

Knowledge and awareness of intestinal parasitic infections among students at King Abdulaziz University in Jeddah, Saudi Arabia

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Received: November 2022 Accepted: December 2022; Published: December 30, 2022.

Citation: Sarah A. Altwaim. Knowledge and awareness of intestinal parasitic infections among students at King Abdulaziz University in Jeddah, Saudi Arabia. World Family Medicine. December 2022 - January 2023 Part 2; 21(1):122-138

DOI: 10.5742/MEWFM.2023.95251571

Abstract

Objective: Intestinal parasite illnesses are one of the most significant public health concerns in both developing and many developed countries, increasing morbidity and mortality. Various researchers have suggested that illness awareness and knowledge are beneficial in avoiding and limiting the spread of numerous diseases.

The current study aims to examine information on knowledge and awareness on intestinal parasite illnesses among university students attending King Abdulaziz University (KAU) in Jeddah, Saudi Arabia.

Methods: Students were given a self-administered questionnaire to complete in order to collect information on their demographics as well as their KAP toward intestinal helminth infections. Simple random sampling was used to conduct this cross-sectional investigation. 213 volunteers from various KAU faculties were included in the study, and the participants were informed and consented to the study's purposes. A questionnaire was made available online for students to complete. The gathered data underwent additional statistical analysis.

Results: The study included 213 students from various disciplines. Male participation was 22.53% and female participation 77.46%. Bachelor degree students made up 89.2%, diploma students 7.04%, master degree students 3.29%, and one PhD student 0.47%. Knowledge assessment on intestinal parasite illnesses revealed that overall, 53.52% of respondents were aware of these infections while 46.48% were not, which was a statistically significant difference.

Conclusion: Students, particularly those majoring in fields other than health sciences, have a poor grasp of and awareness of intestinal parasite diseases; hence, there is a need for more initiatives to implement change.

Key words: Knowledge, Awareness, Intestinal Parasitic Infection, Students, Jeddah

Introduction

Parasites are eukaryotic organisms that can spread a variety of human diseases. Intestinal parasite infections (IPIs) are one of the primary public health problems, as they are the leading cause of illness, morbidity, and mortality in certain developing and wealthy nations. It is estimated that around 3.5 billion people globally are afflicted (1). *Ascaris lumbricoides*, hookworms, *Trichuris trichiura*, *Giardia lamblia*, *Entamoeba histolytica*, *Cryptosporidium parvum*, *Taenia* species, and *Schistosoma* spp. are human-important parasites. Common parasitic symptoms include gastrointestinal disturbances, indigestion, nausea, and vomiting. Certain parasites can also cause ulcers, intestinal bleeding, destruction of cells and tissues, malabsorption of nutrients, nutritional deficiency, and growth retardation in children (2), which can have a negative impact on their academic performance (2). Parasite transmission may be influenced by numerous circumstances. Inadequate sanitation, contaminated water resources, failure to restrict the spread of vectors, a lack of sanitary habits, and inadequate health education are among these factors (3).

Knowledge and awareness of disease are effective, targeted, and straightforward prevention and control techniques that are required in a population (4). This can be accomplished through health education through increasing awareness, understanding, and behavioral changes (5). Health education is critical in reducing and preventing the spread of parasite illnesses. For health education to be effective, many entities must be identified so that a clear message can be provided, and so knowledge and awareness must be interpreted (6). According to recent research, people's beliefs and attitudes toward parasitic infections, as well as their prevention and control, are critical (7). Infections may rise and spread due to a lack of awareness and knowledge about transmission routes, treatment, prevention, and control measures for intestinal parasites. Successful parasitic infection prevention and control necessitates not only an understanding of the parasites but also better understanding of the interactions between the hosts and the parasites

Although many studies have looked at the prevalence of intestinal parasitic infection in Saudi Arabian cities like Jeddah (8-11), few have examined Saudis' knowledge, awareness, and practice with regard to parasitic infections. As a result, the current study seeks to learn more about KAU Jeddah students' familiarity with IPIs and response to parasitic illnesses. Data from this study can be used as a starting point for future research on students' understanding of intestinal parasite disorders and the effectiveness of various strategies for limiting their spread.

