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SOIL-TRANSMITTED HELMINTHS AMONG FARMERS AND AGRICULTURAL WORKERS IN RURAL IRAQ

MOHAMMED JASIM SHAKIR

Department of Microbiology, College of Medicine, University of Diyala, Diyala, Iraq

ABSTRACT

Background and aim: Soil-transmitted helminths (STH) infections are a major public health issue, especially among people involved in agricultural activities. The objective of this study was to uncover crucial characteristics linked to STH infections and provide valuable insights for focused interventions. Additionally, the study attempted to assess the prevalence of STH among farmers and workers.

Materials and Methods: a cross-sectional study that included individuals from agricultural communities was conducted. Structured interviews were carried out to gather sociodemographic data, habits, lifestyle factors, and awareness. The kato-katz method was used to analyze stool samples for the presence of helminths. Statistical techniques, such as chi-square tests and correlation coefficients, were used to evaluate the relationships between variables.

Results: The prevalence of STH (Soil-Transmitted Helminths) was highest at 43.33% among patients aged 46-65. An important association was found between less experience (less than 20 years) and a higher prevalence of STH ($p < 0.00001$). Farmers demonstrated a greater prevalence compared to workers, although the difference was not statistically significant. The prevalence of STH was strongly influenced by handwashing habits, highlighting the crucial nature of maintaining consistent practices ($p < 0.02$). Individuals with a higher level of knowledge had a decreased prevalence of soil-transmitted helminth (STH) infections, with a statistically significant p-value of 0.001867. Several helminths were detected, particularly Ascaris lumbercoids and Trichurs trichura. Age, personal protection equipment, access to clean water, handwashing, and specific helminths were positively correlated.

Conclusion: This study offers a clear understanding of the various factors that affect the prevalence of STH. It highlights the significance of specific interventions that concentrate on enhancing hand cleanliness, ensuring access to uncontaminated water, and implementing protective measures.

Keywords: soil transmitted helminthes, agriculture, rural, Iraq, PPE.

INTRODUCTION

Background:

Soil-Transmitted Helminths (STH) are a class of parasitic worms that invade the body of humans by entering it through soil that has been contaminated. These helminths, including Ascaris lumbricoides (roundworms), Trichuris trichiura (whipworms), and Necator americanus and Ancylostoma duodenale (hookworms), grow in filthy and polluted environments. STH infections are prevalent in regions characterized by a lack of sanitation.

infrastructure, limited access to clean water, and severe socioeconomic conditions. STH (Soil-Transmitted Helminth) exerts a substantial worldwide influence on human health, especially among low-income and emerging countries, where these infections contribute significantly to the overall disease burden [1]. The prevalence and dissemination of soil- transmitted helminths (STH) in Iraq persist as substantial public health challenges. The persistence of soil-transmitted helminths (STH) in many sections of the country can be attributed to water shortage, low sanitary facilities, and socioeconomic issues [2].

Main types of soil transmitted helminthes (STH):

Soil-transmitted helminths (STH) comprise three main categories, each characterized by specific ways of infection and life cycles. Roundworms, such as Ascaris lumbricoides, begin an infection when someone intakes food or water that is contaminated with Ascaris eggs. Once hatching within the small intestine, the larvae infiltrate the intestinal wall, migrate to the lungs through the bloodstream, ascend the respiratory tract, and eventually develop to adulthood within the small intestine. The life cycle comprises larval and adult phases, during which females manufacture copious eggs that are expelled in the host's feces, thereby maintaining the cycle under ideal conditions for egg viability [3, 4].

Hookworms, such as Necator americanus and Ancylostoma duodenale, invade the host's body by penetrating the skin, usually when bare feet come into touch with contaminated soil. Upon invading the body, the larvae pass via the circulation to the lungs, where they are forced out by coughing. They are then eaten and eventually develop into adult worms in the small intestine. The life cycle progresses as mature hookworms generate eggs that are released in feces, and transmission takes place when larvae in the ground infiltrate the skin of a fresh host [5].

Infection with whipworms, specifically Trichuris trichiura, occurs when individuals swallow soil that is contaminated with infective eggs of Trichuris. The process of hatching happens in the small intestine before the larvae develop into adult worms in the big intestine. The life cycle entails the ovulation of eggs by mature whipworms, which are then expelled in fecal matter. Following embryonation in the soil, these eggs become adapted to causing infection, and new hosts acquire the illness by consuming soil that contains these mature eggs [6, 7].

