Prevalence of hepatitis B virus (HBV) infection among nurses in Sana'a hospital in Yemen.

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Abstract

Background: *Hepatitis B virus (HBV) infection is one of the major diseases and is a serious worldwide public health problem. In developing countries, HBV infection in nurses is attributed to professional hazard because of low coverage of vaccine and infection prevention implementation.* ***Objective:*** *To determine the prevalence of hepatitis B surface antigen (HBsAg) among nurses in Sana'a Hospitals and detection the main way of HBV infection , transmission .****Study design:*** *This investigation was conducted on 150 nurses in Sana'a Hospitals in Yemen. All nurses were examined by enzyme-labeled immunosorbant assay to determine the HBsAg.* ***Result:*** *HBV was detected on 20.6% (31/150) of nurses in Sana'a Hospital*. ***Conclusion:*** *HBV is commonly present among nurses in Sana'a Hospital, highlighting the need for vaccination. Due to high prevalence of naturally acquired immunity against HBV pre-testing might be a useful tool to identify susceptible individuals.*

Keyword: *HBV, Nurses in Sana'a hospitals.*

Introduction

More than 2 billion people are infected with hepatitis B virus (HBV) worldwide. of these, 350 million are chronic carriers of HBV and they are at risk of death from acute fulminant liver disease, liver cirrhosis or hepatocellular carcinoma (HCC). The World Health Organization (WHO) has stated that the prevalence of hepatitis B is highest in Africa and East Asia, and they estimate that between 5–10 % of the adult population are chronically infected [1]. Currently, several drugs like tenofovir and entecavir have been approved in industrialized countries for the therapy of chronic HBV infection according to establish guidelines from professional medical organizations [2]. Antiviral treatment of chronic hepatitis B infection significantly delays the progression of cirrhosis, reduces the incidence of HCC and improves long-term survival [3].

The highest report preference HBV in Yemen (5.1%) , in Saudi Arabia (4.25%) , in Oman (2-7%) , in Qatar (2-7%) , in UAE (2-7%) , in Kuwait (3.5%) , in Iraq (0.6%) , in Syria (2-7%) , in Sudan (9%) , in United states and north Europe (0.5%) in Japan (1%) and Korea (4.4%) [20,21,22,23]. Routes of infection include vertical transmission (such as through child birth) early life horizontal transmission (bits, lesions and sanitary habits) and adult horizontal transmission (sexual contact , intravenous drag use , exposure to infection blood or body fluid containing blood).

The lack of treatment opportunities in resource-constrained settings makes prevention of HBV infection crucial. In countries with high HBV prevalence, most HBV transmission occurs already during childhood; however, a significant proportion of people remains susceptible to HBV and is, therefore, at risk of contracting the virus during their adult age [4, 5].

Hepatitis B is an important occupational hazard for nurses [1]. In some studies, nurses have been shown to have an up to four-fold increased risk of acquiring HBV infection [4, 5]. The main risk factor to contract HBV infection for nurses is direct contact with infectious material, especially HBV-infected blood or via a needle stick injury with HBV-contaminated body fluids [6]. In particular, recapping of hollow-bore needles appears to increase the risk of needle stick injuries [7]. Other studies have reported a lack of awareness of HBV among nurses, consequently, proper precautions (e.g., use of disposable gloves) against blood-borne infections are lacking in these workers [8]. This observation is consistent with other studies demonstrating that untrained individuals are more likely to be exposed to HBV infection [5, 9].

Preventive vaccination against hepatitis B for hospital nurses is standard in many countries, but is still not implemented in many resources-poor settings [10, 11]. There have been reports of weak immune responses to HBV vaccination caused by, for example, diabetes or a current viral infection [12, 13, 14]. Therefore the WHO recommends to monitor immune responses to the vaccine in addition to compulsory vaccination of nurses [15].

In Yemen, the prevalence of acute or chronic HBV infection among blood donors , was found to be 5.1 % [11].The high prevalence of hepatitis B in Yemen poses not only a risk to nurses, but also to non-immune patients who risk being infected by a nurses with chronic hepatitis B infection. This is especially applicable to situations involving invasive medical procedures like surgery [19]. To date, there have not been any reports in the scientific literature on HBV infection and HBV immune status in Yemen nurses. Studies on the prevalence of chronic hepatitis B in nurses from other countries are scanty.

