

Prevalence of Intestinal Parasitic Infection and Associated Factors among Adama Science and Technology University Student Adama Town, Oromia, Ethiopia

Legese Lemma Zeme¹, Kebebush Kitesa², Girma Mulisa³, Chala Diriba Feyisa

¹Department of Medical Laboratory, Adama science and Technology University, Adama, Ethiopia

²Department of Medical laboratory, Adama regional and public health Laboratory, Adama, Ethiopia

³Department of Bio-medical science, Adama Hospital Medical College, Adama, Ethiopia

⁴Department of public health at Adama science and technology University, Adama, Ethiopia

*Corresponding author

Legese Lemma Zeme, Department of Medical Laboratory, Adama science and Technology University, Adama, Ethiopia

Submitted: 11 Aug 2022; Accepted: 18 Aug 2022; Published: 29 Oct 2022

Citation: Zeme LL, Kitesa K, Mulisa G, Feyisa CD. (2022). Prevalence of Intestinal Parasitic Infection and Associated Factors among Adama Science and Technology University Student Adama Town, Oromia, Ethiopia. *J Gene Engg Bio Res*, 4(3), 375-385.

Abstract

Introduction: University students who live together in campuses and share different materials for their day-to-day activities may expose them to intestinal parasitic infections. As far as our knowledge is concerned, there is insufficient information on the magnitude of parasitic infections among students at Adama Science and Technology University

Objectives: To determine Prevalence of intestinal parasitic infection and associated factors among Adama University Student Adama Town, Oromia, Ethiopia.

Methods: A cross sectional study was conducted among 483 students attending higher health center at Adama University Student by using systematic random sampling technique. Data on socio-demographic characteristics and potential associated factors for Intestinal parasitic infection was collected by structured interviewer administered questionnaire. One-gram stool samples for direct saline microscopy was collected and processed in accordance to the standard parasitological techniques and procedures at Adama Science and Technology University Higher Health Center Laboratory. Data entry and analysis was done using SPSS version 20.0. Chi-square test and multiple logistic regression was used to identify associated factors. Association between variables were considered statistically significant only if a two-sided P-value <0.05 at 95% confidence level.

Results: This study demonstrates the overall prevalence of intestinal parasite among student accounts 20.1% (95%CI: 16.8, 23.8). Two protozoa and three helminthes spp were detected from total stool sample examined. The predominate parasite isolated were *E.histolotica* 63(13.0%) followed by *G.lambliia* 27(5.6%), *Taenia* spp 3(0.6%), Hookworm 2(0.4%) and *H.nana* 2(0.4%) respectively. being rural residence[AOR]: 2.69, 95% CI: (1.22,5.9)], lower parental educational status(illiterate [AOR]: 5.5, 95% CI: (1.99,15.5)] and primary[AOR]: 3.75, 95% CI: (1.5,9.34)], food source from private cafeterias[AOR]: 2.46, 95% CI: (1.15,5.2)], not hand washing before, food and after defecation[AOR]: 4.9, 95% CI: (1.96,12.3)], Habit of eating raw vegetables and fruit[AOR]: 4.8, 95% CI:(2.28,10.1)], walking with bare foot[AOR]: 13.2, 95% CI: (5.4,32.4)], not trimming finger nail [AOR]: 6.85, 95% CI: (3.2,14.6)] and not using soap [AOR]: 7.53, 95% CI: (3.2,17.8)] were significantly associated with parasitic infection.

Conclusions and Recommendations: The present study demonstrated the frequencies of intestinal parasitic infections among students were found to be high. Residence, educational status of parents, hand washing before meal and after defecation, eating raw vegetables and fruit, walking with bare foot was significant predictors of parasitic infection: Hence all students should wash their hand before meal and after defecation, consume cooked vegetables, avoid walking with barefoot and trim their fingernail and university should improve and sustain inspection and food handler screening of private cafeterias.

Keywords: Intestinal Parasite, Student, Adama Science and Technology University

Introduction

Intestinal parasitosis refers to a group of diseases caused by one or a lot of species of protozoa, cestodes, trematodes and nematodes distributed throughout the world with high prevalence rates [1]. Intestinal parasites are leading cause of diseases among young people and adult in the world today. They are almost the most prevalent human infections affecting approximately one quarter of the world's populations, mainly school children and undergraduates due to their poor hygienic nature or poor sanitary conditions coupled with their voracious eating habits [2]. The high prevalence in certain parts of the world is closely correlated with poverty and poor environmental hygiene namely lack of safe water supply, unsanitary sewage disposal, poor personal hygiene, contamination of the environment by human feces. Commonly, people become infected with helminthes by coming into contact within the soil, water or food that contain infective stages of these parasites [2, 3].

Globally, 3.5 billion individuals were infected with intestinal parasites [4, 5]. Of, which approximately 3.0 billion people infected with intestinal helminthes [5]. The greatest numbers of Soil-transmitted helminthes (STH) infections occur in sub-Saharan Africa, East Asia, China, India and South America [6]. In Sub-Saharan Africa, the prevalence of enteric parasitic diseases is high, and its rate will extend up to 95%. In these counties, up to 250 million individuals are assessed to be infected with something like at least one type of intestinal nematodes [7].

