Journal of Medical and Pharmaceutical Sciences
Issue (1), Volume (2)
March 2018
ISSN: 2522-333X

المجلة العربية للعلوم و نشر الأبحاث
Arab Journal of Sciences & Research Publishing
AJSRP

Prevalence of Helicobacter pylori in Human in Dhamar Governorate / Yemen

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Abstract: The present study was conducted to determine the existence and spread of H. pylori among different ages of human. Four hundred and twelve (412) were collected included 206Blood samples and 206 Stool samples from the same patients. This samples were collected from General Thamar Hospital and some private medical laboratories. The results revealed that the prevalence of H.pylori antibody in human blood samples were (82.52%), while the prevalence of H.pylori in stool according to H.pylori antigen test were (18.45%) .

The relationship between prevalence of H.pylori antibody and sex, revealed that the females were more exposed to infection with H.pylori, the rate of infection were (85.71%), compared with males infection rate were (76.71%) . Also the relationship between prevalence of H.pylori antigen and sex, confirmed that the rate was (19.55%) from females and (16.44%) from male .

This study showed that the high prevalence rate of H.pylori antibody in the blood of children was between the ages of one month to five years (74. 19%), whereas the high prevalence rate of H.pylori antibody in the blood of adult was between the ages of thirty six to forty five years(95.45%).While the high Prevalence rate of H.pylori antigen in the stool of children was between the ages of eleven to fifteen years (28.57%), whereas the high prevalence rate of H.pylori antigen in the stool of adult was between the ages of forty six to fifty five years (25.00%) .

The relationship between months and prevalence of H.pylori antibody during period of study indicated that, March and September take the more prevalence rate (100%), but the rate were decreased during the other months .While when we study the relationship between months and prevalence of H.pylori antigen . The highest rate of prevalence of H.pylori antigen were found in February (40.00%), but the rate of prevalence were seen decrease whenever moved away from this month .From this study we concluded that the prevalence of H. pylori among human in Dhamar Governorate was high, and the infection occurred at early years of life.

Key words: -Prevalence, H.pylori, Human, Dhamar Governorate, Yemen.

Introduction

The genus Helicobacter is a member of the family Helicobacteraceae, and currently in cludes more than 30 Helicobacter species. In general, the genus Helicobacter is classified into two groups, gastricspecies and non - gastric (enterohepatic)Helicobacter species, 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 1, 2.

Gastric Helicobacter species have been found to colonize the stomach of humans, sheep, cattle, dogs, cats, cheetahs, rhesus, monkeys, ferrets, whales, and dolphins, while enterohepatic Helicobacter species are more commonly found colonizing other kinds of animals such as mice, rats, rodents, and hamsters 3, 4.

The main reservoir of Helicobacter pylori (Hp) is human, particularly the human stomach, and the common bacterial infection linked to disorders of the gastrointestinal tract, and the epidemiological evidence has shown that H.pyloricolonizes the upper GIT of more than one in two individuals during their lifespan ; in many of these persons5, 6.

The modern era began when H.pylori was cultivated from gastric mucosa and its association with gastritis and later with peptic ulcer was demonstrated by Warren and Marshall, who were awarded with the Nobel Prize in Medicine 2005 7, 8 .

H. pylori is a Gram – negative, S curved rod – like bacterium, it is a little more than 2 μm and sometimes as long as 3.5 μm, and from 0.5 to 1.0 μm in diameter. It is highly motile due to its multiple flagella that emerge from one of the rounded ends. This bacterium has copious amounts of urease and is microaerophilic 9, 10.

Elshiekh et al. 11, stated that the H.pylori have been linked to gastritis, duodenal ulcer, gastric carcinoma and mucosa associated lymphoid malignancies, and it was categorized as a carcinogen in 1994 by the World Health Organization .

