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SEROPREVALENCE OF *HELICOBACTER PYLORI* AMONG HUMAN IN ERBIL GOVERNORATE, KURDISTAN REGION, IRAQ

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ABSTRACT: The present work was conducted to survey the occurrence of *H.pylori* among human in Erbil Governorate.Three hundred and ten (310) blood samples were collected during the period from July to December 2017.Samples were collected from 170 male (comprised 75 and 95 samples from rural and urban area consecutively), and 140 female (included 65 and 75 samples from rural and urban area respectively).The prevalence of *H.pylori* in total samples were (39.4%).The rate of infection among females were (40.7%), compared with males infection rate were (38.2%).The prevalence of *H.pylori* in the age between 41- 50 years were (51.2%), followed by the human with age > 61years (46.5%) , then from 31- 40 years (44.4%) after that from 1-10 years 40.0% , from 51- 60 years 35.6% ,and from 11 – 20 years 31.1%, finally the age between 21 – 30 years which found just (27.3%).The high prevalence of *H.pylori* antibodies among males was41.3% and 35.8% in rural and urban area consecutively.Also, the prevalence rate of *H.pylori* antibodies was high 41.5% in female among rural area, whereas 40.0% in female among urban area.Results revealed that the occurrence increased in September(44.6%)and October(41.5%).We concluded that the prevalence of H. *pylori* among human in Erbil Governorate was high, and the infection occurred at different stages of life.The importance of public health hazards was discussed.

KEYWORDS: Seroprevalence, *H. pylori*, Human,Erbil governorate,Kurdistan region,Iraq.

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1.INTRODUCTION

The genus Helicobacter belongs to the family Helicobacteraceae, order Campylobacterales, subdivision of the *Proteobacteria*.This family also includes the genera *Wolinella, Flexispira, Sulfurimonas, Thiomicrospira,* and *Thiovulum*.To date, the genus *Helicobacter* comprises of 32 validly published species.*Helicobacter winghamensis*has not been included in the published taxonomy because it has no standing in nomenclature. *Helicobacter pylori* are the type species.Members of this family are able to colonize various ecological niches in the gastrointestinal tract in both humans and a broad range of animal hosts[1,2].With respect to their favored site of colonization, *Helicobacter* species are divided into two groups. The first group named gastric *Helicobacter* species,which preferably colonize the host's stomach of humans,sheep,cattle,dogs,cats,cheetahs ,rhesus ,monkeys,ferrets,whales, and dolphins , represent only one-third of the known species of *Helicobacteraceae* ,while the remaining two-thirds of *Helicobacter* species are referred to as non – gastric or enterohepatic *species (EHS),* are more commonly found colonizing other kinds of animals such as mice, rats, rodents, and hamsters.Both groups demonstrate a high level of organ specificity, such that gastric Helicobacters, in general, are unable to colonize the intestine or liver, and vice versa [3,4].For a long time, the human stomach was considered to be an inhospitable environment for microorganisms mainly because of harsh acidic conditions.This changed in 1982 when Warren and Marshall confirmed that *H. pylori* are a unique bacteria able to colonize human stomach.It found under the mucus layer in the gastric pits in close apposition to gastric epithelial cells and the overlying gastric mucin, which is a highly specialized niche. Helicobacter bacteria are the only known microorganisms that can thrive in the highly acidic environment of the stomach. Currently, the oral cavity has been considered to be a suitable reservoir for *H.pylori* subsistence [5-7]. There is an age-related increase in the acquirement of infection with *H.pylori*.The general belief is that infection takes place mostly in children under the age of 5 years, that is mean most of the people obtain *H. pylori* infection during their early childhood. The epidemiological evidence has shown that *H.pylori* rates ranging from 20-50% in the adult populations of the developed world but the occurrence is much more in the developing countries with prevalence as high as 90% in some countries.The socioeconomic status of the family during childhood appears to be the major marker of infection.Higher prevalence exists in regions of low socioeconomic and poor sanitary conditions, and in rural as contrasted to urban areas.Overcrowding is a risk factor for acquisition of *H.pylori* infection in children.Contaminated water and food also act as sources of infection [8-10]. *H. pylori* is a Gram-negative, S curved, rod-like bacterium, about2 μm to 3.5 μmlong with a diameter of0.5 μm to 1.0 μm.It is the helical shape(from which the genus name derives) is thought to have evolved to penetrate the mucoid lining of the stomach.This Bacterium is highly motile due to its multiple flagella that emerge from one of