Agricultural Practices as a Source of STH:

Agricultural practices may act as an important source of infection for Soil-Transmitted Helminths (STH) infections, which facilitate the transmission of parasitic worms causing health risks to humans. Agricultural environments involve multiple factors that create the perfect environment for the prolonged presence and spread of soil-transmitted helminths (STH). Open defecation, insufficient waste management, and the use of untreated human and animal manure as fertilizer may release parasitic elements into the soil [8, 9].

Moreover, some agricultural practices and methods for irrigation might increase the tendency of soil-transmitted helminths (STH) to survive and proliferate. Using contaminated water sources for irrigation can lead to the spread of helminth eggs onto crops, especially those that directly touch the soil [10]. In addition, agricultural workers, particularly those involved in activities related to plowing and harvesting, are more vulnerable to encountering soil that is contaminated with soil-transmitted helminths (STH). Working environments may accelerate the transmission of helminths, as the parasites are able to penetrate the body through the skin or be inhaled through contaminated hands and food [11, 12].

Seasonal Variations and Environmental Influences:

Seasonal variations and environmental variables have a substantial impact on the occurrence and extent of Soil-Transmitted Helminths (STH) infections. The life cycle of soil-transmitted helminths (STH) has a complex relationship to environmental conditions, and the potential of transmission often shifts throughout the year due to climatic factors and environmental shifts [13].

The transmission of STH is significantly influenced by temperature and moisture, as they have a close relationship to the soil's relative humidity and temperature levels. The survival and growth of helminth eggs and larvae is assisted by optimal temperatures and high humidity. Seasonal variations, such as elevated temperatures in the summer, could accelerate the development of eggs in the environment, resulting in increased infection. Conversely, dry surroundings may limit the likelihood of eggs and larvae to survive [9, 14].

The geographic distribution of rainfall and the frequency of inundation can significantly impact the transmission of soil-transmitted helminths (STH). Excessive rainfall can lead to soil contamination as water brings helminth eggs from feces into the soil around it. Flooded areas can facilitate the transmission of disease-causing agents, resulting in contamination of water sources and increasing the potential of infection, especially in locations with inadequate facilities for sanitation [15, 16].

Furthermore, certain crops and vegetables that make direct contact with the soil possess the capacity to be contaminated with helminth eggs, therefore contributing to the cycle of transmission [17].

The migration of human or animal populations in particular areas can impact the transmission of soil-transmitted helminths (STH). Population migration may bring individuals retaining disease to new places, hence potentially spreading soil-transmitted

helminths (STH) to regions where these parasites were previously missing or less common [18, 19].

Health Impacts of Soil-Transmitted Helminth Infections:

Soil-transmitted helminth (STH) infections exhibit with various symptoms and health implications, which reflect the heterogeneous nature of parasite infestations. Roundworm infections, such as Ascaris lumbricoides, commonly manifest as abdominal discomfort, bloating, and diarrhea. In more severe cases these infections might result in intestinal obstruction. Hookworm infections caused by species such as Necator americanus and Ancylostoma duodenale lead to long-term blood loss, which causes iron-deficiency anemia characterized by fatigue, weakness, and paleness [20, 21].

Infections caused by whipworms, such as Trichuris trichiura, can result in dysentery, characterized by the presence of bloody diarrhea and cramping in the abdomen. Prolonged STH infections, especially in children, sometimes lead to nutritional deficits, stunted growth, and delayed cognitive development. The passage of larvae via the respiratory tract can cause respiratory symptoms, while hookworm infestations have been associated to skin irritation, also known as "ground itch." Moreover, maternal soil-transmitted helminth (STH) infections may have a role in causing unfavorable pregnancy outcomes. Moreover, infections caused by STH (Soil-Transmitted Helminths) have broader social implications, affecting both agricultural productivity and individuals' means of subsistence [22, 23, 24].

MATERIALS AND METHODS

Study design:

The aim of this cross-sectional study is to evaluation the prevalence along with potential factors influencing the presence of soil-transmitted helminths among individuals involved in farming and agricultural activities in rural areas of Iraq. The study was conducted over a period of three months, from June 2023 to August 2023.The study was performed in rural agricultural villages located in various regions or districts of Iraq. The selection of these areas was made with the aim of encompassing a diverse array of agricultural practices and climatic conditions. 90 individual who met the inclusion criteria were selected for participation in this investigation.

