Section: Microbiology

Original Research Article

ASSESSMENT OF DETECTION AND PREVALENCE OF COMMON INTESTINAL PARASITES IN STOOL SAMPLES

R Sathyajith[1], T.G. Ramya[2], Meghna Mohan[3], V. Balaji Tulse Dass[4]

[1]*Associate Professor, Department of Microbiology, PK Das Institute of Medical Sciences, Vaniamkulam, Palakkad, India.*
[2]*Associate Professor, Department of Microbiology, Karuna medical college vilayodi Chittur Palakkad, India.*
[3]*Associate Professor, Department of General Medicine, Karuna Medical College Vilayodi Chittur Palakkad, India.*
[4]*Associate Professor, Department of General Medicine, Karuna Medical College Vilayodi Chittur Palakkad, India.*

Received *: 17/03/2024*
Received in revised form *: 13/05/2024*
Accepted *: 29/05/2024*

Corresponding Author:
Dr. V. Balaji Tulse Dass
Associate Professor, Department of General Medicine, Karuna medical college vilayodi Chittur Palakkad, India.
Email: dr_venkatbalaji@yahoo.co.in

DOI: 10.5530/ijmedph.2024.2.106

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2024; 14 (2); 551-554

ABSTRACT

Background: To detect and assess the prevalence of common intestinal parasites in stool samples.
Materials and Methods: 846 stool samples collected in the Department of Microbiology in the last 8 months were studied and common intestinal parasites in stool samples were identified.
Results: Maximum cases were detected in age group 11-20 years in 34%, 21-30 years in 11%, 31-40 years in 25%, 41-50 years in 15%, 50-60 years in 10% and >60 years in 5% samples. A significant difference was observed (P< 0.05). Type of parasites identified was Giardia lamblia in 3%, Ascaris lumbricoides in 0.28%, Entamoeba histolytica in 12%, Entamoeba coli in 1.8%, and Taenia in 1%. A significant difference was observed (P< 0.05). The sensitivity of different parasitic examination methods used was 51% in zinc sulphate centrifugal floatation, 67% in formol-ether concentration, 37% in simple salt floatation, 39% in routine wet and iodine mount, and formol-ether concentration in 62%. A non- significant difference was observed (P> 0.05).
Conclusion: Entamoeba histolytica, Entamoeba coli, Giardia lamblia, Ascaris lumbricoides, and Taenia were identified as common parasites.
Keywords: Entamoeba histolytica, Stool, Parasites.

INTRODUCTION

Infections with parasites pose a serious threat to global public health, especially in developing nations.[1] The frequency of intestinal parasite infections varies geographically and is also significantly influenced by the number of stool tests performed and the diagnostic techniques used.[2] The high incidence of intestinal parasite infections in India can be attributed to hunger, unsanitary conditions, inappropriate sewage disposal, and the lack of potable water supplies in both rural and urban areas. Worldwide, parasitic infections are common; their frequency varies according to sanitation standards and is linked to factors such as poverty, malnourishment, overcrowding, and tropical weather. A major factor in the spread of these infections is poor food hygiene, contaminated water, and a lack of personal hygiene.[3]

In a microbiology lab, a common laboratory test that is regularly performed to check for gastrointestinal parasites and other disorders is a stool examination.[4] Common parasitic forms found in stool include helminthic eggs (Ancylostoma duodenale, Enterobius vermicularis, and Ascaris lumbricoides), protozoan cysts and trophozoites (Entamoeba histolytica, Giardia lamblia).[5] Taenia worm segments or entire worms are also visible.[6] The high morbidity and mortality rates can be attributed to these infestations. These are especially common in underprivileged communities, especially in tropical and subtropical regions due to the hot, humid weather, poor health outcomes, and more difficult access to drinking water.[7,8] Considering this, the present study was performed to assess prevalence of common intestinal parasites in stool samples.

MATERIAL AND METHODS

The present prospective, observational study comprised of 846 stool samples collected in the Department of Microbiology in the last 8 months. These samples were collected from emergency ward, general medicine, general surgery, orthopaedics, gynaecology, etc.

