Document heading   doi:

Sero−prevalence of *Helicobacter pylori* infection among asymptomatic healthy Omani blood donors

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PEER REVIEW

Peer reviewer

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Comments

The manuscript utilizes simple and undemanding approach for generate important epidemiological data. Authors have reviewed major points of literature of *H. pylori* infection. However, review of recent antibodies prevalence studies and their epidemiological significance is needed. Also, the authors need to review literatures on clinical significance of *H. pylori* IgG, IgM and IgA antibodies.
(Details on Page 149)

ABSTRACT

Objective: To investigate the prevalence of *Helicobacter pylori* (*H. pylori*) infection, a cross−sectional epidemiological study, based on the age and gender−specific seroprevalence of *H. pylori* antibodies in asymptomatic healthy Omani blood donors attending the SQUH blood bank. **Methods:** Analysis of the sera from 133 apparently healthy subjects, based on the serological determination of the IgM, IgG and IgA antibodies against *H. pylori*, was carried out using a commercially available kit ELISA (NovaLisa, NovaTec, Germany). While the presence of *H. pylori*−specific IgG antibodies is the marker for a "chronic" infection with this pathogen. Therefore, there was no indicator of the time of acquisition of the infection. However, the *H. pylori*−specific IgM antibody was a more specific marker for a recently acquired infection with *H. pylori*. **Results:** Of the 133 subjects, there were 100 (74%) males and 33 (26%) females. The age range was 15 to 50 years with a mean of 25.75±3.75 years. The overall prevalence of *H. pylori* infection in our study was 69.5%. The overall seroprevalence was found to be increased 69%−86% with age. Subjects between 15−20 years of age showed 71% seroprevalence, while those between 21−40 years showed gradual increase (63%−70%) with age and reached up to 87% in subjects between 41−50 years of age. A significant inverse association was found between sex and age groups. This is when each age group was examined individually; a higher positive percentage of *H. pylori* antibodies increasing with age was seen in males between 21−40 years of age group in comparison to the females of the same age group. Male subjects with age group between 21 to 40 years were found to have a significant seropositivity compared to the female subjects within the same group. This may reflect how frequent were the male subjects being exposed to the outer environment and their conduct than the females in this society like Oman. **Conclusions:** The seropositivity of *H. pylori* is moderately higher between ages of 21 to 30 more than any other age group.

KEYWORDS

1. Introduction

Several studies have documented a high prevalence of *Helicobacter pylori* (*H. pylori*) infection among healthy and non−healthy individuals in different places[1-6]. *H. pylori* is a Gram−negative, spiral, flagellated bacterium and usually found under the mucus layer in the gastric pits in close apposition to gastric epithelial cells where it causes damage to the cells and tissues[7]. *H. pylori* has become the focus of basic biochemical and clinical research and debate.

Infection with *H. pylori* is well known to play an incontestable role in the human pathogenesis. It is a major etiological factor in chronic gastritis, gastric mucosal associated lymphoid tissue lymphoma (MALT), gastric

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carcinoma and peptic ulcer disease[2,3]. Peptic ulcer disease is now viewed as an infectious disease since eradication of *H. pylori* leads to its cure[5,8]. Many questions, however, remain concerning the adequate diagnostic and therapeutic procedures with which to accost the organism.

Unfortunately, epidemiological studies strongly suggested that more than 50% of the world's populations are infected by *H. pylori*[9], but there are large differences in the prevalence of infection which depends on many factors such as economic development of each country[10,11]. In addition to that age and races, lower socioeconomic status (crowded living conditions) may also contribute significantly to the rate of *H. pylori* infection[10,12].

In developing countries, for instance, the prevalence of *H. pylori* antibodies was found more than 70% in the populations[13,14]. On the contrary, in developed countries, *H. pylori* infection is less common in young children and increases with age and reaches 50% by adulthood[15,16]. However, among this prevalence data, little information is available on the seroprevalence of *H. pylori* in healthy asymptomatic population in Oman. Therefore, the current study was designed to determine the seroprevalence of *H. pylori* in asymptomatic healthy Omani blood donors and to correlate such prevalence with the age and gender distribution of *H. pylori* infection.

2. Materials and methods

2.1. Subjects

The study was carried out at the Immunology Unit, Department of Microbiology and Immunology, Sultan Qaboos University (SQU).

A total of 133 healthy individuals between 18–49 years old consecutive donors who were asymptomatic and attended the SQU Hospital's Blood Bank, between March 2011 and January 2012 were randomly included. The group comprised of 98 males and 33 females with an age range of 18 to 50 years (mean 25.75±3.75 years). Subjects who were previously treated for *H. pylori* infection or who had received antibiotics, proton pump inhibitors or bismuth compounds in the preceding 4 weeks were excluded.

