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Research Article

Prevalence of Parasitic Intestinal Infection in Stool Samples among Canteen Workers Working Inside the Health Care Facilities in Chhattisgarh

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ABSTRACT
Background: Intestinal parasitic infections remain a major public health concern in developing countries and pose a significant risk when present among food handlers. Canteen workers employed within healthcare facilities may act as asymptomatic carriers, facilitating the transmission of parasites through contaminated food and poor hygiene practices.
Objective: To determine the prevalence of intestinal parasitic infections among canteen workers working inside healthcare facilities in Chhattisgarh and to assess associated hygiene-related factors.
Methods: A hospital-based cross-sectional study was conducted among 80 canteen workers employed in healthcare facilities in Chhattisgarh. Demographic and hygiene-related information was collected using a structured questionnaire. Fresh stool samples were obtained from all participants and examined microscopically using saline and iodine wet mount preparations for the detection of intestinal parasites. Statistical analysis was performed using SPSS, and associations between variables were assessed using the Chi-square test, with $p<0.05$ considered statistically significant.
Results: Of the 80 stool samples examined, 18 were positive for intestinal parasites, yielding an overall prevalence of 22.5%. Entamoeba histolytica/dispar was the most common parasite detected (33.3%), followed by Giardia duodenalis (22.2%). Significant associations were observed between parasitic infection and poor hand washing practices ($p=0.006$) as well as inadequate fingernail hygiene ($p=0.018$). Workers with longer duration of employment showed a higher prevalence of infection.
Conclusion: Intestinal parasitic infections were common among canteen workers in healthcare facilities. Regular screening, deworming, health education, and strict adherence to personal hygiene practices are essential to improve food safety and reduce the risk of parasite transmission within healthcare settings.

Keywords: Intestinal Parasitic Infection, Food Handlers, Canteen Workers, Stool Examination, Healthcare Facilities.

INTRODUCTION

Intestinal parasitic infections (IPIs) remain a major public health concern worldwide, particularly in developing countries where inadequate sanitation, poor personal hygiene, overcrowding, and limited access to clean water facilitate transmission. These infections are caused by a variety of protozoan and helminthic parasites that colonize the gastrointestinal tract and may result in malnutrition, anemia, impaired physical development, gastrointestinal disturbances, and reduced work productivity. According to the World Health Organization (WHO), soil-transmitted helminth infections alone affect more than one billion people globally, with the highest burden occurring in tropical and subtropical regions characterized by poor environmental sanitation and socioeconomic deprivation [1].

Food handlers play a crucial role in the transmission dynamics of intestinal parasites. Individuals involved in the preparation, handling, and distribution of food may serve as reservoirs and vehicles for the spread of pathogenic parasites to large populations, particularly when personal hygiene practices are inadequate. Contaminated hands, fingernails, utensils, and food preparation surfaces can facilitate fecal-oral transmission of infective cysts, ova, and larvae. Consequently, food handlers infected with intestinal parasites represent a significant risk factor for foodborne disease outbreaks and pose a substantial challenge to public health systems [2].

Healthcare facilities are expected to maintain the highest standards of hygiene and infection control. However, hospital canteens and food service establishments operating within healthcare institutions may inadvertently become sources of infection if food handlers are asymptomatic carriers of intestinal parasites. Patients, healthcare workers, attendants, and visitors who consume food from these facilities may be exposed to parasitic pathogens through contaminated food and beverages. This concern is particularly important in hospitals because many patients are immunocompromised, elderly, malnourished, or suffering from chronic illnesses that increase susceptibility to infectious diseases [3].

Several studies conducted across different regions of the world have reported varying prevalence rates of intestinal parasitic infections among food handlers. Research from developing countries has demonstrated prevalence rates ranging from 10% to over 50%, depending on local sanitation conditions, socioeconomic status, health education, and screening practices [4]. Commonly identified parasites include Entamoeba histolytica, Giardia duodenalis, Ascaris lumbricoides, Trichuris trichiura, Ancylostoma duodenale, and Hymenolepis nana[5]. Many infected individuals remain asymptomatic, allowing them to continue working and unknowingly contribute to the dissemination of infectious stages of parasites.

