



Prevalence and Risk Factors of *Helicobacter Pylori* in Khat Chewers , Hodeidah , Yemen

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Abstract

Background.: *Helicobacter pylori* (*H. pylori*) infection is associated with several upper gastrointestinal disorders, also the most important etiological factor responsible for the duodenal and gastric ulcer and gastric cancer. **Objective:** The aim of the present study to determine the prevalence of *H. pylori* among the khat chewing adults in Hodeidah, Yemen. **Methodology:** : A cross- sectional community-based study was conducted at Center of Tropical Medicine and Infectious Diseases (CTMED) , Authority of AL-Thawrah Public Hospital Hodeidah, Yemen. The study included 400 khat chewer participants between May and August 2019. 217 were males and 183 females, their age ranged from 20 to 60 years. *H. pylori* was diagnosed by IgG Enzyme Linkage Immunosorbent Assay (ELISA) The Statistical Process for Social Sciences (SPSS) was used for data entry and analyses. **Results:** Out of these 400 khat chewers participants, 206 were found positive for *H. pylori*, giving a prevalence of 51.5%. while its prevalence among male and female participants was 53.4 % and 46.6% respectively. **Conclusion:** The prevalence of *H. pylori* infection was high among khat chewers in Hodeidah Yemen. Thus, health education on the transmission routes and risk factors of *H. pylori* infection is underscored in this line to reduce the burden of the disease

Keywords: *H. pylori*, Khat Chewers , Risk Factors . Yemen

1. Introduction

The infection caused by *Helicobacter pylori* (*H. pylori*) has been observed to be responsible for the occurrence of Gastro-duodenal Ulcer and Gastric Cancer (adenocarcinoma and MALT lymphoma). *Helicobacter pylori*, also referred to as *Campylobacter pylori* before, is an acid fast bacterium that can be easily observed in the stomach. It has been discovered in the year 1982 by the Australian researchers Barry Marshall and Robin Warren, when they observed the bacteria in the stomach of a person suffering from chronic gastritis and gastric ulcers. [1]. It is also linked to the development of duodenal ulcers and stomach cancer [2].

Epidemiological studies have revealed that the prevalence of *H. pylori* infection is high in developing countries (up to 90%) than in developed countries [3]. The prevalence of infection varies from one country to another as well as from within the same country based on race, ethnicity and geographical distribution of the population. The prevalence of *H. pylori* infection pattern shows early childhood acquisition of *H. pylori* infection (30-50%) that increases to over 90% during adulthood in developing countries. It persists lifelong unless treated. This is believed to be associated with poor socio-economic status, hygiene practices and overcrowding [4,5]. In Yemen in symptomatic patients with chronic dyspepsia, the prevalence of *H. pylori* infection was reported between 75-82.2% [6].

The most prevalent mode of transmission is thought to be oral to oral and fecal-to-oral. It is not surprising then, that bacteria have been isolated from feces and oral fluid and dental plaque in some of those who have the disease. Transmission from zoonotic reservoirs has been proposed for certain circumstances. The infection rate for *H. pylori* is highest in poor socioeconomic groups, overcrowding, and poor sanitation. [7]. Diagnostic tests of *H. pylori* can be broadly classified into: 1) non-invasive 2) invasive tests. Non-invasive tests can be blood anti-body tests, urea breath test (UBT), and stool antigen tests. Invasive tests can be carried out by means of endoscopic biopsy specimens and include histology, culture, rapid urease test, and developments in endoscopic equipment which help diagnose *H. pylori* during en-

