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Investigating Intestinal Parasites Infection among University Students at Jiblah University for Medical and Health Sciences, Yemen, 2024

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ABSTRACT

This study aimed to assess the prevalence of intestinal parasitic infections and their associated risk factors among 200 students at Jiblah University, Ibb, Yemen.

Methods and Result: Sociodemographic data showed that 55.5% of participants were female, 41.5% were over 23 years old, and 77.5% lived in urban areas. The prevalence of intestinal parasites infected was 42.5%. The most common of intestinal parasites were Entamoeba histolytica (76.5%), followed by Giardia lamblia (9.5%). The intestinal parasites were higher among groups aged fewer than 21 years (49.2%) and those aged 21-22 years (48%), male (43.8%) and female group (41.4%), while it was (42.8%) in students from urban areas, and (41.5%) from rural areas. Moreover, it was observed that intestinal parasitic infections were higher among students who sometimes or never washed fruits and vegetables before eating (58.1%) with a p= (0.019. Finally, the intestinal parasites infected were higher (50%) among students who ate in restaurants.

Conclusion: The findings from the current study revealed that intestinal parasites infection was higher among the group under 21 years old, male, married, urban, students who sometimes or never washed fruits and vegetables before eating and students who ate in restaurants.

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Introduction

intestinal parasitic infection is a significant global public health issue, especially in developing nations, due to environmental, socioeconomic, and behavioral factors [1]. In food handlers, these infections threaten vulnerable populations, including immunocompromised patients [2]. Common intestinal parasites include Entamoeba histolytica, Giardia lamblia, Cryptosporidium species, Ascaris lumbricoides, and Trichuris trichiura [3]. They spread via contaminated food, water, and poor sanitation, causing gastrointestinal issues [4]. Parasites rely on hosts for sustenance, often harming them in return [5].

Yemen faces severe water scarcity in groundwater and rainwater as its primary sources [6]. Two-thirds of the population do not have access to safe drinking water in 2024, exacerbating public health challenges [7]. This crisis, worsened by inadequate sanitation, has fueled the spread of intestinal parasites [8]. Rural areas, especially among children, are most affected due to contaminated water and soil [9]. Symptoms of intestinal parasites include abdominal pain, diarrhea, nausea, and itching, leading to issues like anemia and developmental delays [10]. This study examines the prevalence and risk factors of intestinal parasites among university students in southern Yemen, aiming to provide some prevention strategies.

Materials and Methods

Setting

The study was carried out among male and female students at Jiblah University, located in Jiblah district, Ibb Governorate, Yemen.

Study Design

An analytical cross-sectional study was designed for this study.

Population

Jiblah University was established in 2019 and includes six faculties focused on medical and health sciences. During the study period, the university had approximately 1,000 students enrolled in various classes.

Sampling and Sample Size
A convenience sample of 200 students, representing 20% of the population, was selected from six faculties: Medicine, Dentistry, Laboratory Sciences, Midwifery, Pharmacy, and Nursing. All participating students voluntarily completed a questionnaire and provided stool samples for analysis.

Data Collection
All students received both questionnaire and stool sample collection boxes. They completed questionnaire sheets and the collected stool samples were submitted between January 9 and March 25, 2024. Each student has code number on both questionnaire sheet and stool sample collection boxes.

Part One
This section contained questions regarding sociodemographic characteristics, including age, sex, residence, marital status, faculty, education level, and monthly family income.

Part Two
The behavioral risk factors associated with intestinal parasitic infections included access to food sources, washing fruits and vegetables before consumption, attending health education sessions, washing hands before eating and after defecation, using soap during handwashing, keeping fingernails trimmed, and caring for animals.

Part Three
Two hundred stool samples were collected from the participants, university students. Each student was provided with a clean, labeled, dry, wide-mouthed plastic container (60 mL) and instructions on the proper method for collecting stool samples. The samples were then transported to the Jiblah University Hospital Laboratories for analysis.

Sample Processing and Examination
A simple sedimentation method was employed to process the samples. Approximately 4 g of stool was placed in a container with 10 mL of 10% formalin for preservation, stirred thoroughly, and allowed to settle for 15 to 25 minutes. The resulting sediments were then examined under an optical microscope using 10X and 40X objectives.