Intestinal parasitic infections such as *Ascariasis*, *hookworm infection* and *Trichiuriasis* are among the ten most common infections in the world and each constituting 1,450 million, 1,300 million and 1,050 million people worldwide, respectively, while *schistosomiasis* affects over 200 million people [4]. On the other hand, among protozoa, *Entamoeba histolytica*, the causative agent of amoebiasis, is estimated to infect 40–50 million people and to kills up to 100 000 people each year, thus ranking as the second deadliest parasitic infections worldwide second only to malaria [8]. Concurrently, *Gardia lamblia*, causing giardiasis, is the most prevalent protozoan parasite worldwide with about 200 million people being currently infected, and East Africa is considered to be among the most endemic regions [8].

Morbidity attributed to soil-transmitted helminths (STHs; roundworm, *Trichuris trichiura*, *Ancylostoma duodenale* and *Necator americanus*) and trematodes (genus *Schistosoma*) is widespread in impoverished areas with limited access to clean water and sanitation [9, 10]. Moreover, the effects of IPI were not limited to morbidity and mortality, extending to nutritional problems (i.e.,

stunted growth, low vitamin A, iron deficiency anemia, loss of weight, chronic blood loss) [1, 8]. It can also compromised mental development (i.e, impaired growth, decreased school attendance, cognitive impairment, decreased educational achievement and adult productivity) [1, 11]. Moreover, every year, millions of disability-adjusted life years (DALYs) are lost and as a consequence, they represent a persistent burden on social and economic development [8].

The prevalence of IPIs is variable among populations and even varies among regions of the same country. Few studies on prevalence of intestinal parasite were conducted among university student in Ethiopia. Accordingly University of Gondar Northwest Ethiopia 45.6%, Hawassa University 47.9%(7) and Addis Ababa university 24.1% [12, 13]. Those studies showed intestinal parasite are still major public health problem among university student. Therefore, there is a need for periodical analysis of the local prevalence and risk factors of IPIs to adapt an acceptable management and prevention strategy.

During the last two decades, a considerable number of literatures were published regarding intestinal parasitic diseases in Ethiopia. Many studies have been carried out among school age and pre-school children either [1, 14 and 16]. On the contrary, few studies have been carried out to determine the prevalence and types of intestinal parasitic infection among university student in Ethiopia only at Gonder, Addis Abeba and Hawasa University [7, 12 and 13]. As to the best of our knowledge there is no similar study conducted in Adama science and Technology University. Therefore, this study designed to address this gap and help to provide helpful information for epidemiological investigations and for planning public health control measures for the particular population involved.

In this regard, University students who live together in campuses and share completely different materials for his or her day-to-day activities might expose them to intestinal parasitic infections. As far as our knowledge is concerned, there is insufficient information on the magnitude of parasitic infections among students at Adama Science and Technology University. Hence; this study aimed to determine prevalence of intestinal parasite infection and associated factors among students at Adama science and Technology University by aiming the information generated from this study might give the initial data required for coming up with management measures. Besides, identification of parasitic agents is a very important step for the initiation of deliberate treatment methods.