doscopy in real time [8]. Many previous studies have shown a positive relationship between Khat chewing and gastric problems. As reported by Raja'a YA et. al in their research, Khat chewing was associated with duodenal ulcers because of stress that is caused by khat chewing. This is quite a common phenomenon, which is caused due to the amphetamine-like nature of cathine found in khat. There is another possibility of *H. pylori* infection due to khat chewing [9]. In addition, another study as a case-control study in Nairobi country showed that the prevalence of *H. pylori* infection was higher among khat chewers, suggesting that khat chewing is a predisposing factor for gastrointestinal diseases [10]. The Khat plant grows abundantly in Yemen and is one of the most valuable commodities for export in the country. The story of Khat has risen to great heights in this country and the consumption of Khat is now a popular activity among all people in Yemen [11,12]. According to my observations, khat chewers use the same room, food and cutlery while chewing. This kind of practice increases the prevalence of *H. Pylori* infection. Most of the khat chewers do not wash the plant before chewing, some of them were unwilling to wash khat because they believed that it reduces its efficacy. In developing countries like Yemen, there is no study carried out to measure the prevalence of *H. pylori* among khat chewers. Therefore, it is necessary to conduct a study on the prevalence of *H. pylori* infection and risk factors associated with it among khat chewers in Hodeidah, Yemen. To find out the prevalence of *H. pylori* infection among khat chewers in Hodeidah, Yemen. To measure the prevalence of *H. pylori* in khat chewers in Hodeidah, Yemen. To identify the risk factors of *H. pylori* infection among khat chewers. To explore the association between *H. pylori* infection and their knowledge about the transmission route of the disease among khat chewers in Hodeidah, Yemen.

2. Methodology

2.1. Study area

This present study was conducted at the Center of Tropical Medicine and Infectious Diseases (CTMC), that first specialized center in this area. Authority of Public AL-Thawrah Hospital which is a reference Hospital for Hodeidah Governorate and several

neighboring governorates such as Hajjah ,Raymah,and Al – Mah-wit, where it receives more than 2000 patients daily .It includes several departments, including of Pediatrics, Gynecology, Obstetrics ,and Surgery, Internal Medicine department. Al- Hodeidah is located at the western side of Yemen on a flat coastal plain on narrow coastal plain between the foothills of the highlands and the red sea. It has a high population density.

2.2. Study design

The Cross-sectional study was be conducted during the period 1May 2019 to August 2019at Authority of General AL-Thawrah Hospital, Hodeida City, Yemen.

2.3. Study population

The study population was selected from the patients referred to the Medical laboratory for routine investigations and from whose are khat chewers by simple random selection Inclusion and exclusion criteria of study population Inclusion criteria : 1-Any khat chewer person more than 20 years, agreed in participation in the study. 2-khat chewer person having symptoms of dyspepsia and gastritis . Exclusion criteria. 1-Any khat chewer person less than 20 years old . 2-Any khat chewer person has chronic diseases. 3- Any patient refuse to participate in study.

2.4. Sample size and Sampling Method

A total of 400 khat chewers patient were enrolled from the patients attended to the clinics of Al Thawrah hospital. They also include khat chewer persons coming to the lab to do the *H pylori* test to check up on themselves.

2.5. Data collection

Pre-tested structured questionnaire was used for the interview. The questionnaire was divided into several section : A) khat chewer studied information e.g. age, sex, residency. B) Socio-demographic characteristics of khat chewer participant these include : marital status education level , nature work. Khat.chewer or, smoking ,and tobacco chewing. C) Knowledge khat chewers studied about *H. pylori* and its routes transmission.

2.6. Specimens of analysis

In serological method, antibodies against *H. pylori* are detected by immunoblotting, ELISA .and enzyme immunoassays (EIA) .Although more tests for IgA, IgG, and IgM abs are performed, only the IgG ab test is reliable. An ELISA test for presence of *H.pylori* specific IgG antibody is the technique of choice for serologic tests because of its accuracy and simplicity.⁽⁸⁾ . Purified *H. pylori* antigen (DRG, German) coated on the surface of microwells. Diluted patients' serum is added to the wells, and the *H pylori* IgG specific antibody , if present , binds to the antigen. All unbound materials are washed away . Enzyme conjugate is added ,which binds to the antibody antigen complex .Excess enzyme conjugate is washed off and solution of TMB Reagent is added .The enzyme conjugate catalytic reaction is stopped at a specific time . The intensity of color generated is proportional to the amount of IgG-specific antibody in the sample . The results are read by a microwell reader compared in parallel manner with calibrator and contro. Materials provided with the test kit [13]. 1-Antigen -Coated Wells (1 plate ,96 wells)

2.7. Data Analysis

Excel 2016 and SPSS version 15 were used for data entry and analyses. Univariate analysis was used to describe the data using frequencies, percentage etc. Chi-square analyses were used to assess the associations between dependent and independent variables (e.g. gender, knowledge etc. and positive *H .pylori* rate).The results of the study were presented as appropriate by tables, percentages.