With the assumption that the prevalence of hepatitis B in nurses will be at least as high as in the general population.About 30 % of nurses

remain susceptible to hepatitis B. Non-immune nurses have a high risk of contracting an infection at the place of work and would benefit from vaccination against HBV.

There are no national recommendations or vaccination program against HBV for nurses in Yemen. A limited national health budget dictates that the most cost-effective strategy should be found allowing to implement preventive HBV vaccination for hospital personnel at risk. Such a strategy should consider the high rate of naturally acquired HBV infection among adults in endemic countries [6]. To distinguish immune nurses from those who are HBV susceptible, laboratory tests are essential. Since conventional HBV serology is costly and often not available in resource-poor settings, cheaper alternatives need to be found. An expanding range of point-of-care tests for infectious diseases including HBV offer logistical advantages at low cost [18] and with a sensitivity and specificity comparable to standard methods.

An accurate point-of-care-test for hepatitis B surface antibodies (anti-HBs) could identify those nurses who are already immune and do not need to be vaccinated therefore. Taking the comparatively high cost of the HBV vaccine itself and the logistical costs for the three required vaccinations into account, this approach should be more cost-effective than an untargeted vaccination program. Here, we aimed to provide data on the prevalence of acquired immunity against HBV and chronic infection with these viruses in nurses in Sana'a hospital in Yemen. The secondary objectives were the risk of infection for nurses at work over time, their vaccination status, and the performance of a commercial anti-HBs point-of-care-test for use prior to vaccination.

Aim of the study

1- To determine the prevalence of hepatitis B surface antigen (HBsAg) among nurses in Sana'a hospitals.

2- Detection the potential risk factor for contracting of HBV infection and transmission.

Subject & Methods

Study design

Cross section study.

Study population and sample size

The study population include all the 150 nurses in Sana'a hospital in Yemen during the period March to December 2015. Epi-info7 was used to calculate the simple size.

Study area

This study was carried out on 150 nurses worker in Al-Thawra , Al-Jomhory , Al-Sabean , Military and Al-Kuwait teaching hospital Sana'a , Republic of Yemen.

Participants and samples

The study enrolled 150 nurses aged ≥ 22 to 57 years. The enrolled participants a complete data set was available for analysis. The study was announced within the hospital by poster, blackboard, presentations in the lecture hall and oral announcement. The participation was voluntary and 150 participants were enrolled consecutively until the desired number of participants was met. The questionnaire was prepared taking into account the most common professions within the hospital setting. The questionnaire did not include questions concerning sexual behavior as this was considered culturally inappropriate in the study setting.

After giving informed consent, a standardized questionnaire was used to collect information on demographics, medical history, profession

and the HBV immunization status of all the participants. An additional sub-analysis was conducted on a subgroup classified by exposure to needle stick injury, surgery, blood transfusion, intravenous (i.v.) drug use, intramuscular (i.m.)/i.v. injection; this subgroup was compared to the non-exposed study participants, regardless of their profession.

Specimen collection

From each nurses participant, 7 ml of whole blood was collected into two serum sampling tubes for serological analysis. The samples were centrifuged for 5 min at 3000 g and the serum was stored in at −20 °C until examination was performed .

Benefit for the study nurses participant

Although currently no antiviral treatment is licensed for chronic hepatitis B infection in Yemen knowledge of the hepatitis B status is of benefit for the nurses, as he is able to undergo further monitoring and evaluation. In addition, it allows family members and potential sexual partners to be vaccinated. In case of women of childbearing age, prevention of mother-to-child transmission is possible. Those nurses participants with significant anti-HBs titers were reassured of their Hepatitis B immunity, those without previous infection were advised to be vaccinated against HBV. These aspects were carefully considered by the ethical board of the hospital.

Statistical analysis

Statistical analyses were performed using SPSS Version 18.

Ethical issues

All nurses participants signed an informed consent form that covered sample analysis for HBV. Nurses Participant received a study

number. No personal data was recorded at any time. The individual test results were made available to the hospital in a sealed envelope labelled with the specific study number. Each nurses participant was able to collect her letter anonymously, containing the laboratory results and their interpretation. In case of findings, indicating a chronic Hepatitis B the nurses participant was advised to seek medical care for further evaluation.