Statistical Analysis
Data analysis was conducted using SPSS software version 26. Descriptive statistics, including frequency, distribution, mean, and standard deviation, were employed to characterize the data. The Chi-Square test was used to assess the significance of the relationship between the parasites affecting participants and the sociodemographic variables in the study. A p-value of less than 0.05 was considered statistically significant.

Ethical Approval
This study obtained ethical approval from the Ethical Committee of the Medical and Health Sciences Department at Jiblah University for Medical and Health Sciences, Yemen (Reference no: Nur's……). Oral consent was secured from all students participating in the study, with a detailed explanation of the research purpose provided prior to data collection. Students were informed of their right to withdraw from the stool sample collection at any time without any obligation and were assured of their privacy. Anonymity was maintained by assigning a unique code to each participant, which was used solely for analysis purposes.

Results
Sociodemographic Characteristics of Participants
A total of 200 students participated in this study. Among them, (n=111;55.5%) were female, and (n=83;41.5%) were over 23 years old. Additionally, (n=145;77.5%) resided in urban areas, while (n=174;87%) of the students were single. Furthermore, (n=56;28%) were from the Faculty of Medicine, and (n=75;37.5%) were in their first year of study. Regarding the educational background of the participants' fathers, (n=78;39%) had a high education level, and (n=142;71%) reported that their monthly family income was sufficient. See Table 1.

Table 1: Sociodemographic Characteristics of Study Participants at Jiblah University for Medical and Health sciences, Yemen 2024 (n=200)

Variables	Categories	Frequency (No.)	Percent (%)
Age	<= 20	50	25
	21 – 22	67	33.5
	23+	83	41.5
Sex	Female	111	55.5
	Male	89	44.5
Residence	Urban	145	77.5
	Rural	55	27.5
Marital Status	Single	174	87
	Married	26	13
Faculty	Nursing	29	14.5
	Pharmacy	18	9
	Dentist	34	17
	Medicine	56	28
	Midwife	36	18
	Laboratory	27	13.5
Education level	First level	75	37.5
	Second level	59	29.5
	Third level	37	18.5
	Fourth level	29	14.5
Family month income	Not enough	16	8
	Quite enough	142	71
	Enough	42	21

Behavioral Characteristics of Participants
With regard to eating habits, most of students reported that they primarily ate at home (n=77; 38.5%) and in cafeteria (n=75;37.5%). More than three-quarters of the students (n=157;78.5%) stated that they always wash fruit and vegetables before eating. Additionally, (n=142;71%) of students attended health education sessions. Concerning handwashing, most students (n=196;98%) reported that they wash their hands before eating and after defecation, while (n=156;78%) indicated that they use soap during these times. Furthermore, (n=168;84%) of students mentioned that they keep their fingernails trimmed. Finally, (n=151;75.5%) of students stated that they take care of cats. See Table 2.

Table 2: Behavioral and Habitual Characteristics of Students at Jiblah University for Medical and Health Sciences, Yemen, 2024 (n=200)

Variables	Category	Frequency (no.)	Percent (%)
Eating resource	house	75	37.5
	restaurant	48	24
	not stationary	77	38.5
Clean fruit and vegetables before eating	Sometimes	43	21.5
	always	157	78.5
Attend Heath Education Session	Yes	142	71
	No	58	29
Wash your hands before eating and after defecation	Yes	196	98
	No	4	2
Using soap with hand washing	Yes	156	78
	No	44	22
Cut fingernail	Yes	168	84
	No	32	16
Animals care	Yes	80	40
	No	120	60

Prevalence of Intestinal Parasite among Participants

All participating students were tested for intestinal parasites. Overall, the prevalence of parasites among the stool samples was (n=85;42.5%). See Figure 1.

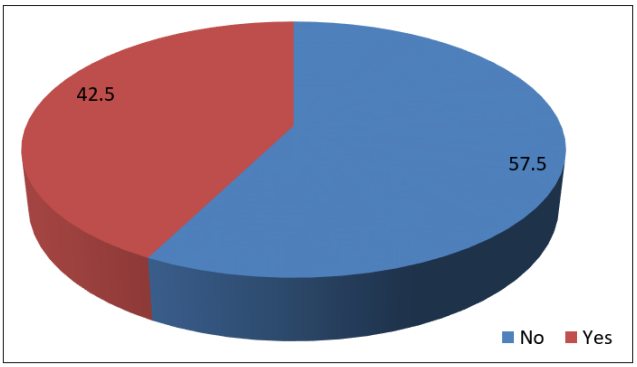

Figure 1: Pevalence of Intestinal Parasite among Students at Jiblah University for Meical and Health Sciences, Yemen 2024 (n=200)