2.8. Ethical consideration

The study protocol was approved by Institutional Research & Ethics Committee of the Department of Community Medicine in Hadramout University, College of Medicine (HUCOM). Also, this study was approved by Authority of Public AL Thawrah Hospital, Hodeidah , Yemen. participants were received a simple explanation of the aim of the study and were asked to participate. The participate were accepted verbally. The participants were given the results of the tests they undertook.

3. Results

3.1. Socio-demographic characteristics

Table 1. shows that 96 (24%), out of 400 studied khat chewer population were in age of 20-29 years, 120 (30%), were among age group of 30-39years 16 (29%) in 40-49years while 66 (16.5%) were among age group of 50-59 years and only 2 patients were in age more than 60 years.217 out of 400 studied khat chewer participants were male (54.4%) and 183(45.8) were females. 45 (11.2%) of khat chewer participants were from rural area were 355 (88.8%) were from urban area. The table also shows that 41 (10.5%) out of 400 khat chewers participants were illiterate, 35 (8.8%) were read and write, 75 (18%), had primary education, 165 (41.2%), had secondary school education and 87 (21.7%) of them had university degree

Table 1:Socio-demographic characteristics of the studied khat chewer participants

Characteristics	No	%
Age		
20-29 years	96	24.0
30-39 years	120	30.0
40-49 years	116	29.0
50-59years	66	16.5
60years	2	0.5
Total	400	100
Gender		
Male	217	54.2
Female	183	45.8
Total	400	100
Residency		
Rural	45	11.2
Urban	355	88.8
Total	400	100
Education level		
Illiterate	41	10.3
Write and read	35	8.8
Primary level	72	18.0
Secondary school	165	41.2
University degree	87	21.7
Total	400	100

3.2. Behavioral characteristics of studied khat chewers:

Table 2. shows that 278 out of 400 studied khat chewers representing (69.8%) were daily khat chewing, 113 (28.2%) were weekly chewing and 8 (2 %) were sometimes chewing. 282 (70%) of the participants started chewing since more than 5 years while 66 were began chewing from 2-5 years (16.5%) and 52 had begun for less than 2 years (13%) . 195 (48.8%) of studied khat chewers were smoking an while 205 (51.2%) were nonsmoking, and 298 drink tap water(74.5%), while 75, 27 drink water bottle and well (18.8%),(6.8%) respectively. Those who did not clean Khat before chewing were 287 (71.8%) did not clean khat before chewing while (28.2%) of them did. Those whom used to have their meals at home were 271 (67.8%), and 129 eat at restaurants (32.2%).

3.3. Common symptoms in the studied khat chewers

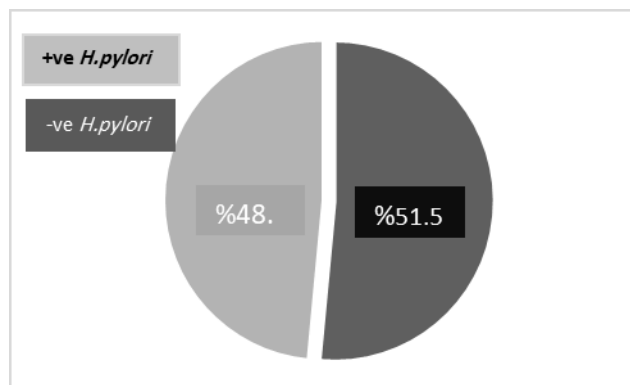
Table 3: shows that the most common symptom is abdominal pain in khat chewer participants (84%), pain was at upper abdomen in 70 % and diffuse abdominal pain in 15.3%. Heart burn association was in 69.0%, while abdominal distension in (60.3%) and nausea/vomiting presented in the morning were present in 50.8% .

3.4. Prevalence rate of *H. pylori* IgG

The prevalence rate of *H. pylori* IgG among studied khat chewers in Hodeidah, Yemen was 51.5% while 48.5% of them were negative (Figure 1).

Table 2 :Behavioral characteristics of studied khat chewers.

