International Journal Of Public Mental Health And Neurosciences
ISSN No: 2394-4668
(An Official publication of Sarvasumana Association)

Prevalence Of Malnutrition And Parasitic Intestinal Infestation, Among Preschool Children Of Fishermen Communities In North Kerala.

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Abstract:

Ojective : To determine the common parasitic infestation among preschool children. To determine the level of malnutrition & anaemia and their association with parasitic infestation, among these children. **Setting:** Aganwadi centers under the integrated child development scheme (ICDS) in, kerala. **Design:** Cross-sectional survey. **Methods:** 14 of 31 Anganwadis in Chemancherry Panchayath were selected located along the coast, all of which were included. Out of 145 children we could enrol 120 between ages of 1.5 to 3.5. 58 (48.33% boys ,51.67% girls) **Results:** out of these thirty one (25.83%) stool samples revealed parasitic infestation.Majority of which was Tinea (20 samples, 65% of total infestations), followed by Ascaris (9 samples, 29% of total infestations)and Hookworm (2 samples, 6% of total infestations). Distribution of infestation among boys and girls was almost equal with 14 (24.1%) boys and 17 (27.4%) girls being infested. There was no statistically significant association between gender and intestinal parasitosis (by Chi-square p = 0.168). **Anthropometry:** Majority (more than 75%) of the children were adequately nourished. The proportion of children who were under-weight, stunted and wasted (under-weight for height) was 21.7%, 13.3% and 23.3% respectively. The proportion of children who were severely under-weight, severely stunted and severely wasted was 4.2%, 1.7% and 2.5% respectively. **Haemoglobin** :The mean hemoglobin was 10.77 g/dl (SE 0.09). Hemoglobin <10 g/dl was found in 21 children(17.5%)There was no statistically significant difference in means of height, weight or heamoglobin levels between the children with infestation and without infestation. **Conclusion:** Although, intestinal parasitosis is lower than other similar regions in the country, it still is high, given the higher Health standard of Kerala State. The prevalent type of parasite isolated is the kind that is also transmitted by consumption of uncooked/improperly cooked meat and not necessarily due to poor sanitation and hygiene. Apprehension regarding safety of Albendazole distributed by MDA is widespread.Nutritional status of the pre-school children in this region is comparable to the State levels which is among the best in the country.

I. INTRODUCTION

Intestinal parasitic infestation and malnutrition (which as a major part includes iron deficiency anemia) are major public health problems in developing countries. One fourth (more than 2 billion people) of the world population suffer infestation with these intestinal parasites and India is one of the

High burden countries. Low socio-economic status attributing to overcrowding, lack of personal hygiene, lack of environmental sanitation and lack of safe water for drinking are common scenarios among developing countries. These factors along with tropical climate make parasitic infestation more common. Protozoan parasitic and intestinal helminthic infestations are common among infants and children when compared to adults, hence, the parasite burden among children reflects the burden in the community. Parasitic infestation leads to nutritional deficiency (including anemia) and impaired growth & development, which results in decreased cognitive function and learning ability.(1,2)

In India and most other developing countries, protozoan parasites are more prevalent when compared to helminthes. Recent studies have reported *Giardia lamblia* to be the most prevalent protozoan followed by *Entamoe bahistolytica* and *Blastocystis hominis.* Among the helminths, the soil transmitted helminthes that include *Ascaris lumbricoides, Trichuris trichuria* and *Ancylostoma duodenale* are more common. *Hymenolepis nana* is considered the most frequent cause of tape worm infestation. (1,3,4)

In Kerala, intestinal parasitic infestationwas found to be more common among children in coastal area belonging to the fishermen communitywhen compared to rural area and urban slums.(5). Hence, this study would be conducted among the preschool children of the fishermen community to know the level of malnutrition &anemia and also to know the common parasitic infestation among these children.

II REVIEW OF LITERATURE:

There are very few studies conducted in Kerala on intestinal parasitic infestations. Being a tropical country and also where fishing is one of the common occupations there are high chances of acquiring the parasites and also contribute the parasites to rest of the community.

