ISSN: 03875547
Volume 46, Issue 02, February, 2023

# Prevalence of Intestinal Parasitic Infections Among Health Care Assistants of a Tertiary Care Hospital

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**Keywords:**
Intestinal Parasites, health-care associated infections. Prevalence of helminthic infections , Soil-transmitted helminth

**ABSTRACT**

Parasitic infections are considered to be a major health problem globally. The prevalence of infections caused by intestinal parasites with special reference to Soil-transmitted helminth [STH] infections are higher in tropical and subtropical climate than temperate climate. Published reports showing diversity in prevalence, detection methods depending on terrain. Persons working as health care workers providing patient care, work in research and clinical laboratories are at risk of becoming infected with parasitic infections like other microbial infections which may or may not be recognized as they usually occur through accidental exposures. In the same way health care workers infected with parasitic infections can infect the patients, mainly critical care patients who are highly susceptible to various infections due to immunocompromised state and also infect other workers of the hospital. Unfortunately, exposures and infections occurring through accidental exposure in these cases goes unrecognized and also remain unreported. To Estimate the prevalence of intestinal parasitic infections among the health care assistants (cleaning staff, staff taking care of patients, Ambulance drivers and food handlers) of a tertiary care hospital and to determine the associated risk factors among infected participants. A Cross-sectional Study conducted in Department of Microbiology of a tertiary care hospital. Health Care assistant workers in a tertiary care hospital during the study period were study population. Stool samples were tested in a microbiology laboratory of a tertiary care hospital, which included gross and microscopic examination. Prevalence of infection found 3.63% due to 4 positive samples from 110 total samples. 2 positive samples showed the presence of H. nana, 1 showed the presence of A. lumbricoides and 1 positive for Giardia lamblia. Less prevalence in comparison to other study may be due to better knowledge of the importance of hand hygiene practices after COVID Pandemic and due to good Hospital infection control practices.

## 1. INTRODUCTION

Parasitic infections are considered to be a major health problem globally. The prevalence of infections caused by intestinal parasites with special reference to Soil-transmitted helminth [STH] infections are higher in tropical and subtropical climate than temperate climate. Developing countries like India show higher rate of prevalence of infection and these infections have always been a public and medical health issue [1].

Published reports showing diversity in prevalence, detection methods depending on terrain.

[1]. Foremost common methods of detection of parasites in stool include direct wet mount (saline and iodine mount) and various concentration techniques like flotation techniques as salt flotation method where egg and cysts of parasites float in a solution of high specific gravity; sedimentation method such as Formalin-ether technique where eggs and cysts of parasites get segmented in a solution with low specific gravity. The concentration techniques help in diagnosis when parasites are scanty in stool sample and may not give positive result during routine microscopic examination and in this way help in excluding false negative results. Intestinal parasites are classified into protozoa and helminths. Commonly isolated protozoa are *Entamoeba histolytica (E. histolytica)* and *Giardia lamblia* (*G. lamblia)* and common helminths causing infections are *Ascaris lumbricoides* (*A. lumbricoides*) (roundworm), *Trichuris trichiura (T. trichura)* (whipworm), and *Necator americanus (N. americanus)* (hookworm) [2].

Persons working as health care workers providing patient care, work in research and clinical laboratories are at risk of becoming infected with parasitic infections like other microbial infections which may or may not be recognized as they usually occur through accidental exposures [3]. In the same way health care workers infected with parasitic infections can infect the patients, mainly critical care patients who are highly susceptible to various infections due to immunocompromised state and also infect other workers of the hospital. Unfortunately, exposures and infections occurring through accidental exposure in these cases goes unrecognized and also remain unreported.

Symptoms associated with intestinal parasitic infections are abdominal pain, diarrhea, nausea, vomiting, weight loss, bloating, constipation, loss of appetite, weight loss, intestinal blood loss, itching in the perianal area and asymptomatic carriers [4]. As most of the infected individuals remain asymptomatic which remains a challenge in diagnosis of these infections. These individuals remain the potential source for the spread of these infections to others for which it is always essential to break the chain.