Materials and Methods

A self-administered questionnaire was distributed and aimed to collect information on Knowledge and awareness of IPI among students towards intestinal helminth infections, in addition to their demographic information.

Ethical statement:

Ethical approval was applied and obtained from the Unit of biomedical & ethics research committee, Faculty of Medicine, KAU in Jeddah, (reference no: 684-20).

Study design:

Students were given a self-administered questionnaire to complete in order to gather data on their demographics as well as their KAP toward intestinal helminth infections. Simple random sampling was used to conduct this cross-sectional investigation. The inquiry involved 213 participants in total, all of whom were 17 years of age or older from various KAU faculties. Participants were informed of the study's objectives. After reading and giving their consent, students were required to complete an online questionnaire. The gathered data underwent additional statistical analysis.

Data analysis:

Statistical analysis was performed by using the statistical program SAS (version 9.4). Data are presented as frequency with a percentage for categorical variables.

Fisher's exact test for association between categorical variables was used. All statistical tests were considered significant if P value \leq 0.05.

Results

The purpose of this research was to assess the knowledge and awareness of IP illnesses among university students. Following approval of their agreement to participate, a total of 213 male and female students responded to the questionnaire. Surprisingly, female responses were greater than male responses (female = 77.46%, male = 22.53%).

Students were divided into two groups based on their field of study: medical/health sciences students and non-medical/health sciences students. Students from non-medical fields made up 58.69% of the participants (125/213), while medical/health sciences students comprised 41.31% (88/213).

In terms of educational level, bachelor degree students accounted for 89.2% (190/213), followed by diploma students 7.04% (15/213), master degree students 3.29%, and only one PhD student 0.47% (Table 1).

The sociodemographic analysis in association with educational level (P value = 0.0021) was statistically significant, as was the field of study variable (P value = 0.0013). Academic achievement (bachelor or master and other degrees) did not exhibit any significance (P value=0.5085). Regarding the ages of the participants, 52.5%

(112/213) were between the ages of 17-20, 36.15 % (77/213) were between the ages of 21 and 24, 6.10 % (13/213) were between the ages of 25 and 30, and only 5.16% (11/213) were over 30 (Table 1).

Participants' response scores were divided into four categories: 0–6 was regarded as poor scores, 7–12 were deemed good, 13–20 were considered very good, and 21–29 were deemed excellent. The response scores of participants was statistically significant ($P < 0.0001$) where medical/health sciences discipline participants were higher than those from non-medical/health specialties; 88.8% of non-medical/health specialties scored poorly, whereas 76.79% of medical/health sciences specialties scored excellently (Figure 1).

A total of 26.29% of participants (56/213) obtained an excellent score, followed by 40.38% (86/213) who received a very good score, 20.66% (44/213) who received a good score, and 12.68% (27/213) who had a poor response rate (Table 1).

Students at KAU were invited to respond to questions about their knowledge and awareness of IP infections (Table 2). The first question asked if they had heard of IPIs, to which the overall response was 53.52% who said yes and 46.48% who said no, and was of significance ($P < 0.0001$) (Tables 2, 3). Furthermore, the majority who answered yes were from medical/health specialties 72.3% (Table 3). The most likely form they learned about IP infections was through university (26.29%) in which 55.68% were from medical/health areas and this was of significance (P value < 0.0001), followed by the internet (24.41%), which showed no significance ($P = 0.51174$) and both non-medical and medical specialties scored a similar percentage response (26.4% non-medical/health field, 21.59% medical/health sciences) (Tables 2, 3).

The overall response rate for whether they had ever encountered any parasitic infection was 93.9% no, with only 6.1% answering yes (Table 2). Looking further into the specialty background, medical/health sciences participants answered no (94.3%) and a similar percentage from non-medical/health sciences specialties (93.6%), though this was not statistically significant (P value = 1.00). (Table 3). Participants were questioned about their perceptions of the effects of intestinal parasitic infections on humans, and the result was statistically significant ($P < 0.0001$): 56.34 % selected harmful to humans (120/213) (Table 2), with the majority of respondents coming from a medical/health background (80.68 %) (Table 3). In addition, 42.25 percent of respondents (90/213) were unaware of the effect of IP on humans, with the majority of respondents coming from non-medical/health disciplines (60.8%) compared to medical/health sciences (15.91%), and only 1.4% selected beneficial, with all responses coming from medical/health specialties (Tables 2, 3).