Recent studies in other parts of India have reported *Giardia lamblia* to be the most prevalent protozoan followed by *Entamoebahistolytica* and *Blastocystishominis*[5].Among the helminths, the soil transmitted helminths that include *Ascarislumbricoides, Trichuri s trichura* and *Ancylostomaduodenale* are more common. *Hymenolepis nana* is considered the most frequent cause of tape worm infestation.(3,5–7). In a study conducted in 2004 assessing potential risk factors for child malnutrition in rural Kerala, it indicated that 42-57 percent of all child deaths in

Developing countries are due to the potentiating effects of malnutrition on infectious

Diseases, of which over three-quarters can be attributed to mild-to-moderate

malnutrition (10).Analysis of childhood malnutrition in Kerala and Goa showed that the relative prevalence of underweight and wasting was high in Kerala, but the prevalence of stunting was medium (11).A study conducted in south Indian fishing village among primary school children common parasite found was ascaris lumbricoides 91%,followed by trichuris trichiura 72% and hookworm 54% (12).A study conducted in tribal population in tiruvananthapuram and kollam districts in kerala showed that the overall prevalence of intestinal helminths was 23.3% with confidence interval of 18.5-28.45 (13).

III OBJECTIVES

1. To determine the common parasitic infestation among preschoolchildren.
2. To determine the level of malnutrition & anaemia and their association with parasitic infestation, among these children.

IV MATERIALS AND METHODS

A Cross - sectional study was conducted between June & August 2015, in Chemancherry Panchayath which is the nearest coastal Panchayath to our institution. Chemancherry Panchayath is located in Kozhikode District of Kerala State. The children attending preschools (Anganawadis) situated in coastal/fisherman community of Chemancherry Panchayath were included in the study following an informed consent by their parents and assent by the children.

Sample size& method: Prevalence (p) for calculation of sample size for our study was 77.7% (p= 0.777), as a study in Kerala showed that 77.7% of children in coastal schools had intestinal parasitic infestations.[3]

The minimum sample size required for our study was 114 children calculated by using the formula : $n = 4pq/d^2$. Where p = 0.777, q = 1- p, d = allowable error of 10% of p.

Of the 31 Anganwadis in Chemancherry Panchayath, 14 are located along the coast, all of which were included. There were 145children enrolled in these 14 anganwadis, of which we could meet and enroll 132 for our study with their parents' consent to participate. Of these 132 children, stool samples were obtained from 120 children A minimum of two repeat visits to these Anganwadis to enroll absentees at the time of survey was carried out, similarly several attempts were made to collect stool samples.

Data collection

The study was approved by the Institutional Ethics Board and permission to conduct the study was obtained from the Director, Directorate of Social Justice, Kerala State. The Anganwadi teachers were contacted to arrange a meeting with the parents, at their respective Anganwadis. After a preliminary meeting with the parents to explain the purpose of the study and to obtain an informed consent, a pretested, semi-structured questionnaire was administered to the parents to collect socio-demographic data and other relevant details. They were also given stool sample containers along with spoon and instructions for collection. The parent and mothers in particular were instructed to collect fresh faecal specimen of the child in the labelled stool container provided. Whereas the stool specimen were collected on the next day, the anthropometric measurement and blood test was done the same day (first visit).

Anthropometric measurements: The weight was measured using bathroom scales which were calibrated using a known standard weight. The standing height of the children were measured for which, the child was made to stand on flat ground against a straight wall, feet kept together, back kept straight and Frankfurt plane held parallel to the ground. A mark was made on the wall, at the junction of the wall and lower border of a scale which was placed on the head parallel to the ground. The distance from the floor to the mark was measured with a tape.

Haemoglobin estimation: Capillary blood was drawn using a capillary after finger prick with lancet. A

drop of this blood was used for on the spot testing of Haemoglobin levels using a digital Haemoglobinometer, by a trained lab technician. The accuracy of the Haemoglobinometer was determined prior to starting the study by comparing Haemoglobin test values obtained from this device with that obtained from an automated machine in the laboratory, of 10 individuals of the investigating team. The range of accuracy varied between +0.7 to -0.5 g/dL.

Stool examination: Direct faecal microscopic examination was done by Saline and Iodine mount.[4]Each specimen underwent two examinations, once each by two investigators, to whom the mounts were given without any labels, so as to conceal the identity of the sample.