H.pyloriinfection is a public health issue. It is one of the world's most common human bacterial infections and associated with chronic gastritis, peptic ulceration and gastric cancer12. Approximately 50% (over 3 billion) of the world populations are known to be infected with H.pylori, mainly in the developing countries making it one of the most controversial bacteria in the world13, 14.

H.pylori has been detected in human by various investigators in several countries 15 – 20 .

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 spreading of H.pyloriinfection varies greatly among countries and even among population groups within the same country 21, 22 .

Since the first is olationof H. pylori, it has become apparent that this organism may be one of the most common bacterial pathogens of humans. Several studies have shown that the prevalence of H.pylori is still high in most countries . In north European and North American populations, about one-third of adults are still infected, whereas in south and east Europe, South America, and Asia, the prevalence of H. pylori is often higher than 50% 23.Currently, Al-Jiffri and Alsharif 24 reported that H. pylori constitute the commonest infection among human being as it affects about 2/3 of population worldwide.

The occurrence of H.pylori infection in Yemen is increased and primarily acquired in early childhood, therefore the objectives of this research were to investigate the prevalence of H. pylori

infection in samples of blood and stool of human in Dhamar 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 eradicate the bacterium.

MATERIALS AND METHODS

Four hundred and twelve (412) human samples (206 Blood samples and 206 Stool samples). Five ml blood sample was collected from General Thamar Hospital and some private medical laboratories into vacutainer tube without anticoagulant, allowed to clot and centrifuged, then the serum was separated and used to detect H.pylori antibody 25 . Stool samples collected from General Thamar Hospital and some private medical laboratories, the samples were collected in dry sterile container according to Falsafi et al. 26, Personal information about patients with samples recorded, include Age, Sex, Place of residence and Directorates.

In laboratory, the detection of H.pylori antibodies in blood was done by using H.pylori antibody test card . The test was performed according to the instruction of Manufactory company (LumiQuick(USA) H.pylori Antibody Test) .Also the detection of H.pylori antigen in stool was done by using H.pylori antigen test card (LumiQuick(USA) H.pylori antigen test card).

The isolation of H.pylori from stools was done under sterile conditions by keeping fresh stools at 37°C in a humid atmosphere enriched in CO2 (approximately 12%) for 2 hours . Then, about 5 g of stool was placed into a tube containing 15 ml of Brucella broth (Merck), complemented with 20% glycerol and 0.5 g cholestyramine(a basic anion exchange resin that binds bile acids). The preparation was homogenized and 100 µlof homogenized stool was streaked onto the two selective agar plates.

The first modified Campy-blood agar composed of Brucella agar plus 10% Sheep Blood (SB), and the antibiotics(Helicobacterpyloriselective supplement) contains Vancomycin (10 mg/liter), Cefsulodin (5 mg/liter), Trimethoprim(5 mg/liter), and Amphotericin B (5 mg/liter). The second Belo horizonte agar containing0.4% Brain–Heart Infusion Base, 0.4% 3, 4, 5-triphenyltetrazoliumchloride, 10% SB, and antibiotics(Helicobacter pylori selective supplement), and incubated at 37°C under the microaerobic and humid conditions for up to 10 days 18 .

The identification of H.pylori is olates were confirmed by Biochemical tests including(Urease Test, TSI with lead acetate paper, Oxidase, Catalase, H2S Production in (TSI), Growth in 3.5% NaCl, Growth in 1% Glycine, Indole, Hippurate Hydrolysis, the Sensitivity or Resistance of Nalidixic acid and Cephalothin(Table A).

Statistical Analysis Was done by using the Statistical Package for Social Sciences(SPSS, version 20). Used for Descriptive Statistics the crosstabs and used for possibility test the Chi-Square .

Table (A): Biochemical tests used for the confirming of *H.pylori*

Biochemical Tests	Results
Catalase	Positive
Oxidase	Positive
Urease	Positive
Indole	Negative
Growth in 1% Glycine	Negative
Growth in 3.5% NaCl	Negative
H_2S Production in (TSI)	Negative
TSI with lead acetate paper	Positive
Nalidixic acid	Resistance
Cephalothin	Sensitive
Hippurate Hydrolysis	Negative

Results

The percentage of H.pylori antibody in collected human blood samples were (82.52%) . While the percentage of H.pylori antigen in the human stool samples were (18.45%) (Table 1).

