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Original Research Article

Prevalence of intestinal parasites among urban and rural population in Kancheepuram district of Tamil Nadu

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ABSTRACT

Background: Intestinal parasitic infections are globally endemic and is a major public health problem of concern. The prevalence is high in developing countries like India probably due to poor sanitary conditions and improper hygiene. Among the various intestinal parasites, the prevalence of Entamoeba, Ascaris, Ancylostoma, Giardia and Trichuris have been studied in this research.
Methods: This is a cross sectional study which involves 205 urban and 185 rural populations. The data was collected from the Urban and Rural health training centres in Anakaputhur and Padappai of Kancheepuram district respectively over a period of three months from August 2017 to October 2017. Data entry was done in MS Excel and analysis was carried out in SPSS software version 22. The analysis was done using descriptive and analytical statistical methods.
Results: Among the rural and urban population, 185 stool samples from the rural population showed nearly 50.8% intestinal parasites (*E. histolytica* 40%, *A. lumbricoides* 2%, *A. duodenalae* 5%, *Giardia* 1%, *T. trichura* 3%). On the contrary 205 stool samples from urban population showed 23.4% of intestinal parasites (*E. histolytica* 18%, *A. lumbricoides* 2%, *A. duodenalae* 5%, *Giardia* 0%, *T. trichura* 0%). The increase in the prevalence of intestinal parasites among rural population than the urban population was statistically significant.
Conclusions: The stool samples collected from rural population showed high prevalence of intestinal parasite infestation when compared to urban population, hence necessary interventions like health education, awareness creation and medical intervention should be undertaken particularly among the rural population.

Keywords: Worm infestation, Sanitation, Hygiene, Socioeconomic status

INTRODUCTION

Parasites are the organisms that live on other organisms or hosts to survive. Some parasites don't affect their hosts, while others grow, reproduce or invade organs that make their hosts sick, resulting in a parasitic infection.[1] There are 3 main classes of parasites which are capable of producing diseases in human beings. They are Protozoa, Helminthes and Ectoparasites.[2] Protozoa are microscopic single celled organisms, can be free living or parasitic in nature.[2] They can multiply in humans which contribute to their survival and also permit serious infections. *Entamoeba histolytica* is a protozoan which can cause amoebiasis and *Giardia lamblia* which causes giardiasis.[2] Helminthes are large, multicellular, visible to the naked eye in their adult stage.[2] They are also free living or parasitic in nature. Helminthes like Flukes and Tapeworm can cause diarrheal disorders and cyst in the visceral organs.[2] Ectoparasites are the blood sucking arthropods such as mosquitoes, ticks, fleas, mites which acts as the vectors of malaria, Q fever, relapsing fever, plaque etc.[2]

Intestinal parasitic infections are the most common and important health problem worldwide. Sixty percentage of the world's population is infected with abdominal

parasites.[3] WHO estimates approximately 50 million people around the world suffers parasitic infection each year, resulting in 40-100 thousand deaths yearly.[4] About 39 Disability Adjusted Life Years (DALY) is associated with parasitic infections which presents as major health burden.[5]

In India the overall prevalence rate of intestinal parasites ranges from 16.5% to 66%.[3] Their prevalence is higher in developing countries which is mainly due to poor sanitary conditions and improper hygiene.[4] There are certain other socio economic factors that attribute to the infections like poverty, illiteracy, hot & humid climate, contaminated drinking water sources.[5] These infections also damage the physical and mental development of children.[6] There are studies done in Chennai which show the prevalence of intestinal parasitic diseases ranging from 60% to 91% in which Ascaris is found to be high in number followed by Trichurus.[6] WHO information indicates that more than 880 million children are in need of treatment for these parasites.[7] They recommend annual treatment of de-worming where prevalence rate is 20%-50% and bi-annual treatment where the prevalence rate is more than 50%.[7] National deworming day, an initiative by Ministry of Health and Family welfare under National Health Mission is celebrated twice in Tamil Nadu where the prevalence is high during 10th of February and August each year in which all children aged 1-19 years are given Tablet Albendazole.[8] Since such interventions are being carried out intensively, this study was conducted to evaluate the distribution of intestinal parasites among the population residing in and around the urban and rural field practice area of our medical college. There is limited epidemiological data in relation to the comparison of urban and rural areas.