Conceptual Framework for Intestinal Parasitic Infection

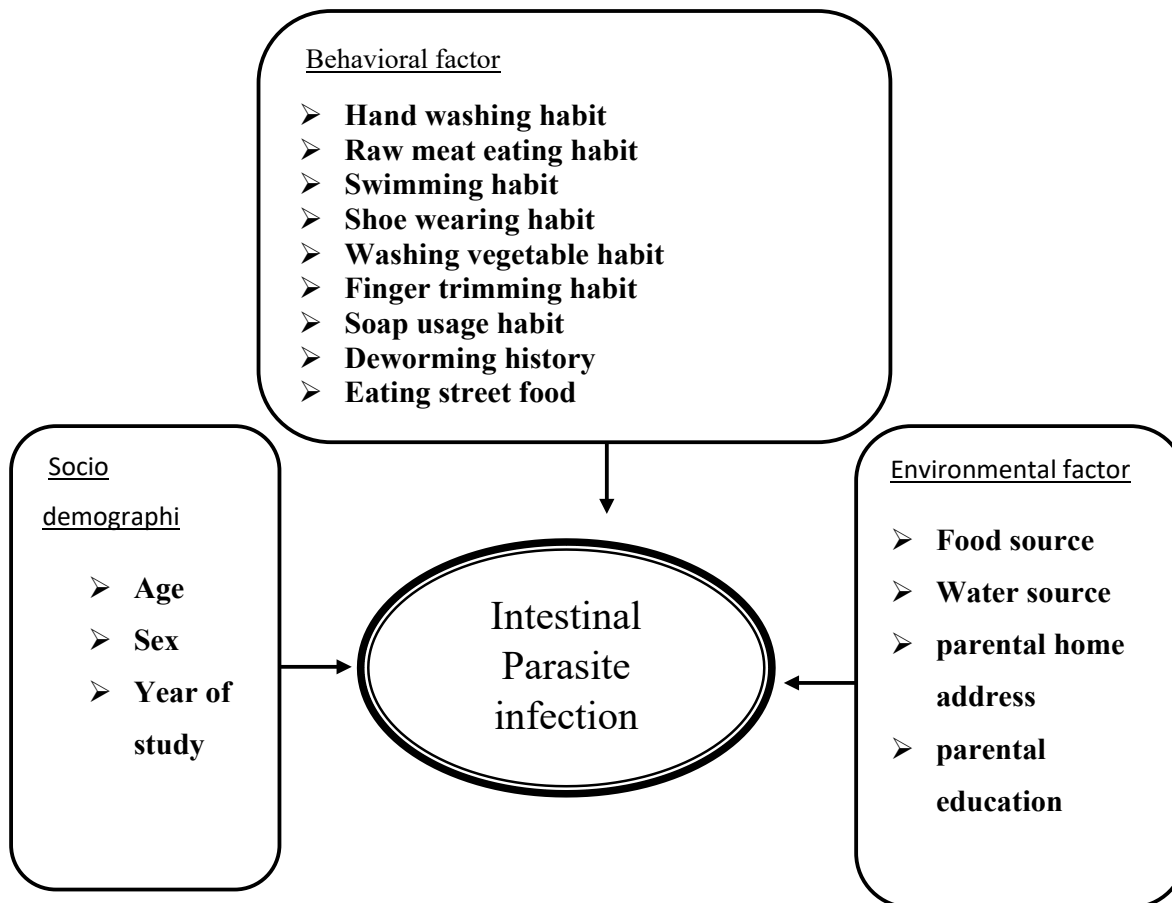


Figure 1: Conceptual framework for determinant of intestinal parasitosis among students who use Adama science and technology university clinics .This conceptual framework developed after reviewing similar studies [12, 13].

Methods and Materials

Study Area /Setting

The study was conducted at Adama Science and Technology University. The university was established in 1993 as Nazareth Technical College (NTC), and was later renamed as Nazareth College of Technical Teacher Education (NCTTE), specializing in training technical teachers until 2003. The same college became a university, namely Adama University (AU), in 2006. Five years later, the university once again changed its name to Adama Science and Technology University (ASTU). There are about 1801 administrative staffs and 514 academic staffs. Moreover, the data obtained from university registrar office showed a total of 8326 students attending their education in this university of which 6575 were under graduate, 1447 of them were following their masters while the remaining 304 were PHD attendants. Our study however only deals on undergraduate students.

Study Design and Period

A cross sectional was conducted from May to June 2022 among ASTU students

Population

Source Population

ASTU students who use clinic service

Study Population

Randomly selected students that visit ASTU clinic during study period

Inclusion and Exclusion Criteria

Inclusion Criteria

All students who use university clinic service was included

Exclusion Criteria

Post graduate students and Students who are department of special needs (deaf or blind). Because there is no skilled personnel for sign language and no man power of interviewer for blind students. Those students who took anti parasitic treatment in the last three month before data collection were excluded.

Sample Size Determination and Sampling Procedure

Sample Size Determination

Sample size was determined using single population proportion formula by taking overall prevalence of intestinal prevalence at Addis Ababa university 24.1% [13]. Using the following assumptions where α -value=0.241, (Absolute level of precision) or margin of error (d) of 4% at 95% confidence level. Adding 10% non-response rate; therefore a total of 483 students was included in the study.

$$n = \frac{(Z_{\alpha/2})^2 p(1-p)}{d^2}$$

$$n = \frac{(1.96)^2 0.241(1-0.241)}{(0.04)^2} = 439$$

By adding 10% non-response rate=439+44=483

Sampling Procedure

A Systematic random sampling technique was used to select the study participants. The data obtained from Adama science and technology university higher health center in the last six consecutive month showed more than 1500 students visited health center per month, therefore By dividing 1500 to our sample size 483(1500/483) we obtained sampling interval k of 3. From 1-3 patient, picking a student on random for the initial start of student, then students were selected systematically by adding 3.

Variables

Dependent Variables

Intestinal Parasite infection

Independent Variables

Socio Demographic like age, sex, year of study, residence

Behavioral Factor like hand washing habit, raw meat eating habit, swimming habit ,shoe wearing habit, washing vegetable habit, finger trimming habit, soap usage habit, deworming history, eating street food

Environmental Factor like food source, water source, parental home address, parental education

Operational Definitions

Intestinal Parasite: Intestinal parasites are organisms that live in the gastro-intestinal tract of humans

Intestinal Parasite Infection Refers presence of either intestinal protozoa and intestinal helminthes during microscopic examination

Intestinal Protozoa A diverse group of unicellular single celled parasites inhabits the intestinal tract of high vertebrate hosts including humans

Intestinal Helminthes

The term “helminthes” refers collectively to wormlike parasites

and encompasses two phyla of major human parasites: Platy helminthes (flatworms), which include tapeworms and flukes and Nematoda (roundworms)

Mixed infestation Is the simultaneous infestation of a host by two or more parasites.

Abdominal Pain/Discomfort: a person feels anywhere between the lower chest to the distal groin.

Data Collection Procedures (Instrument, Personnel and Measurements)

Data on socio-demographic characteristics and potential risk factors for intestinal parasite was collected by structured self-administered questionnaire. The questionnaire adapted after reviewing different literature of similar studies. It was prepared in English. A single fresh fecal sample of 1 gm. was collected in a clean wide mouth container and intestinal parasites were identified using direct wet mount. Direct wet mount microscopy was performed by smearing a well-mixed and small amount of fecal sample (~2 mg) on a glass slide with normal saline solution and cover slide. Then the slide was examined with light microscope using 10X and 40X objectives. Actively motile protozoan parasites together with other helminthes were identified based on motility and morphological structure. Differentiation of *Entamoeba histolytica* and *Entamoeba dispar* was made by identification of engulfed red blood cells and by staining the nuclei.

Data Quality Assurance

The validity of the study Results were assured by applying and following quality control measures during the total process of the laboratory procedures. All materials, equipment, and procedures were adequately controlled. Negative and positive control slides were used to check the functionality of microscope as well as the accuracy of laboratory professional engaged in conducting the study. Every 10th specimen was reexamined for quality control and a discrepancy of 10% or less for the whole study was regarded acceptable. The initial examination was performed by a junior laboratory technician experienced in microscopic identification of intestinal parasites while the quality control examination was performed by an experienced another experienced laboratory technologist without the knowledge of the results from the initial examination.