Table (1): Prevalence of *H.pylori* in Human Samples (Blood and Stool)

Type of samples	Total No. of samples	Positive		Negative		Chi-Square	df	P Value
		No.	%	No.	%			
Blood (antibody)	206	170	82.52	36	17.48	169.181	1	0.00
Stool (antigen)	206	38	18.45	168	81.55			

The prevalence of H.pylori in Human blood according to Sex, showed that Female is more exposed 114 (85. 71%) to infection with H.pylori, compared with Male infection rate 56 (76.71%) (Table 2) .

Table (2): Prevalence of *H.pylori* antibody in Human according to Sex

Sex	Total No. of samples	Positive		Negative		Chi-Square	df	P Value
		No.	%	No.	%			
Male	73	56	76.71	17	23.29	2.65	1	0.10
Female	133	114	85.71	19	14.29			
Total	206	170	82.52	36	17.48			

The prevalence of H.pylori in human according to H.pylori antigen test indicated that the females were more infected with H.pylori antigen 26 (19.55%), compared with males 12 (16.44%) (Table 3) .

Table (3): Prevalence of *H.pylori* antigen in Human according to Sex

Sex	No. of samples	Positive		Negative		Chi-Square	df	P Value
		No.	%	No.	%			
Male	73	12	16.44	61	83.56	0.30	1	0.58
Female	133	26	19.55	107	80.45			
Total	206	38	18.45	168	81.55			

This study showed that the prevalence rate of H.pylori antibody was high in children between the ages of one month to five years 23 (74. 19%), followed by the children with age between eleven to fifteen years 13 (61.90%), then from six to ten years 8(61. 54%). Whereas the prevalence rate of H.pylori antibody in adults was high between the ages of thirty six to forty five years 21(95.45%), followed by the adults with age between forty six to fifty five years 19 (95.00%), then from twenty six to thirty five years 41(87.23%), after that from sixteen to twenty five years 34 (87.18%), finally the older age fifty six to sixty five which found just 11 infected (84.62%) (Table 4) .

Table (4): Prevalence of *H.pylori* antibody in Human according to Age

	Age Groups	No. of samples	Positive		Negative		Chi-Square	df	P Value	Chi-Square	P Value
			No.	%	No.	%					
Children	1month-5 years	31	23	74.19	8	25.81	1.15	2	0.56	14.49	0.00
	6- 10 years	13	8	61.54	5	38.46					
	11- 15years	21	13	61.90	8	38.10					
Adults	16- 25 years	39	34	87.18	5	12.82	2.25	4	0.69		
	26 -35 years	47	41	87.23	6	12.77					
	36- 45 years	22	21	95.45	1	4.55					
	46 -55 years	20	19	95.00	1	5.00					
	56- 65 years	13	11	84.62	2	15.38					
Total		206	170	82.52	36	17.48					

Table 5, show that the high Prevalence rate of H.pylori antigen in the stool of children was between the ages of eleven to fifteen years 6 (28.57%), followed by the children with age between one month to five years 3 (9.68%), then from six to ten years 0(0.00%) . Whereas the prevalence rate of H.pylori antigen in the stool of adult was high in the ages between forty six to fifty five years 5(25.00%), followed by the human with age between twenty six to thirty five years 11(23.40%), then from fifty six to sixty five were 3 (23.08%), after that from thirty six to forty five years 4(18.18%) finally the age from sixteen to twenty five years were 6 (15.38%) .

