

Study of epidemiological and clinical profile of worm infestation among preschool age children attending Anganwadi of urban and rural areas of Sangli district

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Abstract

Introduction: The incidence of parasitic infestation is worldwide. Intestinal parasitic infestation is much more common problem in children. In India accurate data is unavailable. This study intended to find out the incidence of various parasitic infestations in preschool children and to find out the effects of nutritional status and epidemiological and clinical profile. **Material and Methods:** The Descriptive Cross Sectional Study was carried out during September 2010 to May 2012, among preschool children from urban slum and rural locality. Total 450 urban and 420 rural Anganwadi children were selected for study. General information of children collected and thorough physical examination done to see symptoms and signs related to worm infestation. Stool samples were collected and carried to the laboratory. **Results:** Out of 870 children 399 (45.8%) were positive for parasitic infestation. Among them 375 (93.98%) were with single and 34 (6.9%) were infested with double parasites. Entamoebahistolytica and Ascarislumbricoides was the commonest combination observed (5.61 %). Worm Infestation among mixed diet consuming children is significantly more than vegetarian children. Prevalence of worm infestation was more as the grade of malnutrition increases and in 3-5 yrs of age. Those having symptoms of abdominal pain, H/o passing worms and loose stools only 32.3 % had worm infestation. 13.76 % children with anemia and 3.5 % children with skin manifestation had worm infestation. **Conclusion:** As incidences of worm infestation in urban and rural areas and in the age group of 3 -5 years were higher and many of them were asymptomatic , high suspicion and periodic deworming in all the preschool children is the main key to treat the worm infestation effectively.


Keywords: Parasitic Infestation, Preschool children, Malnutrition, Anemia, Pruritus, Urticaria.

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INTRODUCTION

The incidence of human intestinal parasitic infestation is widely recognized and is widely spread all over the world. Intestinal parasitic infestation is much more common problem in children. Although the parasitic infestations are more prevalent in tropical and subtropical regions, temperate and cold regions are not spared. Unfortunately in India there are no accurate data available of parasitic infestations, may be because ours is vast country and preventive measures in an all-encompassing, sustained manner are missing in our country.¹ In India,

parasitic infestation is particularly heavy due to rapid industrialization, shifting of large masses of floating population from nearby villages to towns, this labour class population continue to eat and defecate by road sides and added to it are menace of flies and insects, poor personal cleanliness, habitual bare foot walking, poor disposal of human excreta and lack of safe drinking water supply. Promiscuous defecation by toddlers in immediate vicinity of soil is also sufficient to maintain a high level of endemicity. Children are generally more heavily infested than adults and are therefore more likely to suffer from the pathologic consequences of these infestations.² Majority of epidemiological surveys carried out for intestinal parasites were conducted on hospital patients and on general population. Very few studies have been done on preschool age group children, even though they constitute about 20-25 % population. In Maharashtra, though Integrated Child Development Scheme facilities are made available in most of the tehsils, during routine health check up of preschool age children in Anganwadis. More stress is given to clinical appearance of child than the time consuming and laborious stool examination for intestinal parasites. The association of malnutrition and worm infestation is a very well-known feature.³ Other common symptoms associated with worm infestation are vomiting, anorexia, constipation, pica, diarrhea, perianal pruritus, urticaria and loose stools. Many times complaints of vague abdominal discomfort and pain are wrongly interpreted for surgical exploration. The prevalence of parasitic infestations in a particular community serves as index of socio - economic status of that community. This study was undertaken to find out the incidence of various parasitic infestations in preschool age children. The study also aims to find out the effects of various epidemiological factors such as age, sex, type of diet and nutritional status.

MATERIALS AND METHODS

The descriptive cross sectional study was carried out during September 2010 to May 2012 among preschool age children from urban slum of Sangli city and from rural locality Ankali and InamDhamni – about 10-12 Kms away from Sangli city. Total 450 urban and 420 Anganwadi children from urban and rural area selected for study respectively. Study started after obtaining necessary permission from the ICDS project officer of Sangliurban and rural project officer, Miraj. General information of children collected and entered in a proforma followed by thorough physical examination of the children to see symptoms related to worm infestation and if child had some skin complaints referred to dermatologist. A day prior, the bulbs were distributed for collection of stool samples of children and were asked to

carry it to the Anganwadi. This was done with the help of Anganwadi sevika and parents after their training. On the same day samples were carried to the laboratory. Lab technician processed the stool samples and examined by simple saline smear and Lugol's iodine preparation. The samples which were found negative after saline smear examination were processed for zinc sulphate concentration method. The microbiologist carried out the examination of the stool samples. The results were recorded in proforma. The nutritional status of these children was designated according to IAP classification and was recorded duly inproforma.