In order to assure data quality, high emphasis was given to minimize errors using the following strategies. Training was given to the data collectors and supervisors for two days on basic skills, ways of obtaining consents and objectives of the study by the principal investigator. Pretest was done on 5% of sample size at Arsi University. The principal investigator was under gone on-site supervision during the data collection period and review all filled questionnaires during the next morning of each data collection so as to identify incomplete and incoherent responses. The supervisor and principal investigator was closely supervise the performance of the data collectors on a daily basis and the collected record

sheets was thoroughly scrutinized every day at the end of data collection session and any inconsistencies was amended on time.

Data Processing and Analysis

Before data entry, questionnaires was checked for errors, cleaned, coded and entered SPSS version 20 software package for analysis. Descriptive statistics were used measures of frequency, central tendency and dispersion of participants' characteristics computed as appropriate. Pearson Chi-square was done to determine the relationship between the independent and dependent variables. Association between variables were considered statistically significant only if A two-sided P-value <0.05.

Ethical Consideration

Institutional Review Board (IRB) of Rift Valley University College ethically approved the study. Before commencing data, collection legal permission with letter of support was obtained from Adama woreda health office to Adama science and Technology University. All the study participants were informed about the purpose of the study and their right to refuse. Verbal informed consent was obtained from every respondent. Strict confidentiality was also maintained through coding of questionnaire anonymously and for those students diagnosed for parasitic infection; advised to take

anti parasite from Adama science and technology university higher health center and communicating students with health center staff were done by principal investigator.

Dissemination of Result

The results of this study will be presented to Rift Valley University College. The manuscript will be sent to local journals and international journals for publication. Hard copy provision to stake holders and Presentation on scientific meeting will be other option of dissemination.

Results

Socio-Demographic Characteristics of Study Participants

A total of 483 students were included in the study making response rate 100%.The mean age with standard deviation of study participants were 21(+1.3) years. Among total study subjects, 441(91.3%) of them were within 20-24 years of age. Regarding their sex about 327(67.7%) of them were male sex. In terms of their residence, 268(55.5%) of them were urban residence. About one-fourth (25.7%) of them were 2ndyear in their year of study. When we look at educational status of their parent, about 207(42.9%) of them were primary level of education (Table 1).

Table 1: Socio-demographic characteristics of Adama Science and Technology University Student, Adama Town, Oromia, Ethiopia, 2022 (n=483)

Variables	Categories	Frequency (N)	Percent (%)
Age category	17-19	36	7.5
	20-24	441	91.3
	25 & above	6	1.2
sex	Male	327	67.7
	Female	156	32.3
Parents Place of Residents	Urban	268	55.5
	Rural	215	44.5
Year of study	1styear	113	23.4
	2ndyear	124	25.7
	3rdyear	117	24.2
	4thyear	69	14.3
	5thyear	60	12.4
Parenteral educational status	No formal education	96	19.9
	primary Education	207	42.9
	Secondary education & above	180	37.3

Behavioral and Environmental Characteristics of Students

Concerning students source of food, 339(70.2%) of them obtained their food from students cafeteria. About 321(66.5%) of students were responded that university toilets are safe and clean. Nearly three-fourth (74.1%) of students was get personal hygiene and sanitation education from health care provider of ASTU clinics. Regarding the raw meat consuming habit, about 402(83.2%) of them were never or occasionally eat raw meat. About 419(86.7%) of stu-

dents wash their hands before eating and after defecation. In terms of frequency of hand washing habit, 422(87.4%) of them were Often or always wash their hand. Regarding soap usage during hand washing about 331(66.5%) of them were use soap to wash their hand. More than three-fourth (77.4%) of them were ever walked bare foot. When we look at their finger trimming habit 378(78.3%) of them were trimmed their fingernail.

Table 2: Behavioral and Environmental characteristics of students at Adama Science and Technology University, Adama Town, Oromia, Ethiopia, 2022 (n=483)

Variables	Categories	Frequency (N)	Percent (%)
Source of food	From students cafeteria	339	70.2
	private cafeteria	144	29.8
University toilets are safe and clean	No	162	33.5
	Yes	321	66.5
Ever get personal hygiene and sanitation education	No	125	25.9
	Yes	358	74.1
Eating raw meat	Never or occasionally	402	83.2
	Often or always	81	16.8
Wash your hands before eating and after defecation	No	64	13.3
	Yes	419	86.7
Frequency of hand washing habits	Never or occasionally	61	12.6
	Often or always	422	87.4
Soap usage	No	162	33.5
	Yes	321	66.5
Habit of eating raw fruit and vegetable	Yes	155	32.1
	No	328	67.9
Ever walked barefoot	Yes	109	22.6
	No	374	77.4
Fingernail	Untrimmed	105	21.7
	Trimmed	378	78.3
Deworming history	No	384	79.5
	Yes	99	20.5

Prevalence of Intestinal Parasite

This study demonstrates the overall prevalence of intestinal parasite among student accounts 97(20.1%) (95%CI; 16.8, 23.8).Two protozoa and three helminthes spp were detected from from total

stool sample examined. The predominate parasite isolated were *E.histolitica* 63(13.0%) followed by *G.lambliia* 27(5.6%), *Taenia spp* 3(0.6%),*Hookworm* 2(0.4%) and *H.nana* 2(0.4%) respectively.