Characteristic	Frequency	%
Khat chewing		
Daily	279	69.8
Weekly	113	28.2
Sometimes	8	2.0
Totally	400	100
Beginning of khat chewing		
<2 years	52	13.0
2-5 years	66	16.0
>5years	282	70.5
Total	400	100
Smoking		
Yes	195	48.8
No	205	51.2
Total	400	100
Did you drink a lot of tea or coffee?		
Yes	124	31.0
No	276	69.0
Total	400	100
Source of water		
Tap	298	74.5
Bottle	75	18.75
Well	27	6.75
Total	400	100
Clean khat before chewing		
Yes	113	28.2
No	287	71.8
Total	400	100
Where to eat ?		
In house	271	67.8
In restaurant	129	32.2
Total	400	100

**Figure 1.** Prevalence rate of *H. pylori* IgG among studied khat chewers in Hodeidah, Yemen

3.5. Relationship between the socio-demographic characteristics of khat chewers and *H. pylori* IgG antibody

In table 4. Regarding *H. pylori* IgG test results, 206 out of 400 studied khat chewers (51.5%) found to be positive for *H. pylori* IgG, most of them in the age group of 40-49 years (36.4%) then 30-39 years (30.1%) while (15.8%), (17.8) (0.5%) from each 20-29 and 50- 59 years and 60 year respectively. There was a statically significant association between the age and *H. pylori* IgG test (p – value < 0.001). Among male and female, it was positive in (53.4%) and (46.6%) respectively and there wasn't significant association between the gender and *H. pylori* IgG test (p -value = 0.801). Also, there were no significant relationship between *H. pylori* IgG results and residency (p -value > 0.05) and the same in in regard to level of education (p -value > 0.05).

Table 3 :Common symptoms in the studied khat chewers .

Symptoms	Frequency	%
Dyspepsia:		
Yes	337	84.3
No	63	15.7
Total	400	100
Abdominal pain:	280	70.0
Epigastric pain	62	15.5
Diffuse	58	14.5
No	400	100
Total		
Nausea or vomiting:		
Morning	203	50.8
Wake up	40	10
After eat	80	20
No	77	19.2
Total	400	100
Abdominal distension:		
Yes	241	60.3
No	159	39.7
Total	400	100
Nature of pain:		
Heartburn	276	69.0
Colic	61	15.3
Nothing	63	15.8
Total	400	100

3.6. Relationship between nature of work of studied khat chewers and *H. pylori* IgG test results :

Table 5. shows the association between type of work and *H. pylori* infection, that most of positive *H. pylori* IgG test results among studied khat chewers were among housewives (32%) then workers (cleaning and factory workers)(15.5%). Then the drivers (9.7%) , teachers, administrative s, health workers and soldiers with (7.3%, 7.3%, 11.2% and 5.8%) respectively, and there statistically significant association between the nature of work and *H. pylori* IgG test results. (p -value = 0.021).

3.7. Risk factors with *H. pylori* infection among studied khat chewers

On table 6 . shows that 279 participants were daily khat chewers, 76.2% (157) out of them were positive according serology tests results ,then 47 out of 113 (22.8%) weekly khat chewers were positive *H. pylori* IgG test. There was significant association between continuously khat chewing and *H. pylori* IgG test results . p -value = 0.0099. Regarding period of khat chewing according to *H. pylori* serology results, 161 out of 282 (78.2%) khat chewers for more than 5years were positive for *H. pylori* IgG .While khat chewers for between 2-5years and less than 2years 30 and 15 (14.6%) (7.3%) were positive for *H. pylori* IgG respectively. There was high significant association between period of khat chewing and *H. pylori* IgG results (p value = < 0.001) while there were no statistically significant association between the smoking ,place of eating and source of water (p – value > 0.05) .Distribution of cleaning of khat before chewing showing that 287 (71.8%) of khat chewers didn't clean their khat, and 158 (76.7) of them were *H. pylori* positive IgG results while 113 (28.2) of khat chewers clean khat before chewing ,48(23.3)out of them was *H. pylori* positive IgG .There were significant association between cleaning khat before chewing and *H. pylori* serology results(p -value=.0.023).

Table 4 : Relationship between the socio-demographic characteristics of studied khat chewers and *H. pylori* IgG antibody.