Table (5): Prevalence of *H.pylori* antigen in Human according to Age

	Age Groups	No. of samples	Positive		Negative		Chi-Square	df	P Value	Chi-Square	P Value	Chi-Square
			No.	%	No.	%						
Children	1month -5 years	31	3	9.68	28	90.32	6.36	2	0.04	1.34	1	0.25
	6- 10 years	13	0	0.00	13	100						
	11- 15 years	21	6	28.57	15	71.43						
Adults	16- 25 years	39	6	15.38	33	84.62	6.32	4	0.18			
	26 -35 years	47	11	23.40	36	76.60						
	36- 45 years	22	4	18.18	18	81.82						
	46 -55 years	20	5	25.00	15	75.00						
	56- 65 years	13	3	23.08	10	76.92						
Total		206	38	18.45	168	81.55						

Table 6 illustrate that the isolation rate of H.pylori from human stool was 38 (18.45%), and from this table and figure we noticed that Male is more exposed 16 (21.92%) to infection with H.pylori, compared with Female infection rate 22 (16.54%) .

Table (6): Isolation of H.pylori from Stool

Human Stool	Number of samples	Positive		Negative		Chi-Square	df	P Value
		No.	%	No.	%			
Male	73	16	21.92	57	78.08	0.91	1	0.34
Female	133	22	16.54	111	83.46			
Total	206	38	18.45	168	81.55			

The relationship between Months and prevalence of H.pylori antibody during period of the research revealed that the highest rate of prevalence of H.pylori antibody were found in March and September 23 (100%), then in May and February 21(95.45%) and 19 (95.00%) respectively, but the rate of prevalence were seen decrease whenever moved away from these months (Table 7) .

Table (7): Relationship between Months and prevalence of *H.pylori* antibody during period of Study

Months	No. of samples	H.pylori antibody Positive		H.pylori antibody Negative		Chi-Square	df	P Value
		No.	%	No.	%	29>82	8	
February	20	19	95.00	1	5.00			
March	23	23	100	0	0.00			
April	23	13	56.52	10	43.48			
May	22	21	95.45	1	4.55			
June	24	19	79.17	5	20.83			
July	24	18	75.00	6	25.00			0.00
August	24	17	70.83	7	29.17			
September	23	23	100	0	0.00			
October	23	17	73.91	6	26.09			
Total	206	170	82.52	36	17.48			

While the relationship between Months and prevalence of H.pylori antigen during period of the study indicated that the highest rate of prevalence of H.pylori antigen were found in February 8(40.00%), but the rate of prevalence were decreasing whenever moved away from this month (Table 8) .

Table (8): Relationship between Months and prevalence of H.*pylori* antigen during period of Study

Months	No. of samples	H.pylori antigen positive		H.pylori antigen Negative		Chi-Square	df	P Value
		No.	%	No.	%			
February	20	8	40.00	12	60.00			
March	23	1	4.35	22	95.65			
April	23	6	26.09	17	73.91			
May	22	5	22.73	17	77.27			
June	24	4	16.67	20	83.33	11.42	8	
July	24	4	16.67	20	83.33			0.18
August	24	4	16.67	20	88.33			
September	23	3	13.04	20	86.96			
October	23	3	13.04	20	86.96			
Total	206	38	18.45	168	81.55			

DISCUSSION

H.pylori infection in humans is associated with gastritis, gastric ulcer, and gastric cancers. Infection occurs mainly in childhood and infected individuals usually carry it for life unless treated. Epidemiology of infection by H.pylori has been characterized by a linear increase with age in western industrial countries and by a large number of children and juveniles being infected in developing countries [19, 27].

Studying the epidemiological data on H.pylori is essential as it provides necessary information regarding its prevalence and incidence rate and help in the establishing public health action that could halt transmission and therefore acquisition of the infection and aid the therapeutic program to eradicate the bacterium [14, 28].