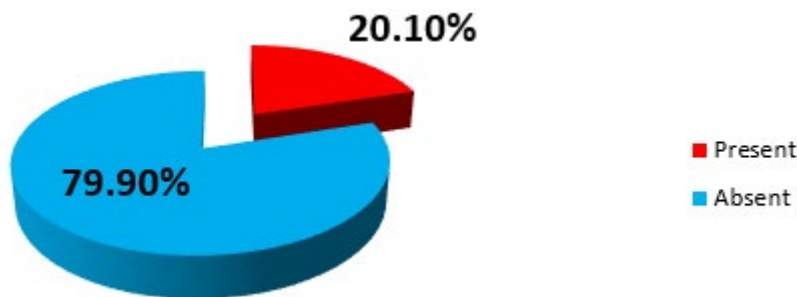


Figure 2: Prevalence of intestinal parasite among students at Adama Science and Technology University, Adama Town, Oromia, Ethiopia, 2022 (n=483)

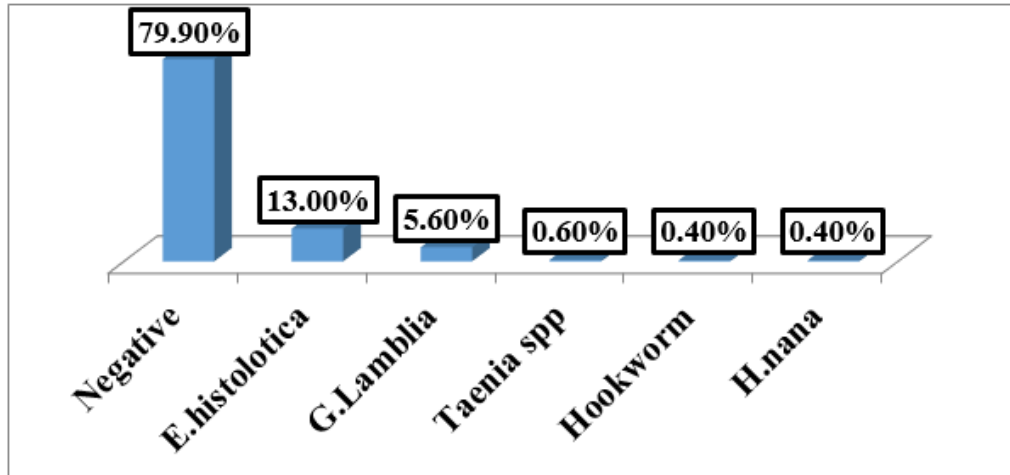


Figure 3: Parasite Spp isolated among students at Adama Science and Technology University, Adama Town, Oromia, Ethiopia, 2022 (n=483)

Factors Associated Intestinal Parasite Infection

From the result of chi-square test; Sex of study participant, Age category, Eating raw meat, deworming history and getting personal hygiene education were not significantly associated with intestinal parasitic infection (p -value >0.25) whereas being rural residence [AOR]: 2.69, 95% CI: (1.22,5.9), lower parental educational status(illiterate [AOR]: 5.5, 95% CI: (1.99,15.5)] and primary[AOR]: 3.75, 95% CI: (1.5,9.34)], food source from private cafeterias[AOR]: 2.46, 95% CI: (1.15,5.2)], not hand washing before food and after defecation[AOR]: 4.9, 95% CI: (1.96,12.3)], Habit of eating raw vegetables and fruit[AOR]: 4.8, 95% CI:(2.28,10.1)], walking with bare foot[AOR]: 13.2, 95% CI: (5.4,32.4)], not trimming finger nail [AOR]: 6.85, 95% CI: (3.2,14.6)] and not using soap [AOR]: 7.53, 95% CI: (3.2,17.8)]were significantly associated with parasitic infection(p -value <0.05).

This study showed the odds of parasitic infection 3 times more likely higher among students from rural residence as compared to those student from urban residence [AOR]: 2.69, 95% CI: (1.22,5.9)].In addition the odds of parasitic infection increased by 6 and 4 fold among students whose parent were illiterate and primary educational level as compared to those secondary and above in their educational back ground(illiterate [AOR]: 5.5, 95% CI:

(1.99,15.5)] and primary[AOR]: 3.75, 95% CI: (1.5,9.34)] respectively. Moreover our study also indicated that the prevalence of intestinal parasite 5 times more likely higher among students who did not wash their hand before eating and after defecation as compared to those that did [AOR]: 4.9, 95% CI: (1.96, 12.3)].The odds of parasitic infection increased by 2 fold among students that use food from private cafeterias as compared to those that served from students cafeteria [AOR]: 2.46, 95% CI: (1.15, 5.2)].

From result of study it was observed that the odds of parasitic infection 5 times more likely higher among students that had habit of eating raw vegetables and fruit as compared to those that did not [AOR]: 4.8, 95% CI:(2.28,10.1)].Likewise the odds of intestinal parasite infection increased by 13 fold among students that walked with barefoot as compared to those that wear shoes [AOR]: 13.2, 95% CI: (5.4,32.4)].Additionally this study also indicated that the odds of parasitic infection 8 times more likely higher among students who were not use soap for hand washing as compared those that did[AOR]: 7.53, 95% CI: (3.2,17.8)].Lastly the current study revealed that the odds of intestinal parasitic infection 7 times more likely higher among students that did not trimmed their finger nail as compared to those that trimmed their finger nail[AOR]: 6.85, 95% CI: (3.2,14.6)].