OBSERVATIONS AND RESULTS

Total 870 children were examined. Out of these 450 were from urban and 420 from rural area. Out of 870 preschool children 511 were male and 359 were female. Table 1 shows age and gender wise distribution of children in urban and rural areas.

Table 1: Age wise distribution of study population in urban and rural area

Age	Urban	Rural	Total
< 1	10	24	34
1-2	60	71	131
2-3	119	102	221
3-4	125	110	235
4-5	136	113	249
Total	450	420	870
Gender			
Male	259	252	511
Female	191	168	359
Total	450	420	870

Out of 870 children 399 (45.8%) were positive for parasitic infestation among 511 males 247 (48.3%), and among 359 females 152 (42.3%) were positive for worm infestation. 375 (93.98%) were with single parasitic infestation whereas 34 (6.9%) were infested with double parasites. Entamoebahistolytica and Ascarislumbricoides was the commonest combination observed (5.61%) in the present study, while combination of Giardia Lamblia and ascaris was found in one child. No triple parasitic infestation was found in present study.

Table 2: Incidence of different types of parasites in urban and rural area

Type of Parasite	Urban	Rural	Total
	n (%) N =194	n (%) N=205	n (%) N=399
Ascarislumbricoides	96 (49.5)	101 (49.3)	197 (49.4)
Entamoebahistolytica	38 (19.6)	43 (20.9)	81 (20.3)
Giardia lamblia	31 (15.9)	37 (18)	68 (17)
Hook worm	8 (4.1)	11 (5.3)	19 (4.7)
EnterobiousVermicularis	9 (4.6)	7 (3.4)	16 (4)
Hyemenolepis Nana	8 (4.1)	6 (2.9)	14 (3.5)
TrichurisTrichuria	4 (2.1)	-	4 (1)
Total	194	205	399

Out of 399 children positive for parasitic infestation, 197 (49.4%) were infested with *Ascaris lumbricoides* and *Trichuristrichuria* infestation found only in 4 (1%) children. All were from urban area.

Table 3: Distribution of Parasite infested children according to the type of diet consumed

Type of diet	Parasitic infestation		Total	Chi – square
	Present	absent		
Vegetarian	75	159	234	$\chi^2 = 24.59$ df = 1 P = 0.000 Highly significant
Mixed diet	324	312	636	
Total	399	471	870	

Out of 234 children consuming veg. diet 75 (32.5%) were infested with one or other parasites. Out of 636 children consuming mixed diet (veg/nonveg) diet 324 (50.94%) were infested with one or other parasite. Worm Infestation among mixed diet consuming children is significantly more.

Table 4: Nutritional status of children according to IAP classification and incidence of parasitic infestation

Grades of malnutrition	Weight for age	Parasitic infestation present n (%)	Total no. of children
0	80-100	156 (40.7)	383
I	70-80	159 (46.7)	340
II	60-70	49 (58.3)	84
III	50-60	33 (55)	60
IV	< 50	2 (66.6)	3
Total	-	399 (45.8)	870

Out of 870 children 383 were normal nutrition remaining 487 were having grade I to Grade IV malnutrition. Among 340 grade I malnourished 159 (46.7%) had worm infestation, among 84 Grade II malnourished 49 (58.3 %) had worm infestation, among 60 Grade III malnourished 33 (55 %) had worm infestation among 3 Grade IV malnourished 2 (66.6 %) had worm infestation.

Table 5: Agewise incidence of parasitic infestation

Age group	Total no. of children			Total no. of cases			%
	Urban	Rural	Total	Urban	Rural	Total	
< 1yr	10	24	34	1	2	3	8.8
1-2	60	71	131	16	22	38	29.0
2-3	119	102	221	46	41	87	39.0
3-4	125	110	235	57	61	118	50.2
4-5	136	113	249	74	79	153	61.4
Total	450	420	870	194	205	399	45.8

Below one year the positive cases for parasitic infestation were 3. The percentage of infestation was 8.8% below one year. In 1-2 year the positive cases were 38. The percentage of infestation was 29%. In 2-3 year the positive cases 87. The percentage of infestation was 39%. In 3-4 year the positive cases were 118. The cases were 153, the percentage of infestation was 61.4%. The overall percentage of parasitic infestation was 45.8%.