Characteristics	Total		Positive (IgG)		Negative (IgG)		Chi-square	p-value
	No	%	No	%	No	%		
Age group/years								
20-29	96	24.0	32	15.5	64	33.0	20.97	< 0.001**
30-39	120	30.0	62	30.1	58	29.0		
40-49	116	29.0	75	36.4	41	21.1		
50-59	66	16.5	36	17.5	30	15.5		
60	2	0.5	1	0.5	1	0.5		
Gender:							0.06	0.801
Male	217	54.2	110	53.4	107	55.2		
Female	183	45.8	96	46.6	87	44.8		
Residency:							0.00	1
Rural area	45	11.2	23	11.2	22	11.3		
Urban area	355	88.8	183	88.8	172	88.7		
Education level:							7.82	0.099
Illiterate	41	10.3	19	9.2	22	11.3		
Read and write	35	8.8	25	12.1	10	5.2		
Primary level	72	18.0	39	18.9	33	17.0		
Secondary level	165	41.2	77	37.4	88	45.4		
University degree	87	21.7	46	22.3	41	21.1		
Total	400	100	206	51.5	194	48.5	.360	.000

Significant: p-value ≤ 0.05 is significant.**Table 5:** Relationship between nature of work of studied khat chewers and *H. pylori* IgG test results

Nature of Work	<i>H. pylori</i> IgG				Total		Chi-square	<i>p-value</i>
	positive		negative					
	No	%	No	%	No	%		
Health workers	23	11.2	24	12.3	47	11.7	25.35	0.021
Driver	20	9.7	12	6.2	32	8.0		
Khat seller	6	2.9	4	2.1	10	2.5		
Engineer	5	2.4	1	0.5	6	1.5		
Teacher	15	7.3	10	5.2	25	6.2		
Soldier	12	5.8	10	5.2	22	5.5		
Farmer	3	1.5	8	4.1	11	2.8		
Administrative	15	7.3	8	4.1	23	5.8		
Housewife	66	32.0	53	27.3	118	29.7		
Student	5	2.4	23	11.9	28	7.0		
Lawyer	1	0.5	1	0.5	2	0.5		
Worker	32	15.5	39	20.1	71	17.8		
Fisher	2	1.0	1	0.5	3	0.8		
informative	1	0.5	0	0.0	1	0.2		
Total	206	51.5	194	48.5	400	100		

3.8. Relationship between symptomatic and asymptomatic khat chewers and *H. pylori* IgG positive

Table 7 shows that the most of khat chewers studied 334 (86%) had GIT symptoms while 56 (14%) were asymptomatic. Among symptomatic khat chewers studied group 183 (45.7%) of them were positive for *H. pylori* IgG and 23 (5.8%) of asymptomatic khat chewers were positive for *H. pylori* IgG

3.9. Knowledge of khat chewers studied group about *H. pylori* infection and its transmission routes

Table 8 shows the relationship between Knowledge of khat chewers studied group about *H. pylori* infection and *H. pylori*

IgG test results . 178 out of 400 khat chewers of them (45.5%) know about *H. pylori* , 91 (44.2%) of them were positive for *H. pylori* IgG test. 222 (55.5%) of khat chewers studied didn't know about *H. pylori* and 155 (55.8%) of them were positive for *H. pylori* IgG test. There weren't significant association between knowledge of khat chewers about *H. pylori* infection. Only 33 of 400 (8.2%) of the Participants knew the transmission routs of *H. pylori* infection, 11 of them were positive *H. pylori* IgG test (5.3%) . 367 of 400 khat chewers studied didn't know the transmission routs of *H. pylori* (91.8%) and 195 of them were positive *H. pylori* IgG test (94.7%). There were statistically significant association (p -value = 0.029).

Table 6. Risk factors with *H. pylori* infection among studied khat chewers .

