for Haemoglobin estimation by cyan methaemoglobin method and for peripheral smear examination. For age group between 6 months and 5 years, haemoglobin level 11 gm/dl was taken as cut off for anaemia. Between 5 years and 11 years it was 11.5 gm/dl and 12 gm/dl, for age group above 12 years. Peripheral smears were prepared on clean glass slides. After drying and staining, smears were examined under microscope later.

Weight was measured using electronic weighing machine. Height was measured using a measuring tape calibrated to the nearest half centimetre taking precautions that the slippers are off, feet flat on the ground, back against the wall with the child looking straight ahead and using a flat ruler on the top of the head to project the level on to the measuring tape fixed on the wall. Underweight and stunting were categorised in to mild, moderate and severe.

All data were tabulated and analysed. Data were tabulated according to age group, gender, tribal/non tribal community.

RESULTS

In our study 59.6% children were found to be anaemic. Table 1 shows 65.5% tribal and 54.1% non-tribal were anaemic. Tribal were more anaemic compared to nontribal.

Among females, 65.1% tribal and 52.6% non-tribal were anaemic. Table 2 shows 58.4% females were anaemic and adolescent girls were more affected. Among males 61.2% were anaemic. Here less than 5 years, age group was more affected. Table 3 shows 65.9% tribal and 56.4% non-tribal males were anaemic. Prevalence of anaemia was slightly higher in males compared to females. Two age groups were found to be more anaemic, under 5 age group and adolescents (Table 4). 64.1% smears showed hypochromia. Eosinophilia was present in 20.7% anaemic smears.

Table 1: Prevalence of anaemia among tribal and nontribal.

Panchayath	Tribal (%)	Non-tribal (%)	Total (%)
Agali	78 (56.9)	95 (48.5)	173 (52)
Pudur	101 (73.2)	85 (74.6)	186 (73.8)
Sholayur	75 (66.4)	46 (42.6)	121 (54.8)
Total	254 (65.5)	226 (54.1)	480 (59.6)

Table 2: Prevalence of anaemia according to age group in females.

Age (Years)	Tribal (%)	Non-tribal (%)	Total (%)
6 m -<5	65 (62.5)	56 (47.1)	121 (54.3)
5-11	37 (61.7)	8 (21.1)	45 (45.9)
>11	40 (74.1)	69 (71.9)	109 (72.7)
All	142 (65.1)	133 (52.6)	275 (58.4)

Table 3: Prevalence of anaemia according to age group in males.

Age (Years)	Tribal (%)	Non-tribal (%)	Total (%)
6 m -<5	76 (79.2)	75 (58.1)	151 (67.1)
5-11	24 (42.9)	17 (54.8)	41 (47.1)
>11	12 (66.7)	1 (20)	13 (56.5)
All	112 (65.9)	93 (56.4)	205 (61.2)

Table 4: Prevalence of anaemia according to age group.

Age (Years)	Tribal (%)	Non-tribal (%)	Total (%)
6 m-<5	141 (70.5)	131 (52.8)	272 (60.7)
5-11	61 (52.6)	25 (36.2)	86 (46.5)
>11	52 (72.2)	70 (69.3)	122 (70.5)

Table 5: Prevalence of stunting according to age group in females.

Age (Years)	Normal/Mild (%)		Moderate (%)		Severe (%)	
	Tribal	**Non-tribal**	**Tribal**	**Non-tribal**	**Tribal**	**Non-tribal**
<6	82 (73.9)	99 (79.8)	19 (17.1)	14 (11.3)	10 (9)	11 (8.9)
>6	44 (73.3)	33 (89.2)	14 (23.3)	3 (8.1)	2 (3.3)	1 (2.7)

Table 6: Prevalence of stunting according to age group in males.

Age (Year)	Normal/Mild (%)		Moderate (%)		Severe (%)	
	Tribal	**Non-tribal**	**Tribal**	**Non-tribal**	**Tribal**	**Non-tribal**
<6	59 (54.6)	100 (71.9)	36 (33.3)	31 (22.3)	13 (12)	8 (5.8)
>6	32 (76.2)	19 (70.4)	9 (21.4)	6 (22.2)	1 (2.4)	2 (7.4)

Table 7: Prevalence of underweight according to age group in females.