Table 6: Agegroupwise distribution of parasitic infestation

Age group	Parasite infestation		
	Present	Absent	Total
1 – 3 yrs	128	258	386
3 -5 yrs	271	213	484

Out of 870 children, 386 were from the age group 1-3 years and 484 were from the age group 4-5 years with parasitic infestation cases 128 (33.1%) and 271 (55.9%) respectively.

Table 7: Distribution of children having symptoms and signs with parasitic infestation

Symptom *	No. of children N = 870
Abdominal pain	102 (11.2)
H/O passing worms	83 (9.8)
Loose stools	26 (3.2)
Total	211
Signs*	
Anaemia	238 (27.4)
Vitamin A deficiency	80 (9.2)
Caries teeth	131 (17.4)
Skin condition	58 (6.66)
Total	477

* Signs and symptoms are mutually not exclusive

Out of 870 children 102 (11.2%) were having abdominal pain, 83 (9.8%) were having history of passing worms and 26 (3.2%) were having loose stools. 238 (27.4%) children were having anaemia and 80 (9.2%) were with vitamin A deficiency. 131 (17.4%) children were with Caries teeth.

Table 8: Skin Manifestations in children

Type of Skin Manifestation	No. of children, N = 62 (7.1 %)
Urticaria	20 (2 %)
Excoriated papules, plaques etc	28 (3.2 %)
Nocturnal Pruritus	10 (1.5 %)
Follicular Hyperkeratosis in Vit A deficiency 80 cases	4 (0.4 %)

Skin Conditions were seen in 62 children out of which, Urticarial lesions were seen in 20 (2%) and nocturnal pruritus in 10 (1.46%) patients, total being (3.5%) passing worms in infestation with ascaris and enterobius vermicularis respectively. 28 (3.2%) children without worm infestation had skin infections (scabies, pyoderma, ringworm infection etc.) symptoms. Follicular Hyperkeratosis was seen in 4 (0.4 %) children without worm infestation. Symptoms in relationwith infestation rate. In present study out of 399 children positive on stool examination for parasitic infestation only 129 (32.3 %) had symptoms.remaining were asymptomatic. Out of 102 children with history of abdominal pain 39 (38.2%) were positive on stool examination. Out of 83 children with H/O passing worm, 76 (91.5%) were positive on stool examination. Out of 26 children were having loose stools, 11 (42.3 %) were positive on stool examination for

parasitic infestation. Signs and worm infestation. Out of these 276 children with clinical pallor 238 (86.2%) children had parasitic infestation of one or other type and 38 (13.76%) had no evidence of infestation. Anaemia was commonest with hookworm infestation. Out of 19 children 13 (68 %) had anaemia than in ascariasis, out of 197 positive for ascariasis, 79 (40.1 %) had anaemia.. In present study 80 cases had signs of vitamin A deficiency. Out of these 38 (47.5 %) had evidence of worm infestation and 42 (52.5 %) had noworm infestation. Infestations most commonly associated with vitamin A deficiency are Ascariasis, Trichuriasis.

DISCUSSION

Overall incidence of parasitic infestation found in the study was 45.8 %. Pohowalla (1959)⁴ reported 23.3% incidence in preschool children, Rao BRH (1961)⁵ reported the incidence of parasitic infestation as 55.4 % whereas Santhanakrishnan (1974)⁶ reported it as 53.6 %. Ajwani *et al* (1974)⁷ 18 % incidence in 0- 10 year children. 88.6 % incidence was reported by K. Subbannayva (1984)⁸ in rural and urban hostel resident children. This difference of incidence appears to be due to geographic difference and hygienic habits of peoples.^{4,9,10,11} Out of 399 children who are positive for infestation on stool examination, 375 (93.9 %) had single parasite, 34 (6.9 %) had two parasites and no case with triple parasite was detected in any stool sample When the infestation rate of urban and rural population is compared, the infestation rate is slightly higher in rural area than urban area. Amongst the incidence of different types of parasites in both the group ascariasis is found to be the most common type of infestation among 49.4 % children. Most of the Indian workers have reported *Ascaris Lumbricoides* as the commonest infestation.^{9,12,13,14,15,16} While in Britain *Trichuris Trichuria* was commonest infestation reported by Allain and Ridley¹⁷, *Clonorchis Sinensis* in China reported by Grant and Ascariasis in Phillipines reported by Stransky and Reye¹⁸. This difference was due to geographical and environmental conditions. De Silva (1956)¹⁹ also pointed out that the highest incidence of ascariasis is in the age group 1 to 6 years.^{4,15,20} The total incidence of parasitic infestation appears high both in urban and rural groups. *Ascaris* infestation was also high in rural area, such a difference in *ascaris* infestation may be due to higher contamination of soil with *ascaris* in rural area Second most frequently occurring parasite was *E. Histolytica* 81 (20.3%) children were positive for *E. Histolytica* cysts on stool examination. Various other workers from India reported variable incidence from 0.5% to 13%. C.K. Rao (1971) 33 reported 19.6% incidence in 0-14 years rural children. Ranjit Sen (1968) 31 reported 6.9%, Mohammad