Characteristics	<i>H. pylori</i> IgG				Total		Chi -Square	<i>p</i> - value
	positive		Negative					
	No	%	N0	%	No	%		
Khat chewing :								
Daily	157	76.2	122	62.9	279	69.8	9.23	0.0099
Weekly	47	22.8	66	34.0	113	28.2		
Sometimes	2	1.0	6	3.1	8	2.0		
Total	206	100	194	100	400	100		
Period of khat chewing								
< 2years	15	7.2	37	19.1	52	13.0	22.18	< 0.001*
2-5 years	30	14.6	36	18.5	66	16.5		
>5 years	161	78.2	121	62.4	282	70.5		
Total	206	100	194	100	400	100		
Smoking :								
Yes	109	52.9	86	44.3	195	48.8	2.94	0.087
No	97	47.1	108	55.7	205	51.2		
Total	206	100	194	100	400	100		
Drink a lot of tea or coffee								
Yes	65	31.6	59	30.4	124	31.0	0.02	0.806
No	141	68.4	135	69.6	276	69.0		
Total	206	100	194	100	400	400		
Source of drink water								
Tap water	159	77.2	139	71.6	298	74.5	1.15	0.563
Bottle	33	16.0	42	21.7	75	18.7		
Well	14	6.8	13	6.7	27	6.8		
Total	206	100	194	100	400	100		
Clean khat before chewing:								
Yes	48	23.3	65	33.5	113	28.2	5.37	0.023*
No	158	76.7	129	66.5	287	71.8		
Total	206	100	194	100	400	100		
Where to eat								
House	142	68.9	129	66.5	271	67.8	0.28	0.597
Restaurant	64	31.1	65	33.5	129	32.2		
Total	206	100	194	100	400	100		

Table 7: Relationship between symptomatic and asymptomatic khat chewers and *H. pylori* IgG positive

Characteristics	<i>H. pylori</i> IgG				Total		Chi- square	<i>p</i> -value
	Positive		Negative					
	No	%	No	%	No	%		
Symptomatic khat chewers	183	45.7	161	40.2	334	86.0	2.37	0.124
Asymptomatic khat chewers	23	5.8	33	8.3	56	14.0		
	206	51.5	194	48.5	400	100		
Significant: <i>p</i> -value ≤ 0.05 is significant								

Table 8. Knowledge of khat chewers studied group about *H. pylori* infection and its transmission routes

Knowledge of khat chewers studied about <i>H. pylori</i> infection	<i>H. pylori</i> IgG results				Total		Chi-square	<i>p-value</i>
	positive		Negative					
	No	%	No	%	No	%		
Do you know about <i>H. pylori</i> ?								
Yes	91	44.2	87	44.8	178	44.5	0.016	0.893
No	155	55.8	107	55.2	222	55.5		
Total	206	51.5	194	48.5	400	100		
Do you know about <i>H. pylori</i> trans- mission routes ?								
Yes	11	5.3	22	11.3	33	8.2	4.752	0.029*
No	195	94.7	172	88.7	367	91.8		
Total	206	51.5	194	48.5	400	100		

Significant: $p\text{-value} \leq 0.05$ is significant.

4. Discussion

In the present study, the sero-prevalence of *H. pylori* in khat chewers was found to be 51.5%, which is lower than the previous study done on khat chewers as a case control study in Nairobi, Kenya (2015), where the prevalence of *H. pylori* among khat chewers was 67.2%. [10] Another study by Alebie et al. (2016) reported the prevalence of *H. pylori* among khat chewers to be 72.4%. [14] However, the result obtained in the present study was higher than the previous study done by Akeel M, et al. (2018) in Saudi Arabia, which reported a prevalence rate of *H. pylori* in khat chewers to be 46.5% [15]. There is no previous study done on the relationship between *H. pylori* infection and chewing of khat in Yemen. It is known that khat is rich in alkaloids, therefore, it provides a suitable medium for growing *H. pylori* in the stomach. Therefore, it can be said that there is a relationship between human *H. pylori* and chewing of khat. In our study, majority of those infected fall within the age category of 30-39 years and 40-49 years at 30.1% and 36.4% respectively. Our study differs from a study carried out in Mumbai, where age related prevalence of *H. pylori* infection revealed results with maximum prevalence of 58% in the age group of 30-39 years [16]. In this research, it is shown that there is a statistically significant relationship between the presence of *H. pylori* infection and age. In the current research, more than 50% of the infected participants were males with 53.4%, while females represented 46.6%, with no statistical significance in relation to sex to be considered a risk factor. However, this result disagrees with another study done in Taiz (Ameri and Alkadasi 2013), in which females (52.5%) had a higher infection rate than males (41.9%) [17].

Additionally, in This study there is no relationship between *H. pylori* IgG results and residency (p -value= 0.956) and level of education (p -value =0.493). This finding is in agreement with study of Alyahawi et al which shows that there was an association between education level and acquisition of *H. pylori* infection [11]. The number of khat chewers has significantly increased in Yemen and the use of khat has become popular among all classes of Yemeni population whether in rural and urban areas. Many people use khat for various reasons such as social entertainment, to stay awake while driving long distance [18,19] to relieve physical tiredness and work hard for long time.