Inclusion criteria:This study encompasses farmers living in rural Iraqi villages. The research study targeting individuals aged 18 to 65 in order to identify a specific demographic. This criterion specifically targets agriculturalists of working age, with the aim of examining the impact of soil-transmitted helminths on this specific population. The study aims to investigate the frequency and characteristics of rural Iraq's agricultural villages' residents' eligibility. In addition, the volunteers are required to have a substantial level of agricultural expertise in order to guarantee the quality and validity of the study.

Exclusion Criteria:

Individuals who satisfy the exclusion criteria are ineligible for participating in the study. The study specifically excludes individuals who are not engaged in farming or with non- agricultural occupations in order to maintain its primary focus on farmers. The age criterion restricts the inclusion of individuals who are below or over specific age thresholds from taking part in the study. Pregnant women are excluded from soil-transmitted helminth testing and treatment due to the resulting implications. Furthermore, those with previous medical histories that could potentially affect the accuracy of diagnostic tests or their ability to participate are also not included. In order to prevent distorting prevalence data, those who have had anti-helminthic treatment during the past six months are not included.

Participants in rural agricultural areas in Iraq were asked in person to complete a standardized questionnaire. Interviews were conducted by local language and culture. The questionnaire encompassed demographic data, agricultural practices, hygiene, awareness of health issues, and soil-transmitted helminth infections.

During the extensive data gathering process, individuals submitted stool samples for clinical evaluation. Qualified physicians obtained samples from participants using sterile containers and proper hygiene protocols. Every specimen was appropriately labeled and carefully recorded to ensure precision. The specimens were immediately transported to the laboratory for examination.

The stool samples acquired during the clinical assessment undergo extensive laboratory analysis to identify and assess soil-transmitted helminths. The aforementioned examinations were conducted at [……], an up-to-date institution operated by proficient technicians and equipped with advanced technology. The Kato-Katz method, a well acknowledged and recognized technique in the field, was used to examine the samples, facilitating the detection and identification of helminth eggs [20]. Extensive quality control measures were implemented to ensure the accuracy and dependability of the acquired results. The laboratory analysis enabled a precise assessment of the prevalence of helminths and the identification of specific helminth species.

Upon completion of the data collection process, statistical analyses were conducted using IBM SPSS Statistics version 25 to extract meaningful insights from the acquired data. Descriptive statistics were utilized to present a concise overview of demographic characteristics, prevalence rates, and other relevant aspects. The data included frequencies, means, and standard deviations.

RESULTS

Sociodemographic distribution and its correlation with prevalence of soil transmitted helminthes:

Table 1 indicates that the prevalence of soil-transmitted helminths (STH) varies across different sociodemographic parameters. There is a clear and important relationship between age and the prevalence of STH (Soil-Transmitted Helminths). The highest rates of STH are found in the age group of 46-65, with a prevalence of 43.33%. While farmers have a higher prevalence compared to workers, the association between the two groups is not statistically significant. The p-values for gender differences (0.634752) and marital status (0.496359) suggest that there is no significant correlation with STH prevalence.

Table 1 *(correlation between prevalence of soil transmitted helminthes and differ sociodemographic characteristics.)*

		prevalence				p. Value
		Yes		No		
		No.	%	No.	%	
Age	18-30	10	11.12%	7	7.78%	0.000756
	31-45	29	32.22%	3	3.33%	
	46-65	39	43.33%	2	2.22%	
Type of work	Farmer	46	51.11%	3	3.33%	0.124577
	Worker	32	35.56%	9	10%	
Gender	Male	51	56.66%	7	7.78%	0.634752
	Female	27	30%	5	5.56%	
	Single	30	33.33%	2	2.22%	

Marital status	Married	36	40%	7	7.78%	0 .496359
	Divorced	7	7.78%	2	2.22%	
	Widow	5	5.56%	1	1.11%	

Habits and lifestyle correlation with prevalence of soil transmitted helminthes:

Protective gear wearers, especially those who use it "Always," have a lower STH prevalence (12.22%). Statistically, this link is significant (p-value 0.001765). STH prevalence is

correlated with type of personal protection equipment (P.P.E), the highest prevalence showed in only using gloves where the least showed with individuals using all PPE. Correlation is significant with p-value 0.031855.