Several risk factors of infection have been noted in previous studies which includes greater susceptibility of infection to females, lack of toilets in their homes, their lower socioeconomic status, crowding in house, inadequate personal hygiene practices due to their lower level of education, and lack of access of clean drinking water in various places, decreased immunity due to various diseases [2], [5], [6].

After the search of similar studies, we found that there is a lack and and moreover there are no such studies for determining the prevalence of intestinal parasitic infections in health care assistants (taking personal care of patients, cleaning staff, Ambulance drivers) of tertiary care hospitals, those who remain indirectly in contact with the patient. It is essential to do these types of studies to know the prevalence of these infections in this population. Therefore, this study is done to estimate the prevalence of intestinal parasitic infection in these workers of a tertiary care hospital.

**2. Objectives**

1. Estimate the prevalence of intestinal parasitic infections among the health care assistants (cleaning staff, staff taking care of patients, Ambulance drivers and food handlers) of a tertiary care hospital.
2. Determine the associated risk factors among infected participants.

**3. Materials and Methods**

Place of study: Department of Microbiology of a tertiary care hospital
Study type: Cross-sectional study
Study Population: Health Care assistant workers in a tertiary care hospital during the study period.
Study period- 2 months (1 July 2022- 31 August 2022)
Inclusion criteria: Health care assistants (persons involved in cleaning of wards and ICUs, personal patient care, security guards, ambulance drivers and food handlers) that directly or indirectly come in contact with patients.

Exclusion criteria:
(i)Workers who have received anti-intestinal parasite treatment within span of two weeks prior to the day of sample collection.
(ii) Those not willing to provide their samples for the said study.
Ethical clearance- This study was approved by the Ethics Committee of the tertiary care hospital.

Procedure:
We approached all workers and explained about the project and sample required for this test.

Specimen Collection- Before stool collection, clear instructions were given to all participants for appropriate collection of samples and containers for the sample collection were given to the participants those were ready to volunteer in the study. Consent was taken by means of a consent form. Sample was collected by each participant in a clean, dry, leak-proof sterile container labeled with respective participant information such as Name, age, sex and working area. After collection of sample, each participant gave the sample container to the microbiology laboratory of the hospital for the further testing. Stool samples were tested in a microbiology laboratory of a tertiary care hospital, which included gross and microscopic examination. In gross stool examination- the color, consistency, presence or absence of mucus, blood, adult worms were noted.

Microscopic Examination: Direct microscopic examination: Saline wet mount preparation examined for the trophozoites of protozoa in living state and helminth eggs or larvae. Iodine mount also checked for the nuclear details and glycogen mass of trophozoites and cysts.
Direct Examination -Thin emulsion of small amount of faeces sample with the help of wooden stick is made in saline at one end and Lugol's iodine on other end of glass slide and both the preparations are covered with clean cover slips and examined under low power (10 X) and high power (40 X) objectives.

Concentration Methods:
Saturated salt solution (flotation technique)- For this the faecal sample is mixed in solution of higher density.

- One quarter of 20-25 ml tube is filled with saturated salt solution. About one gram of sample is emulsified using a stick or glass rod and then 12-15 ml of salt solution is added till the tube is completely filled.
- This tube is kept in vertical position and any coarse matter present removed from this and using a dropper further solution is added in the tube to ensure that it is filled to the brim.
- Cover glass slip placed on the top of tube and preparation is allowed to stand for 25-30 minutes.

- The coverslip is lifted and placed on glass slide with the face downward
- Prepared slide examined under under low power (10 X) and high power (40 X) objectives for the presence of eggs/cysts in sample.

Formol–ether concentration (sedimentation technique) also performed on all samples processed in the laboratory.

