International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 21s, 2025
https://theaspd.com/index.php

The Role Of Health Knowledge And Awareness In Preventing Parasitic Infections Among Smokers And Non-Smokers In Babylon

Sarah Ishraq Abd[1], Raad Ajam Sayel[2]
[1]Al-Furat Al-Awsat Technical University, College of Health and Medical Techniques/Kufa, Community Healthy Techniques, Iraq.
[2]Al-Furat Al-Awsat Technical University, College of Health and Medical Techniques/Kufa, Iraq.
Email of Corresponding Author: sarah.abd.chm@student.atu.edu.iq
Email[1b]: dr.raadajem@gmail.com

ABSTRACT

Background: *Parasitic diseases remain a public health concern, especially among populations with varying health awareness and health knowledge. It is essential to know the impact of health knowledge and sources of information on the occurrence of parasitic diseases to effectively implement preventive measures.*

Aim of study: *To examine the role of health awareness and knowledge and sources of information, in preventing parasitic infection among Babylonian smokers and non-smokers.*

Methodology: *The research was a descriptive cross-sectional study conducted from November 1, 2024, to January 1, 2025, at Imam Al-Sadiq Hospital and Morjan Medical City in Babylon Province. 125 participants who were selected by purposive sampling and tested positive or negative for intestinal parasitic infections and consented to participate were included. The data were collected by administering a validated structured questionnaire on sociodemographic variables, smoking status, knowledge about parasitic infections, and information sources. The infection status was assessed by the results of stool examination. The data were analyzed using IBM SPSS version 23, with descriptive statistics and chi-square tests to find associations.*

Results: *The study showed that there was a very high correlation between knowledge regarding parasitic infection rates and health. Out of the knowledgeable participants, 82.4% were infected, whereas 17.6% of those with no knowledge were infected (P = 0.00007). The rate of infection also varied based on the source of knowledge, with the maximum rate of infection among those who reported doctors as the source of information (39.2%) and the lowest rate of infection in those who used other sources (4.8%) (P = 0.00001). Further, 97.6% of those who had no infection, and 54.5% and 53.1% of participants with parasitic and microscopic infection, respectively, belonged to the knowledgeable group in comparison with 2.4% and 45.5% belonging to the no-knowledge group (P = 0.00006). Based on the source of knowledge, the infection type also varied significantly, with the internet and doctors showing lower rates of infection.*

Conclusion: *Increased awareness regarding health and credible sources of information, particularly health staff, are linked with less parasitic infection. Increased awareness of health via credible channels is the solution to the success of prevention and control of parasitic infection in smokers and non-smokers in Babylon.*

Key words: *Parasitic Infections, Knowledge, Awareness, Smokers, Non-Smokers*

INTRODUCTION

Parasitic diseases remain a serious worldwide public health issue, especially in low- and middle-income nations where socioeconomic determinants, environmental health, and literacy in health influence their distribution. These diseases, caused by a vast array of protozoa, helminths, and ectoparasites, have their greatest impact on the vulnerable segments in society, leading to heavy morbidity, deficiency in nutrition, and weakened immunity (Chatterjee, 2009; WHO, 2014). In Iraq, especially in governorates such as Babylon, parasitic diseases continue to spread unrestrained due to factors such as inadequate sanitation, inadequate personal hygiene, and low awareness in health (Al-Hemiary et al., 2014; Talib & Al-Khafaji, 2020).

Environmental determinants play an important role in parasitic infection transmission dynamics. The prevalence of intestinal parasites increases with contact with contaminated soil, water, and food, and is believed to be more closely linked to living conditions and socioeconomic status (Jassim and Naji, 2015; Jaafar et al., 2021). In addition, responses to environmental pollutants and parasitic infections have

received increasing attention. In plain terms, the presence of heavy metals like lead and cadmium in unprotected waste emissions and industrial discharge has not only contributed to gut microbiota imbalance as well as immune deficiency but also exposed the individual to an escalated risk of parasitic infestation (Alkardhi et al., 2024; Cui et al., 2021; Raju & Mehta, 2022).