Unus (1977) 26 reported 4.6% and K. Subbannayya (1984) 42 reported 12.2% incidence in rural and urban school children. C.K. Rao (1971)²¹ stated that prevalence of *E. Histolytica* was lower in latrine users than persons using no latrine. However no such difference, 19.6 % in urban and 20.9 % in rural children was observed in present study. The possible explanation lies in the fact that both groups in this study were not using latrine facility. In the present study none of the child from urban as well as rural area had larvae of *strongyloidstercoralis* on stool examination. It is said that *strongyloidstercoralis* infestation is more common in institutional children. Present study observation is similar with the observations made by Pohowalla (1959),⁴ Rao BRH (1961)⁵, Ranjit Sen (1968)²² and Usha Parekh (1972)¹⁵, who also did not found a single case of *strongyloidstercoralis* infestation in their study. Reported incidence of *strongyloidstercoralis* infestation by others 0.8% by Shrivastava (1953)²³, 0.9% by Jathakia (1946)²⁴ and 0.3% by Subbannayya (1984)⁸ in rural school children. Among the children with multiple parasitic infestations two parasites were found in 6.9 % of children and none had three parasites. Incidence of multiple parasitic infestation reported by other workers is 14.2% by Ranjeet Sen (1968)²². Higher incidence was also reported by Veerannan (1977)¹⁶ 35.5% double, 10.52 % triple and 3.44 % quadruple Infestations and Santhanakrishnan (1974)⁶ reported 27.6 % as double and 1.4 % as double or more parasites. The commonest combination of parasites observed in present study was *E. Histolytica* and Ascariasis (5.61%) while combination of *Giardia Lamblia* and Ascariasis was in one child. Combinations reported by various workers are *K. Histolytica* and Ascariasis, *Giardia Lamblia* and Ascariasis, Ascariasis and *E. Vermicularis*, *Giardia* + Ascariasis and *e. Histolytica*. *E. Histolytica* + Tinea. Out of 870 children examined, 234 were consuming purely vegetarian diet and 636 were consuming mixed (veg and nonveg) diet. When the incidence of parasitic infestation was compared it was observed that preschool children consuming mixed diet were more infested than vegetarian which is statistically significant. Similar observations were made by Veerannan K.M. *et al* (1977)¹⁶ The infestation rate was significantly less in grade zero and grade I malnourished children than grade II, III and IV malnourished children. This suggests that parasitic infestations are more likely to occur in malnourished children. It is possible that the lower rate of infestation in the best nourished group is either due to better standards of living or children with good nutrition are able to deal with parasitic attack in a more efficient way with a lower rate of infestation. Similar observations were made by Usha Parekh *et al* (1972)¹⁵. On the other hand worm infestations are often incriminated as one of the factors