Changing work clothes "Weekly" seems to increase STH prevalence (40%) compared to "Twice a week" (31.11%) or "Daily" (15.56%).

A p-value of 0.002749 indicates this link is significant. Clean water access is also important, with those who "Always" have access having a lower STH prevalence (16.67%). A significant p-value of 0.001449 supports this link.

Table 2 *(correlation between habits, life style and prevalence of soil transmitted.)*

		prevalence				p. Value
		Yes		No		
		No.	%	No.	%	
Wearing protective gear frequency	Always	11	12.22%	7	7.78%	0.001765
	Sometimes	23	25.55%	4	4.44%	
	Rarely	38	42.22%	1	1.11%	
	Never	6	6.67%	0	--------	
P.P.E type	Gloves	22	24.44%	1	1.11%	0.031855
	Boots	18	20%	1	1. 11%	
	Face mask	17	18.88%	2	2.22%	
	Two of them	12	13.33%	3	3.33%	
	All	9	10%	5	5.56%	
Change work clothes	Daily	14	15.56%	5	5.56%	0.002749
	Twice a week	28	31.11%	4	4.44%	
	Weekly	36	40%	3	3.33%	
Access to clean water	Always	15	16.67%	1	1.11%	0.001449
	Sometimes	19	21.11%	4	4.44%	
	Rarely	27	30%	3	3.33%	
	Never	17	18.89%	4	4.44%	

Hand washing habits distribution among participants and correlation with soil transmitted helminths prevalence:

Individuals who constantly engage in hand hygiene prior to eating demonstrate a significantly reduced prevalence (13.33%) of soil-transmitted helminth (STH) infections compared to those who wash their hands less frequently. This difference is supported by a statistically significant p-value of 0.02084.

Likewise, there is a clear link between handwashing after using the toilet and a lower prevalence of soil-transmitted helminths (STH). Individuals who consistently wash their hands have a prevalence rate of 20%, while those who wash their hands occasionally have

a higher prevalence rate of 20%, rarely wash their hands have a rate of 33.33%, and those who never wash their hands have the highest rate of 36.66%. This association is statistically significant, with a p-value of 0.017817. Following participation in agricultural activities, there is a continuous pattern where those who regularly wash their hands had the lowest frequency of soil-transmitted helminth (STH) infections at 7.78%. In contrast, those who wash their hands seldom (26.67%) or never (37.78%) have higher rates of STH infections. The p-value of 0.018414 is statistically significant, (Table 3).

Table 3 *(correlation between handwashing habits and prevalence of soil transmitted helminthes.)*

		Prevalence				P. Value
		Yes		No		
		NO.	%	NO.	%	
Befor e eating	Always	12	13.33%	6	6.67%	0.02084
	Sometimes	17	18.89%	3	3.33%	
	Rarely	19	21.11%	2	2.22%	
	Never	32	35.56%	1	1.11%	
After toilet	Always	18	20%	5	5.56%	0.017817
	Sometimes	18	20%	4	4.44%	
	Rarely	30	33.33%	2	2.22%	
	Never	33	36.66%	1	1.11%	
After agricultural activity	Always	7	7.78%	4	4.44%	0.018414
	Sometimes	13	14.44%	4	4.44%	
	Rarely	24	26.67%	3	3.33%	
	Never	34	37.78%	1	1.11%	

Awareness of soil transmitted helminthes relation to prevalence:

Table 4 illustrates the association between knowledge of soil-transmitted helminths (STH) and their prevalence, demonstrating a significant link. Individuals categorized as "Very aware" exhibit a reduced prevalence of STH (14.44%) in comparison to those classed as "Some aware" (30%) or "Not aware at all" (44.44%). The p-value of 0.001867 is statistically significant, indicating a strong link between awareness levels and STH prevalence.