In the study at hand, the prevalence of *H.*pylori antibody in blood were 170 (82.52%), as show in (Table 1), which is approach or slightly higher percentage with Gunaid *et al.*[16] in Yemen, whom found the prevalence of *H.pylori* infection in dyspeptic patients was 82.2% .The result of our study was agreement with study in Jordan where the prevalence of H.pylori infection was 82% [28], also our result was consistent with Cherian e*t al*[29] in Australia whom found the prevalence of H.pylori infection was 82%.

The result also showed a less rate of prevalence in Yemen compared with that reported from other studies in Yemen . Al –Shami [15] found that the prevalence of H.pylori infection among patients underwent upper gastrointestinal endoscopy in Sana'a major hospital was very high (99.6%) .

While the result achieved in this study was more than those reported in other developing countries, the prevalence of *H.pylori* infection in Iraq was 78% [30], 60% in Egypt [31], 75% in Saudi Arabia [32], 43% in Iran [33], 50.47% in Nepal [34], 30.4% in Malaysia [35].

However, recent study from Australia showed the prevalence of *H.pylori* infection was 21.5% [36], from Oman was 25% [37], from Japan was 3.1% [38], and 18.6% from China [6].

The variability in the prevalence rate of *H.pylori* infection could be due to differences in socioeconomic condition, standard of hygiene and source of drinking water, also due to poor social and economic development ; low education level ; poor hygiene practices during childhood ; crowded families ; absence of a sewage disposal facility during childhood ; and improper food handling [39].

Also Table 1 show that the prevalence of *H.pylori* antigen in stool was 38 (18.45%) .Result of this study consider more than result achieved by Sýkora[40] in Czech Republic, who found that the prevalence of *H.pylori* infection in asymptomatic children was 7%.Some researchers found highest rate of our result. Parent [41] in Brazil found that the prevalence of *H.pylori* antigen in children was 38.0% .

Accuracy of the stool antigen test is affected by treatment with proton pump inhibitors, because the treatment with proton-pump inhibitors or antibiotics for 4 days or more before saving stool samples leads to false negative results in some patients [42, 43] .To avoid false negative results, patients should be off antibiotics for at least four weeks and off proton pump inhibitors (PPIs) and bismuth for at least two weeks. A positive *H.pylori* stool antigen test is highly predictive of the presence of *H.pylori* infection, but

H.pylori disappears quite quickly from the stool after eradication, therefore positive results indicate persisting active infection [2, 44].

Statistical analysis using Chi- Square showed a significant difference at the level of 0.05 for the *H.pylori* existing in the blood and stool where the value of Chi- Square was (169.18) with level of significance 0.000 ($p< 0.05$).

Table 2, which include the result of *H.pylori* antibody test according to sex, show that the female is more exposed to infection with *H.pylori*, the rate of infection in female was 114(85.71%), compared with the rate of infection in male 56 (76.71%).

Another point of this study include the result of *H.pylori* antigen test according to sex, the prevalence rate obtained from female was 26(19.55%) out of 133 stool samples, this is more than rate obtained from male was 12(16.44%) out of 73 samples(Table 3).There are no significant differences found between sexes. There is no relationship between sex and infection with *H.pylori* ($p>0.05$) .Our result were compatible with Yucel*et al.* [44] 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.[11] in Egypt, reported that the rate of infection in female and male was 52% and 48% respectively.

Result from this study don't agree with Faisal *et al.* [45] 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 4show that the prevalence of *H.pylori* antibody among children in the age between one month to five years were 23 (74.19%), followed by the children with age between eleven to fifteen years 13 (61.90%), then from six to ten years 8 (61.54%) .Whereas the prevalence of *H.pylori* antibody among adult in the age between thirty six to forty five years were 21(95.45%), followed by the human with age between forty six to fifty five years 19 (95.00%), then from twenty six to thirty five years 41 (87.23%), after that from sixteen to twenty five years 34 (87.18%), finally the bigger age fifty six to sixty five which found just 11 infected (84.62%).The value of ($p<0.05$) (0.00) showed significant differences between the *H.pylori* infection in children and adults, where the infection in the adults were higher than children .