Results

Elisa test was used to study the prevalence of Hepatitis B Virus (HBV) among nurses in Sana'a hospital in Yemen.

The HBV was found in 31 out of 150 (20.6%) nurses in Sana'a Hospital in Yemen.

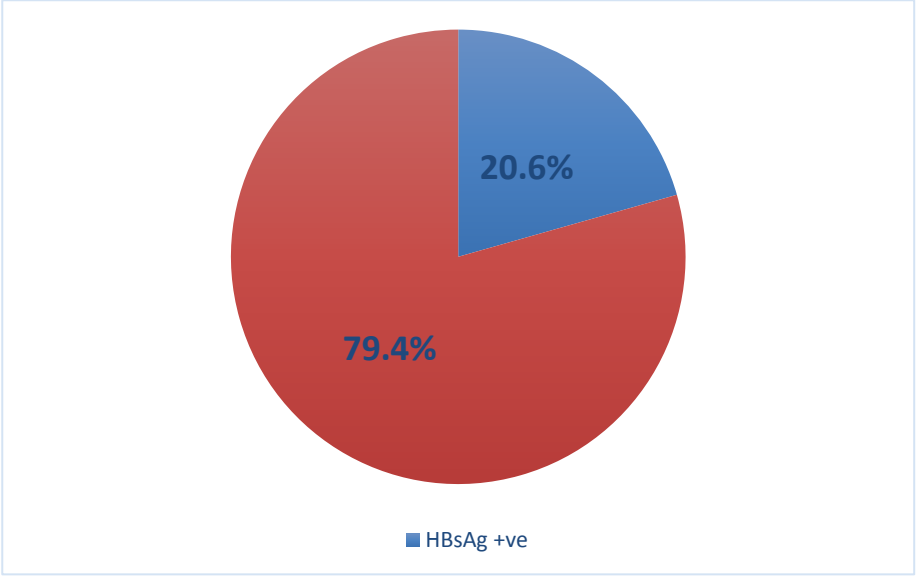

Fig (1):seroprevalence of HBV infectionamong nursesin Sana'a hospital in Yemen 2015.

Table (1): Characteristic future of the studied regarding age and sex among nursesin Sana'a hospital in Yemen 2015.

Age and sex					X^2	P. Value
Sex	HBsAg +ve		HBsAg -ve			
	No	%	No	%		
Male	12	21	45	79	2	0.391
Female	19	20.4	74	79.6		

From this table (1) we can notice that HBV incidence high in the male 12 (21%) than female 19 (20.4%). The difference is statistically insignificance

Table (2): potential Risk factors for HBV infection among nursesin Sana'a hospital in Yemen 2015.

Potential risk factor	Total	HBsAg +ve		HBsAg -ve		X^2	P.value
		No	%	No	%		
Needle stick						8.3	0.01
Yes	29	4	13.8	25	86.2		
Spilt blood						9.2	0.01
Yes	43	7	16.3	36	83.7		
Sharps injuries						8.59	0.01
Yes	21	3	14.3	18	85.7		

As regard the Risk factors for HBV infection, it is found that 4 of 29 (13.8%) nurses who had needle stick had HBV seropositivily, 7 of 43 (16.3%) nurses had HBV seropositivily and 3 of 21 (14.3%) nurses who

had history of sharps injuries were seropositivily for HBV. The difference is statistically highly significant.

Discussion

The present study attempted to clarify these issues in Yemen , A country known for it's endemicity of HBV infection.

This study revealed a high burden of HBV infection in nurses in Sana'a hospital in Yemen. The overall prevalence of chronic HBV infection (HBsAg positivity) among nurses in Sana'a hospital in Yemen.

The proportion of nurses who achieved immunity due to healed infection with HBV in this study (20.6 %) was higher than that of a different study on the prevalence of HBV in nurses at Saudi Arabia is (13 %), Pakistan is (15%) and in Turkey (18.7%).