Students were prompted to choose from a list of diseases to assess their knowledge of intestinal parasitic infections; only 22.54% (48/213) correctly identified giardiasis, of which 44.32% were from a medical/health sciences background (39/213) and only 7.2% were from a non-medical/health sciences background (9/213); 51.6% selected "don't know" (Table 2). In addition, the outcomes were statistically significant ($P < 0.0001$) (Tables 2, 3).

Students' knowledge of the modes of transmission of IPIs was assessed by selecting the correct answer from a list of options (Tables 2, 3). Students from the medical and health sciences correctly answered the questions on drinking polluted water and eating contaminated food, with significant results ($P = 0.0002$ and 0.0038 , respectively) (Tables 2, 3). The table's other choices demonstrate that medical and health science students responded more favorably than those who are not majoring in medicine/health sciences (Tables 2, 3).

Participants were requested to select common signs and symptoms of parasite infections from a list; both medical and non-medical/health sciences participants selected the majority of accurate answers, which was statistically significant (Tables 2, 3).

The participants were also questioned what they believed to be the most appropriate treatment for an IP infection. A total of 79.34% (169/213) selected consult a doctor with significant findings ($P = 0.032$) and correct scoring in both fields (Question 14, Tables 2, 3).

Finally, students were then invited to select what they believed to be the most effective means of preventing and controlling IP infections. Except for the proper cooking of meat, which was non-significant ($P = 0.1646$), correct answers were statistically significant (Q 15, Tables 2, 3).

Figure 1: Field of study (specialty) score responses between medical/ health sciences participants and non-health disciplines.