- For this about one gram of faeces is emulsified in 7 ml of 10% of formalin (fixative) and left for 10 minutes.
- It was after strained with gauze piece.
- Added 3 ml of ether to the filtrate and shaked vigorously for a minute.
- Centrifuged the tube at 2,000 rpm for 2 minutes and
- Allowed to settle
- Supernatant fluid with debris is decanted leaving 1-2 drops
- Wet mount preparation of this is examined under a light microscope using 10× and 40× objective for cysts, eggs and larvae [9], [12].

Various associated risk factors (susceptibility of infection to females, lack of toilets in their homes, their lower socioeconomic status, crowding in house, inadequate personal hygiene due to their lower level of education, and lack of access of clean drinking water in various places, decreased immunity due to various diseases) asked from the participants.

**4. Results**

We approached more than 200 health care assistants of a tertiary care hospital for the stool samples of this project. More than 130 participants initially agreed and were ready to participate in the study. 20 health care assistants were excluded from the study as they had taken the anti-intestinal parasite treatment and were fitting in the exclusion criteria of this study. Excluding 20 participants, 110 health care workers were included for the study. Other health care assistants refused or did not give the sample even after taking the container and agreeing to participate in the study. They were not convinced for giving the sample even after repeated explaining about the project and the benefits of the test for them as well. The persons who were not ready to participate in the study were mostly male health care assistant workers.

Out of 110 participants, 67 were female and 43 were male participants (Fig1). These participants included cleaning staff those taking care of the patients and kitchen staff. Out of 110 samples, 100 samples were taken from the cleaning staff and patient care attendants and 10 were from kitchen workers. Out of 100, 75 were from the wards and OPDs and 20 from those who worked in ICUs and 5 were from laboratory those who also assist in laboratory work. Age of the participants ranged from 20-45 years. Average education level of all the participants was from 10-12th Class pass. Persons living in the house average said were 4-5 persons.

When asked, all participants said they follow hand hygiene practices before and after use of toilet, before and after duty, before and after touching the patient. They mentioned how in COVID pandemic they understood the importance of hand hygiene and few of them when asked able to show the steps of hand hygiene also. Out of 110 participants 4 working in various wards and OPD, were using open defecation practices, otherwise all have the availability of toilets in their home. All when asked have the facility of routine clean drinking water supply in their homes except 2 participants.

All participants involved in the study when asked they said that they have no symptoms of GI infection, only a few complained of constipation occasionally. Out of 110 participants, we had found only four positive samples. Prevalence of infection in health care assistant found to be 3.63% in a tertiary care hospital. Out of these 4 patients, 3 were female and 1 was male. Out of these 4 patients, 1 patient using open defecation was

ISSN: 03875547
Volume 46, Issue 02, February, 2023

male, working in ward. From other three Positive patients one was working in lab side and 2 from wards. Out of these 3, 1 had lack of clean drinking water supply and in 2 were found to have crowded household as risk factors.

One sample found positive on direct microscopy and showed the trophozoite of *Giardia lamblia*. In all other samples positive findings were missed in the direct microscopy on saline and iodine mount. Out of other three positive findings, one was found positive after saturated salt solution flotation technique and two were positive found after processing the sample with the formalin ether concentration method. Positive finding in the sample after saturated salt solution was of the eggs of *H.nana* in one sample and after the formalin ether technique eggs of *Ascaris lumbricoides* and *H.nana* identified in two different samples.