Statistical analysis : Data was entered and analysed in Microsoft excel 2010 spread sheet as well as in Epi Info version 7.1.5 statistical software. Anthropometric analysis for nutritional status was done in a software called WHO Anthro (version 3.2.2, January 2011), which is a software from World Health Organization (WHO), in which analysis is done against the WHO growth standards 2007. Unpaired t test was done for measuring association between means of weight, height and haemoglobin levels and presence or absence of intestinal parasitic infestation. The level of significant association was fixed at 5% ($p < 0.05$). The classification system to assess anthropometric parameters is that of z-scores or standard deviation (SD) scores. A 'Z' score of <-2.00 was used as cut off to determine 'underweight', stunting' and 'wasting' for the respective parameters which are 'weight for age', 'height for age' and 'weight for height'.

V RESULTS:

Of the 120 children, 58 (48.33%) were boys and 62 (51.67%) were girls, between the ages of 1.5 to 5.0 years. Mean age was 41.04 months (SD 7.2 months). Major (89 children-74.2 %) age group was 36 to 47months. There were 12 children aged between 18 to 36 months.Majority were Muslims (72, 60%) and remainder were Hindus.

Intestinal Parasitic Infestation : Thirty one (25.83%)stool samples revealed parasitic infestation.Majority of which was Tinea (20 samples, 65% of total infestations), followed by Ascaris (9 samples, 29% of total infestations)and Hookworm (2 samples, 6% of total infestations) (Figure 1). None of the samples showed more than one type of parasite. Distribution of infestation among boys and girls was almost equal with 14 (24.1%) boys and 17 (27.4%) girls being infested. There was no statistically significant association between gender and intestinal parasitosis (by Chi-square $p = 0.168$)

Nutritional Status

Anthropometric measurements :Majority (more than 75%) of the children were adequately nourished. The proportion of children who were under-weight, stuntedand wasted (under-weight for height)was 21.7%, 13.3% and 23.3% respectively. The proportion of children who were severely under-weight, severely stunted and severely wasted was 4.2%, 1.7% and 2.5% respectively(Table 1)

Haemoglobin :The mean hemoglobin was 10.77 g/dl (SE 0.09). Hemoglobin <10 g/dl was found in 21 children (17.5%)

There was no statistically significant difference in means of height, weight or heamoglobin levels

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between the children with infestation and without infestation (Table 2)

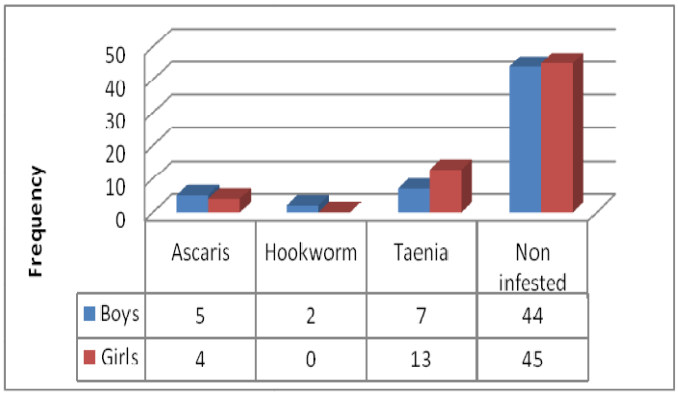

Figure 1.Distribution of types of Intestinal parasitic infestation

Table 1. Distribution of anthropometric measurements against WHO Growth Standards 2007