Table 4 *(awareness of STH and its correlation with prevalence.)*

	prevalence				p. Value
	Yes		No		
	No.	%	No.	%	
Very aware	13	14.44%	7	7.78%	

Some aware	27	30%	4	4.44%	
Not aware at all	40	44.44%	1	1.11%	0 .001867

History and symptoms associated with soil transmitted helminthes correlation with prevalence:

Table 5 demonstrates a significant association between the previous infection and symptoms related to soil-transmitted helminths (STH) and their prevalence. Individuals who have a history of soil-transmitted helminth (STH) infections show a much greater occurrence rate (67.78%) compared to those who do not have such a history (18.89%). This highlights the significance of previous infections in comprehending the current prevalence. The association is substantiated by a statistically significant p-value of 0.001235. Likewise, the occurrence of symptoms is closely associated with a higher occurrence of STH, as persons who experience symptoms have a prevalence rate of 82.22%, whilst those without symptoms have a significantly lower prevalence rate of 4.44%. The p-value of less than 0.00001 indicates a strong association between clinical manifestation and the prevalence of STH.

Table 5 *(correlation between history, symptoms and prevalence of STH.)*

		Prevalence				P. Value
		Yes		NO		
		No.	%	No.	%	
History	Yes	61	67.78%	4	4.44%	0.001235
	No	17	18.89%	8	8.89%	
Symptoms	Yes	74	82.22%	2	2.22%	<0.00001
	No	4	4.44%	10	11.11%	

Distribution of different soil transmitted helminthes among farmers and workers:

Table 6 and figure 1 present a comprehensive analysis of the prevalence of several soil-transmitted helminths (STH) among farmers and laborers in the population under investigation. Enterobius vermicularis is notable among the discovered helminths, as it has a prevalence of 16.67%.

Ascaris lumbricoides has a prevalence rate of 35.56%, while Trichuris trichiura is found in 23.33% of the cases. Ancylostoma duodenale is present in 7.78% of the cases, whereas Strongyloides stercoralis is identified in 3.33% of the people. In addition, 13.33% of the individuals under study exhibited no evidence of helminth infection.

Table 6 *(soil transmitted helminthes distribution.)*

	No.	%
Entrobuis vermicularis	15	16.67%
Ascaris lumbercoides	32	35.56%
Strongyloides stercoralis	3	3.33%
Trichurs trichura	21	23.33%
Ancylostoma duodenale	7	7.78%
No helminthes detected	12	13.33%