In India, intestinal parasitic infections continue to represent a significant public health issue despite improvements in sanitation infrastructure and hygiene awareness. Several investigations among food handlers have identified protozoan and helminthic infections as persistent concerns, particularly in regions where environmental sanitation remains inadequate. Factors associated with parasitic infections include poor hand washing practices, untrimmed fingernails, lack of periodic medical examinations, inadequate health education, and consumption of contaminated water [6,7]. Regular screening and treatment of food handlers have therefore been recommended as important preventive strategies.

Chhattisgarh, a central Indian state characterized by diverse geographical, socioeconomic, and tribal populations, continues to face challenges related to sanitation, safe drinking water availability, and communicable disease control. Although substantial efforts have been made through national programs such as the Swachh Bharat Mission, intestinal parasitic infections remain prevalent in several communities. Limited data are available regarding the burden of intestinal parasitic infections among canteen workers employed within healthcare facilities in the state. Considering their direct involvement in food preparation and distribution, understanding the prevalence of parasitic infections among these workers is essential for strengthening infection prevention measures and ensuring food safety within hospitals [8].

Stool examination remains the gold standard for diagnosing intestinal parasitic infections. Microscopic identification of ova, cysts, trophozoites, and larvae provides valuable epidemiological information regarding the prevalence and distribution of intestinal parasites within specific populations. Routine surveillance among food handlers can facilitate early detection, prompt treatment, and implementation of targeted health education interventions aimed at reducing transmission [9].

Given the potential risk posed by infected food handlers to vulnerable hospital populations, assessment of intestinal parasitic infections among canteen workers within healthcare facilities assumes considerable public health significance. The present study was therefore undertaken to determine the prevalence of parasitic intestinal infections in stool samples among canteen workers employed in healthcare facilities in Chhattisgarh and to generate evidence that may support the development of effective screening, treatment, and hygiene promotion strategies for safeguarding food safety and public health.

MATERIALS AND METHODS

Study Design and Setting

A hospital-based cross-sectional study was conducted to determine the prevalence of intestinal parasitic infections among canteen workers employed within healthcare facilities in Chhattisgarh, India. The study was carried out at Abhishek I Mishra Memorial Medical college And Reaserch over a period of 12 months from April 2025to March 2026. The healthcare facility serves a large population of patients, healthcare personnel, attendants, and visitors, and operates an in-house canteen providing food services on a daily basis.

Study Population

The study population comprised canteen workers involved in food preparation, cooking, serving, cleaning of utensils, food distribution, and other food-handling activities within the healthcare facility. All eligible workers employed during the study period were invited to participate.

Sample Size

A total of 80 canteen workers were included in the study. The sample consisted of workers who fulfilled the eligibility criteria and provided written informed consent for participation and stool sample examination.

Inclusion Criteria

- Canteen workers aged 18 years and above.
- Workers directly or indirectly involved in food handling, preparation, serving, or distribution.
- Individuals willing to participate and provide stool samples.
- Workers employed in the healthcare facility canteen for at least three months prior to data collection.

Exclusion Criteria

- Workers who had received anti-parasitic treatment within the preceding four weeks.
- Individuals unwilling to provide stool samples.
- Workers absent during the study period despite repeated contact attempts.
- Inadequately collected or improperly labeled stool specimens.

Data Collection Procedure

Following informed consent, demographic and occupational information was collected using a pretested structured questionnaire. Information regarding age, gender, educational status, duration of employment, personal hygiene practices, handwashing habits, source of drinking water, nail hygiene, and history of gastrointestinal symptoms was recorded.