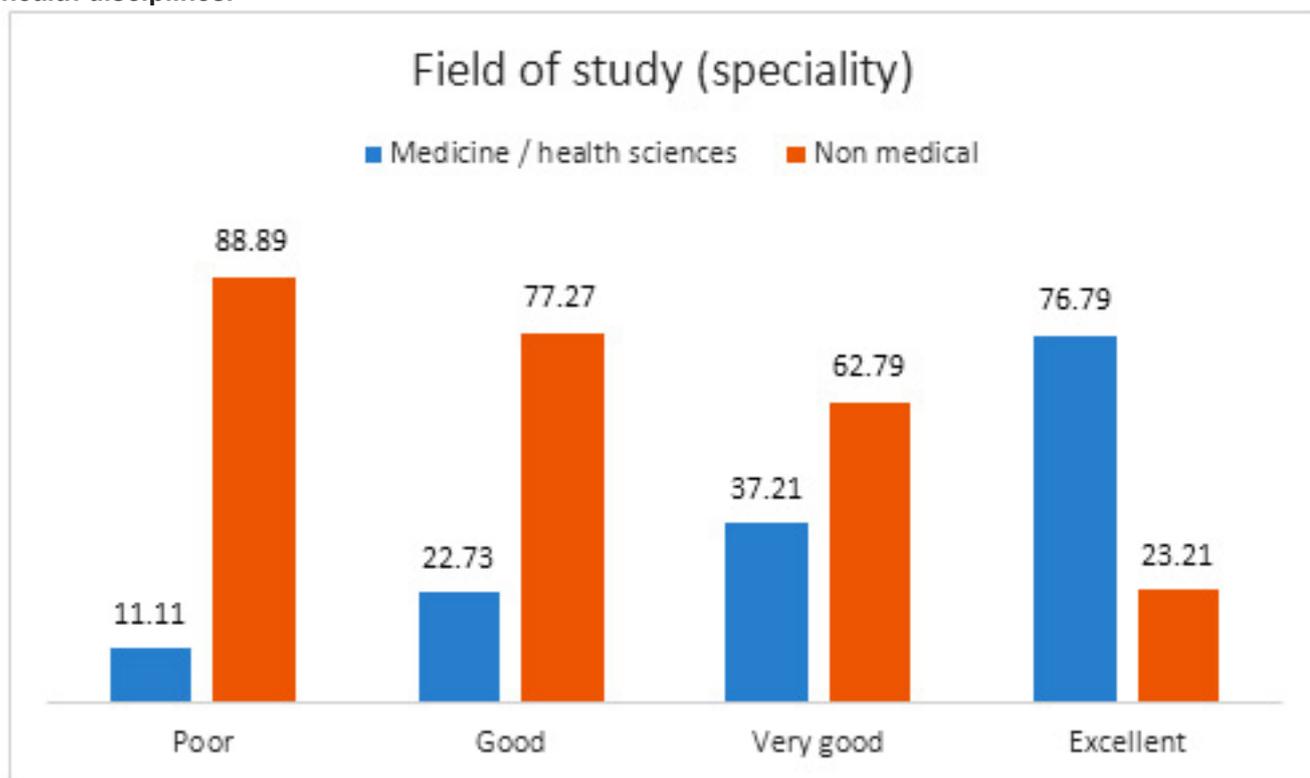


Table 1: Demographic characteristics of KAU student's participants

Variables	Total	Percentage (N %)
Score		
Poor	27	12.68%
Good	44	20.66%
Very good	86	40.38%
Excellent	56	26.29%
Age		
17-20 years	112	52.58%
21-24years	77	36.15%
25-30 years	13	6.1%
> 30 years	11	5.16%
Age_1		
17-20 years	112	52.58%
> 20 years	101	47.42%
Gender		
Female	165	77.46%
Male	48	22.54%
Educational level		
Bachelor	190	89.2%
Diploma	15	7.04%
Master	7	3.29%
PhD	1	0.47%
Educational level_1		
Bachelor	190	89.2%
Other	23	10.8%
Field of study (specialty)		
Medicine / health sciences	88	41.31%
Non-medical/ health sciences	125	58.69%

Table 2: Overall response rate of Knowledge & awareness of IP infections among KAU students

Variables	Total	Percentage (N %)
1- Have you heard about intestinal parasitic (IP) infections?		
No	99	46.48%
Yes	114	53.52%
2- How did you hear about it?		
Internet		
No	161	75.59%
Yes	52	24.41%
Television		
No	203	95.31%
Yes	10	4.69%
School		
No	180	84.51%
Yes	33	15.49%
University		
No	157	73.71%
Yes	57	26.29%
Newspaper		
No	209	98.12%
Yes	4	1.88%
Friends / Family		
No	186	87.32%
Yes	27	12.68%
Clinic/ hospital		
No	200	93.9%
Yes	13	6.1%
3- Have you ever been infected with intestinal parasites?		
No	200	93.9%
Yes	13	6.1%
4- What are the effects of intestinal parasitic infections?		
Beneficial to peoples' health	3	1.41%
Don't Know	90	42.25%
Harmful to peoples' health	120	56.34%
5- Which of the following diseases is an intestinal parasitic infection?		
Aids	6	2.82%
Cholera	30	14.08%
Don't know	110	51.64%
Giardiasis	48	22.54%
Hepatitis	19	8.92%
1- Eating contaminated vegetables and fruits		
Don't know	50	23.47%
No	12	5.63%
Yes	151	70.89%
2- Drinking contaminated water		
Don't know	50	23.47%
No	20	9.39%
Yes	143	67.14%

Table 2: Overall response rate of Knowledge & awareness of IP infections among KAU students (continued)