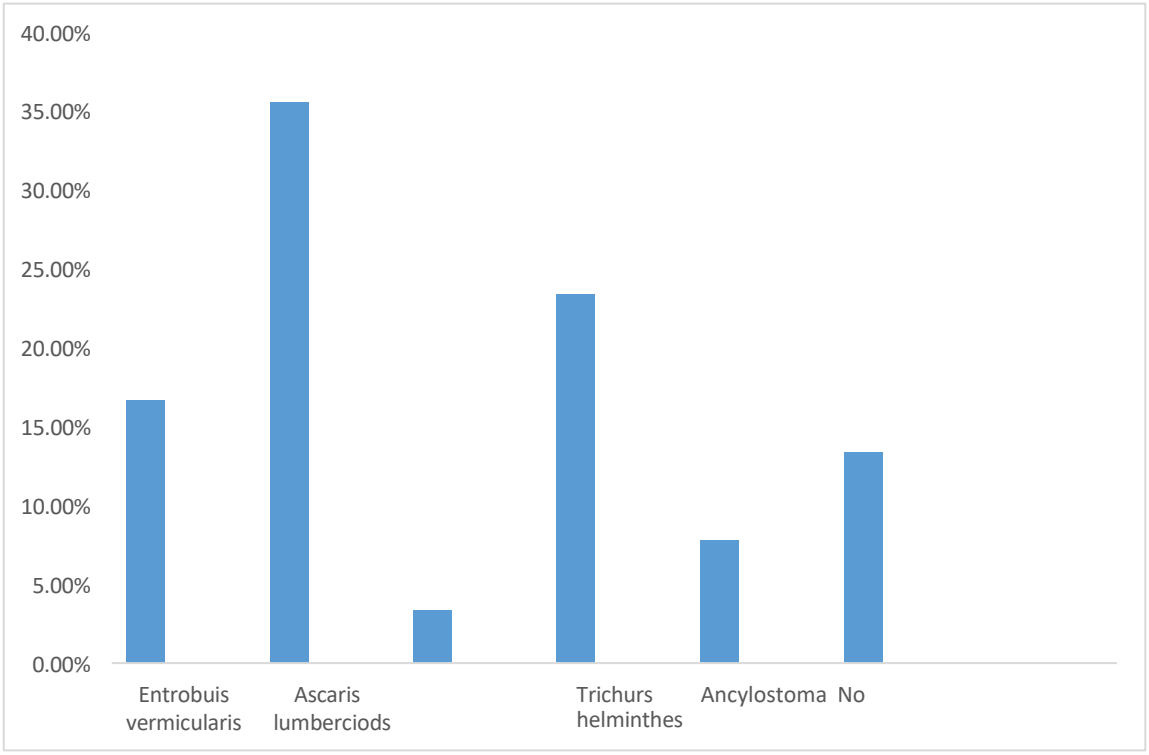

Figure 1 *(Distribution of STH among participants.)*

Type of helminthes correlation with some parameters:

Table 7 displays the relationships between the category of helminths and other parameters in the population under study. The data shows a strong positive correlation (r = 0.683) between age and the type of helminths, suggesting that as individuals get older, there is a corresponding rise in the occurrence of a certain type of helminth. However, gender does not show a statistically significant association. Conversely, there are significant associations between several parameters concerning hygienic practices and preventative measures. The

utilization of personal protective equipment (r = 0.762) and the frequency of clothing changes (r = 0.634) exhibit a positive correlation with the type of helminths, highlighting the significant influence of preventive measures on the prevalence of helminth infections. The correlation coefficient (r = 0.857) indicates a robust positive link between access to clean water and susceptibility to a particular type of helminth. This suggests that persons with improved access to clean water are likely to have a lower susceptibility to this specific helminth. Handwashing habits demonstrate a significant positive connection (r = 0.946) with the type of helminthes, emphasizing the crucial function of regular hand hygiene in decreasing helminth prevalence.

Table 7 *(Correlation between different parameters and type of STH prevalence.)*

parameter	r	P. Value
Age	0.683	0.010043
Gender	0.261	0.231586
Personal protective equipment	0.762	0.001216

Access to clean water	0.857	0.002487
Washing hands	0.946	0.00001

DISCUSSION

When dealing with the challenges associated with soil-transmitted helminths (STH), it is crucial to use a pioneering and scientifically sound approach that combines innovation and practicality. Within this discussion, we explore the complex chain of relationships discovered during our investigation of the prevalence of soil-transmitted helminths (STH) in agricultural communities. This section provides an in-depth assessment of the ramifications of our findings, considering factors such as sociodemographic nuances, habits, and lifestyle. As we evaluate the connections between age, experience, protective measures, and types of helminths, the debate reveals important information that is essential for guiding particular approaches and influencing future research in the field of STH infections.

The present investigation reveals that age plays a crucial role in determining the prevalence of soil-transmitted helminths (STH), whereas gender, kind of work, and marital status do not exhibit significant associations. Notably, research conducted in Thailand shows that there is an increase in the prevalence of STH (Soil-Transmitted Helminths) with age, but this rise is not statistically significant (p-value 0.304). However, there is a strong association between gender and prevalence (0.040*) [21]. Conversely, the findings from Indonesia reveal that there are no significant connections between age and gender (with p- values of 0.24 and 0.26, respectively), despite the higher occurrence of the condition in females and older individuals. Significantly, the report emphasizes the increased susceptibility of farmers to STH infection [15]. A study conducted in Tanzania in 2023

provides evidence of a strong link (p-value 0.006) between the nature of one's occupation and the prevalence of a certain condition. The study reveals that farmers had a higher prevalence compared to other types of workers. However, no significant association (p- value 0.730) was found between marital status and the incidence of the condition [22].

The current study establishes a substantial correlation between the frequency and type of personal protective equipment (P.P.E) and the prevalence of soil-transmitted helminths (STH). The associations are remarkable, with p-values of 0.001765 and 0.031855 for frequency and type of P.P.E, respectively. Similarly, there are statistically significant connections between hygienic habits, such as how often work clothes are changed and availability to clean water, and the prevalence of STH. The p-values for these associations are 0.002749 and 0.001449, respectively.