Two protozoa and two helminths were identified in the tested samples. The isolated parasites included Entamoeba histolytica (n=65cases; 76.5%) and Giardia lamblia (n=5cases; 9.4%), as well as Ascaris lumbricoides (n=5cases;5.9%) and Hymenolepis nana (2 cases; 2.3%). Additionally, (n=5cases;5.9%) were found to be infected with both Entamoeba histolytica and Giardia lamblia. See figure 2.

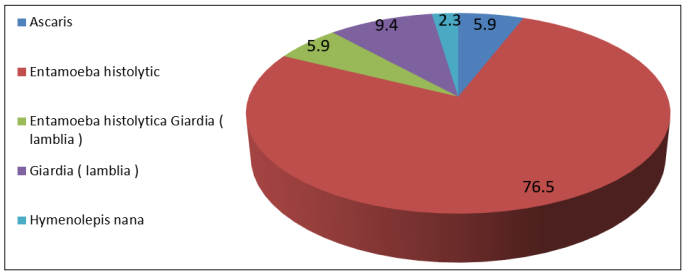

Figure 2: Prevalence of Types of Parasites among Students at Jiblah University for Medical and Health Sciences, Yemen 2024 (n=200)

Risk Factors Associated with Intestinal Parasite Infection

Regarding the sociodemographic characteristics of the students, the results of this study indicated that there were no significant associations between parasitic infections and sociodemographic factors such as age, sex, residence, marital status, faculty, education level, and monthly family income (p-value > 0.05). However, the findings showed that the percentage of parasitic infections was notably higher among participants under 21 years (33 cases; 49.2%) and those from 21 to 22 years (24 cases; 48%), compared to students aged 23 and older (n=28;33.8%). In the male group, (n=39;43.8%) were infected, while (n=46;41.4%) were infected in the female group. Furthermore, parasitic infections were found in (n=62;42.8%) of students from urban areas, compared to (n=23;41.5%) from rural areas. See Table 3.

Table 3: Risk Factors Associated with Intestinal Parasite Infection Regarding Sociodemographic Characteristic among Students at Jiblah University for Medical and Health Sciences, Yemen 2024 (n=200)

Variables	Categories	Parasites		Statistic test	
		Absent (115) (%)	Present (85) (%)	Chi squire	p-value
age	< 21	26(52%)	24 (48%)	4.479	0.107
	21 – 22	34(50.8%)	33(49.2%)		
	23+	55(66.2%)	28(33.8%)		
Sex	Female	65(58.6%)	46(41.4%)	0.114	0.735
	male	50(56.2%)	39(43.8%)		
Residence	Rural	32(58.5%)	23(41.5%)	0.014	0.904
	urban	83(57.2%)	62(42.8%)		
Marital state	Single	96(83.5%)	78(91.8%)	2.967	0.085
	Married	19(16.5%)	7 (8.2%)		
Faculty	Nursing	14(48.3%)	15(51.7%)	6.023	0.304
	Pharmacy	8(44.4%)	10(55.6%)		
	dentist	18(52.9%)	16(47.1%)		
	medicine	39(69.6%)	17(30.4%)		
	Delivery	20(55.6%)	16(44.4%)		
	laboratory	16(59.3%)	11(40.7%)		
Education level	first	43(57.3%)	32(42.7%)	2.03	0.566
	third	18(48.6%)	19(51.4%)		
	second	35(59.3%)	24(40.7%)		
	fourth	19(65.5%)	10(34.5%)		
Family month income	not enough	7(43.7%)	9(56.3%)	3.029	0.22

	quite enough	87(61.3%)	55(38.7%)		
	Enough	21(50%)	21(50%)		

Regarding behavioral and habitus risk factors, there was no statistically significant association between intestinal parasitic infections and student behaviors related to food sources, attending health education sessions, trimming fingernails, using soap during handwashing, and animal care. But it was observed that intestinal parasitic infections were higher among students who sometimes or never washed fruits and vegetables before eating (25 cases;58.1%) compared to those who always did so (60 cases;38.2%), with a p-value of 0.019. Additionally, Table 4 indicates a higher prevalence of intestinal parasitic infections (n=24 cases;50%) among students who ate in restaurants.