Table 3: Factors Associated Intestinal Parasite Infection Among students at Adama Science and Technology University, Adama Town, Oromia, Ethiopia, 2022 (n=483)

variables		Parasite		COR (95%CI)	AOR (95%CI)	P-Value
		Present N (%)	Absent N (%)			
Sex	Male	60(18.3%)	267(81.7%)	0.72(0.46,1.15)		
	Female	37(23.7%)	119(76.3%)	1.00		
Place of Residents	Rural	58(27.0%)	157(73.0%)	2.17(1.38,3.42)*	2.69(1.22,5.9)	0.014
	Urban	39(14.6%)	229(85.4%)	1.00	1.00	
Age category	17-19 years	8(22.2%)	28(77.8%)	1.43(0.15,14.0)		
	20-24 years	88(20.0%)	353(80.0%)	1.25(0.14,10.8)		
	25 & above years	11(6.7%)	58(3.3%)	1.00		
Parenteral educational status	No formal education	36(37.5%)	60(62.5%)	7.1(3.59,14.10)*	5.5(1.99,15.5)	0.001
	primary Education	47(22.7%)	160(77.3%)	3.48(1.85,6.57)*	3.75(1.5,9.34)	0.004
	Secondary education & above	14(7.8%)	166(92.2%)	1.00	1.00	
Source of food	private cafeteria	42(29.2%)	102(70.8%)	2.13(1.34,3.37)*	2.46(1.15,5.2)	0.021
	Student cafeteria	55(16.2%)	284(83.8%)	1.00	1.00	
Eating raw meat	Never or occasionally	87(21.6%)	315(78.4%)	1.96(0.97,3.96)		
	Often or always	10(12.3%)	71(87.7%)	1.00		
hands washing before food & after defecation	No	33(51.6%)	31(48.4%)	5.9(3.4,10.31)*	4.9(1.96,12.3)	0.001
	Yes	64(15.3%)	355(84.7%)	1.00	1.00	
eating raw fruit and vegetable	Yes	76(49.0%)	79(51.0%)	14.1(8.2,24.2)*	4.8(2.28,10.1)	0.000
	No	21(6.4%)	307(93.6%)	1.00	1.00	
Ever walked barefoot	Yes	56(51.4%)	53(48.6%)	8.58(5.2,14.1)*	13.2(5.4,32.4)	0.000
	No	41(11.0%)	333(89.0%)	1.00	1.00	
Fingernail	Untrimmed	52(49.5%)	53(50.5%)	7.26(4.43,11.9)*	6.85(3.2,14.6)	0.000
	Trimmed	45(11.9%)	333(88.1%)	1.00	1.00	
Deworming history	No	75(19.5%)	309(80.5%)	0.85(0.5,1.45)		
	Yes	22(22.2%)	77(77.8%)	1.00		
Get personal hygiene education	No	79(19.9%)	302(80.1%)	0.95(0.56,1.62)		
	Yes	22(20.8%)	84(79.2%)	1.00		
Soap usage	No	60(37.0%)	102(63.0%)	4.5(2.83,7.21)*	7.53(3.2,17.8)	0.000
	Yes	37(11.5%)	284(88.5%)	1.00	1.00	

Discussion

The finding of present study showed that the overall prevalence of intestinal parasite among student accounts 20.1 % (95%CI: 16.8, 23.8). This finding is lower than two previous studies in Nigeria(- Michael Okpara University of Agriculture of Umudike Abia State 72.0%(2) and Undergraduate Students at Federal University of Technology Akure (Futa) 44.5% Kigali Institute of Education students in Rwanda 50.5% five-year trend of intestinal parasite prevalence at Gondar University 45.6% a 10-year retrospective study on Prevalence of intestinal parasitic infections in Hawassa University students' clinic 47.9% Addis Ababa University 24.1% and Ethiopian Army Students of Health Sciences College in Bishoftu 29.4% [5]. The probable justification for lower prevalence in current study might be gradual decline in parasite prevalence due to intervention made by ministry of health like mass deworming at community level and programs targeting open defecation free were made so far in most rural kebeles where many of university students came from. In addition the laboratory method employed for isolation of intestinal parasite in current study were direct wet smear only whereas two previous studies in Nigeria were done by direct wet smear and formol-ether sedimentation and concentration techniques that increase the yield of ova of parasite in the stool which in turn increases the prevalence of parasite. Moreover, inconsistency in prevalence of intestinal parasitosis among different studies might happen due to sample size determination, study period, geographical, economic or social differences in the study subjects.

The present study is consistent with previous studies from Dhaka University in Bangladesh 23.14% and university female students of Gaza in Palestine 20.6% [17, 18]. The existence of such similarity probably might be comparable sample size and study populations were included in all studies. In this study *Entamoeba histolytica*/dispar was the most predominant parasite (13.0%) followed by *G. lamblia* (5.6%). Similar finding were reported from Dhaka university in Bangladesh as *Entamoeba histolytica* (4.86 %) were the predominant parasite isolated followed by *Giardia intestinalis* [17]. Moreover a study from Gaza in also revealed among detected intestinal parasites: *Entamoeba histolytica*/dispar were (7.5%) followed *Giardia lamblia* (4.9%) [18].

Similarly the finding from Uganda among the infected students, prevalence of *Entamoeba histolytica* was 54.5% followed by *Giardia duodenalis* was 3.6% [8].