The findings from Ghana confirm this pattern, suggesting a link between using of personal protective equipment (PPE) and illnesses caused by soil-transmitted helminths (STH) in a multivariable analysis. The prevalence of these infections was found to be related to the use of PPE, with a p-value of 0.052 [23]. Furthermore, a study conducted in Hungary highlights the connection between the utilization of gloves and footwear when engaging in agricultural activities and the occurrence of soil-transmitted helminths, indicating a possible protective impact [24].

New evidence emerges, emphasizing the influence of washing clothes on the occurrence of soil-transmitted helminths. One study demonstrated that washing clothes is affecting the prevalence of soil transmitted helminthes [25]. An Indonesian study highlights the significance of restricted availability of potable water, inadequate sanitation, and densely populated living situations as poverty-related factors

that contribute to an elevated susceptibility to STH infection. Furthermore, the presence of uncontaminated water is linked to a decreased likelihood of soil-transmitted helminth infection, as demonstrated by a study carried out in Mlaten village, East Java ($p < 0.05$) [15]. The collective findings highlight the complex relationship between preventative measures, hygiene behaviors, and environmental factors in influencing the prevalence of soil-transmitted helminths.

The current study thoroughly examines handwashing patterns and identifies strong associations between washing hands prior to meals, after using the bathroom, and after engaging in agricultural activities and the frequency of soil-transmitted helminths (STH).

In line with our results, a study conducted in Northwestern Ethiopia demonstrates a 3.82- fold rise in the likelihood of soil-transmitted helminths (STHs) among those who did not wash their hands before meals, compared to those who routinely practiced handwashing [26]. In Indonesia, individuals who tested positive for soil-transmitted helminths (STH)

demonstrated the practice of washing their hands with water and soap prior to eating and defecating [27].

A 2022 investigation highlighted the importance of personal hygiene behaviors, such as regular interaction with dirt, washing hands with soap prior to meals, and after coming into contact with soil or livestock. The findings revealed a strong correlation, indicating that individuals who are farmers and have poor personal hygiene are 5.756 times more prone to acquiring STH infections compared to those who practice good personal hygiene ($p=0.00$) [28].

In the same vein, a study conducted in Ethiopia in 2015 pinpointed untrimmed nails and failure to wash hands before meals as the two primary risk factors for STH infections among the Ethiopian population [29].

In the present investigation, a notable link arises between the awareness and understanding of soil-transmitted helminths (STH) and their prevalence. This highlights the crucial significance of well-informed comprehension in shaping the prevalence of STH infections. In line with our research, a study conducted on conventional pig farmers in Bali highlights that a limited understanding of health and hygiene practices associated with soil- transmitted helminthiasis is strongly associated with a high occurrence of STH infections within this group [28]. In Ethiopia, the significant occurrence of STH infections is ascribed to a lack of awareness among both children and their parents. The study highlights a notable association between knowledge, awareness, and rates of infection with soil-transmitted helminths (STH) [30].

Ascaris lumbricoides is the most common soil-transmitted helminth (STH) parasite, responsible for 35.56% of infections in the current study. This prevalence exceeds the rates documented in other regions. A. lumbricoides was found to be the most common species of soil-transmitted helminths (STH) in South Asia, with a prevalence rate of 17.8% [31]. Similarly, prevalence rates of 18.3% and 16.5% were recorded in investigations conducted in South Africa and Ejaji [32], Ethiopia [33], respectively .

Nevertheless, our research reveals a greater occurrence of A. lumbricoides in comparison to a study conducted in Debre Tabor, where the frequency of this specific soil-transmitted helminth species was documented at 7% [34]. This discrepancy highlights the variation in STH prevalence among different areas and emphasizes the importance of conducting localized epidemiology studies to customize effective management techniques.

Ancylostoma is prominently observed in the present investigation, constituting 7.78% of the cases among the soil-transmitted helminths (STH). The prevalence mentioned here differs with the results of a research conducted in the Arba Minch Zuria district, where the

prevalence of Ancylostoma was reported to be 14.5% [35]. Nevertheless, our findings demonstrate a greater occurrence in contrast to the research conducted in Debre Tabor, which documented a prevalence rate of 3.2% [36]. The observed changes can be ascribed to factors such as variations in altitude, environmental circumstances, socio-economic status, and behavioral behaviors among the local populations, emphasizing the intricate and context-specific nature of STH epidemiology [37].