Participants were provided with clean, sterile, wide-mouthed, leak-proof stool containers and instructed regarding proper sample collection procedures. Fresh stool specimens were collected and transported to the Department of Microbiology under standard biosafety precautions for laboratory examination.

Laboratory Analysis

Macroscopic examination of stool samples was initially performed to assess consistency, color, presence of mucus, blood, adult worms, or other visible abnormalities.

Subsequently, microscopic examination was carried out using standard parasitological techniques. Direct wet mount preparations were prepared using normal saline (0.85%) and Lugol's iodine solution. Saline wet mounts facilitated the detection of motile trophozoites, larvae, ova, and cysts, whereas iodine preparations enhanced visualization of protozoal cyst morphology.

Each specimen was examined independently by trained microbiologists under low-power (10×) and high-power (40×) objectives. Stool samples were screened for the presence of pathogenic intestinal parasites including Entamoeba histolytica/dispar, Giardia duodenalis, Ascaris lumbricoides, Trichuris trichiura, hookworm species, Hymenolepis nana, Taenia species, Strongyloides stercoralis, and other intestinal protozoa and helminths.

For quality assurance, a proportion of randomly selected slides was re-examined by a second experienced microbiologist to ensure consistency and accuracy of findings.

Outcome Measures

The primary outcome measure was the prevalence of intestinal parasitic infection, defined as the proportion of stool samples positive for one or more intestinal parasites upon microscopic examination.

Secondary outcomes included:

- Distribution of specific intestinal parasites identified.
- Association of parasitic infection with demographic characteristics and hygiene-related factors.
- Frequency of single and multiple parasitic infections.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using the Statistical Package for Social Sciences (SPSS) version 26.(IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages.

The prevalence of intestinal parasitic infection was calculated as the percentage of positive stool samples among the total samples examined. Associations between categorical variables were evaluated using the Chi-square test or Fisher's exact test, as appropriate. A p-

value of less than 0.05 was considered statistically significant.

RESULTS

A total of 80 stool samples were collected from canteen workers employed in healthcare facilities in Chhattisgarh and subjected to microscopic examination. Of the 80 participants screened, 18 (22.5%) were found positive for one or more intestinal parasites, while 62 (77.5%) were negative.

Table 1. Demographic Characteristics of Study Participants (n = 80)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18–30	22	27.5
	31–40	28	35.0
	41–50	20	25.0
	>50	10	12.5
Gender	Male	56	70.0
	Female	24	30.0
Educational Status	Illiterate	12	15.0
	Primary School	24	30.0
	Secondary School	31	38.8
	Graduate & Above	13	16.2

Table 1 presents the demographic profile of the canteen workers included in the study. Among the 80 participants, the largest proportion belonged to the 31–40 years age group (35.0%), followed by 18–30 years (27.5%) and 41–50 years (25.0%). Workers aged above 50 years constituted 12.5% of the study population. Male participants predominated, accounting for 70.0% of the workforce, while females represented 30.0%. Regarding educational status, most participants had completed secondary education (38.8%), followed by primary education (30.0%). Illiterate workers constituted 15.0% of the study population, whereas only 16.2% had attained graduate-level education or higher.

Table 2. Prevalence of Intestinal Parasitic Infection among Canteen Workers

Stool Examination Result	Frequency (n)	Percentage (%)
Positive	18	22.5
Negative	62	77.5
Total	80	100

Table 2 depicts the prevalence of intestinal parasitic infections among the study participants. Out of the 80 stool samples examined, 18 workers tested positive for one or more intestinal parasites, resulting in an overall prevalence of 22.5%. The remaining 62 participants (77.5%) showed no evidence of parasitic infection upon microscopic examination. These findings indicate that nearly one in every five canteen workers was infected with an intestinal parasite, highlighting a potential risk for food contamination and transmission within healthcare settings.