Age (Year)	Normal/Mild (%)		Moderate (%)		Severe (%)	
	Tribal	**Non-tribal**	**Tribal**	**Non-tribal**	**Tribal**	**Non-tribal**
<6	70 (62.5)	102 (80.3)	28 (25)	20 (15.7)	14 (12.5)	5 (3.9)
>6	35 (58.3)	29 (74.4)	20 (33.3)	10 (25.6)	5 (8.3)	0 (0)

Table 8: Prevalence of underweight according to age group in males.

Age (Year)	Normal/Mild (%)		Moderate (%)		Severe (%)	
	Tribal	**Non-tribal**	**Tribal**	**Non-tribal**	**Tribal**	**Non-tribal**
<6	52 (48.6)	105 (75)	38 (35.5)	29 (20.7)	17 (15.9)	6 (4.3)
>6	16 (38.1)	19 (57.6)	18 (42.9)	13(39.4)	8 (19)	1 (3)

In the age group less than 6 years, 9% tribal females and 8.9% non-tribal females were severely stunted. Above 6yrs it was 3.3% and 2.7% respectively. Table 5 shows that moderate stunting was more common among tribal females, but severe stunting was almost comparable between two groups. Table 6 shows prevalence of stunting in males. Here, in the age group less than 6 years, moderate and severe stunting was common among tribal. Above 6 years it was common among non-tribal.

Table 7 shows prevalence of underweight in females. Moderate and severe underweight was common among tribal in both age groups, i.e. above and below 6 years. Among males also, moderate and severe malnutrition was common among tribal (Table 8).

DISCUSSION

Anaemia occurs when the total volume of red blood cells (and/or the amount of haemoglobin in these cells) is

reduced below normal values, as defined by healthy populations. There are often multiple causes for anaemia. Although iron deficiency is the most common cause of, especially among younger children and women of child-bearing age, other nutrient deficiencies, such as folic acid and vitamin B12, can also contribute to anaemia. Iron deficiency is the commonest nutritional deficiency in the developing and developed countries. Children who suffer from anaemia have delayed psychomotor development and impaired performance; in addition, they have 5-10-point deficits in intelligence quotient. Iron deficiency can cause significant central nervous system damage even in the absence of anaemia.

According to our study 65.5% of tribal and 54.1% of non-tribal children attending Anganwadi was anaemic. It is to be noted that non tribal children attending Anganwadi are also likely to be very poor. The national family health survey 3 (NFHS-3) placed the extent of anaemia in children in Kerala at 44.5% and that of India overall at 69.5%. A study conducted by Philip RR et al among tribal children of Wayanad district in the age group 1-6 years showed a prevalence of 95.7%.[17] In a study conducted by Sreedhar et al, to know the prevalence of anaemia in tribal children of Visakhapatnam among 5-18 years it was 66.1%.[18] 72.7% adolescent girls were found to be anaemic in our study. In a study conducted in Tamil Nadu among 10-15-year old adolescent girls, it was 58.4%.[19] Another study in Andhra Pradesh showed a prevalence of 77.33%.[20]Among age group 6 months to 5 years 60.7% were anaemic in our study. A study done by Kanchana et al among similar age group showed a prevalence of 77.8%.[1]

Ismail et al did a study among tribal population of North Kerala above 18 years, which showed an overall prevalence of 51.1%.[12] 33.3% males and 64% females were anaemic in this study. This shows the importance of early detection and treatment of anaemia during childhood. Otherwise there will be a huge number of anaemic pregnant women leading to low birth weight babies which is a matter of concern.

It is clear that the chief cause of anaemia is iron deficiency because 64.1% of those who had anaemia, had hypochromia in the smear. Sickle cell anaemia is a rare cause of anaemia in this population; which would not contribute to more than an occasional case going by previous prevalence estimates. As much as 20.7% of the cases showed eosinophilia in the smear. This point, to the possible role of hookworm infestation as an additional cause of iron deficiency, besides nutritional deficiency. Barefoot walking is very common and hence periodic deworming in addition to nutritional supplementation and oral iron is needed in the anaemic children.

In both the NNMB and NFHS data, Kerala has the lowest prevalence of underweight, stunting and wasting among the Indian states. About a third of all tribal children in Attappadi were stunted, 8.1% showing severe stunting. The non-tribal children had stunting in less than one fourth as for the rest of Kerala. A full 46.1% of the tribal children are underweight which is more than the all India average and more than double the Kerala figure in 2005 as per NFHS-3 data. 13.7% tribal had severe underweight.23.2 % nontribal had stunting and 6.7% were severely stunted. Among them prevalence of underweight and severe underweight were 24.7 and 3.5% respectively. A study was done by Philip et al among tribal children of Wayanad district, 1-6 years of age. In this study prevalence of underweight and stunting were 39 and 38% respectively.[17]

Limitations

Since Anganwadi areas were selected, equal numbers of tribal and nontribal children were not selected. We were not able to calculate MCV, MCH, MCHC and RDW. Follow up studies were not done.