Stool was gathered into clean, wide-mouthed containers. The samples were thoroughly inspected to check for proglottids, mucus, color, consistency, and frank blood. After being collected, the samples were examined in an hour. Lugol's iodine and a drop of saline were added to clean glass slides, along with a tiny quantity of stool, to create saline and iodine wet mounts. The slide was covered with a cover slip, and it was examined under a microscope at low power to identify trophozoites and eggs, and at higher power to observe morphological details. Clinical suspicion of parasite infection led to the use of ethyl acetate for stool concentration. Results of the present study were subjected for statistical inferences using chi- square test. The level of significance below 0.05 was regarded significant and less than 0.01 as highly significant.

RESULTS

Maximum cases were detected in age group 11-20 years in 34%, 21-30 years in 11%, 31-40 years in 25%, 41-50 years in 15%, 50-60 years in 10% and >60 years in 5% samples. A significant difference was observed (P< 0.05). [Table 1]

Type of parasites identified was Giardia lamblia in 3%, Ascaris lumbricoides in 0.28%, Entamoeba histolytica in 12%, Entamoeba coli in 1.8%, and Taenia in 1%. A significant difference was observed (P< 0.05). [Table 2, Figure 1]

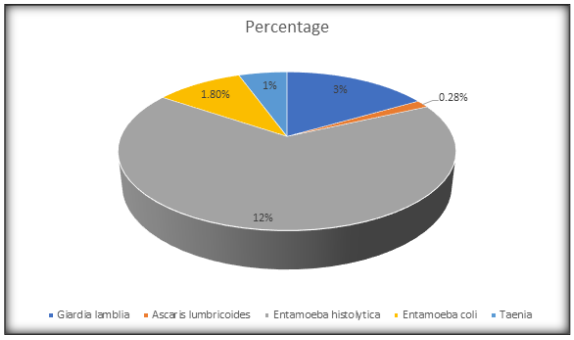

Figure 1: Type of parasites identified

The sensitivity of different parasitic examination methods used was 51% in zinc sulphate centrifugal floatation, 67% in formol-ether concentration, 37% in simple salt floatation, 39% in routine wet and iodine mount, and formol-ether concentration in 62%. A non- significant difference was observed (P> 0.05). [Table 3, Figure 2]

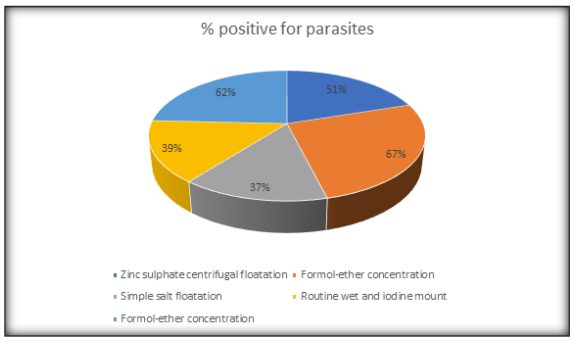

Figure 2: Sensitivity of different parasitic examination methods

Table 1: Age-wise distribution of samples

Age group (Years)	Percentage	P value
11-20	34%	0.05
21-30	11%	
31-40	25%	
41-50	15%	
50-60	10%	
>60	5%	

Table 2: Type of parasites identified

Parasites	Percentage	P value
Giardia lamblia	3%	0.01
Ascaris lumbricoides	0.28%	
Entamoeba histolytica	12%	
Entamoeba coli	1.8%	
Taenia	1%	

Table 3: Sensitivity of different parasitic examination methods

Procedure	% positive for parasites	P value
Zinc sulphate centrifugal floatation	51%	0.69
Formol-ether concentration	67%	
Simple salt floatation	37%	
Routine wet and iodine mount	39%	
Formol-ether concentration	62%	