The prevalence among the high-risk groups in Saudi Arabia was found to be 5.88% among hemodialysis patients [24] and 12.6% among intravenous drug users [25]. In the less populated Gulf States, HBV was found to be 7.1% among pregnant women in Oman [26] and 12.7% in hemodialysis patients [27]. In Bahrain HBpositive markerswere found in about 20.5% of haemolytic Bahraini patients [28] while hepatitis B surface antigen (HBsAg) was positive in 0.62% among haemodialysis patients [24]. In Qatar, the prevalence rate among pregnant women reached 1% [26]. However, it should be remembered that there is additional potential risk in this area of groups of visitors and expatriates who may have been born in an endemic area.

HBV prevalence in Syria was 2.8% among health-care workers[29] and 7.8% among haemodialysis patients [30]. In Iraq, the prevalence among haemodialysis patients was 13.5% [31]. In Lebanon, HBV prevalence was 0.99% among sex workers from both genders [32]. In Jordan it was found to be 5.9% among patients undergoing

haemodialysis, [33] while in neighbouring Gaza it reached 8.1% for the same risk group [34].

HBV prevalence among specific groups and categories in Egypt has been intensively studied. HBV was found to be extremely high at 20.7% among tourism workers, [35] and it was even higher among high-risk groups where it was 29% in multi-transfused thalassemia patients [36]. HBV prevalence among Egyptian hemodialysis patients was found to be 4.1% [37]. In Sudan, HBV prevalence among pregnant women was found to be 5.6%, [38] while patients on hemodialysis were found to have a prevalence rate of 4.5% [39].

This study result confirm that nurses in Sana'a hospital in republic of Yemen, who have no received vaccine against HBV prior to their work in the hospital.

This finding may indicate that needle stick, spilt blood and sharps injuries may be a risk factor for transmission of HBV.

The study found a significantly higher rate of HBV infection in the nurses in Sana'a hospital exposure to needle stick, spilt blood and sharps injuries. Aside from the existing policy in Yemen on injection safety in nurses, use of auto-disposable syringes and better safety awareness concerning HBV as an infectious agent are crucial to the prevention of blood-borne infections.

Conclusions and recommendation

It is found that the prevalence of HBV infection and the risk of occupational exposure to HBV among nurses were high, there is an urgent need to focus on reducing transmission through improving the work place environment and ensuring to the infection virus. It's also important that healthy persons be properly informed about their risk of HBV infection so as to measure to avoid been protecting it work face and ensuring that health workers are not linked in any way with

transmission of the HBV in the general population. HBV is commonly present among nurses in Sana'a hospital, highlighting the need for vaccination. Due to high prevalence of naturally acquired immunity against HBV pre-testing might be a useful tool to identify susceptible individuals.

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Prevalence of Helicobacter pylori among students in Dar-AlSalam International University for Science & Technology in Sana'a city –Yemen

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Abstract

Background:Helicobacterpylori infection causes chronic gastritis, peptic and duodenal ulcers, the man only reservoir and source of H.pylori. The infection usually acquired in childhood and persists for the live of the host despite eliciting a seemingly vigorous immune response. ***Objective:*** To determine the prevalence of helicobacter pylori among student in Dar AlSalam International University for science and Technology and detected the risk factor for contracting H. pylori transmission infection. ***Study design:*** This investigation was conducted on 200 student in Dar AlSalam International University for Science and technology in Sana'a, Yemen. All students were examined by enzyme-labeled immunosorbant assay to determine the H.pylori. ***Result:*** H. pylori was detected on 61% (121/200) of student in Dar AlSalam International University for Science and Technology in Sana'a, Yemen.

Conclusions: H. pylori is commonly present among studens in Dar AlSalam International University for science and Technology in Sana'a, Yemen, The prevention of H. pylori infection in Yemen is done by increasing the healthy education about mode transmission and risk factor infection and the treatment of the infected patient by H.pylori.

Keyword: H.pylori, Students in DarAlSalam.