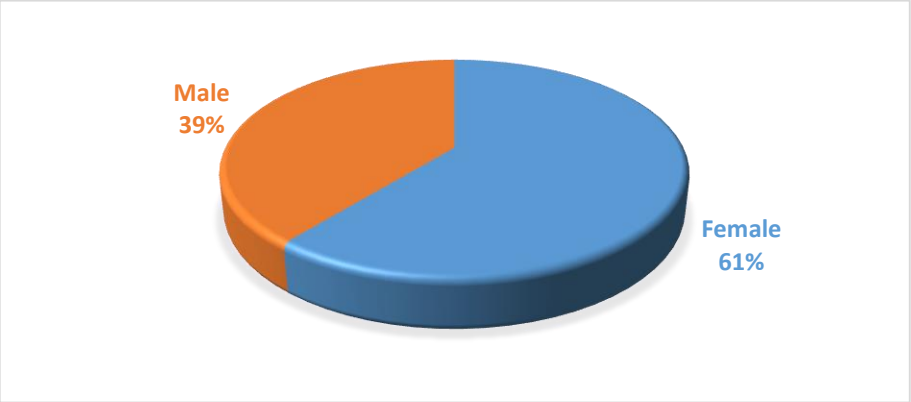


**Figure 1:** shows the distribution of male and female participants

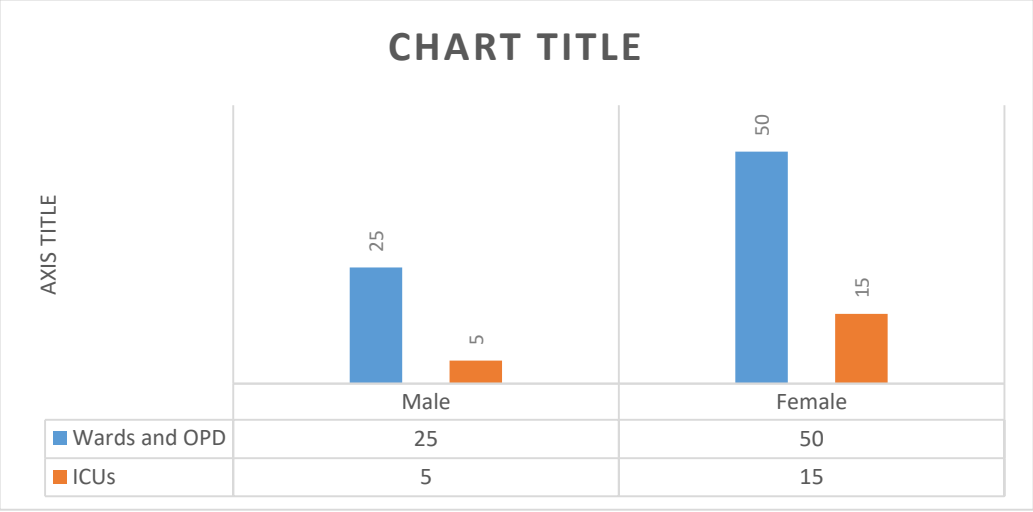


**Figure 2:** Sex wise distribution of cleaning and involved in patient care participants from wards and ICUs

**5. Discussion**

Due to lack of these types of studies on health care assistants and even on other health care workers (Doctors, Nurses) those who are directly involved in the patient care, while searching Google, Google scholar and PubMed engines, were not found. So comparison of study participants with the same type of population was not possible.

On comparing the prevalence of this study, which was 3.63% with other type of study population, was found less [13- 17]. This may be due to the reason that these health care assistants, follow HIC practices taught to

them during various training sessions about patient care when required and after the COVID Pandemic they have also learned the importance of health and hand hygiene very well. But seeing the prevalence in different countries in other types of study population, there is need of these types of studies in our country in the future as cross-contamination can occur by both ways from patient to staff or vice versa.

The variations in the prevalence and type of parasites varies due to differences in sample size, geographical location, environmental conditions, host and host factors. In a study of [18] from Puducherry conducted between September 2016- December 2018 among urban and rural population, 1006 participants involved and prevalence was found 30.3%. Most common protozoa were Giardia intestinalis (15.8%) followed by Blastocystis species (6.2%), among helminths common was hookworm (2.2%) followed by *A. lumbricoides* and *H. nana* (each 0.4%). In the above study population, most persons were in the age group of 1-10 years (87.7%), followed by 11-20 years (9.4%) and 21-30 years (2.7%). Compared to the above study, in this study, age group was 20-45 years' persons. And the common parasite found was *H. nana* (2 participants) followed by *A. lumbricoides* (1 participant) and Giardia (1participant).