Lifestyle factors, specifically tobacco smoking, are known to be modulators of gut microbiota composition and immune function. Smoking subjects the body to carcinogens and toxicants that may change the microbial ecology of the gastrointestinal tract, compromise mucosal immunity, and enable parasitic colonization or enhance existing infections (Biedermann et al., 2013; Zhou et al., 2018; Karam et al., 2021). Various studies have indicated that smoking impacts diversity and stability of gut microbiota and, consequently, may influence susceptibility to parasitic infection (Bullard, 2000; Lundberg et al., 2016; Maji et al., 2018). Smoking cessation, nevertheless, has been correlated with the partial restoration of microbiota homeostasis, which reflects the dynamic relationship between lifestyle and gut health (Chalabi, 2024; Sublette et al., 2020).

Even though it is evident that lifestyle behavior and the impact of environmental determinants on parasitic disease interact substantively, health knowledge and health awareness have not been examined appropriately regarding the same. To a large extent, health literacy determines the ability of individuals to embrace pre-prevention routines, obtain timely treatment and comply with health education programs. Evidence has indicated that increased awareness and adequate health information can prevent the spread and occurrence of parasitic disease, particularly if disseminated through credible sources such as healthcare practitioners (Nutbeam, 2008; Farmer, 2001). In Iraq, inadequate health education, particularly on parasitic disease, remains prevalent owing to infrastructural as well as socio-cultural limitations, thereby negating attempts at effective disease control (Hadi et al., 2020).

The purpose of this study is to address this gap by examining the influence of health awareness and knowledge, and information sources, on the epidemic of parasitic infection in smokers and non-smokers in Babylon. Knowledge of the role of health literacy in infection prevalence can inform targeted intervention and health promotion. Since environmental exposure, lifestyle factors such as smoking, and health awareness interact in complex ways, this study seeks to provide a holistic assessment of factors affecting the epidemiology of parasitic disease in the region.

METHODOLOGY

Study Design:

This is a descriptive cross-sectional study to evaluate the association between the knowledge and awareness regarding parasitic infections among the study participants and their infection status, with a special focus on smokers and non-smokers.

Study Setting and Population:

The study was carried out at two main hospitals of Babylon Province, Imam Al-Sadiq Hospital and Morjan Medical City, from November 1, 2024, to January 1, 2025. The sample included participants who tested positive or negative for intestinal parasitic infections regardless of gender and age but with the condition that they would answer a structured questionnaire.

Sample Size and Sampling Method:

125 participants were chosen purposively. Stool analysis of all was done, and the level of knowledge and smoking status were recorded. Inclusion included informed consent and laboratory-confirmed infection status.

Data Collection Tool:

A formal questionnaire was used as the main instrument of data collection. It included:

Section 1: Sociodemographic details (age, gender, education, profession).

Section 2: Smoking status (smoker, non-smoker).

Section 3: Knowledge items on parasitic infections.

Section 4: Sources of information (i.e., internet, physicians, books, etc.).

Validity of the Questionnaire:

The seven experts in community health and parasitology reviewed and validated the questionnaire. Experts' views were slightly followed to refine the questionnaire in terms of clarity and cultural sensitivity.

Ethical Considerations

Permission was obtained from the Babylon Health Directorate, and informed consent was obtained from all the participants. Participants' anonymity and confidentiality were maintained during the study.

Data Analysis

Analysis of data was done using IBM SPSS version 23. The variables were summarized using descriptive statistics such as percentages and frequencies. Chi-square tests were used to identify associations among infection status (microscopic or parasitic), level of knowledge, and source of knowledge.

Results

Table 1 and Figure 1, shows the distribution of parasitic infection in the study sample according to having knowledge of infection and no knowledge of infection and were found the highest percentage among those with knowledge group 82.4% and the lowest in those with no knowledge group 17.6%.

Table 1: Distribution of infection presence across study samples according to the knowledge about parasitic and microscopic infections.