the rounded ends.*H. pylori* typically has up to six polar sheathed flagella. Members of the genus *Helicobacter* are all microaerophilic organisms, and many but not all species are urease positive, also in most cases are catalase and oxidase positive[11-13]. Members of the family *Helicobacteraceae,* particularly the *Helicobacter* species, have been recognized as agents of gastrointestinal disease in both humans and a broad range of animal hosts, while not all species are pathogenic.Elshiekh et al. ,[14] stated that the *H.pylori* has been strongly linked to gastritis, duodenal ulcer, gastric carcinoma and mucosa-associated lymphoid malignancies, and it was categorized as a class one(definite)carcinogen implicated in the etiopathogenesis of gastric malignancies in 1994 by the World Health Organization [15].Jemilohun and Otegbayo [9] mentioned that there is an association between *H. pylori* and gastric lymphomas.Rana et al.[16] reported that 90% of duodenal ulcers and 70% of gastric ulcers are associated with Helicobacter pylori infections.It is the most general contagious human pathogen, infecting more than 50% of the peoples worldwide (just about 30% of children and 60% of adults), and is allied with 70% of benign gastric ulcers and 90% of duodenal ulcers.*Gonzalez-Pons et al.[17] clarified that H. pylori* are the major cause of peptic ulcer sickness and gastric cancer, besides it possesses the enzyme *urease,* which hydrolyzes urea to carbon dioxide and ammonia, and this enables survival of the bacterium in the acidic environment of the stomach.*H. pylori* are quite a frequent infection all over the world.It is one of the world's most common human bacterial ubiquitous infections and associated with chronic gastritis, peptic ulceration, and gastric cancer.The occurrence of *Helicobacter pylori* (*Hp*) infection is still high in most countries.There were approximately 4.4 billion individuals among both developed and developing countries are infected with H.pylori worldwide in 2015 making it one of the most controversial bacteria in the world.Over 80% of individuals infected with the bacterium are asymptomatic, and it may play an important role in the natural stomach ecology [18,19]. *H.pylori has* been recognized in human by various researchers in different countries[20- 24].Prevalence of H. pylori infection varies from 7.3 % to 92.0 % depending on age, geographic location, and socioeconomic status of the populations.Also, the epidemiology of *H.pylori* infection varies greatly among countries and even between population groups within the same country [25, 26]. Several studies have shown that the prevalence of *H.pylori* is still high in most countries.In the south and east Europe, South America, and Asia, the prevalence of *H.pylori* is often higher than 50%, Whereas, in north European and North American populations, about one-third of adults are still infected[27].presently, Al-Jiffri and Alsharif [28] mentioned that *H. pylori* constitute the universal infection among human being as it affects about 2/3 of the population worldwide.The occurrence of *H.pylori* infection in Kurdistan region is increased and primarily acquired in early childhood, therefore the aims of this research were to study the seroprevalence of *H. pylori* infection among human in Erbil Governorate, and to determine the prevalence of *H.pylori* in humans during the

months of study.Also the studying of the epidemiological data on *H.pylori* help in the establishing public health action that could halt transmission and therefore acquisition of the infection and aid the therapeutic program to get rid of the bacterium.

2. MATERIALS AND METHODS

2.1. Study Design and Sampling

Three hundred and ten (310) human blood samples were collected among Erbil Governorate, during the period from July 2017 to December 2017.Samples were collected from 170 male (comprised75and95samples from rural and urban area respectively), and 140 female (included 65 and 75 samples from rural and urban area consecutively).All males and females ranged in age from one (1) year to more than sixty-one (> 61) years.Five (5) ml blood samples were collected from every individual into vacutainer tube without anticoagulant.The samples collected were allowed to clot and forwarded by the sterile container to the Microbiology Laboratory/Department of Pathological Analysis/ College of Science/Knowledge University.In the laboratory the blood centrifuged, and serum was separated for used to detect *H.pylori* antibodies.

2.2. Personal information

Information about persons was recorded, including gender, age, and habitation site.

2.3. Detection of *H.pylori*antibodies in the blood

In the laboratory, the detection of *H.pylori* antibodies in blood samples was done by using *H.pylori* antibody test card(*Fastep* Houston, USA;**Fastep® Rapid Diagnostic Test**).The test was carried out according to[21].The subsequent steps were followed:-

1- Brought the kit components to room temperature before testing.