In a study from Uttarakhand done from August 2012 to May 2013 on stool samples of patients admitted in wards and of OPD. Prevalence was found 11.6%. Parasites identified in patient samples, were *G. lamblia* (3.06%), hookworm (2.75%) and H. nana (2.14*%), A. lumbricoides* (1.53%), *Strongyloides spp*. (1.22%) and *E. histolytica* (0.92%). Positive samples maximum seen in female patients (17.07%) compared to males (8.33%) patients although the number of male patients was more than the female patients. Infection found maximun in 51 and 60 years (22.22%) of age group with risk factors including open defecation (22.69%), use of untreated water (17.91%) people living in rural areas (15.17%) [19]. Compared to the above study, in this study also, more positive samples are from female participants only, most of the participants have availability of toilets in their home. One participant with positive finding using open defecation and found with poor hand hygiene practices. One with lack of clean drinking water and two with household crowding.

In a 5 years' retrospective study from Kashmir (Jan 2014 to Dec 2018) done by Peerzada BY et al; from 2159 stool specimens processed in microbiology laboratory ,7.6% identified the parasites presence. The most common identified intestinal parasite was *Ascaris lumbricoides* (71.9%) followed by Giardia lamblia (16.4%). Maximum numbers of patients were in the age group of 16-30 years followed by 0-15 years' age group. In comparison to other studies, this study found the less prevalence of parasites which again explains the geographical and period variation [20].

In one more study of Kashmir done in the Gurez Valley situated in the north of Kashmir and published in 2010. 352 children between ages of 1-15 years were included in the study 75.28% were positive for intestinal helminths. Prevalence of parasite infection found was of *A.* lumbricoides, 71.87%, followed by *Trichuris trichiura*, 26.42%. Water, defecation site, maternal education and personal hygiene and were significant risk factors in predicting the infection caused by intestinal helminth [21]. These studies showed the common age group less than 30 years which in comparison is less than the average age group of participants in this study.

Limitation of this study, sample size was less as many workers were not ready to participate in the study. We tried to find the reason of less sample during the study. The staff was ready to give the blood, urine, sputum sample but were hesitant to give stool sample. It was difficult to convince the females due to shyness and discomfort they feel after knowing the type of sample and various reasons they gave that they can not collect in home and bring this type of sample in the hospital with eatables and were also not ready to collect in hospital. Also workers had different timing of duty rotations (morning, evening, afternoon). This was also found to be one of the reasons of less samples in this period. Mostly males were not ready to give the sample

after knowing that it is a stool sample. As in this study, study period was of 2 months only, may be in future we can think about these types of studies with extended period so as to be able to convince them by talking each person individually in detail.

This study was done to estimate the prevalence of Intestinal Parasitic Infections among Health Care Assistants of a tertiary care hospital and associated risk factors among infected participants. In this study, 110 samples from participants were included.

Prevalence of infection found 3.63% due to 4 positive samples from 110 total samples.
2 positive samples showed the presence of *H. nana*, 1 showed the presence of *A. lumbricoides* and 1 positive for *G. lamblia*
Less prevalence in comparison to other study may be due to better knowledge of the importance of hand hygiene practices after COVID Pandemic and due to good Hospital infection control practices (e.g frequent trainings to staff handling BMW, Hand hygiene,patient care) in hospital Risk factors among infected participants found following open defecation practices and poor hand hygiene, participant not getting routine clean drinking water supply and in rest 2 crowded household might be the associated risk factor.

**6. Conclusions**

Prevalence of infection varies for various geographical region, depending upon various risk factors present in that region and related to host and host factors. In our study prevalence of infection was 3.63%. We found lack of studies on health care assistant workers. Further, more studies are required from various hospitals established in various regions of country with more sample size to come to a strong conclusion for regular checkup and/or including faeces sample testing in Pre Employment Medical Examination (PEME) and for periodic anti-intestinal parasitic treatment if required in that area or in certain population which can help in reducing the burden and spread the infection in the hospital where critical patient lies.

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