Group	Infection Status		Total	P. value
	Positive	Negative		
Have knowledge of infection	23	80	103	0.00007
	53.5%	97.6%	82.4%	
Have no knowledge of infection	20	2	22	
	46.5%	2.4%	17.6%	

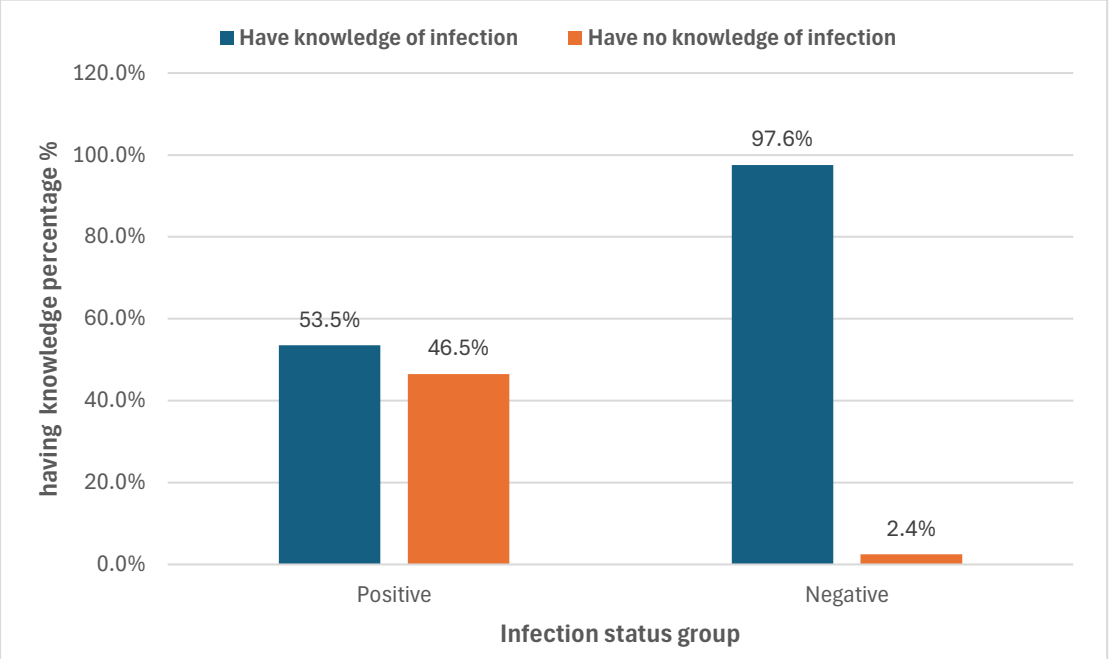

Figure 1: Distribution of infection presence across study samples according to the knowledge about parasitic and microscopic infections.

Table 2 and Figure 2, shows the distribution of parasitic infection in the study sample according to source of knowledge of infection and the highest percentage among those with the doctors source of knowledge group 39.2% and the lowest in those with other sources 4.8%.

Table 2: Distribution of infection presence across study samples according to the knowledge Source.

Group	Infection Status		Total	P. value
	Positive	Negative		
None	19	2	21	0.00001
	44.2%	2.4%	16.8%	

Internet	10	37	47
	23.3%	45.1%	37.6%
Books and articles	0	2	2
	0.0%	2.4%	1.6%
Doctors	14	35	49
	32.6%	42.7%	39.2%
Others	0	6	6
	0.0%	7.3%	4.8%