Introduction:

In 1979 Robin Warren, a pathologist *in Perth, Western Australia*, began to notice that curved bacteria often were present in gastric biopsy specimens submitted for histological examination [1]. These organisms were not present within the gastric mucosa but were present in the mucus layer overlying the tissue . *Warren* found that similar organisms had been described by European pathologists in the late 19th century, but because they could never be isolated, they were ignored and ultimately forgotten by generations of physicians and scientists. A young trainee in internal medicine, Barry Marshall, became interested in Warren's observations, and together the two sought to isolate the organisms from biopsy specimens. Since the organisms had the appearance of curved, gram-negative rods, the investigators used methods for the isolation of Campylobacter species, which involved inoculating the biopsy specimens ontoselective media and incubating the cultures under micro aerobic conditions [1].In developing countries, 70 to 90% of the population carries H. pylori; almost all of these acquire the infection before the age of 10 years [2,3]. In developed countries, the prevalence of infection is lower, ranging from 25 to 50%. The data from developed countries also suggest that most infections are acquired in childhood. Consistent with this model is a wide body of evidence that the incidence of H. pylori infection has been declining with the changes concomitant with industrial development [4]. There appears to be no substantial reservoir of *H. pylori* aside from the human stomach. Other animals harbor organisms that resemble *H. pylori*, but with the exception of non humanprimates [6] and, under particular circumstances, perhaps cats [7], none harbor *H. pylori*. Thus, the major question of transmission show*H. pylori*travels from the stomach of one person to that of another. Three routes have been described. The first and least common is atrogenic, in which tubes, endoscopes, or

specimens in contact with the gastric mucosa from one person are introduced to another person[5]. The development of infection of endoscope reduced in the cadence of transmission[8,13].

Interestingly, endoscopists, especially those who did not wear gloves during procedures, were at increased risk of becoming infected [10. Occupationally acquired infections also have been reported; although there does not appear to be any special risk associated with handling this organism, laboratory and should use universal precautions when handling clinical specimens and should remember that *H. pylori* strains are human pathogens. Fecal oral transmission is perhaps the most important. Although *H. pylori* has been isolated from the feces of young children infected with the organism [12], fecal isolation is not common; this could indicate that shedding is intermittent. Focally contaminated water may be a source of infection, but the organism has not been isolated from water [11]. Food-borne transmission has not been substantiated. Finally, oral transmission has been identified in the case of African women who pre masticate foods given to their infants[9].*H. pylori* occursonly in humans and transmittedby the fecal-oral pathway . The pathogen colonizes and infects the stomach mucosa [14]. The pathogenicity factors include pronounced motility for efficient target cell searching, adhesion to the surface epithelial cells of the stomach, urease that releases ammonia from urea to facilitate survival of the cells in a highly acidic environment and a vacuolizingcytotoxin (VacA) that destroys epithelial cells [16]. Once the pathogen has infected the stomach tissues an acute gastritis result, the course of which may or may not involve overt symptoms [15].*Helicobacter pylori* infection is the major cause of gastric cancer. Gastric cancer (GC) is the second leading cause of cancer related death among all cancers, next only to lung cancer although the relationship between *H. pylori* infection and gastric cancer has been very well established, the mechanisms of how tumor

initiation and the early development remain elusive. *H.pylori* infection and gastric cancer was concluded by International Agency for Research on cancer, world health Organization (IARC) in1994, found that the relative risk for gastric cancer increased with increasing period of time between *H.pylori* seropositivity and diagnosis of gastric cancer [17,18]. Four major virulence factors have been identified from *H.pylori*, includingcytotoxin-associatedantigenA (CagA), vacuolatingcytotoxin (VacA). and outer membrane protein (OMPs).some of them encode type four secretion system (TFSS),which are essential for pathogenesis and are responsible for delivery of CagA protein and peptidoglycan (PGN) into host cells [18,19].

Aim of the study

1- To determine the prevalence of H. pylori among DarAlSalam International University for Science and technology in Sana'a, Yemen.
2- Detection the potential risk factor for contracting H. pylori infection and transmission.

Subject & Methods

Study design:

Cross section study.

Study population and sample size:

The study population includes all the 200 student in Dar-AlSalam International University for Science and Technology in Sana'a, Yemen, duration the period March to April 2014. Epi-info7 was used to calculate the sample size.

Participants & Sample

The enrolled students number is 200, age ≥ 18 to 30 years. A systematic random sampling of every 10^{th} students on the list was performed. The pre designed questionnaire included demographic data question on socio-economic status as well as questions on potential risk factor of H. pylori infection and age, gander, chowing gatt, smoking,Spicy food**,** caffeine consumption, the presence of gastric symptom. Grades were allotted according to the information supplied by the volunteers on socio economic and personal conditions such as moth hygiene, housing hygiene, presence of houseflies and number of residents in the house.