Table 3. Distribution of Intestinal Parasites Identified in Positive Samples (n = 18)

Parasite Identified	Frequency (n)	Percentage (%)
Entamoeba histolytica/dispar cyst	6	33.3
Giardia duodenalis cyst	4	22.2
Ascaris lumbricoides ova	3	16.7
Hookworm ova	2	11.1
Hymenolepis nana ova	2	11.1
Trichuris trichiura ova	1	5.6
Total	18	100

Table 3 illustrates the spectrum of intestinal parasites detected among the 18 positive stool samples. The most frequently identified parasite was Entamoeba histolytica/dispar, accounting for 33.3% of all infections. Giardia duodenalis was the second most common parasite, detected in 22.2% of positive cases. Helminthic infections included Ascaris lumbricoides (16.7%), hookworm species (11.1%), Hymenolepis nana (11.1%), and Trichuris trichiura (5.6%). The predominance of protozoal infections observed in the present study suggests ongoing fecal-oral transmission related to hygiene and sanitation practices.

Table 4. Association Between Hand washing Practice and Parasitic Infection

Hand washing Practice After Toilet Use	Positive n (%)	Negative n (%)	Total	p-value
Regular with Soap	5 (10.9)	41 (89.1)	46	
Irregular/Water Only	13 (38.2)	21 (61.8)	34	0.006*
Total	18	62	80	

Table 4 demonstrates the relationship between hand washing practices and intestinal parasitic infection. Among workers who reported regular hand washing with soap after toilet use, only 10.9% were infected. In contrast, workers practicing irregular hand washing or using water alone exhibited a substantially higher infection rate of 38.2%. Statistical analysis revealed a significant association between inadequate hand hygiene and parasitic infection ($p = 0.006$). These findings underscore the importance of proper hand washing practices in preventing the transmission of intestinal parasites among food handlers.

Table 5. Association between Fingernail Hygiene and Parasitic Infection

Fingernail Status	Positive n (%)	Negative n (%)	Total	p-value
Trimmed/Clean	6 (13.0)	40 (87.0)	46	
Untrimmed/Dirty	12 (35.3)	22 (64.7)	34	0.018*
Total	18	62	80	

Table 5 presents the association between fingernail hygiene and intestinal parasitic infection. Workers with properly trimmed and clean fingernails demonstrated a relatively low prevalence of infection (13.0%). Conversely, participants with untrimmed or dirty fingernails showed a markedly higher infection rate of 35.3%. The observed association was statistically significant ($p = 0.018$), indicating that poor fingernail hygiene is an important risk factor for parasitic infection. The accumulation of dirt and infective parasitic stages beneath fingernails may facilitate transmission through food handling activities.

Table 6. Distribution of Infection According to Duration of Employment

Duration of Employment	Positive (n)	Negative (n)	Total	Prevalence (%)
<1 year	2	14	16	12.5
1–5 years	7	29	36	19.4
>5 years	9	19	28	32.1
Total	18	62	80	22.5

Table 6 shows the prevalence of intestinal parasitic infection according to duration of employment among canteen workers. The prevalence was lowest among workers employed for less than one year (12.5%). Infection rates increased progressively with longer duration of employment, reaching 19.4% among those employed for 1–5 years and 32.1% among workers with more than five years of service. This trend suggests that prolonged occupational exposure may increase the likelihood of acquiring intestinal parasitic infections, particularly in the absence of periodic health screening and preventive interventions.