Statistical analysis using Chi- Square showed no significant difference at the level of 0.05 for the *H.pylori* infection between children where the value of Chi- Square was (1.15) with level of significance 0.56 ($p> 0.05$), also no significant difference at the level of 0.05 for the *H.pylori* infection between adults value of Chi- Square was (2.25) with level of significance 0.69 ($p> 0.05$).

Table 5 illustrate prevalence rate of *H.pylori* antigen of stool from children between the ages from eleven to fifteen years were 6 (28.57%), followed by the children with age between one month to five years were 3 (9.68%), while not detected in children with age between six to ten years . Whereas the prevalence of *H.pylori* antigen from adult between the ages of forty six to fifty five years were 5 (25.00%),

followed by the human with age between twenty six to thirty five years were 11 (23.40%), then from fifty six to sixty five were 3 (23.08%), after that from thirty six to forty five years were 4 (18.18%), finally the age from sixteen to twenty five years were 6 (15.38%) . No significant differences between the *H.pylori* infection in children and adult (p >0.05) . The high incidence of *H.pylori* infection early in adult life can possibly be explained by the exposure of persons to *H.pylori* early in life because of a risk factors, like bad hygiene, lack of proper sanitation and increased susceptibility because of a genetic predisposition [46] .

Statistical analysis using Chi- Square showed significant difference at the level of 0.05 for the *H.pylori* infection between children where the value of Chi- Square was (6.36) with level of significance 0.04 (p< 0.05) . In adult no significant difference at the level of 0.05 for the *H.pylori* infection between adults, value of Chi- Square was (6.32) with level of significance 0.18(p> 0.05).

There are a number of studies reporting 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 eradicate this pathogen with a stronger immune response. Other reasons could be the more exposure of aged patients to the *H. pylori* in their lives as compared to children.

The result were non-agreement with result found by [44], 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 non agreement with research of [47] 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%. In another hand results were in agreement with the result found by [48], where they found that the prevalence of *H.pylori* infection in South Africa was > 50% by the age of 10 years and 94% by the age of 30 years . Results consistent with the study conducted by [49] 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.

The results obtained from this study are considered opposite of the results obtained by [17]inYemen, who found the seroprevalence of H.*pylori* antibodies was 9% by using Enzyme -labeled immune sorbent assay . The prevalence according to age varied from 0.0% in children under 2 years to 12.5% in age group 9 - 10 years, but these result agree with him in terms of correlation between the rates of positive antibodies and increasing age.

Also the results of adult are consistent with the study conducted by 50 whom they found that the prevalence of H.pylori in age group 15 – 25 years was 66.66%, 87.50% in age group 26- 35years, 92.31% in age group 36 - 45years, 100% in age group 46- 55 years, and 87.5% in age group 56- 65 years .AL-Sinani et al. [37] mentioned that the prevalence of H.pylori in Omani children increased from 7% in children aged <5 years, to 33% in those aged between 5 and 10 years .

The prevalence of H.pyloriinfection 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 decreased number of microorganisms as a result of gastric atrophy [18, 37].

Overcrowding is a risk factor for acquisition of H.pyloriinfection in children. Contaminated water and food also act as sources of infection. But since H.pylori cannot withstand high oxygen, high temperatures and paucity of nutrients in the environment, it does not remain viable in inhospitable conditions. Hence direct person-to-person transmission is thought to be still the main mode of transmission of this infection in children [51, 52].

Increased rates of acquisition of infection, as well as spontaneous clearance of infection, have been observed primarily in children under the age of 5 years [53]. Mansour- Ghanaei et al. [54] in Iran, mentioned that the Overall prevalence of H.pylori by the stool test among 475 boys and 486 girls, aged 7 to 11 years were 384 (40%), and the higher prevalence of H. pylori was found in the stools of individuals who consumed well water and municipal tap water when compared to boiled water ($p<0.05$).