directly or indirectly responsible for malnutrition. Woodruff (1965)²⁵ stated that worm infestation causes loss of iron, protein and other nutritional constituents. Fyre and Faust (1955)²⁶ supported this particular statement. This may be the possible cause for the high rate of infestation in malnourished children. Nadkarni and Deodhar (1962)¹⁴, reported that infestation rate in children observed from 1 year onwards and reached maximum at 5 to 7 years. This observation was supported by many workers. In present study the incidence of parasitic infestation in children 1 - 3 years 33.1 %, 3 - 5 years 55.9 %, This is understandable because, as the child grows the chances of contamination becomes greater. Increased incidence in later age group may be because of increased exposure of later age group children to open field and non vegetarian diet. Similar observations were made by K Subbannayya (1984)⁸. Out of 870 preschool children studied, the presenting symptoms were abdominal pain, history of passing worms and loose stools. Other symptoms which are usually associated with parasitic infestations, were not encountered in the study. Out of 102 children with abdominal pain, only 39 (38.2 %) had evidence of worm infestation on stool examination. And out of 83 children with history of passing worms 76 (91.5 %) were positive on stool examination. And out 26 children with history of loose stools only 11 (42.3 %) were positive on stool examination. These findings suggest that these symptoms were not entirely due to parasitic infestation. All the infested children do not have symptoms. In present study out of 399 children positive on stool examination for parasitic infestation only 129 (32.3 %) had symptoms. About 2/3rd of the children were asymptomatic. Shreevastava (1953)²³, Pohowalla (1959)⁴, and Ajwani (1974)⁷ reported similar observations. Chatterji¹² in addition to above symptoms reported distension of abdomen, fever, cough, constipation, rectal prolapse, scanty high coloured urine, loss of appetite which were absent in this study. Anaemia is often associated with parasitic infestation. In present study, 276 children were having clinically pallor. Out of these 276 children with clinical pallor 238 (86.2%) children had parasitic infestation of one or other type and 38 (13.76%) had no evidence of infestation. Similar observations were made by Usha C. Parekh *et al* (1974)¹⁵. Where 78.3% children below Haemoglobin level 8.00 gms% were infested with one or other type. Similar observations were reported by Pohowalla (1959)⁴, Ajwani (1974)⁷ and Santhanakrishnan (1974)⁶. Anaemia associated with parasitic infestation is due to

1. Loss of Iron, Proteins and other essential components required for haemopoiesis.

Production of toxic substances by parasites, which suppress haemopoiesis.

2. Loss of blood by Hook worm which sucks 0.16 to 0.34 ml blood/ worm / day and Trichuris Trichuriasucks 0.005 ml blood / worm/ day.

Anaemia was commonest with hookworm infestation. Out of 19 children 13 (68 %) had anaemia than in ascariasis, out of 197 positive for ascariasis, 79 (40.1%) had anaemia. Similar observations were done by Ajwani (1974) *et al*⁷. Many workers have suggested that the ascariasis is important factor in causing vitamin A deficiency. Pohowalla (1959)⁴ also reported that vitamin A deficiency associated with malnutrition is often exaggerated by ascariasis. In present study 80 cases had signs of vitamin A deficiency. Out of these 38 (47.5 %) had evidence of worm infestation and 42 (52.5 %) had no worm infestation. Infestations most commonly associated with vitamin A deficiency are Ascariasis, Trichuriasis. Round worms not only interfere with food and nutrient absorption but it is known to infest vitamin A, which possibly could explain, vitamin A deficiency and ascariasis association. Skin manifestations like Urticaria 20 (2%), Nocturnal pruritus 10 (1.5 %) were seen in worms infested children which is common and other signs in 28 (3.2 %) which were not worm infested²⁷. Out 80 vitamin A deficient children , 4 (5 %) had follicular hyperkeratosis which is were without worm infestation and is comparable with study of Rangunath S *et al* in which 4.8 % had follicular hyperkeratosis in < 5 years children²⁸.

SUMMARY AND CONCLUSIONS

870 preschool children were examined in the present study. Out of which, 450 from urban slum and 420 from rural area. The incidence of parasitic infestation is correlated with the age, sex, type of diet consumed by the children and by the nutritional status of the children. The overall infestation rate in the present study was 45.74 %. *Ascaris Lumbricoides* was the commonest infestation observed in urban as well as rural area. More than one parasitic infestation was found in 6.9 % preschool children. *Entamoeba Histolytica* and *ascaris Lumbricoides* was the commonest combination observed in the present study. In the present study the percentage of infested rural preschool children was 48.7 %. In urban preschool children the percentage of infestation was 43.1 %. The percentage of parasite infestation in male preschool children was slightly higher than female preschool children. The percentage of parasitic infestation in preschool children consuming mixed diet is significantly more than the children consuming only vegetarian diet. The percentage of infestation rate in the children of age

group 3 -5 years was highest. Malnourished children were more frequently infested than normally nourished children. Among the infested children only 1/3rd children had symptoms like abdominal pain, history of passing worms and loose stools remaining were asymptomatic. More than 4/5th anemic children had parasitic infestation. Around half of the Vit A deficient children had parasitic infestation. Very few children had skin manifestations. As incidences of worm infestation in urban and rural areas and in the age group of 3 -5 years were higher and many of them were asymptomatic, high suspicion and periodic deworming in all the preschool children is the main key to treat the worm infestation effectively. Efforts should be made to improve personal hygiene, environmental and sanitary conditions for the preschool children which can be achieved by health education of parent.

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