2- Opened the pocket and removed the card.

3- The test used immediately.

4- Labeled the test card with patient identity.

5- Applied 3 drops (120-150μL) of serum to the sample well marked.

6- Result was read at the end of 10 minutes.

7- A strong positive sample may show result earlier.

Interpretation of result

Positive result / Both control line and the test line appears.It indicates the antibodies of the *H.pylori* have been detected.

Negative result / Only control line appears.

2.4. Statistical Analysis

Data were analyzed using Chi-Square test and SPSS software version 15.

3. RESULTS AND DISCUSSION

3.1. **Prevalence of *H.pylori* antibodies in human according to gender**

The total prevalence of *H.pylori* in human blood was 122/310 (39.4%)(Table 1), also from this table, we noticed that the female is more exposed 57/140 (40.7%) to infection with *H.pylori*, compared with male infection rate 65/170 (38.2%)

Table (1): -Prevalence of *H.pylori* antibodies for human according to gender.

Gender	No of Samples examined	Positive		Negative		Chi Square	P Value
		No.	%	No.	%		
Male	170	65	38.2	105	61.8	0.198	0.657 NS=Non-Sig.
Female	140	57	40.7	83	59.3		
Total	310	122	39.4	188	60.6		

3.2. **Prevalence of *H.pylori* antibodies in human according to age**

This study showed that the prevalence rate of *H.pylori* antibodies was high (51.2%) in the age group between 41- 50 years, followed by the group with age more than sixty-one (> 61) years (46.5%) (Table 2).

Table (2): -Prevalence of *H.pylori* antibodies for Human according to Age

Age Group (Years)	No of Samples examined	Positive		Negative		Chi Square	P Value
		No.	%	No.	%		
1-10	45	18	40.0	27	60.0	8.176	0.226 NS
11-20	45	14	31.1	31	68.9		
21-30	44	12	27.3	32	72.7		
31-40	45	20	44.4	25	55.6		
41-50	43	22	51.2	21	48.8		
51-60	45	16	35.6	29	64.4		
> 61	43	20	46.5	23	53.5		
Total	310	122	39.4	188	60.6		

3.3. Prevalence of *H.pylori* in male according to habitation site

Table (3): Prevalence of H.pylori for male according to habitation site

Habitation Site	No of Samples examined	Positive		Negative		Chi Square	P Value
		No.	%	No.	%		
Rural Area	75	31	41.3	44	58.7	0.545	0.460 NS
Urban Area	95	34	35.8	61	64.2		
Total	170	65	38.2	105	61.8		

According to the habitation site of the male participants, the high prevalence of *H.pylori* antibodies was 31/75 (41.3%) in a rural area, whereas 34/95 (35.8%) among urban area (Table 3).

3.4. Prevalence of *H.pylori* in female according to habitation site

From this study, we noticed that the prevalence rate of *H.pylori* antibodies was high27/65(41.5%) in female participants among rural area, whereas 30/75 (40.0%%) in the female participants among urban area (Table 4).

Table (4): - Prevalence of *H.pylori* for Female according to habitation site

Habitation Site	No of Samples examined	Positive		Negative		Chi Square	P Value
		No.	%	No.	%		
Rural Area	65	27	41.5	38	58.5	0.034	0.853 NS
Urban Area	75	30	40.0	45	60.0		
Total	140	57	40.7	83	59.3		

3.5.The relationship between Months and prevalence of *H.pylori* antibodies during the period of Study

Table 5 points up the relationship between months and prevalence of H.pylori antibodies in human blood during the period of study. From this table we indicated that the highest rate of prevalence of *H.pylori* antibodies was found in September25/56(44.6%), then in October 22/53 (41.5%), while the lowest rate was found in December and August 19/53(35.8%) and 16/45 (35.6%) respectively.