In recent study designed by [55] in Ghana, the overall prevalence of H. pylori infection among children in this study was 14.2%, and the age group with the least H. pylori infection rate was 14—16 years with prevalence of 11.9%. The study population showed a female: male ratio of 1.3:1, with a higher proportion of females having H. pylori infection compared to males [16.8% (females) vs 10.7% (males)].

Anyway serological studies of asymptomatic population groups have been of major importance in mapping the epidemiology of H.pyloriand documenting differences in its behavior among specific age groups in various parts of the world [56].

According to the results in the Table 6 the isolation rate of *H.pylori* from stool of humans were 38(18.45%) . There are no significant differences between isolation of *H.pylori* from male and female where the significant value was more than 0.05 (0.34). This observations indicate that the density of bacteria in the stomach is important to recover *H.pylori* from stool, so the use of cholerstyramine in the initial treatment of stool improves the yield of *H.pylori* in stool culture, which may be related to the successful isolation of the metabolically active form of *H.pylor*i34 .Our result was consistent with result designed by [57] whom found that *H.pylori* was isolated from 218 of 1456 (15%) stool samples. While these result are inconsistent with another study in Gambia which reported that the isolation rate of *H.pylori* from faeces was 39.13% [58].

In this study, the relationship between months and prevalence of *H.pylori* antibody during period of study in Dhamar Governorate were followed up . Results which described in Table 7, explain that the prevalence increased in March and September 23(100%). Then in May and February, prevalence rate was21(95.45%) and 19 (95.00%) respectively. But if we notice results, will see that the rate of prevalence were decrease whenever moved away from these months, in June 19 (79.17%), July 18 (75.00%), followed October 17 (73.91%), August 17 (70.83%), finally in April 13 (56.52%), ($P<0.05$).

Whereas the prevalence of *H.pylori* antigen during period of study in Dhamar Governorate was increased in February 8 (40.00%). However, the rate decreases whenever moved away from this month, in April 6 (26.09%), May 5 (22.73%), then June, July and August were 4 (16.67%), after that in September and October 3(13.04%), finally in March 1(4.35%) (Table 8). There is no significant difference between prevalence of *H.pylori* in stool and the different seasons of the year during the period of study ($p > 0.05$) .

The results are consistent with the study conducted by [59] in Caracas, Venezuela public hospital, who found that the frequency of infection increased from 70% in the dry months to 96% in the rainy months, meanwhile its inconsistent with Khedmat *et al.* [60] in Tehran, who presented there was significant increase in the occurrence of duodenal ulcer in cold period of the year (Autumn and Winter) in comparison to hot one (Spring, Summer).

According to the results obtained from this study it could be concluded that the prevalence of H.*Pylori* antibody in blood and antigene in stool among humans in Dhamar Governorate seems to be high (82.52%) and (18.45%) respectively, this high percentage may be due to socioeconomic status, family dietary, poor living conditions, and sanitary habits or another risk factors that can increase the occurrence of infection.

Due to the importance of this study further researches and studies on *H.pylori* in different governorates of Yemen should be carried out . Also working on creating specialized national center to deal with further studies and diagnosis of *H.pylori*, and emphasis for inter the diagnosis of *H.pylori* within the routine work of the laboratories in hospitals, as well as the restaurant workers must be tested for *H.pylori and* providing them the health cards. This study also recommends all people especially who work in field of food preservation and food cooking either in household or that working in restaurants to follow the five keys to safer food published by WHO [61] which include the following instructions: Keep clean, always wash hands with soap after going to the toilet. Separate raw and cooked food, avoid contacting between raw and cooked food and keep food at safe temperature. Cook thoroughly, especially meat and poultry. Use safe water and raw materials, wash fruit and vegetables .

Acknowledgements

The authors introduce with thanking and estimation to baynoun laboratories in Dhamar Governorate in Yemen country. And almost to his supervisor, Dr. Hassan Aljabry, for facility the procedures of the practical side of the search .