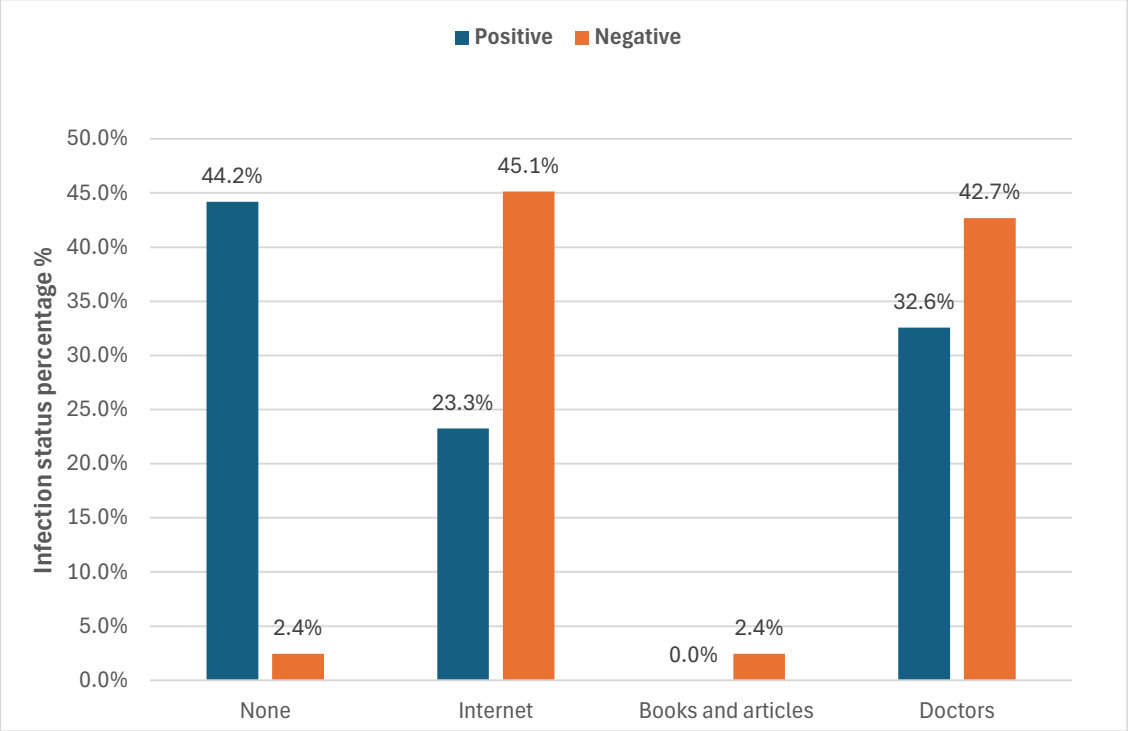

Figure 2: Distribution of infection presence across study samples according to the knowledge Source.

Table 3 and Figure 3, explain that the distribution of infection presence across study samples according to the knowledge about parasitic and microscopic infections and type of infection, the table shows that the group with no infection was 97.6% and for parasitic infection was 54.5% , microscopic infection 53.1% and the have no knowledge about parasitic and microscopic infections group 2.4% , Parasitic infection 45.5 %, microscopic infection 46.9 %.

Table 3: Distribution of infection presence across study samples according to the knowledge about parasitic and microscopic infections and Type of infection.

Groups	Type of infection			Total	P. value
	Have no infection	Parasitic infection	Microscopic infection		
Have knowledge of infection	80	6	17	103	0.00006
	97.6%	54.5%	53.1%	82.4%	
Have no knowledge of infection	2	5	15	22	
	2.4%	45.5%	46.9%	17.6%	