Table (5): -Relationship between Months and prevalence of H.pylori antibodies during the period of Study

Month	No.of Samples examined	Positive		Negative		Chi Square	P Value
		No.	%	No.	%		
July	47	18	38.3	29	9.4	1.326	0.932 NS
August	45	16	35.6	29	9.4		
September	56	25	44.6	31	10.0		
October	53	22	41.5	31	10.0		
November	56	22	39.3	34	11.0		
December	53	19	35.8	34	11.0		
Total	310	122	39.4	188	60.6		

4. CONCLUSION

Gastric cancer is the fifth most common incident cancer and the third leading cause of cancer death worldwide, and *H.pylori* is a major risk factor for the increase of gastric cancer,so the epidemiological studying about *H.pylori* is essential because it provides necessary information regarding its prevalence rate, also help in the establishing public health action that could halt

transmission and then acquirement of the infection, besides aid the therapeutic program to eradicate the bacterium. Serological tests are more universally used, and it is the most practical method available to confirm diagnosis.*H.pylori* antibodies rapid test is used to monitor human sera in different places.This test is the easiest methods to apply and the most globally used for recognizing antibodies of infection with *H.pylori* [29,30].In the work at hand, three hundred and ten 310 (170 males and 140 females) blood samples were collected among Erbil Governorate, Erbil, Kurdistan region, during the period from July 2017 to December 2017.The overall prevalence of *H.pylori* antibodies in total human samples were122/310 (39.4 %), which is an approach or slightly lower percentage of Sheikhian et al.[31]in Iran, who found the prevalence of *H.pylori* infection in the dyspeptic patient was 43 %.The result of our study was non agreement with a study in Egypt where the prevalence of *H.pylori* infection was 60% [32], also our result was inconsistent with Salih[33]in Saudi Arabia who found the prevalence of *H.pylori* infection was 75%.The prevalence of *H.pylori* among humans in Erbil Governorate showed a less rate compared with that reported from other studies in some developing countries.Bani-Hani and Hammouri [34] in Jordan indicated that the prevalence of *H.pylori* infection was 82 %, Perez -Perez et al.[35] mentioned that the prevalence of *H.pylori* infection among patients underwent upper gastrointestinal endoscopy in Yemen, Sana‘a major hospital, was very high (78%), also Sasidharan et al.[36] in Nepal reported that the infection rate with *H.pylori* was 50.47%. While the result achieved in this study was more than those reported in some other countries, the prevalence of *H.pylori* infection in Australia was 21.5%[37],30.4% in Malaysia [36], and 25% in Oman[38].However, a recent study conducted by Shu et al.[39] showed that the prevalence of *H.pylori* infection was 3.1 % and 18.6 % in Japan and China consecutively.The changeability in the occurrence rate of *H.pylori* infection could be due to poor social and economic development,differences in socioeconomic condition,poor hygiene practices during childhood;absence of a sewage disposal facility during childhood;standard of hygiene and source of drinking water,also low education level;crowded families;and improper food handling [40]. Higher incidence exists in regions of low socioeconomic and poor sanitary conditions, and in rural as contrasted to urban areas.The socioeconomic status of the family during childhood appears to be the major marker of infection [41,42]. Also from Table1, we noticed that the highest rate of frequency of *H.pylori* antibodies was found in female57/140(40.7%), while the lowest rate of occurrence was found in male 65/170(38.2%).Statistically, the differences in the *H.pylori antibodies* test between male and female according to positive and negative examined were not significant ($p>0.05$).Our result was compatible with Yucel *et al.[43]*inTurkey, who found that the female was more exposed to infection with *H.pylori,* by using monoclonal *H.pylori* stool antigen test, and the rate of infection in female was 76.2%, compared with the rate of infection in male 23.8 %.In the study conducted by Elshiekh et al.[14]in Egypt, reported that the rate of infection