3- Eating raw or undercooked meat		
Don't know	57	26.76%
No	12	5.63%
Yes	144	67.61%
4- Coughing and sneezing		
Don't know	97	45.54%
No	89	41.78%
Yes	27	12.68%
5- Poor hygiene (not washing hands)		
Don't know	76	35.68%
No	29	13.62%
Yes	108	50.7%
6- Walking without shoes outside		
Don't know	77	36.15%
No	45	21.13%
Yes	91	42.72%
7- Soil contact		
Don't know	84	39.44%
No	43	20.19%
Yes	86	40.38%
8- Sexual contact		
Don't know	100	46.95%
No	68	31.92%
Yes	45	21.13%
9- Animal contact		
Don't know	88	41.31%
No	34	15.96%
Yes	91	42.72%
10- Faeces are considered a source of parasitic infection?		
Don't Know	97	45.54%
No	23	10.8%
Yes	93	43.66%
11- Do you think food handlers could be a source of transmission (cooks, waiters)		
Don't know	70	32.86%
No	15	7.04%
Yes	128	60.09%
12- Do you think flies & cockroaches could transmit parasites?		
Don't know	74	34.74%
No	19	8.92%
Yes	120	56.34%
13- Which are common symptoms of intestinal parasitic diseases? (Choose one or more options)		
Diarrhoea		
No	60	28.17%
Yes	153	71.83%

Table 2: Overall response rate of Knowledge & awareness of IP infections among KAU students (continued)

Dysentery (blood with stool)		
No	112	52.58%
Yes	101	47.42%
Abdominal pain		
No	77	36.15%
Yes	136	63.85%
Anaemia		
No	169	79.34%
Yes	44	20.66%
Nausea/vomiting		
No	77	36.15%
Yes	136	63.85%
Fever		
No	126	59.15%
Yes	87	40.85%
Weight loss		
No	123	57.75%
Yes	90	42.25%
Muscle pain		
No	175	82.16%
Yes	38	17.84%
Sore throat		
No	199	93.43%
Yes	14	6.57%
14- If you were infected with a parasitic disease, which one would you choose for treatment?		
Consult with a doctor	169	79.34%
Don't know	25	11.74%
Don't take it seriously	5	2.35%
Self-medication	4	1.88%
Traditional medicine	10	4.69%
15- Which of the following methods prevent intestinal parasitic diseases? (Choose one or more options)		
Proper washing fruits and vegetables		
No	34	15.96%
Yes	179	84.04%
Washing hands before eating and after defecation		
No	59	26.29%
Yes	157	73.71%
Boiling untreated water		
No	101	47.42%
Yes	112	52.58%
Cover mouth when sneezing		
No	149	69.95%
Yes	64	30.05%
Using bed nets when sleeping		
No	155	72.77%
Yes	58	27.23%

Table 2: Overall response rate of Knowledge & awareness of IP infections among KAU students (continued)

Proper cooking of meat		
No	60	28.17%
Yes	153	71.83%
Cutting finger nails regularly		
No	117	54.93%
Yes	96	45.07%
Treatment of pets		
No	128	60.09%
Yes	85	39.91%
Avoid swimming in contaminated water		
No	83	38.97%
Yes	130	61.03%
Wearing a face mask in public		
No	171	80.28%
Yes	42	19.72%
Avoid sexual contact with infected partner		
No	124	58.22%
Yes	89	41.78%

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline

Variables	Medicine/health sciences	Non-medical/health sciences	P value
1- Have you heard about intestinal parasitic (IP) infections?			<.0001
No	24 27.27	75 60.00	
Yes	64 72.73	50 40.00	
2- How did you hear about it?			
Internet			0.5174
No	69 78.41	92 73.60	
Yes	19 21.59	33 26.40	
Television			0.5292
No	85 96.59	118 94.40	
Yes	3 3.41	7 5.60	
School			0.0536
No	69 78.41	111 88.80	
Yes	19 21.59	14 11.20	
University			<.0001
No	39 44.32	118 94.40	
Yes	49 55.68	7 5.60	
Newspaper			0.6441
No	87 98.86	122 97.60	
Yes	1 1.14	3 2.40	
Friends / Family			0.8348
No	76 86.36	110 88.00	
Yes	12 13.64	15 12.00	
Clinic/ hospital			0.1516
No	80 90.91	120 96.00	
Yes	8 9.09	5 4.00	
3- Have you ever been infected with intestinal parasites?			1.0000
No	83 94.32	117 93.60	
Yes	5 5.68	8 6.40	

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline (continued)