Parameter	Age group (Months)	N	% above -2SD	% with <2SD (95% CI)	% with <3Sd (95% CI)	Mean compared to Mean of Standard
Weight for age	12 – 23	2	100	0 (0%, 25%)	0 (0%, 25%)	-0.38
	24 – 35	10	90	10 (0%, 33.6%)	0 (0%, 5%)	-0.2
	36 – 47	89	78.7	21.3 (12.3%, 30.4%)	2.2 (0%, 5.9%)	-1.23
	48 - 60	19	68.4	31.6 (8%, 55.1%)	15.8 (0%, 34.8%)	-1.42
	Total	120	78.3	21.7 (13.9%, 29.5%)	4.2(0.2%, 8.2%)	-1.19
Height for age	12 – 23	2	100	0 (0%, 25%)	0 (0%, 25%)	0.86
	24 – 35	10	100	0 (0%, 5%)	0 (0%, 5%)	1.82
	36 – 47	89	88.8	11.2 (4.1%, 18.4%)	1.1 (0%, 3.9%)	0.93
	48 - 60	19	68.4	31.6 (8%, 55.1%)	5.3 (0%, 17.9%)	1.03
	Total	120	86.7	13.3 (6.8%, 19.8%)	1.7 (0%, 4.4%)	1.06
Weight for height	12 – 23	2	100	0 (0%, 25%)	0 (0%, 25%)	0.01
	24 – 35	10	90	10 (0%, 33.6%)	0 (0%, 5%)	-0.91
	36 – 47	89	76.4	23.6 (14.2%, 33%)	2.2 (0%, 5.9%)	-1.05
	48 - 60	19	68.4	31.6 (8%, 55.1%)	5.3 (0%, 17.9%)	-1.15
	Total	120	76.7	23.3 (15.3%, 31.3%)	2.5 (0%, 5.7%)	-1.04

Table 2.Comparison of weight, height and Hemoglobin levels of children with parasites and without parasites.

		Mean	SD	n	Unpaired t test	P value
Height(cm)	Infested	96.10	5.75	31	1.255	0.212
	Non-infested	94.73	5.03	89		
Weight(kg)	Infested	13.43	2.06	31	1.602	0.112
	Non-infested	12.80	1.83	89		
Hemoglobin level(g/dl)	Infested	10.64	0.85	31	0.895	0.373
	Non-infested	10.82	1.00	89		

Level of significance at $p<0.05$

DISCUSSION:

According to Census 2011, the sex ratio in Kerala is 1084 females per 1000 males, this reflected in our study, as the sex ratio was 1069 females per 1000 males.(8) Malnutrition rates were also similar to the findings in this State as perNational Family Health Survey (NFHS) III. The NFHS III rates for Kerala State of under-weight, stunting and wasting were 22.9%, 24.5% and 15.9% respectively, and we found the same parameters to be 21.7%,13.3% and 23.3%respectively.The NFHS III rates for Kerala State of severely under-weight, severely stunted and severely wasted was 4.7%, 4.1% and 6.5% respectively, and we found the same parameters to be 4.2%, 1.7% and 2.5%respectively.(9) Other similar studies have shown variable results, the results of which are much higher when compared to their regions NFHS III rates, as was found in a study conducted in Lucknow were 67.6% were underweight,62.8%were stunted and 26.5% were wasted.(6) A study on preschool children of the urban slums of Delhi revealed protein energy malnutrition prevalence of 81.8%.

About one fourth of the children were infested by parasites. The commonest was taenia (65% of total infestations), followed by Ascaris(29 % of total infestations)and Hookworm (6% of total infestations), this is in contrast to other studies. In a similar study in coastal region of India half the children were infested and E.histolytica and G.intestinalis were the commonest parasites, followed by H.nana, Hookworm and Strongyloides.(7)In a study in Lucknow,Ascaris lumbricoides was the commonest intestinal parasite seen in preschool children in urban slums.(6) The reduction in the ascaris may be due to the mass drug administration. The high frequency of Taeniasis in our study may be explained by the fact that meat especially beef is consumed more frequently.

Although the coverage of Mass Drug Administration (MDA) for Filariasis is good, very few people consume the drugs.

CONCLUSION:

Although, intestinal parasitosis is lower than other similar regions in the country, it still is high, given the higher Health standard of Kerala State. The prevalent type of parasite isolated is the kind that is also transmitted by consumption of uncooked/improperly cooked meat and not necessarily due to poor sanitation and hygiene.

Apprehension regarding safety of Albendazole distributed by MDA is widespread.

Nutritional status of the pre-school children in this region is comparable to the State levels which is among the best in the country.

SUGGESTIONS:

1. Improve the awareness regarding the need to adequately cook meat (killing of the cysts of Taenia requires atleast 56°C core temperature which is likely to be compromised in partially cooked meat)
2. Improve the awareness regarding safety of Albendazole distributed by MDA and the need to participate in the same.

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