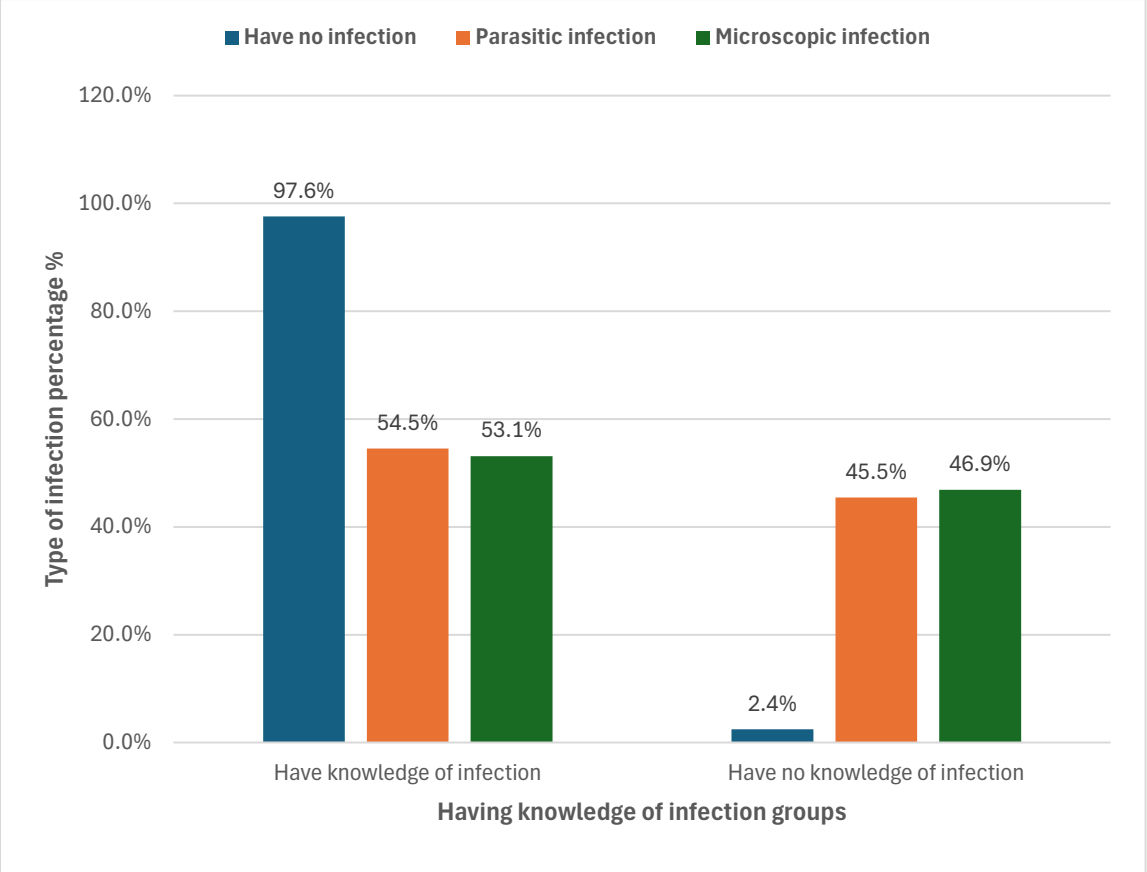

Figure 3: Distribution of infection presence across study samples according to the knowledge about parasitic and microscopic infections and Type of infection

Table 4 and Figure 4, shows that those with none and with no infection 2.4% and for parasitic infection 45.5% , microscopic infection 43.8% and the internet source have no infection group 45.1 % , Parasitic infection 27.3 %, microscopic infection 21.9%
And the books and articles group with no infection 2.4% Parasitic infection 0 %, microscopic infection 0% while for the doctors group with no infection 42.7% and for parasitic infection 27.3 % , microscopic infection 34.4% and for other sources with no infection 7.3% and for parasitic infection 0.0% , microscopic infection 0%.

Table 4: Distribution of infection presence across study samples according to the knowledge Source and Type of infection.

Groups	Type of infection			Total	P. value
	Have no infection	Parasitic infection	Microscopic infection		
None	2	5	14	21	
	2.4%	45.5%	43.8%	16.8%	
Internet	37	3	7	47	
	45.1%	27.3%	21.9%	37.6%	
Books and articles	2	0	0	2	0.00008
	2.4%	0.0%	0.0%	1.6%	
Doctors	35	3	11	49	
	42.7%	27.3%	34.4%	39.2%	
Others	6	0	0	6	