4- What are the effects of intestinal parasitic infections?			<.0001
Beneficial to peoples' health	3 3.41	0 0.00	
Don't Know	14 15.91	76 60.80	
Harmful to peoples' health	71 80.68	49 39.20	
5- Which of the following diseases is an intestinal parasitic infection?			<.0001
Aids	1 1.14	5 4.00	
Cholera	18 20.45	12 9.60	
Don't know	26 29.55	84 67.20	
Giardiasis	39 44.32	9 7.20	
Hepatitis	4 4.55	15 12.00	
1- Eating contaminated vegetables and fruits			0 .0002
Don't know	9 10.23	41 32.80	
No	4 4.55	8 6.40	
Yes	75 85.23	76 60.80	
2- Drinking contaminated water			0.0038
Don't know	11 12.50	39 31.20	
No	8 9.09	12 9.60	
Yes	69 78.41	74 59.20	
3- Eating raw or undercooked meat			0.0076
Don't know	15 17.05	42 33.60	
No	3 3.41	9 7.20	
Yes	70 79.55	74 59.20	
4- Coughing and sneezing			0.0067
Don't know	31 35.23	66 52.80	
No	48 54.55	41 32.80	
Yes	9 10.23	18 14.40	

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline (continued)

5- Poor hygiene (not washing hands)			0.0015
Don't know	20 22.73	56 44.80	
No	11 12.50	18 14.40	
Yes	57 64.77	51 40.80	
6- Walking without shoes outside			0.0009
Don't know	23 26.14	54 43.20	
No	14 15.91	31 24.80	
Yes	51 57.95	40 32.00	
7- Soil contact			<.0001
Don't know	20 22.73	64 51.20	
No	13 14.77	30 24.00	
Yes	55 62.50	31 24.80	
8- Sexual contact			0 .1081
Don't know	34 38.64	66 52.80	
No	34 38.64	34 27.20	
Yes	20 22.73	25 20.00	
9- Animal contact			<.0001
Don't know	23 26.14	65 52.00	
No	12 13.64	22 17.60	
Yes	53 60.23	38 30.40	
10- Faeces are considered a source of parasitic infection?			<.0001
Don't Know	18 20.45	79 63.20	
No	9 10.23	14 11.20	
Yes	61 69.32	32 25.60	

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline (continued)

11- Do you think food handlers could be a source of transmission (cooks, waiters)			0.0608
Don't know	21 23.86	49 39.20	
No	7 7.95	8 6.40	
Yes	60 68.18	68 54.40	
12- Do you think flies & cockroaches could transmit parasites?			0.1023
Don't know	24 27.27	50 40.00	
No	7 7.95	12 9.60	
Yes	57 64.77	63 50.40	
13- Which are common symptoms of intestinal parasitic diseases? (Choose one or more options)			
Diarrhoea			<.0001
No	12 13.64	48 38.40	
Yes	76 86.36	77 61.60	
Dysentery (blood with stool)			<.0001
No	27 30.68	85 68.00	
Yes	61 69.32	40 32.00	
Abdominal pain			<.0001
No	15 17.05	62 49.60	
Yes	73 82.95	63 50.40	
Anaemia			0.0096
No	62 70.45	107 85.60	
Yes	26 29.55	18 14.40	
Nausea/vomiting			0.0597
No	25 28.41	52 41.60	
Yes	63 71.59	73 58.40	
Fever			0.0019
No	41 46.59	85 68.00	
Yes	47 53.41	40 32.00	

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline (continued)

Weight loss			0.0030
No	40 45.45	83 66.40	
Yes	48 54.55	42 33.60	
Muscle pain			0.2762
No	69 78.41	106 84.80	
Yes	19 21.59	19 15.20	
Sore throat			0.4059
No	84 95.45	115 92.00	
Yes	4 4.55	10 8.00	
14- If you were infected with a parasitic disease, which one would you choose for treatment?			0.0323
Consult with a doctor	78 88.64	91 72.80	
Don't know	5 5.68	20 16.00	
Don't take it seriously	1 1.14	4 3.20	
Self-medication	0 0.00	4 3.20	
Traditional medicine	4 4.55	6 4.80	
15- Which of the following methods prevent intestinal parasitic diseases? (Choose one or more options)			
Proper washing fruits and vegetables			0.0232
No	8 9.09	26 20.80	
Yes	80 90.91	99 79.20	
Washing hands before eating and after defecation			0.0015
No	13 14.77	43 34.40	
Yes	75 85.23	82 65.60	
Boiling untreated water			0.0034
No	31 35.23	70 56.00	
Yes	57 64.77	55 44.00	