2.2. Blood collection and measurement of antibody levels

Sera were separated after centrifuging at 4 000 r/min in a cooling centrifuge. All sera were tested for *H. pylori* IgM, IgG and IgA antibodies using ELISA tests (NovaLisa, NovaTec, Germany), according to the standard operating procedures. In order to fulfill the Saporro criteria all investigations were performed in duplicates.

2.3. Ethical status

Ethical clearance was sought and obtained from the SQU Ethical Committee and per–formed in accordance with the Declaration of SQUH. Informed written consent was obtained from all subjects before being included in the study.

2.4. Data analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS), version 19.0. Results were presented as mean±standard deviation for quantitative variables and number (percentages) for qualitative variables. The differences in such level was considered as positive when $P<0.05$.

3. Results

A total of 133 healthy asymptomatic individuals residing in different regions of the Sultanate of Oman were enrolled in the study. Of these, 98 were males and 33 were females whose ages ranged from 18–50 years. The overall prevalence of *H. pylori* infection was 68.4% and the age distribution is shown in Table 1. The ELISA test detected IgG *H. pylori* antibody in 69.5% of the total healthy asymptomatic individuals. The overall seroprevalence was found to increase with age. Subjects between 15–20 years of age showed 71% seroprevalence, while those between 21–40 years showed gradual increase (63%–70%) with age and reached up to 87% in subjects between 41–50 years of age (Table 1).

Table 1
The seroprevalence of *H. pylori* infection positive samples among Omani blood donors.

Age Group (Years)	No. of subjects examined	No. of *H. pylori* (+) subjects (%)
15–20	17	12 (71%)
21–30	71	45 (63%)
31–40	30	21 (70%)
41–50	15	13 (87%)
Total	133	91

When all subjects were grouped into those who were less than 40 and those who over 40 years of age, a significant difference was obtained. The *H. pylori* IgG antibodies were detected in 78 (66%) of 118 subjects who were 40 years or less of age, and in 13 (87%) of 15 subjects who were over 40 years of age. Of the 133 subjects, *H. pylori* antibodies were positive in 74 males (76%) and 17 females (52%) showing no significant difference. However, when each age group was examined individually, a higher positive percentage of *H. pylori* antibodies between 69%–86% "increasing with age" was seen in males between 21–40 years compared to the females of the same age group. In age group 15–20 years, the seroprevalence was almost equal in both males and females (Table 2).

Table 2
Multivariate analysis of the effects of gender, age, of Omani blood donors on the likelihood of being *H. pylori* seropositive.

| Age group (years)	Male		Female	
	No. of subjects examined	No. of *H. pylori* (+) (%)	No. of subjects examined	No. of *H. pylori* (+) (%)
15–20	13	9 (69%)	4	3 (75%)
21–30	45	32 (71%)	26	13 (50%)
31–40	27	20 (74%)	3	1 (33%)
41–50	15	13 (86%)	–	
Total	100	74 (76%)	33	17 (52%)

Analysis of *H. pylori*–specific IgG antibodies showed that out of the 69.5% IgG–antibody–positive blood donors, 16.7% were positive for *H. pylori*–specific IgM antibodies, 35.6% were negative in the IgG–antibody–negative group (Figure 1, Table 3).

Table 3
Prevalence of seropositivity(%) of antibodies to Helicobacterpylori by different antibody class among Omani blood donors' samples.

Antibodies	Status	Blood donors (%) n=133	P value
IgM	Positive	21 (15.1%)	0.45
	Negative	113 (84.9%)	
IgA	Positive	11 (8.7%)	0.42
	Negative	122 (91.7%)	
IgG	Positive	83 (62.4%)	0.31
	Negative	50 (35.6%)	

Overall, 15.8% of the male and female blood donors had recently been exposed to *H. pylori*, as defined by positivity for specific IgM antibodies, compared with 83% that showed seronegativity *H. pylori*–specific IgM antibodies ($P>0.01$). Finally, out of the total blood donors, only 1.5% showed concomitant *H. pylori*–specific IgM, IgA and IgG antibodies (Figure 1, Table 3).
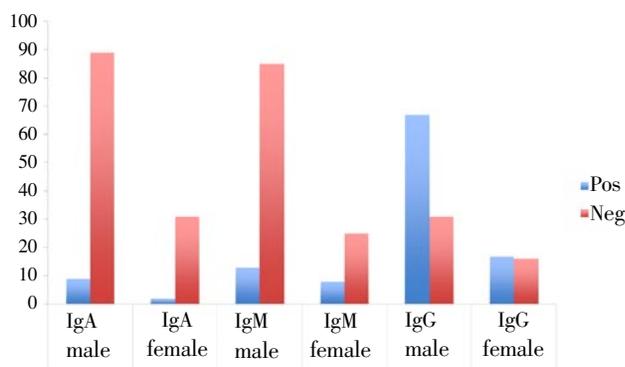
Figure 1. Frequency of detection antibody classes of *H. pylori* infection among adult Omani blood donors according to gender.