The studies at different universities in Ethiopia also come up with similar finding for instance five-year trend of intestinal parasite prevalence among students attending clinic at university of Gondar showed *Entamoeba histolytica*/dispar was the most predominant parasite (20.3%) followed by *G. lamblia* (8.2%) [12]. Likewise a 10-year retrospective study on Prevalence of intestinal parasitic infections in Hawassa University students' clinic also reported that *E. histolytica*/*E. dispar* trophozoite was the most common identified parasite [7]. In addition the finding from Addis Ababa University also indicated that Trophozoite stage of *Entamoeba histolytica*

was the predominant parasite which had seen in 55(29.1%) of university students followed by cyst and trophozoite stage of *Giardia lamblia* 38(20%) [13].

Moreover a study at Ethiopian Army Students of Health Sciences College in Bishoftu showed that among parasite isolated *Entamoeba histolytica* were 72.41% followed with *Giardia lamblia* 20.69% [5]. The probable justification for such similarity probable due to poor hygiene practice by food handler, poor sanitation of most of universities toilet and since students live together they share different materials for their day to day activities may expose them to intestinal parasitic infections.

This study showed the odds of parasitic infection 3 times more likely higher among students from rural residence as compared to those student from urban residence [AOR]: 2.69, 95% CI: (1.22,5.9)]. Similar finding were reported by Assemie et al that they reported , rural residents were 87% more likely to be infected by intestinal parasites [1]. This situation may arise because rural community dwellers had lower awareness and more frequent contact with soil as well limited access to safe water and latrine. In addition the odds of parasitic infection increased by 6 and 4 fold among students whose parent were illiterate and primary educational level as compared to those secondary and above in their educational back ground(illiterate [AOR]: 5.5, 95% CI: (1.99,15.5)] and primary[AOR]: 3.75, 95% CI: (1.5,9.34)] respectively. This finding were supported by Assemie et al that they reported that students belonging to uneducated mothers at a higher risk of Intestinal parasitic infection(1). This finding could reflect the fact that educated parents had better knowledge about intestinal parasitic infection prevention.

Moreover our study also indicated that the prevalence of intestinal parasite 5 times more likely higher among students who did not wash their hand before eating and after defecation as compared to those that did [AOR]: 4.9, 95% CI: (1.96, 12.3)]. This finding is analogous with studies from Rwanda and West Iran that showed students, who did not have regular hand washing habits, had more than a triple the likelihood of being infected by intestinal parasite as compared to those participating in regular hand washing [9, 10]. The plausible reason for this association might be transmission of ova/cyst of parasite via contaminated hand while feeding.

Similarly from result of study it was observed that the odds of parasitic infection 5 times more likely higher among students that had habit of eating raw vegetables and fruit as compared to those that did not [AOR]: 4.8, 95% CI:(2.28,10.1). Similar finding were reported from different studies in Ethiopia and Rwanda that indicated raw fruit and vegetable were a risk factor for Intestinal parasitic infection [1, 10]. The plausible justification for this association might be due to fruit and vegetables might be contaminated with cyst and ova of parasite from night soil used as fertilizer and untreated water used for irrigation.

Moreover, the odds of intestinal parasite infection increased by 13 fold among students that walked with barefoot as compared to those that wear shoes [AOR]: 13.2, 95% CI: (5.4,32.4)]. This finding is supported by a study in Ethiopia and Thailand that revealed those individual who do not regularly wear shoes were more likely to develop Intestinal parasitic infection as compared to those who habitually wear shoes [1, 11]. This could be due to the fact that parasitic infections like hook worm is mainly acquired by walking barefoot on contaminated soil.

Lastly the current study revealed that the odds of intestinal parasitic infection 7 times more likely higher among students that did not trimmed their finger nail as compared to those that trimmed their finger nail [AOR]: 6.85, 95% CI: (3.2,14.6)] .Similar finding were reported by systematic study from Ethiopia that students who did not maintain finger nail hygiene were more likely to be infected by intestinal parasite [1]. The plausible justification for this association might be ova and cyst of parasite transmitted via untrimmed and unhygienic fingernail.

Strength and Limitation of Study

Strength of Study

- Random selection of study participant were made that increase generalizability of result to study population
- response rate being 100%
- Three laboratory professionals diagnose the sample that improves the quality of the results

Limitation of Study

- Due to financial constraint, we did not use formol-ether concentration technique and kato-katz technique exhibit high sensitivity for the detection of *Schistosoma mansoni*, *Trichuris trichuria* and *Ascaris lumbricoides* and we might miss the chance of detecting parasitic organisms when these are small in numbers.
- Since cross sectional study exposure and disease status is assessed at a single point in time, temporal relationship between exposure and disease cannot be clearly determined.

Conclusions and Recommendation

Conclusions

The present study demonstrated the frequencies of intestinal parasitic infections among students were found to be high (20.1%). According to the obtained results, being rural residence, lower parental educational status, food source from private cafeterias, not hand washing before food and after defecation, Habit of eating raw vegetables and fruit, walking with bare foot and not trimming fingernail were significantly associated with parasitic infection.

Recommendation

All students should wash their hand before meal and after defecation, consume cooked vegetables and washed fruit, to avoid walking with bare foot and to trim and clean their fingernail. We also recommend ministry of health to improve awareness creation, access to safe water and latrine for rural communities. Adama

science and Technology University higher health center should undergo regular inspection of private cafeterias in the compound and food handler screening for intestinal parasitic infection. Other researchers should undergo this study on large sample size by formol-ether concentration technique, kato-katz technique and molecular techniques.