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انتشار البكتريا الحلزونية البوابية في الإنسان في محافظة ذمار/ اليمن

الملخص: صممت هذه الدراسة لتحديد مدى انتشار البكتريا الحلزونية البوابية في الإنسان في محافظة ذمار / اليمن، وذلك تبعاً للفئات العمرية المختلفة، حيث تم جمع 412 عينة من الأشخاص المراجعين في مستشفى ذمار العام والمختبرات الطبية الخاصة في المحافظة، وشملت هذه العينات 206 عينة دم و 206 عينة براز من نفس هؤلاء الأشخاص.

أظهرت النتائج أن نسبة انتشار الجرثومة في الإنسان اعتمادا على الأجسام المضادة في الدم كانت 82.52%، وأن نسبة انتشار الجرثومة اعتمادا على مستضد البكتريا في البراز بلغت 18.45% .

كما أوضحت النتائج التي تخص انتشار الأجسام المضادة للجرثومة في الدم حسب الجنس؛ أن نسبة الانتشار في الإناث كانت أعلى من الذكور، حيث كانت النسبة 85.71% و 76.71% على التوالي . وكذلك فقد أشارت النتائج إلى أن نسبة انتشار مستضد البكتريا في براز الإناث كانت أعلى من نسبة انتشار مستضد البكتريا في براز الذكور حيث كانت النسبة 19.55% و 16.44% على التوالي.

وعند دراسة العلاقة بين المراحل العمرية المختلفة وبين نسبة انتشار الأجسام المضادة في الدم، وجدنا أن أعلى نسبة لانتشار الأجسام المضادة في دم الأطفال كانت في الفئة العمرية التي تتراوح ما بين شهر واحد – 5 سنوات وبنسبة 74.19%، و كانت أعلى نسبة لانتشار الأجسام المضادة في دم البالغين كانت في الفئة العمرية التي تتراوح ما بين 36 – 45 عام وبنسبة 95.45%، في حين كانت أعلى نسبة لانتشار مستضد البكتريا في براز الأطفال في الفئة العمرية التي تتراوح ما بين 11 – 15 عام وبنسبة 28.57%، وأن أعلى نسبة لانتشار مستضد البكتريا في براز البالغين كانت في الفئة العمرية التي تتراوح ما بين 46 – 55 عام وبنسبة 25.00% .

أما النتائج التي تخص العلاقة ما بين نسبة انتشار الأجسام المضادة للجرثومة في الدم وما بين أشهر السنة التي تضمنتها الدراسة، فقد أشارت إلى أن أعلى نسبة انتشار كانت خلال شهر مارس وشهر سبتمبر وبنسبة 100% لكل منهما، وتقل النسبة لانتشار المرض كلما ابتعدنا عن هذين الشهرين . وأما بالنسبة للعلاقة ما بين انتشار مستضد البكتريا في البراز وما بين أشهر السنة خلال فترة الدراسة، فقد اوضحت النتائج أن أعلى نسبة انتشار كانت في شهر فبراير 40.00% .

استنتج من هذه الدراسة أن نسبة انتشار البكتريا الحلزونية البوابية في محافظة ذمار كانت عالية، وأن إصابة الإنسان بهذه الجرثومة تكتسب من مراحل عمرية مبكرة، وأن أعلى نسبة انتشار للأجسام المضادة للجرثومة في الدم كانت في شهر مارس وشهر سبتمبر، في حين أن أعلى نسبة انتشار لمستضد البكتريا في البراز كانت في شهر فبراير .

أوصت الدراسة بضرورة تواصل الأبحاث والدراسات عن البكتريا الحلزونية البوابية في مختلف المحافظات، والعمل على إنشاء مراكز وطنية متخصصة في مجال عزل وتشخيص البكتيريا الحلزونية البوابية.

الكلمات المفتاحية :انتشار، البكتريا الحلزونية البوابية، الإنسان، محافظة ذمار، اليمن.