Table 4: Risk Factors Associated with Intestinal Parasite Infection Regarding Behavioral and Habits Characteristics among Students at Jiblah University for Medical and Health sciences, Yemen 2024 (n=200)

Variables	Categories	Parasites		Statistic	
		Absent (115) (%)	Present (85) (%)	Chi squire	p-value
Eating resource	House	45(60%)	30(40%)	1.455	0.483
	Restaurant	24(50%)	24(50%)		
	Cafeteria	46(59.7%)	31(40.3%)		
Clean fruit and vegetables before eating	Sometimes or never	18(41.9%)	25(58.1%)	5.483	0.019
	Always	97(61. 8%)	60(38.2%)		
Attend Heath Education Session	Yes	76(53.5%)	66(46.5%)	3.172	0.075
	No	39(67.2%)	19(32.8)		
Cut fingernail	Yes	98(58.3%)	70(41.7%)	0.298	0.585
	No	17(53.1%)	15(46.9%)		
Using soap with hand washing	Yes	88(56.4%)	68(43.6%)	0.345	0.557
	No	27(61.4%)	17(38.6%)		
Animal care	Yes	43(53.8%)	37(46.2%)	0.767	0.381
	No	72(60%)	48(40%)		

Discussion

This is the first study to explore intestinal parasites among university students in Yemen. It is essential for guiding decision-makers at Jiblah University in planning intervention programs. While several studies have been conducted among school students in various regions of Yemen, they reported parasite prevalence rates of 48% in Amran governorate, 51.26% in rural schools in Taiz governorate, 47.3% in Aden governorate, and 31.2% in Sana'a governorate [11-14]. Al-fakia study (2022) was conducted among children school in Ibb governorate and showed that the prevalence rate of protozoan infections was (56.3%0 which was higher than helminthic infections (10%) and the most common intestinal parasite was E. histolytica/dispar (28.5%) [15]. In this study, the prevalence of intestinal parasites among students at Jiblah University was 42.5%. This finding is comparable to a study conducted in Ethiopia, which reported a parasite prevalence of 41.3% among individuals at the Gondar Poly Health Center [16]. Additionally, the prevalence in this study showed a slight decrease compared to the 45.6% reported among students at the University of Gondar in Northwest Ethiopia [17]. This study also found that Entamoeba histolytica was the most common parasite (76.5%), followed by Giardia lamblia (9.4%). These findings align with a study conducted at the Ethiopian Army Students of Health Sciences College, where Entamoeba histolytica accounted for 72.41% of cases, followed by Giardia lamblia at 20.69% [18]. Morover, the current results were contributed to other results from studies; findings were reported from Adama Science and Technology University Students in Ethiopia that Entamoeba histolytica (13%) were the predominant parasite isolated followed by Giardia lamblia intestinalis (5.6%) [19]. Another study was carried out among female students at Islamic University of Gaza in Palestine to detect intestinal parasites, revealing that Entamoeba histolytica/dispar was (7.5%), followed by Giardia lamblia (4.9%) [20]. The current study revealed that parasitic infections were more prevalent among individuals aged under 21 years and those aged 21–22 years. Additionally, the prevalence of parasitic infections was higher among females compared to males. These findings are consistent with a study conducted among students at Adama Science and Technology University in Adama Town, Oromia, Ethiopia [21]. Another study was carried out among students at Federal University of Agriculture Makurdi, Benue State Nigeria [22]. The study which was carried out by students at a university in Ethiopia reported that female, married and rural student were more likely to be infected with protozoan infections these results did not agree with the current study's findings [23]. The two studies are different because the sample size of rural areas and married participants were few in this study. Futhermore, it can be observed in this study that intestinal parasitic infections were higher among students who sometimes or never washed fruits and vegetables before eating and students who ate in restaurants. This result was in same line with other studies [24].

Conclusion

The findings from current study revealed that intestinal parasites infection was higher among age group under 21 years old, male, married, urban and students who has sometimes or never washed fruits and vegetables before eating and students who ate in restaurants [25].

Recommendation

These findings emphasize the importance to reduce the risk of parasitic infections among university students

- Proper health education program for student about avoid parasites infection.
- Implementing the hygiene and food safety practices training for food handle in cafeteria and restaurant.

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