CONCLUSION

Anaemia and malnutrition are common among children of Attappadi. Tribal children are more affected than non-tribal children. Anaemia is more common among age groups, less than 5 years and more than 11 years. As far as anaemia is concerned, males and females are affected, with a slight increase among males. Among females' adolescent girls are more affected. If not treated they will be more anaemic during pregnancy, ultimately leading to low birth weight babies. Other than nutritional causes hookworm infestation also has a role. Hence periodic deworming is indicated. Periodic assessment of growth parameters and early detection and treatment of anaemia are needed.

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REFERENCES

1. Kanchana, Madhusudan S, Ahuja S, Nagaraj N. Prevalence and risk factors of anemia in under five-year-old children in children's hospital. Int J Contemp Pediatr. 2018;5:499-502.
2. WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and

mineral nutrition information system. Geneva, World Health Organization. 2011;6.
3. Brabin BJ, Hakimi M, Pelletier D. An analysis of anemia and pregnancy related maternal mortality. J Nutr. 2001;131:604-15.
4. Kalaivani K. Prevalence and consequences of anemia in pregnancy. Indian J Med Res. 2009;130:627-33.
5. Silverberg DS, Wexler D, Liana A. The role of anemia in the progression of congestive heart failure. Is there place for erythropoietin and intravenous iron. J Nephrol. 2004;17(6):749-61.
6. Demaeyer EM. Preventing and controlling iron deficiency anemia through primary health care. World Health Organization, Geneva. 1989;58.
7. Lozoff B, Jemenez E, Wolf AW. Long term developmental outcome of infants with iron deficiency. New Eng J Med. 1991;325:687-94.
8. Politt E. Iron deficiency and cognitive function. Annu Rev Nutr. 1993;13:521-37.
9. Halterman JS, Kaczorowski JM, Aligne CA, Auinger P, Szilagyi PG. Iron deficiency and cognitive achievement among school-aged children and adolescents in the United States. Pediatr. 2001;107:1381-6.
10. Walter T, Kovalskys J, Stekel A. Effect of mild iron deficiency on infant mental development scores. J Pediatr. 1983;102:519-22.
11. Anish TS, Vijayakumar K, George DR, Ramachandran R, Lawrence T. Deprived Among the Marginalised-Health Status of Women in a Tribal Settlement. Int Res J Soci Sci. 2010;3(2):77-84.
12. Ismail IM, Kahkashan A, Antony A, Sobhith VK. Role of socio-demographic and cultural factors on anemia in a tribal population of North Kerala, India. Int J Community Med Public Health. 2016;3:1183-8.
13. Park K. Park's Textbook of Preventive and Social Medicine, Jabalpur: Banarsidas Bhanot Publishers. 2002;381.
14. Government of India, CSSM review. A Newsletter on Child Survival and Safe Motherhood Program, No.25, January 1995.
15. Jyothi Lakshmi A, Begum K, Saraswathi G, Prakash J. Prevalence of anemia in Indian rural preschool children: Analysis of associative factors. Indian J Nutr Dietet. 2001;38:182-90.
16. Ahmed AM, Ahmed T, Roy S, Alam N, Hossain MI. Determinants of undernutrition in children under 2 years of age from rural Bangladesh. Indian Pediatr. 2012;49:821-4.
17. Philip RR, Vijayakumar K, Indu PS, Shrinivasa BM, Sreelal TP, Balaji J. Prevalence of undernutrition among tribal preschool children in Wayanad district of Kerala. Int J Adv Med Health Res. 2015;2:33-8.
18. Sreedhar T, Prasad U, Lakshmi Bhagya A, Balaji C, Venugopal P, Kasibabu A. Study of Anemias In Tribal Children-A Prospective Study. J Dental Med Sci. 2016;15(5):01-5.
19. Devi R, Jaysree TM, Felix AJW, Ethirajan N. Prevalence of anemia among children age 10 to 15 years in urban, Chidambaram. J Drug Discov Ther. 2014;2(22):67-70.
20. Koushik NK, Bollu M, Ramarao NV, Nirojini PS, Nadendla RR. Prevalence of anaemia among the adolescent girls: a three months cross-sectional study. Women. 2014;14(16):12.

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