DISCUSSION

In the developing world, the estimated numbers of individuals afflicted with roundworm, whipworm, hookworm, and Giardia lamblia are 200, 500, 700, and 800 million, respectively.[9] The direct wet mount and the iodine mount are two common techniques used to identify intestinal parasites from stool.[10] The traditional techniques are not sensitive enough to identify parasites in stool samples. The application of concentration procedures improves the ability to identify parasites in the faecal specimens.[11,12] For the diagnosis and epidemiologic surveillance of parasitic infections in humans, a variety of concentration techniques are used, including modified formol-ether concentration, zinc sulphate centrifugal floatation, simple salt floatation, and formol ether concentration. These methods improve the identification of helminthic eggs and larvae and the protozoan cysts.[13] Some methods, such as formol-ether concentration, have the advantage of causing less damage to the organisms and increasing the recovery of operculated eggs and Schistosoma spp. Sensitive, easily applied diagnostic instruments that can simultaneously identify multiple intestinal parasite species in a single stool sample are needed in light of the rising polyparasitism in developing nations.[14,15] The present study was performed to assess prevalence of common intestinal parasites in stool samples.

In our study, maximum cases were detected in age group 11-20 years in 34%, 21-30 years in 11%, 31-40 years in 25%, 41-50 years in 15%, 50-60 years in 10% and >60 years in 5% samples. Diongue et al,[16] included 2578 patients in their study. A total of 408 samples tested positive, revealing 440 intestinal parasites, or a 15.8% prevalence. In both monoparasitism (85.7%) and multiparasitism (14.3%), parasites were found. Ascaris lumbricoides (7.3%), Giardia intestinalis (8%), E. histolytica/dispar (12.7%), and Entamoeba coli (38.9%) were the most frequently occurring species in monoparasitism. A. lumbricoides-Trichuris trichiura (3.6%) and E. coli-G. intestinalis (2.7%) were the most frequent combinations. Patients who were not hospitalized had a significantly higher rate of impact (65.4%) than their counterparts who were; additionally, there were more men (50.7%) than women. Adults were the age group most affected, accounting for 67.4%, while the elderly, at 7%, were less affected.

We observed that type of parasites identified was Giardia lamblia in 3%, Ascaris lumbricoides in 0.28%, Entamoeba histolytica in 12%, Entamoeba coli in 1.8%, and Taenia in 1%. Chavan et al,[17] studied 10,336 stool samples from both outpatient and inpatient departments. Out of these samples, 9904 were finally included. The pathogenic parasites detected were Entamoeba histolytica cysts and trophozoites in 720 samples (7.26%) followed by trophozoites and cysts of Giardia lamblia in 128 samples (1.29%), ova of Ascaris lumbricoides in 14 samples (0.14%) and ova of Taenia in 2 samples (0.02%). Both hanging drop and routine examination was done for 976 (9.85%) samples and routine examination was done for 8928 (90.14%) samples. Stool samples collected were examined grossly and microscopically for presence of any infectious parasites. The most common parasite detected in the stool samples was Entamoeba histolytica with higher percentage of cases seen in females (60%) and age group of 0-10 years (33.33%).

The sensitivity of different parasitic examination methods used was 51% in zinc sulphate centrifugal floatation, 67% in formol-ether concentration, 37% in simple salt floatation, 39% in routine wet and iodine mount, and formol-ether concentration in 62%. Parameshwarappa et al,[18] in their study a total of 1000 stool samples were collected from the rural and the urban populations and each stool sample was examined by gross examination, direct microscopic examination by using saline and iodine preparations and by concentration techniques like simple salt flotation, zinc sulphate centrifugal floatation, formol-ether concentration and modified formol-ether concentration. The prevalence of the intestinal parasitic infections was higher in the rural population. A male predominance was noted (33.29%) in both the populations. Children in age range 10-20 years of age had the highest prevalence of the parasitic infestations.

Alqarni et al,[19] found that the color of positive specimens was mainly brown (86.4%). Stool consistency in infected cases was soft in (64%) samples. In total, 59 of the 112 participants were infected with intestinal parasites, representing 52.7%. Different intestinal protozoa parasites were identified in which Blastocystis hominis (86.4%) was highest. None of the intestinal helminths were detected. Out of the 59 infected cases, single infections were found in (62.7%) samples. The intestinal protozoan parasites in single infections were B. hominis (78.4%), Giardia lamblia (8.1%), and (2.7%) from each Entamoeba histolytica, Cryptosporidium parvum, Entamoeba coli, Endolimax nana, and Chilomastix mesnili. Microscopy, RDTs, and real-time PCR were used for detection and identification of G. lamblia, E. histolytica, and C. parvum.