Table 3: Knowledge and awareness of IP infections response among KAU students according to specialty discipline (continued)

Cover mouth when sneezing			1.0000
No	62 70.45	87 69.60	
Yes	26 29.55	38 30.40	
Using bed nets when sleeping			0.0629
No	58 65.91	97 77.60	
Yes	30 34.09	28 22.40	
Proper cooking of meat			0.1646
No	20 22.73	40 32.00	
Yes	68 77.27	85 68.00	
Cutting finger nails regularly			0.0502
No	41 46.59	76 60.80	
Yes	47 53.41	49 39.20	
Treatment of pets			0.0068
No	43 48.86	85 68.00	
Yes	45 51.14	40 32.00	
Avoid swimming in contaminated water			0.0002
No	21 23.86	62 49.60	
Yes	67 76.14	63 50.40	
Wearing a face mask in public			0.2949
No	74 84.09	97 77.60	
Yes	14 15.91	28 22.40	
Avoid sexual contact with infected partner			0.6730
No	53 60.23	71 56.80	
Yes	35 39.77	54 43.20	

Discussion

With a fluctuating prevalence and geographic distribution, intestinal parasitic infections are neglected diseases brought on by helminths and protozoa (12). They can also impair adult productivity and cause significant morbidity and death in susceptible areas (13), leading to worldwide annual loss of 39 million disability-adjusted life years (DALYs) (14).

To date, limited studies have been conducted in Jeddah, Saudi Arabia on the knowledge and awareness of intestinal parasite infections among university students. The purpose of this study was to assess the knowledge and awareness of intestinal parasite infection among KAU students from various academic disciplines. This will serve as initial information to assist in the prevention and spread awareness of IPIs.

Overall, non-medical/health sciences students had less knowledge and awareness of intestinal parasite illnesses, the mode of transmission, symptoms, and preventive strategies. This is comparable with a 2007 survey among KAU students, which demonstrated that two-thirds of the respondents had a low level of knowledge on parasites and parasitic illnesses (15).

Data from educational level perspectives were found to be poor among bachelor level students, with 92.5% scoring poorly in terms of knowledge and awareness of IPIs compared to students from other educational levels (diploma, master, and PhD). Despite this, the majority of participants held bachelor's degrees. Furthermore, those that scored exceptionally well had a bachelor's degree background.

In order to examine students' knowledge of IPIs, they were separated into medical/health sciences specialties and non-medical/health sciences specializations. Medical/health sciences participants received the highest scores (excellent), as expected, with 76.79%.

In a study conducted on the population in Ahvaz County, southwestern Iran, 49.5% of the participants were female and 50.5% were male (16), whereas in our study, female participants comprised the majority with 77.46% of the sample while male students comprised 22.53 %, where age, specialty, and educational level were all significant sociodemographic factors.

As predicted, medical/health sciences students had the highest total response score, while non-medical health students had the lowest. Moreover, 53.5% of participants reported acquaintance with IPIs, with the majority coming from the medical/health sciences and 46.48 % from non-medical backgrounds. This was in line with the outcomes of a survey among university students in Selangor, Malaysia (17). More than half of the respondents in similar research conducted in Nigeria reported knowledge of gastrointestinal parasites, which was consistent with these findings (18). A larger percentage was reported in Rio de Janeiro, Brazil, among their respondents (19), as well as in a study of

adult residents of Selangor, Malaysia, where the level of knowledge about parasite infection was 76.3% (3), and an investigation on IP infection conducted on students in Asmara, Eritrea, where 73% of them had prior knowledge of IPIs (20).

Surprisingly, the primary source of information about intestinal parasitic infections was mostly through the university, followed by the internet. This concurs with past research that discovered the internet to be the primary source of information on parasitic illnesses (6). Internet and media provide critical roles in educating the public about parasite diseases and are essential components of efficient health communication (7). However another study in Pahang discovered that the major reference for gaining knowledge of parasites is from health clinics or hospitals, which was less in our study (21).