7.3%	0.0%	0.0%	4.8%

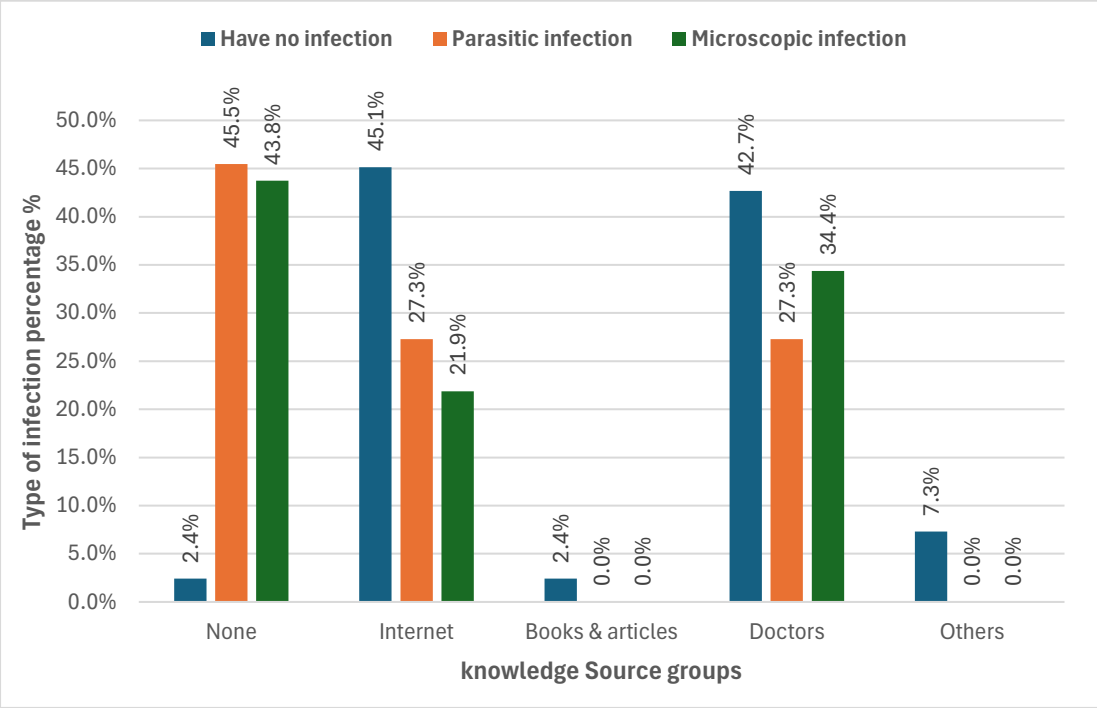

Figure 4: Distribution of infection presence across study samples according to the knowledge Source and Type of infection

DISCUSSION

Results of the current study illustrate a dynamic association between the prevalence of infections and awareness of parasitic infection, and they both provide support and disapproval of the earlier studies. To our surprise, infection prevalence in the aware group was at 82.4 percent compared to unaware participants who stood at 17.6 percent. What this finding suggests is that having a basic knowledge base might be insufficient to prevent infection unless and until behavioral and environmental factors are also resolved. Others have reported this in some settings where increased awareness is not matched with protective behaviors due to continuous exposure to contaminated environments or entrenched behaviors such as poor hygiene and smoking (Talib & Al-Khafaji, 2020; Jassim & Naji, 2015). High prevalence among aware participants might also signify previous exposure or intrinsic risk factors that are not resolved through knowledge.

In the current study, the rates of infection were influenced significantly by sources of health information. The participants who relied on valid sources such as books or articles and other unspecified sources reported lower rates of infection compared to those who relied on doctors or the internet as sources of information. This result is supported by evidence that health education delivered by trained health workers or by verified and credible sources is superior to inducing preventive behavior and reducing the burden of disease (Nutbeam, 2008; Jaffar et al., 2021). The utilization of internet sources with possibly unverified or false information was, however, associated with increased rates of infection and underscores the importance of credible sources of health communication.

Furthermore, the knowledge-based comparison of infection types found that even knowledgeable respondents maintained high rates of parasitic and microscopic infections. This suggests that behavioral and environmental determinants, including exposure to contaminated water or soil and lifestyle behaviors such as smoking, can overcome the protective effect of knowledge. Poor sanitation, environmental pollution, and lifestyle factors that impair the functioning of the immune system are the usual causes of parasitic infection as proposed in the literature (Farmer, 2001; Cui et al., 2021). As an example, smoking has been reported to alter intestinal microbiota, suppress mucosal immunity and elevate predisposition to parasite colonization (Karam et al., 2021; Zhou et al., 2018). Thus it is these underlying determinants that need to be approached in order to effectively control the disease.

Environmental contamination, particularly heavy metals and toxics, also introduces the complexity of gut microbiota and immune system impairment, thereby increasing vulnerability to parasitic infection

(Alkardhi et al., 2024; Raju & Mehta, 2022). That infection was high even among the knowledgeable indicates the necessity of supplementing health education with environmental interventions. Increased awareness alone without concomitant improvement in sanitation infrastructure and environmental contaminants may not be translated to a tangible decrease in the infection prevalence. This is in agreement with general public health information that parasitic infection is multifactorial in etiology, determined by socioeconomic background, sanitation, and environmental health status (Jassim & Naji, 2015; WHO, 2014). Overall, while good health and quality information sources are the greatest determinants of prevention of disease, their effect is significantly amplified by the addition of behavioral change, environmental sanitation, and lifestyle change. That infection remains high despite knowledge serves to underline the fact that education must be complemented with infrastructure, behavioral change especially in terms of smoking cessation, and environment interventions to effectively stem the burden of parasitic diseases. The findings underscore the need for a wide multisectoral approach to parasitic disease control in countries like Babylon, where environmental and behavioral causes of risk are well entrenched in daily activities.