CONCLUSION

Entamoeba histolytica, Entamoeba coli, Giardia lamblia, Ascaris lumbricoides, and Taenia were identified as common parasites.

REFERENCES

1. Golia S, Sangeetha KT, Vasudha CL. Prevalence of parasitic infections among primary school children in Bangalore. Int J Basic Appl Med Sci. 2014; 4:356–61.

2. Manochitra K, Padukone S, Ajay S, Subh P, Chan A, dra Parija. Prevalence of Intestinal Parasites among Patients attending a Tertiary Care Centre in South India. Int J Curr Microbiol Appl Sci. 2016;5(9):190–7.
3. Singh GK, Parajuli KP, Shrestha M. The prevalence of intestinal parasitic infestation in a Tertiary Care Hospital - a retrospective study. J Nobel Med Coll. 2013; 2:13–7.
4. Chandrashekar V. Detection and Enumeration of the Commonest Stool Parasites Seen in a Tertiary Care Center in South India. ISRN Trop Med. 2013;1–6.
5. Sethi S, Sehgal R, Malla N, Dudey ML, Mahajan RC. The changing trends of the intestinal parasitic infections in Chandigarh (NG): A hospital- based study. Ind J Med Microbiol 2000; 18(3):106-09.
6. Shobha M, Bithika D, Bhavesh S. The prevalence of intestinal parasitic infections in the urban slums of a city in Western India. J Infect Public Health. 2013;6(2):142–9.
7. Kang G, Mathew MS, Rajan DP, Daniel JD, Mathan MM, et al. Prevalence of intestinal parasites in rural Southern Indians. Trop Med Int Health. 1998;3(1):70–5.
8. Cox FEG. Modern Parasitology: A Textbook of Parasitology, second ed. Wiley-Blackwell Publishers; 1993.
9. Panjarathinam R. Textbook of Medical Parasitology, second ed. India: Orient Longman; 2007.
10. Iqbal Z. Techniques in Parasitology. Pakistan: Higher Education Commission Publishers; 2008.
11. Yogyata M, Binita S. Prevalence of intestinal parasites at Ujjain, Madhya Pradesh, India: Five-year study. Afr J Microbiol Res. 2011;5(18):2711–4.
12. Allen AVH, Ridley DS. Further observations on the formol-ether concentration technique which is used for faecal parasites. J Clin Path 1970; 23:545-46.
13. Marothi Y, Singh B. The prevalence of intestinal parasites at Ujjain, Madhya Pradesh, India: a five-year study. Afr J Microbiol Res 2011;5(18):2711-14.
14. Bisht D, Verma AK, Bharadwaj HHD. Intestinal parasitic infestations among children in a semi-urban Indian population. Trop Parsitol 2011;1(2):104-07.
15. Kang G, Mathew MS, Rajan DP, Daniel JD, Mathan MM, Mathan VI et al. The prevalence of intestinal parasites in rural southern Indans. Trop Med and Int Health 1998; 3(1): 70-75.
16. Diongue K, Ndiaye M, Seck MC, Ndiaye YD, Badiane AS, Ndiaye D. Distribution of parasites detected in stool samples of patients in Le Dantec University Hospital of Dakar, Senegal, from 2011 to 2015. Journal of tropical medicine. 2017 May 15;2017.
17. Chavan SKD, Roopa C. Detection and prevalence of common intestinal parasites in stool samples at a tertiary care hospital in Hyderabad Karnataka region: A retrospective study. Indian J Microbiol Res 2020;7(1):24-27.
18. Parameshwarappa KD, Chandrakanth C, Sunil B. The Prevalence of Intestinal Parasitic Infestations and the Evaluation of Different Concentration Techniques of the Stool Examination. Journal of Clinical & Diagnostic Research. 2012 Sep 1;6(7).
19. Alqarni AS, Wakid MH, Gattan HS. Prevalence, type of infections and comparative analysis of detection techniques of intestinal parasites in the province of Belgarn, Saudi Arabia. PeerJ. 2022 Aug 11;10: e13889.