in female and male was 52% and 48% respectively.The result from this study doesn't agree with Faisal *et al.[44]* in Pakistan, who found that the prevalence of *H.pylori* infection in male was 71.4 %, while in female was 28.6 %.The results from Table 2 show that the prevalence of *H.pylori* antibodies among human in the age between 41- 50 years were (51.2%), followed by the human with age more than sixty-one (> 61) years (46.5%) , then from 31- 40 years (44.4%) after that from 1-10 years 40.0% , from 51- 60 years 35.6% ,and from 11 – 20 years 31.1%, finally the age between 21 – 30 years which found just 12/44 infected (27.3%).No significant differences in the *H.pylori antibodies* test between age groups according to positive and negative results ($p>0.05$).The result was non-agreement with result found byYucel[43], whom they found 43.7% of the *H.pylori* infection with age from 20 years and under, 46.8 % with age from 21-23 years, and 9.5 % with age from 24 years and over.Also, our results were not agreement with research of Ahmed et al.[45] in Islamabad Suburbs (Pakistan), where they reported that the prevalence rate was 73.6 % in 3-8 years' age group, 74.4 % in 8-12 years' age group and 60.4% in children between 12-16 years of age.In another hand, results were consistent for somewhat with the result found by Bader et al.[46] in Egypt whom found that the prevalence of *H.pylori* antigen in stool from children < 5 years was 30 %, followed by 5-10 years was 40 %, finally age group >10 years the rate was 20%. The results obtained from this study are considered opposite of the results achieved by Al-shamahy[20] in Yemen, who found the seroprevalence of H.*pylori* antibodies was 9 % by using Enzyme -labeled immunosorbent assay,and the occurrence according to age varied from 0.0 % in children under 2 years to 12.5 % in the age group 9 - 10 years, but our results agree with him in terms of the correlation between the rates of positive antibodies and increasing age.In a recent study designed byAL-Sinaniet al.[38] in Oman, the overall prevalence of *H.pylori* in Omani children increased from 7% in an age less than 5 years, to 33% in those aged between 5 and 10 years.Also, Awukuet al.[47]in Ghana, reported that the overall prevalence of *H. pylori* infection among children was 14.2%, and the age group with the minimum *H. pylori* infection rate was 14–16 years with the prevalence of 11.9%. The study population showed a female: male ratio of 1.3:1, with a higher proportion of females(16.8%) having *H. pylori* infection compared to males(10.7%) .Mayass [21] and Al-Sinaniet al.[38] reported that the prevalence of *H.pylori* infection increased with age, but a slight decrease in prevalence in the oldest age group is probably due to decreasing specific immune response among older individuals and /or to the decreased number of microorganisms as a result of gastric atrophy. The high occurrence of *H.pylori* infection in adult life can possibly be clarified by the exposure of peoples to *H.pylori* early in life because of risk factors, like bad sanitation, lack of proper hygiene and increased susceptibility due to a genetic tendency.Overcrowding is a risk factor for acquisition of *H.pylori* infection in children, contaminated water and food also act as sources of infection. The epidemiological studies published at the beginning of this decade supported the evidence that *H.*

pylori are most common in impoverished areas with overcrowding and poor sanitation. Transmission occurs during childhood through an oral–oral or a fecal-oralroute[48,49**]**.There are a large number of *researchers* indicated a higher rate of *H. pylori* infection either in males or females, and there was an increase in the rate of *H. pylori* infection with increasing age. This may be due to weakened immune responses in elderly as compared with children who are better able to spontaneously eliminate this pathogen with a stronger immune response. Other reasons could be the more exposure of aged persons to the *H. pylori* in their lives as compared to children and youthful.In general, the occurrence of the infection is associated with age, and there is an age-related increase in prevalence in the developed countries which is a reflection of birth group effect. In any case, the broad idea is that infection takes place mostly in childhood and the rate of acquirement has reduced with the improved sanitary condition and probably antibiotic use among children in the developed countries. According to the Table 3, we noticed that the high prevalence of *H.pylori* antibodies among males were 41.3% and 38.2% in rural and urban area respectively.These observations indicate that *H.pylori* was prevalent in both of these areas.There is no significant difference in the *H.pylori antibodies* test for male according to habitation for positive and negative samples ($p>0.05$).Also, from this study (Table 4) we noticed that the prevalence rate of *H.pylori* antibody was high 27/65(41.5%) in female participants among rural area, whereas 30/75 (40.0%%) in female participants among urban area. The obtained results indicated that there was no significant difference at the level of ($p>0.05$) in the *H.pylori antibodies* test for female according to habitation for positive and negative examined samples.In this work, the correlation between months and prevalence of *H.pylori* antibodies through a period of study in Erbil Governorate were followed up. Results which illustrated inTable5,explain that the prevalence increased in September(44.6%),October(41.5%), and November 39.3%.Then in July, December and August, the prevalence rate was(38.3%), (35.8%), and (35.6%) consecutively.The statistical analysis of differences in the *H.pylori antibodies* test for six months according to our results were not significant ($p>0.05$).The results are consistent for somewhat with the study conducted by [21], who found that the incidence increased in March and September(100 %). Then in May and February, the prevalence rate was (95.45 %) and (95.00 %) respectively. But the rate of dominance was decreasing whenever moved away from these months, in June (79.17 %), July (75.00 %), followed October (73.91 %), August (70.83 %), finally in April (56.52 %).

5. CONFLICT OF INTEREST

The authors have declared that they have no conflict of interest**.**

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