Problem statement of Entamoeba histolytica

Amoebiasis is a most common Gastro-intestinal tract infection. It is a major health problem in China, Southeast Asia, Latin America especially Mexico. Globally 500 million people carry *E. histolytica* in their intestinal tract in which one tenth of infected people suffers from invasive amoebiasis. In India the prevalence rate is 15% which ranges from 3.6 to 47.4% in different geographical regions.[9]

Problem statement of Ascaris lumbricoides

It is the most common helminthic infection and most common among children aged 3-9 years. Globally, about one billion people are infected annually with about 12 million acute cases and 20,000 more deaths.[9]

Problem statement of Ancylostoma duodenale

It is more commonly seen in warm, moist climates in tropical and subtropical regions of Asia, Africa, South America and south pacific.[7] It is almost eradicated in Europe and USA. The global prevalence of Hook worm is about 576-740 million cases, in which 80 million were severely affected.[9]

Problem statement of Trichuris trichura

It is the third most common soil transmitted helminthic infection in the humans.[9] It is common in South East Asia and United states. Nearly 800 million people are infected and majority of them are children aged from 4-10 years of age.[9]

Problem statement of Giardia lamblia

Globally it is the most common cause of diarrhea in humans and animals.[10] It affects 2% of the adults, 6 to 8% of the children in developed countries.[11] Almost, 33% of the people in developing countries have Giardiasis.[11]

METHODS

Study design

This is a cross sectional descriptive study.

Study area

This study was carried out in Anakaputhur and Padappai, urban and rural field practice areas of a private medical college in Kanchipuram district.

Study population

All the patients who attended the out-patient department of field practice areas of medical college for a period of 3 months.

Sample size

Based on study done in 2016 by Manochitra K et al, the overall prevalence of intestinal parasite in the stool sample was estimated to be 22%.[5] At 95% confidence limits and with 10% permissible error the sample size was estimated to be 354, based on the formula $N=4PQ/L^2$. The final sample size was rounded off to 390 due to availability of data.

Study period

Three months from August to October 2017.

Data collection

Data was collected using a structured questionnaire to obtain the socio demographic profile and a sterile container was used to collect the stool samples.

Ethical approval

Obtained

Informed consent

Informed consent in the local language (Tamil) was obtained before the data and sample collection.

Methods used in detection of parasites

Direct wet mount method was used in detection of parasites. It is otherwise called as Saline and Iodine wet mount method. Nearly 2 mg of stool sample is picked up using a wooden stick, mixed with a saline (0.9%) drop on a glass slide. Then it is covered using a cover slip and observed under microscope to look for parasite eggs.[4] In Iodine wet mount method, instead of saline, the sample is mixed with a drop of Lugol's iodine, then it is covered with a cover slip and observed under microscope.

Inclusion criteria

Patients who attended the out-patient department of urban and rural health training centers of the medical college with various complaints and who were willing to give their samples are included.

Exclusion criteria

Infants and pregnant mothers and patients who were not willing to give their samples were excluded.

Sample collection

Patients were given a sterile labeled container and advised to take required amount of stool sample. Microscopic examination was done within 2-4 hours of sample collection.

Statistical analysis

Data analysis was done in SPSS version 22.

RESULTS

Table 1 shows the socio-demographic characteristics of study population. The participants are divided in to four categories based on age in years 1-14, 15-30, 31-60 and more than 61. Majority of the participants belonged to the age group of 15 to 30 (33%) and 31 to 60 (33%) years of age. There was near equal distribution of male and female population, about 48% and 52% respectively. Among the total study participants 53% of them is from urban population and 47% is from rural population.

Table 2 shows the prevalence of intestinal parasites in the stool samples of the study participants. Among the stool samples collected from study population, 63.6% of the total samples did not have any intestinal parasite, 28.5% of stool samples showed the presence of *Entamoeba histolytica* and 0.5% of the samples showed the presence of *Giardia lamblia* which was the least when compared to other organisms.

Table 1: Sociodemographic characteristics of study population.

S.No	Particulars	Frequency N=390	Percentage (%)
1	**Age (in years)**		
	1-14	121	31
	15-30	130	33.3
	31-60	129	33.1
	>61	10	2.6
2	**Gender**		
	Male	187	48
	Female	203	52
3	**Residence**		
	Rural	185	47.4
	Urban	205	52.6

Table 2: Percentage of intestinal parasites in stool samples of study population.

Parasites	Number	Percentage (%)
No parasites	248	63.6
E. histolytica	111	28.5
A. lumbricoides	10	2.6
A. duodenalae	13	3.3
G. lamblia	2	0.5
T. trichura	6	1.5
Total	390	100

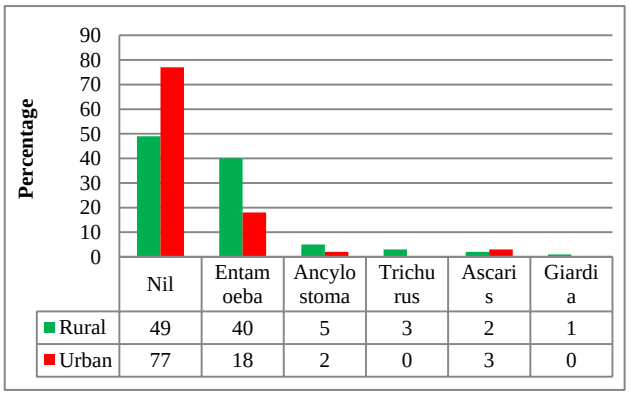

Figure 1: Distribution of intestinal parasites among rural and urban population.