CONCLUSION

The prevalence of infection was higher among knowledgeable and aware participants, indicating the need for targeted awareness programs to promote health and disseminate prevention strategies. Accurate information sources, such as the internet and medical professionals, are associated with lower infection rates, indicating the need for proper dissemination of information to prevent parasitic infections. Proper improvement in health education programs, specifically by medical staff and available internet sources, can minimize prevalence of parasitic infections among smokers and non-smokers. Targeted awareness programs for the practice of good hygiene, preventive interventions, and sources of accurate information need to be implemented for the prevention and control of parasitic infections in the population.

REFERENCES:

1.Al-Hemiary, N., Abdulghani, E. A., & Al-Tawil, N. G. (2014). Tobacco smoking among Iraqi youth: Prevalence and associated factors. Eastern Mediterranean Health Journal, 20(3), 187–194.
2.Alkardhi, H. A., Jabur, M. H., & Al Fatlawi, H. K. (2024). Epidemiological Analysis of Parasitic Infections Among Pediatric Patients with Diarrhea in Diwaniyah Hospitals. Journal of Babylon University, 32(2), 461–468.
3.Biedermann, L., Zeitz, J., Mwinyi, J., Sutter-Minder, E., Rehman, A., Ott, S. J., ... & Scharl, M. (2013). Smoking cessation induces profound changes in the composition of the intestinal microbiota in humans. PLoS ONE, 8(3), e59260.
4.Bullard, R. D. (2000). Dumping in Dixie: Race, class, and environmental quality. Westview Press.
5.Chalabi, N. A. (2024). A Ten-Year Retrospective Study on Intestinal Parasites in Erbil Governorate: Trends and Demographics. Iraqi Journal of Parasitology, 20(1), 215–222.
6.Chatterjee, K. D. (2009). Parasitology (13th ed.). Calcutta: CBS Publishers.
7.Cui, Y., Wang, Q., Chang, R., Zhou, X., Xu, C., & Ding, H. (2021). Cadmium exposure disrupts the intestinal barrier and microbiota structure in mice. Environmental Pollution, 268, 115930.
8.Farmer, P. (2001). Infections and inequalities: The modern plagues. University of California Press.
9.Hadi, A., Al-Saeed, H., & Rahman, M. (2020). Health education gaps in parasitic control programs in Iraq. Basrah Medical Journal.
10. Jaffar, A. J., Al-Ali, M. H., & Hameed, R. F. (2021). Distribution and risk factors of intestinal parasites in Wasit Province, Iraq: A hospital-based study. Wasit Medical Journal.
11. Jassim, A., & Naji, H. (2015). Socioeconomic status and health in Babil. Iraqi Medical Research Journal.
12. Karam, S. M., Wang, J., Saad, N., & Rezaei, N. (2021). Tobacco smoking and its impact on gut microbiota and parasitic infections. Journal of Parasitology Research, 2021, 1–12.
13. Lundberg, R., Toft, M. F., August, B., Hansen, A. K., & Nielsen, D. S. (2016). Smoking cessation alters the intestinal microbiota: Results from a pilot study. Gut Microbes, 7(6), 522–530.
14. Maji, A., Misra, R., & Prakash, S. (2018). The impact of tobacco smoke on gut microbiome and its potential role in disease. Journal of Clinical Microbiology, 56(12), e01201-18.
15. Nutbeam, D. (2008). The evolving concept of health literacy. Social Science & Medicine, 67(12), 2072–2078.
16. Raju, D., & Mehta, R. (2022). Influence of environmental heavy metals on intestinal inflammation and microbial dysbiosis. Toxicology Reports.
17. Sublette, M. E., Hudson, K. D., & Benton, M. C. (2020). Effects of Smoking and Smoking Cessation on the Intestinal Microbiota. American Journal of Physiology-Gastrointestinal and Liver Physiology.
18. Talib, H. A., & Al-Khafaji, M. A. (2020). Parasitic infections in Iraq: An overview. Medical Journal of Babylon.
19. WHO. (2014). World Health Statistics 2014.
20. Zhou, J., He, X., Shi, Y., Yang, H., & Dong, H. (2018). Effect of smoking on gut microbiota and intestinal parasitic infections. Journal of Clinical Microbiology, 56(7), e01911-17.