This highlights the critical importance of increasing IPI information and awareness among students in non-health disciplines. Despite the fact that fewer respondents had a history of parasitic infection, the majority were able to identify significant parasitic symptoms such as diarrhea and abdominal pain. This finding is consistent with a study in Selangor, Malaysia, where they predominantly identified diarrhea as a symptom of parasitic infection (6), and in Iran (16). Also, in Côte d'Ivoire (5), applicants were able to recognize symptoms of fatigue, loss of appetite, diarrhea, and blood in stool (5, 6). Compared to our investigation, a larger proportion of respondents in a study on underprivileged border inhabitants of Thailand and Myanmar 71.3% were unaware of IPI-risk signs (21). Despite the high prevalence of IPIs in animal and water samples, 32.3% of respondents claimed to be unaware of their household's animal waste management or water treatment. These factors may contribute to the high incidence of infectious diseases in the Tha Song Yang District (21). Though not significant, a study on impoverished border residents of Thailand and Myanmar, educational level and understanding about IPIs was significant (21).

According to the results, 6.1% of participants had IPI infections, which is consistent with a study conducted in Iran, where 9.9% of individuals reported having an infection with a parasitic disease (16).

In the current study, only 22.54% of respondents correctly identified an example of intestinal parasite infection. This was in line with the results of a survey of Orang Asli residents of Malaysia (21). Meanwhile, in a study conducted in Iran, about 42.8% of participants correctly classified malaria as a parasitic disease (4). The likelihood of parasitic disease transmission through dirty hands and direct contact with animals was also known to over half of the (22) respondents, which was consistent with our findings (16).

The majority of students (60.09%) had a solid understanding of the role of food handlers in the transmission of IP disease. In contrast, a recent study of university students in Selangor, Malaysia (17) and another survey of Malaysian food handlers (22) revealed low levels of understanding.

People acknowledged wearing shoes as a worm prevention measure in a 2010 survey conducted in western Côte d'Ivoire, however they failed to explain that soil contact is required for worm transmission. Therefore, there was a reasonable level of information regarding the methods of worm infection transmission and prevention (5).

In compliance with past studies (5), (21), the majority of participants selected consulting with a physician as the most beneficial method for treating parasitic worms (5), (21). This demonstrated that students had a solid understanding of treatment recommendations for IPIs.

Participants gave favorable responses to IPI prevention and control strategies such as thoroughly cooking meat and periodically boiling water before consuming it. This finding was reinforced by a study conducted in Lusaka, Zambia, which indicated that proper meat processing and hygiene inspection provide the cornerstone for preventing human taeniasis (23), as well as in Selangor, Malaysia (3). A survey of university students in southern Brazil indicated that 93.9% were aware that eating raw meat poses a health risk (24). This is significant since meat intake is a potential source of parasite transmission.

The number of female sample respondents was larger than the number of male participants, which was consistent with a study conducted in Selangor, Malaysia (5). There may be gender bias in the data, but this has no effect on the awareness pattern; the key issue is to evaluate adult awareness of parasite infection.

The study's findings revealed a large gap among KAU students that requires immediate intervention. Regardless of the individual's expertise in each area, it is possible to state that 46.4% of respondents lack fundamental IPI knowledge. This percentage is big enough to warrant an awareness-raising effort, which is compliant with prior research (25-27).

Conclusion

To effectively control parasitic diseases, better participatory strategies are needed like the necessity for community-based interventions in high-endemicity areas for educational initiatives (5).

IPIs remain a global public health issue, highlighting the need for more financing, and health and education professional training to control these diseases in vulnerable communities. It also advocates for more funds to provide high-quality public health services. Thus, IPIs and socioeconomic determinants of health must be understood (24).

This study demonstrated the need for more efforts to raise awareness of intestinal parasite illnesses' routes of transmission and prevention and control among non-medical/health sciences university students.

Furthermore, they offer an intriguing perspective on the disease, which is critical for the effective execution of any preventive measures (28).

Conflict of Interest: Author declares no conflicts of interest in this paper.

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