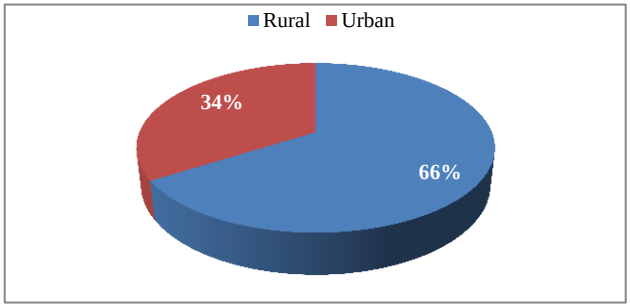

Figure 2: Comparison of rural and urban samples based on presence of intestinal parasites.

Figure 1 depicts the distribution of intestinal parasites among the rural and urban population. The prevalence of *E. histolytica* was found to be 40% in stool samples collected from rural population and 18% in the samples collected from urban population, *A. duodenellae* was found in 5% of the samples collected from rural population and 2% in the samples from urban population, *T. trichura* was found in 3% of the total samples collected from rural population and no samples collected from urban population showed the presence of *Trichurus*, *A. lumbriciodes* was found in 2% of samples collected from rural population and 3% of samples collected from urban population, The stool samples collected from rural population showing the presence of *G. lamblia* was 1%.

Figure 2 shows the prevalence of intestinal parasites in the stool samples among the rural population (66%) was more when compared to the urban population (34%) and Table 3 shows the statistically significant association ($p \leq 0.05$) and Odds ratio found to be 3.37 times higher risk of acquiring intestinal parasitic infection in rural population.

Table 3: Association between presence of intestinal parasites among rural and urban population.

Residence	Presence of parasites		Absence of parasites		Total	P value	Odds ratio
	Number	Percentage (%)	Number	Percentage (%)			
Rural	94	50.8	91	49.2	185	0.00	3.37
Urban	48	23.4	157	76.6	205		
Total	142	36.4	248	64.6	390		

DISCUSSION

A total of 390 samples was studied and the overall prevalence of intestinal parasites in the stool samples among the study population was found to be 36.4% which is similar to the overall India prevalence range.[5]

Among the stool samples showing protozoal infections, *E. histolytica* and *G. lamblia* showed high prevalence of 80% than the helminthic infections (*A. duodenalae, A. lumbricoides, T. trichura*) which was 20% which is similar to a study done by Manochitra et al.[5]

It is evident from this study that females (55%) had higher prevalence of parasites in their stool samples when compared to males (45%) which is similar to the study done by Jayalakshmi et al.[12] It is evident that females are in higher chance of getting infected with intestinal parasites, due to their association with children.

The prevalence of intestinal parasites in the stool samples collected from rural population rural samples is 50.6% where as it is 91% in a similar study done by Fernandez et al. On the contrary the prevalence of infection in urban population is 23.4% whereas, it is 33% in the study done of Fernandez et al.[6] This shows that there is great reduction in the overall parasitic infection rate among rural population and mild reduction of infection rate among urban population.

Among the positive samples N=142, the infection rate of *E. histolytica* (79%) is more when compared to the study by Padmaja et al which is 63%.[13] The infection rate of *G. lamblia* is 5%, which is lesser when compared to a study by Padamaja et al showing 1%.[13] However the study samples showed more prevalence of *E. histolytica* which is similar to other studies done by Padmaja et al and Manochitra et al.[13,5]

The stool samples showing the parasites such as of *A. lumbricoides* (2%), *T. trichura* (3%), *A. duodenale* (5%), *G. lamblia* (1%) is less when compared to the study done Fernandez et al which shows 53% of *Ascaris*, 45.6% of *Trichurus*, 37.6% of *Ancylostoma* and 16% *Giardia* among the rural population.[6] But the stool samples showing *Entamoeba* is more (40%) when compared to the study done (Fernandez) showing 4%. This suggests that there is poor sanitary condition and possibility of recent faecal contamination in the drinking water.

In this study, the samples from the urban population did not show any *Giardia* and *Trichurus* infestation when compared to Fernandez et al which shows a prevalence of 22.6% and 2% respectively, this signifies that the protection against Giardia and hookworm is excellent in the urban population.[6] The stool samples showing *Entamoeba* was more (18%) in this study when compared to a study done by Fernandez showing 10%.[6]

CONCLUSION

The overall prevalence in rural population is comparatively higher than the urban population, hence necessary interventions like improving the sanitary conditions, periodic de-worming, Mass screening, Awareness creation programs and the public should be educated regarding faecal contamination of water and necessity of drinking boiled water. Urban population should also be given equal importance in periodic de-worming and improvement in the sanitary conditions and health awareness creation.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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