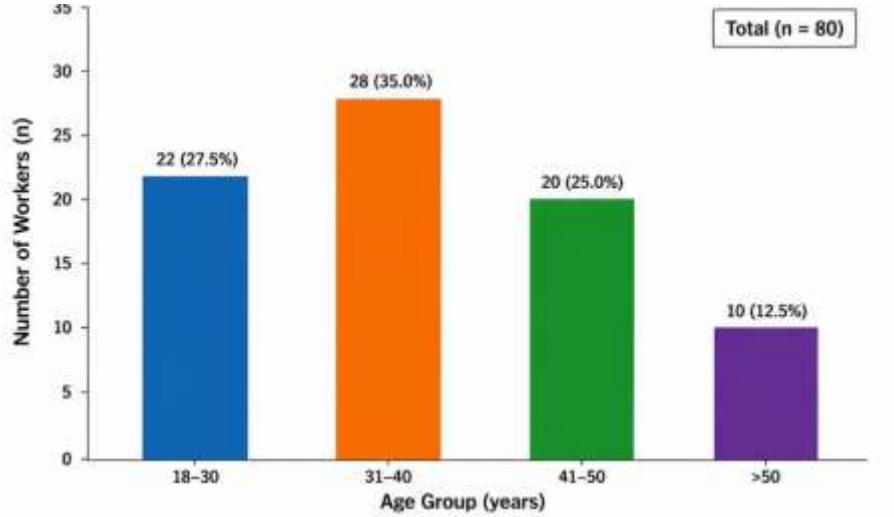

Figure 1. Age-wise distribution of canteen workers included in the study (n = 80)

Figure 1 illustrates the age distribution of the 80 canteen workers enrolled in the study. The majority of participants belonged to the 31–40 years age group, comprising 28 workers (35.0%). This was followed by the 18–30 years age group with 22 workers (27.5%) and the 41–50 years age group with 20 workers (25.0%). Workers aged more than 50 years constituted the smallest proportion of the study population, accounting for 10 participants (12.5%). The findings indicate that most canteen workers were in the economically productive middle-age groups, with more than half of the workforce (60.0%) falling between 31 and 50 years of age. This age distribution suggests a relatively experienced workforce engaged in food handling activities within healthcare facilities.

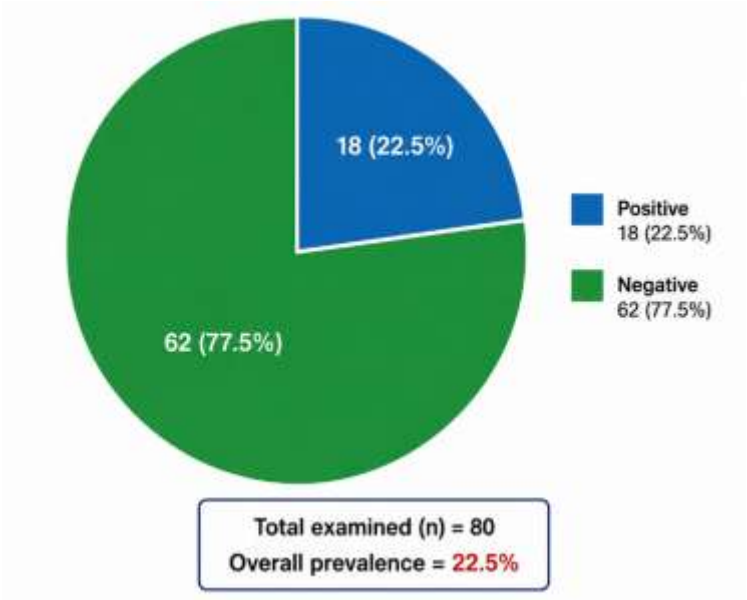

Figure 2. Overall prevalence of intestinal parasitic infection among canteen workers working in healthcare facilities in Chhattisgarh

Figure 2 depicts the overall prevalence of intestinal parasitic infections among the 80 canteen workers included in the study. Of the total participants examined, 18 workers (22.5%) were found to be positive for one or more intestinal parasites, while 62 workers (77.5%) tested negative on stool microscopy. The findings indicate that approximately one-fourth of the food handlers employed within healthcare facility canteens were infected with intestinal parasites. This prevalence highlights the potential risk of food contamination and transmission of parasitic infections within hospital environments, particularly among

vulnerable patient populations. The results emphasize the importance of regular medical screening, periodic stool examination, deworming programs, and reinforcement of personal hygiene practices among canteen workers to ensure food safety and prevent the spread of enteric infections.