Acknowledgment

We would like to thank Rift Valley University for allowing us to overcome of numerous obstacles we have been facing during our study. Our sincerest and deepest gratitude goes to our advisors Girma Mulisa for his constant guidance, supervision, encouragement and helpful advice from beginning of proposal to this thesis. We would like thank Adama science and technology higher health centers for offering us necessary data. we wish longlife and better health to all students participated in this study.

Author Contributions

Legese Lemma: Conceptualization, Methodology Data entry, analysis, interpretation and Writing –original draft and developing this manuscript Kebebish kitesa: Data collection and Laboratory Investigation Girma Mulisa: Writing review & editing of manuscript

Compliance with Ethical Standards

Conflict of Interest

The authors declare that they have no competing interests.

Financial Disclosure

All the expense for this original study was covered by principal investigators

Ethics Approval

Ethical Approval was obtained from Rift Valley University by reference letter number RU/2596/2022

References

1. Assemie, M. A., Petrucka, P., Shitu, D., Hune, Y., Abebe, A. M., Telayneh, A. T., & Habtegiorgis, S. D. (2020). Intestinal Parasitic Infection and Its Associated Factors among Primary School Students in Ethiopia; a Systematic Review and Meta-Analysis.
2. Ohaeri, C. C., & Orji, N. B. (2013). Intestinal parasites among undergraduate students of Michael Okpara University of Agriculture, Umudike Abia state, Nigeria. *World Appl Sci J*, 25(8), 1171-1173.
3. Torgerson, P. R., Devleeschauwer, B., Praet, N., Speybroeck, N., Willingham, A. L., Kasuga, F., & de Silva, N. (2015). World Health Organization estimates of the global and regional disease burden of 11 foodborne parasitic diseases, 2010: a data synthesis. *PLoS medicine*, 12(12), e1001920.
4. Dada, E. O. (2015). Prevalence of human intestinal helminth parasites among undergraduate students at the off campus (North gate area), Federal University of Technology, Akure (FUTA), Nigeria. *Open Access Library Journal*, 2(03), 1.

5. Duguma FK, Dadi T, Ayzo BM, Gizachew H, Menge S, Aregaw M. (2019). Prevalence of Intestinal Parasitic Infections and Associated Risk Factors among Ethiopian Army Students, Health Sciences College, Bishoftu, Ethiopia. *Adv Biotechnol* .13.
6. Brooker, S., Clements, A. C., & Bundy, D. A. (2006). Global epidemiology, ecology and control of soil-transmitted helminth infections. *Advances in parasitology*, 62, 221-261.
7. Menjetta, T., Simion, T., Anjulo, W., Ayele, K., Haile, M., Tafesse, T., & Asnake, S. (2019). Prevalence of intestinal parasitic infections in Hawassa University students' clinic, Southern Ethiopia: a 10-year retrospective study. *BMC Research Notes*, 12(1), 1-5.
8. Emile, N., Bosco, N. J., & Karine, B. (2013). Prevalence of intestinal parasitic infections and associated risk factors among Kigali Institute of Education students in Kigali, Rwanda. *Tropical biomedicine*, 30(4), 718-726.
9. Clark, N. J., Owada, K., Ruberanziza, E., Ortu, G., Umulisa, I., Bayisenge, U., & Mbituyumuremyi, A. (2020). Parasite associations predict infection risk: incorporating co-infections in predictive models for neglected tropical diseases. *Parasites & vectors*, 13(1), 1-16.
10. Mahmoudvand H. (2020). Prevalence and associated risk factors of intestinal helminthic infections in children from Lorestan province, Western Iran. *Parasite Epidemiol Control*. 6.
11. Ngrenngarmlert, W., Lamom, C., Pasuralertsakul, S., Yaicharoen, R., Wongjindanon, N., Sripochang, S., & Kiatfuengfoo, R. (2007). Intestinal parasitic infections among schoolchildren in Thailand. *Trop Biomed*, 24(2), 83-8.
12. Derso, A., Yenealem, G., & Addisu, A. (2021). A Five-Year Trend of Intestinal Parasite Prevalence among Students Attending Clinic at University of Gondar, Northwest Ethiopia. *Journal of Parasitology Research*, 2021.
13. Neda E. (2021). Addis Ababa University College of Health Sciences School of Public Health. 81.
14. Shiferaw, K., Tesfay, T., Kalayu, G., & Kiros, G. (2021). Human Intestinal Parasites: Prevalence and Associated Risk Factors among Grade School Children in Maksegnit, Northwest Ethiopia. *Journal of Tropical Medicine*, 2021.
15. Tulu, B., Taye, S., & Amsalu, E. (2014). Prevalence and its associated risk factors of intestinal parasitic infections among Yadot primary school children of South Eastern Ethiopia: a cross-sectional study. *BMC research notes*, 7(1), 1-7.
16. Haftu, D., Deyessa, N., & Agedew, E. (2014). Prevalence and determinant factors of intestinal parasites among school children in Arba Minch town, Southern Ethiopia. *Am J Health Res*, 2(5), 247-4.
17. Khanum, H., Rahman, F., & Zaman, R. F. (2013). Occurrence of intestinal parasites among the teachers, students and staffs of Dhaka University. *Journal of the Asiatic Society of Bangladesh, Science*, 39(2), 239-246.
18. Al-Hindi, A., Redwan, A. A., El-Egla, G. O., Qassem, R. R. A., & Alshammari, A. (2019). Prevalence of intestinal parasitic infections among university female students, Gaza, Palestine. *Avicenna journal of medicine*, 9(04), 143-147.

Copyright: ©2022 Legese Lemma Zeme. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.