There are studies which show that students attending universities and colleges use Khat to improve their academic performance. In the present study, we found that out of 86% of participants, most of them were symptomatic and 14% were asymptomatic participants while *H. pylori* positivity was more in case of symptomatic than asymptomatic participants which were 45.7% and 5.8%, respectively. This shows that *H. pylori* plays a key role in peptic disorders. Most of the Khat chewers participants had dyspeptic symptoms which were close to those of Yemen, where in Aden it was 75% and in Sana'a 82.2% [20, 21]. Other study Nigussie et al that conducted in Ethiopia (2013) showed dyspeptic symptoms among khat chewers were 71.8% [22]. Our current study revealed that khat chewing have play important roles to demonstrate dyspeptic symptoms. The presence of *H. pylori* among asymptomatic indicates the prevalence of infection in our community and this is consistent with may reports that indicate *H. pylori* harbors GIT without causing inflammatory changes and only 10-20% of those colonized by *H. pylori* will ultimately develop gastric and duodenal inflammation. Although this study did not show an association between infection, *H. pylori* symptoms and chewing khat.

In the current study, *H. pylori* infection mostly occurred among housewives 32%, followed by workers, including cleaning and factory workers 15.5%, and drivers 9.7%. Thus, it can be concluded that the socioeconomic conditions and poor hygiene are factors contributing to acquisition of *H. pylori* infection among participants who chewed khat. There was no association between type of occupation and acquisition of *H. pylori* infection. The recent study has shown that *H. pylori* infection mostly occurred among participants who chewed khat on a daily basis (76.2%) and weekly khat chewers (22.8%). Therefore, there is an association between chewing khat and acquisition of *H. pylori* infection. Chronic khat chewers (those who chewed for more than 5 years) acquired *H. pylori* infection in 78.2%. Hence, there is an association between duration of chewing khat and acquisition of *H. pylori* infection. In the current study, *H. pylori* infection occurred in 76.7% of infected khat chewers who did not clean khat prior to chewing and in 23.3% of those who cleaned it before chewing.

Therefore, there was a significant association between *H. pylori* and cleaning khat before khat chewing. This supports (Raja'a et al.) who found that the effect may be because the presence of *H. pylori* associated with khat can be due to using of organic compost or fertilizers, beverages consumed during the session or insecticides and chemicals used for growing the khat plants [9]. In the present study revealed that 52.9% of infected khat chewers were smokers, it also found that there wasn't association between the smoking and *H. pylori* infection in khat chewers participants. Our results differed from those obtained by Alyahawi et al study (2018) and Alebie et al study (2017) [11,14]. The study also showed that the majority of participants (91.7%) didn't know the transmission routes of *H. pylori*. There was significant relationship between knowledge of transmission routes of *H. pylori* and acquisition *H. pylori* infection. Therefore, the lack of awareness of transmission routes of *H. pylori* is one of well-known risk factor for acquiring the *H. pylori* infection. [14].

5. Conclusion

The findings of the study indicate that there was a statistically significant relationship between Khat chewing and infection with *H. pylori* among the adults in Hodeidah, Yemen. There was a high prevalence of *H. pylori* among the khat chewers in Hodeidah, Yemen. The study indicated that There was a statistically significant relationship between the age and *H. pylori* IgG test. There was no statistically significant relationship between *H. pylori* infection and the sex, educational level, residents, nature of work among the khat chewers in this study. This study indicated that there is a high prevalence of *H. pylori* infection which increases with the frequency of the khat chewing as well as the period of chewing the drug. The prevalence of dyspeptic and gastritis symptoms increases among khat chewers participants. Apart from the mentioned practices, poor personal hygiene practice (khat not cleaned before chewing) and lack of knowledge of the transmission ways of *H. pylori* infection were the major contributing factors for this high prevalence.

Authors' contributions

Abdulkadoos R. : Methodology, formal analysis, software, writing—original draft; **Bahaj A** is a supervision and writing—review and editing.

Data Availability

The data that support this study are available from the corresponding author upon reasonable request

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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