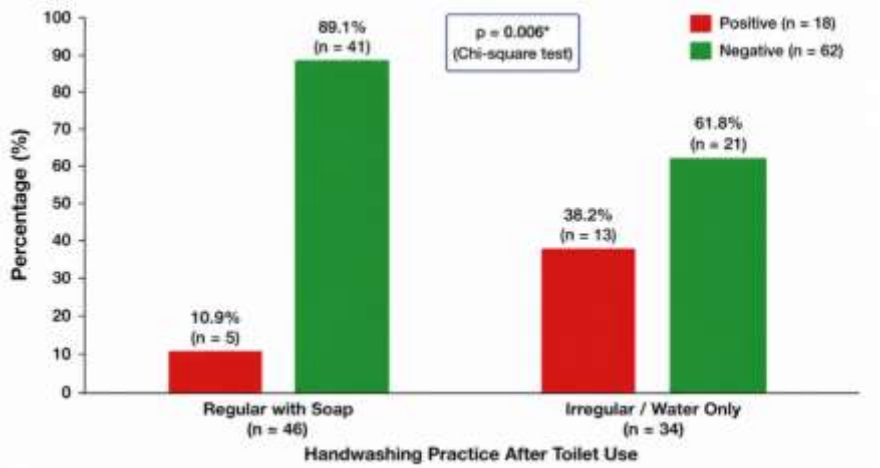

Figure 3. Comparison of parasitic infection prevalence according to hand washing practices

Figure 3 compares the prevalence of intestinal parasitic infections among canteen workers according to their hand washing practices after toilet use. Among workers who reported regular hand washing with soap, only 5 out of 46 participants (10.9%) were positive for intestinal parasites, while 41 (89.1%) were negative. In contrast, among workers who practiced irregular hand washing or used water alone, 13 out of 34 participants (38.2%) were infected, whereas 21 (61.8%) were free from infection.

DISCUSSION

The present study assessed the prevalence of intestinal parasitic infections among canteen workers employed within healthcare facilities in Chhattisgarh. Food handlers play a critical role in the transmission of intestinal parasites because they may serve as asymptomatic carriers and contaminate food during preparation and distribution. The overall prevalence of intestinal parasitic infection observed in the present study was 22.5%, indicating that nearly one-fourth of the participants harbored at least one intestinal parasite.

The prevalence observed in the present study is comparable to findings reported from other developing countries where food handlers continue to constitute an important reservoir for enteric infections. Tefera and Mebrie reported a pooled prevalence exceeding 20% among food handlers in their systematic review and meta-analysis, emphasizing the continued burden of intestinal parasitic infections in food service settings [4]. Similarly, Ayalew et al. reported a prevalence of 21.6% among food handlers and identified inadequate personal hygiene and poor sanitation as major risk factors [10]. The prevalence observed in the current study therefore reflects an ongoing public health concern despite improvements in sanitation and hygiene awareness.

Among the parasites identified, Entamoeba histolytica/dispar was the most frequently detected organism, accounting for 33.3% of positive samples. Similar findings have been reported in studies conducted among food handlers, where amoebiasis remains one of the most common protozoal infections because of fecal contamination of food and water sources [11]. The predominance of Entamoeba species in the present study may be attributed to poor hand hygiene, environmental contamination, and asymptomatic carriage among workers. Giardia duodenalis was the second most common parasite identified (22.2%), consistent with previous reports that have recognized giardiasis as an important foodborne and waterborne parasitic infection among food handlers [12].

Helminthic infections including Ascaris lumbricoides, hookworm species, Hymenolepis nana, and Trichuris trichiura were also detected. Although their prevalence was lower than that of protozoal infections, the presence of these parasites remains epidemiologically important because infected individuals may facilitate environmental contamination and

continued transmission. Similar observations have been reported in studies evaluating soil-transmitted helminth infections in developing countries [13].