The combined prevalence estimates of Trichuris trichiura (T. trichiura) in our study is 23.33%, indicating a significant frequency of this parasitic worm transmitted through soil. The prevalence mentioned is higher than the rates reported in Ejaji (10.0%) [33] and Yirgacheffe (7.2%) [38]. Nevertheless, it outperforms the findings from rural regions in southern Thailand, where the incidence of T. trichiura was significantly lower at 2.1% [21].

Possible explanations for these discrepancies may arise from disparities in environmental circumstances and the duration of the investigation. Infections caused by T. trichiura are more prevalent in tropical and subtropical locations, posing a greater risk to persons residing in these areas. Furthermore, communities that do not have consistent access to clean water and sufficient sanitary facilities in other areas are more likely to be infected with T. trichiura, which adds to the variations in prevalence seen in different geographical locations [37].

The present investigation reports a prevalence rate of 3.33% for Strongyloides stercoralis (S. stercoralis). This is consistent with the results of a research conducted in Gena Bossa, Ethiopia, which likewise found a prevalence rate of 3.3% [39]. Nevertheless, our findings indicate a reduced prevalence of S. stercoralis compared to the stated rate of 7.5% in Mecha town [40].

The decreased prevalence of S. stercoralis that has been found can be ascribed to its distinctive traits, which need different diagnostic approaches compared to other soil- transmitted helminths (STH). As a result of these distinctive characteristics, infections caused by S. stercoralis are frequently disregarded or not accurately diagnosed, which leads to lower prevalence rates reported in different research [37].

The current investigation reveals that Enterobius vermicularis is detected in 16.67% of instances, indicating a significant prevalence of this specific soil-transmitted helminth (STH). In contrast to the results of a study conducted in Yemen, where Enterobius vermicularis was shown to have a prevalence of 19.2%, the current prevalence is different [41]. Furthermore, our findings indicate a higher incidence compared to the reported occurrence in Pakistan, where Enterobius vermicularis was identified in 9.81% of patients [42].

The present investigation reveals relationships between age, gender, utilization of personal protective equipment (P.P.E), availability of clean water, and handwashing practices with the type of nematodes found. Remarkably, all indicators have substantial associations, except for gender.

A Nigerian study found that individuals in the age ranges of 50 years and above had a greater rate of infection with Ascaris lumbricoides, whereas those aged 11-20 years had a higher prevalence of Trichuris trichiura. Although these relationships were noted, they did not reach statistical significance. Gender did not exhibit a substantial link with soil- transmitted helminth (STH) infection in this particular situation p value 0.447[43].

In indoensia, A. lumbricoides infection is not associated with one gender. Knowledge and behaviour related to hygiene and gastrointestinal diseases varied widely and were generally not associated with STH infection [15].

A study conducted in Vietnam emphasized the correlation between the utilization of personal protective equipment and the occurrence of Ancylostoma duodenale infection [44]. Another investigation revealed that there were correlations observed between hygiene behaviors, such as handwashing, and infections caused by Trichuris trichiura (0.01) and Ancylostoma duodenale (0.001). Additionally, sanitation, including access to clean water, showed correlations with infections caused by Ascaris lumbricoides (0.043) and Trichuris trichiura (0.05), but not Ancylostoma duodenale (0.456) [28].

Furthermore, across diverse environments, the act of washing one's hands, both prior to consuming food and after excreting waste, was linked to reduced likelihood of contracting Ascaris lumbricoides infection. The presence of clean water was consistently associated with a reduced probability of contracting any soil-transmitted helminth, including Trichuris trichiura and Ascaris lumbricoides, albeit not hookworm infection [45].

CONCLUSION

The study's findings demonstrate a noteworthy connection between sociodemographic factors, habits, lifestyle, handwashing behaviors, awareness, and the prevalence of soil- transmitted helminths (STH) in the population under investigation. Age, and specific sanitation habits were determined to be influential factors in the occurrence of STH (soil- transmitted helminths). The study highlights the significance of keeping up regular hand hygiene, ensuring access to uncontaminated water, and implementing appropriate preventative measures that will reduce the prevalence of soil-transmitted helminth (STH) infections. These findings enhance our comprehension of the intricate interrelationship among many variables and helminth infections. By addressing these factors, we could come up with specific interventions that aim to reduce the impact of soil-transmitted helminths (STH) and enhance the health of the community.

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