4. Discussion

Most of the data available on the prevalence of *H. pylori* are unsatisfactory. This is because very few studies have assessed a truly normal population. Surprisingly, the data are probably most reliable in the developing world, because the majority of children for example are infected by the time they reach adulthood. This will raise some questions such as how many of the older people in these communities no longer act as hosts for the bacterium, due to the development of atrophic gastritis? Do people become re–infected in a high–risk environment for *H. pylori* infection? Whatever the answers would be, infection with *H. pylori* has to be addressed seriously and all the measures should be taken into action either by public health measures that halt transmission of the bacterium, or by therapeutic intercession to eradicate infection.

In this study, an overall prevalence of *H. pylori* infection was detected in 69.5% asymptomatic healthy blood donors examined. Similar results were shown in a study from Turkey where 53% asymptomatic subjects were seropositive for *H. pylori* antibodies[17].

An early study from Saudi Arabia found an increase in *H. pylori* seroprevalence with advancing age reaching to 70% for those who were 20 years old or more[18]. In the present study, there was a gradual increase in prevalence rate with age from 69% to 74% for those between 21–40 years male group and getting lower with the females of the same age group. This clearly shows that overall seroprevalence of *H. pylori* has decreased in this country from developing to developed status where decreasing trend in seroprevalence was found in both adulthood (from 70% to 66%) and children (49% to 17%) in recent decades. Moreover, the results showed a significant difference in the seropositivity to *H. pylori*, for instance, subjects >40 years had higher antibody seropositivity (86%). The similar phenomenon was found in other studies[19,20] where asymptomatic subjects >40 years of age have shown 75%–85% seropositivity for *H. pylori*. This finding may propose that infection with *H. pylori* is enduring chronic infection.

Furthermore, in our study, *H. pylori* seropositivity has shown increasing tendency with age in females (55%–65%) between age group 21–50 years compared to males of the same age groups (35%–55%), whereas other studies conducted in the region and other locations did not find any significant gender difference for aquision of *H. pylori* [17,19]. However, in another study, an attention was given to gender differences indicating that the prevalence of *H. pylori* infection was higher in men with upper and non–upper digestive tract symptoms than that of in women[21].

The seropositivity of *H. pylori* is moderately higher between ages of 21 to 30 more than any other age group. Finally, we are in need of high quality data about the prevalence of *H. pylori*. These can only be obatined by large–scale prospective studies to document this incidence and hence duration of infection, in normal individuals.

Conflict of interest statement

We declare that we have no conflict of interest.

Acknowledgements

Comments

Background

Infection with *H. pylori* is well known to play an incontestable role in the human pathogenesis. It is a major etiological factor in chronic gastritis, gastric mucosal associated lymphoid tissue lymphoma, gastric carcinoma and peptic ulcer disease. Peptic ulcer disease is now viewed as an infectious disease since eradication of *H. pylori* leads to its cure. Many questions, however, remain concerning the adequate diagnostic and therapeutic procedures with which to accost the organism. Authors have reviewed major points of literature of *H. pylori* infection. However, more literature review is required.

Research frontiers

The paper attempt to utilize simple, cheap non−invasive test to evaluate prevalence of infection with H. pylori.

Related reports

The prevalence of anti−*H. pylori* IgG antibodies was examined in. Seroprevalence association with sociodemographic, clinical, and behavioral characteristics. The development of reliable serological assays to detect antibodies against *H. pylori*.

Innovations & breakthroughs

Utilization of simple and cheap method for evolution of epidemiological status of *H. pylori*.

Applications

This paper provides a undemanding methods for assess prevalence of infection with *H. pylori*. It is significant for the therapy of infection with *H. pylori*.

Peer review

The manuscript utilizes simple and undemanding approach for generate important epidemiological data. Authors have reviewed major points of literature of *H. pylori* infection. However, review of recent antibodies prevalence studies and their epidemiological significance is needed. Also, the authors need to review literatures on clinical significance of *H. pylori* IgG, IgM and IgA antibodies.

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