A major finding of the present study was the significant association between hand washing practices and intestinal parasitic infection. Workers who practiced irregular hand washing or used water alone demonstrated a significantly higher prevalence of infection compared with those who regularly washed their hands with soap (38.2% vs. 10.9%; $p = 0.006$). This finding is in agreement with previous studies that identified poor hand hygiene as one of the strongest predictors of intestinal parasitic infections among food handlers [14,15]. Proper hand washing with soap effectively removes infective cysts, eggs, and larvae, thereby interrupting fecal-oral transmission pathways. These findings reinforce the importance of promoting hand hygiene practices within institutional food service settings.

The present study also revealed a significant association between fingernail hygiene and intestinal parasitic infection. Workers with untrimmed or dirty fingernails had a substantially higher prevalence of infection compared with those maintaining clean and trimmed fingernails (35.3% vs. 13.0%; $p = 0.018$). This observation is consistent with previous reports demonstrating that fingernails may harbor parasitic cysts, helminth eggs, and pathogenic microorganisms, thereby facilitating contamination of food during handling and preparation [16]. Maintenance of proper nail hygiene should therefore be considered an essential component of food safety programs.

Another noteworthy observation was the increasing prevalence of infection with longer duration of employment. Workers employed for more than five years demonstrated the highest prevalence of infection (32.1%), whereas those employed for less than one year showed the lowest prevalence (12.5%). This trend may reflect cumulative occupational exposure, repeated contact with contaminated environments, and declining adherence to preventive hygiene practices over time. Similar associations between occupational exposure and parasitic infection risk have been reported among food handlers in institutional settings [17].

The predominance of workers in the 31–40 years age group observed in the present study is comparable with findings from previous investigations among food handlers where economically productive middle-aged adults constituted the majority of the workforce [10,18]. Since this age group forms the core workforce responsible for food preparation and service activities, targeted health education and regular medical screening may substantially reduce the risk of transmission within healthcare institutions.

The findings of the present study have important implications for infection prevention and food safety. Healthcare facilities cater to vulnerable populations, including immunocompromised individuals, elderly patients, and those suffering from chronic illnesses. Consequently, the presence of intestinal parasitic infections among food handlers represents a potential threat to patient safety and hospital infection control. Routine stool screening, periodic medical examinations, regular deworming, mandatory food-handler certification, and reinforcement of personal hygiene practices should be integrated into institutional health policies to minimize transmission risks [19].

The present study has certain limitations. The sample size was relatively small and the investigation was confined to a single healthcare facility, which may limit the generalizability of the findings. Furthermore, only microscopic examination was used for parasite detection, and more sensitive molecular diagnostic techniques were not employed. Nevertheless, the study provides valuable baseline epidemiological data regarding intestinal parasitic infections among healthcare facility canteen workers in Chhattisgarh and highlights the need for continued surveillance and preventive interventions.

Overall, the findings indicate that intestinal parasitic infections remain prevalent among canteen workers employed within healthcare facilities. The significant associations observed with poor hand washing practices and inadequate fingernail hygiene emphasize the need for strengthened food safety measures, routine health monitoring, and continuous hygiene education. Implementation of these interventions is likely to reduce the burden of intestinal parasitic infections and improve the safety of food services provided within healthcare institutions.

CONCLUSION

The present study demonstrated that intestinal parasitic infections remain a significant public

health concern among canteen workers employed within healthcare facilities in Chhattisgarh, with an overall prevalence of 22.5%. Entamoeba histolytica /dispar and Giardia duodenalis were the most frequently identified parasites, indicating the continued importance of fecal-oral transmission in this occupational group. The study further revealed significant associations between intestinal parasitic infection and poor hand washing practices as well as inadequate fingernail hygiene, highlighting the critical role of personal hygiene in preventing parasite transmission.

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