Specie collection:

From each student participant, 7ml of whole blood was collected in to serum sample tab for serological analysis. The samples were centrifuged for 5 min at 3000gm and serum was stored in at -20 C° until examination was performed.

All serum samples were screened using an enzyme linked immunosorbant assay (Elisa) for H. pylori IgG antibodies.

Statistical analysis:

Statisticalanalysiswere performed using spas verismo 18.

Ethical issues:

All students participant an informed consent from the covered sample analysis for H. pylori. Each participant was able to collect his letter anonymously,containing the laboratory result and their interpretation. In case of findings, indicating H. pylori. The participant was advised to seek medical care for further evaluation.

Result

Two hundred students (volunteers) completed the study questionnaires and then donated blood, which were test for H. pylori specific IgG. All participants were Yemenes living in Sana'a, Yemen. The H. pylori was found in 121 out of 200 (61%) student in DarAlSalam international University for science and technology in Sana'a, Yemen. The study revealed relative risk factors of 42% associated with caffeine, 52 associated with eating spicy food, 72.3 associated with chewing qat and 19.8% associated with smoking.

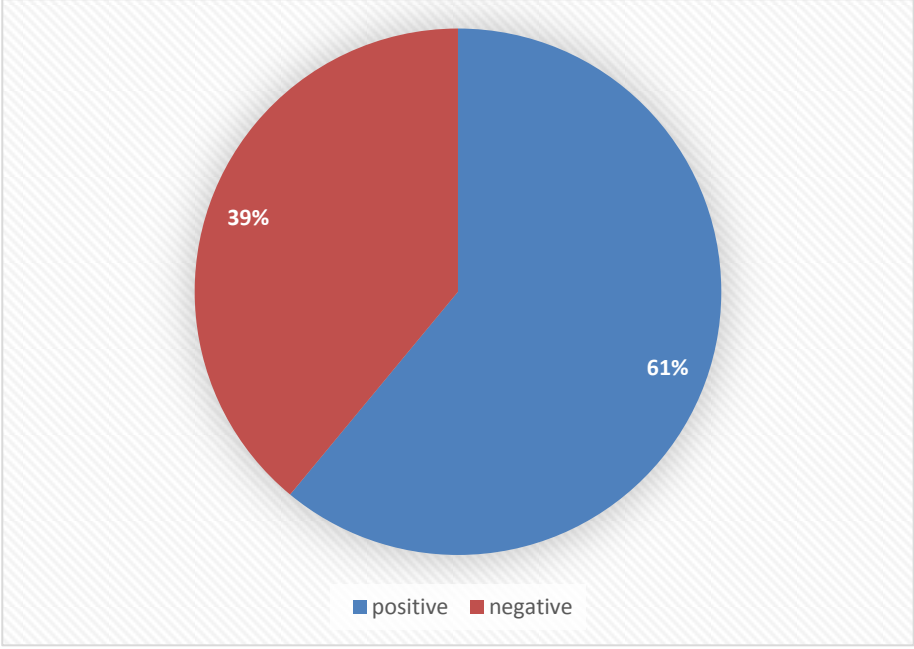

Figure (1): seroprevalence of H. pylori among student in Dar AlSalam International University for Science and Technology in Sana'a, Yemen 2014.

From figure (1), it has been observed that the deference between positive and negative disease of H. pylori infection among 79 (39%) students in DarAlSalam international University for science and technology in Sana'a, Yemen.

Table (1): Characteristic future of the studied regarding age and sex among students in Dar-AlSalam International University for Science and Technology in Sana'a, Yemen 2014.

Age and sex					X2	P.value
Sex	H. pylori +ve		H. pylori -ve			
	NO	%	NO	%		
Male	81	61.4	51	38.6	2.3	0.41
Female	40	58.5	28	41.2		

From this table (1), we can notice the H. pylori in cadence is high in the male 81 (61.4%) than it is on female 40 (58.8%). The difference is statically insignificant.

Table (2): potential Risk factor for H. pylori infection among student in Dar AlSalam international University for science and technology in Sana'a, Yemen 2014.

Potential risk factor	Total	H. pylori +ve		H. pylori -ve		X2	P.value
		NO	%	NO	%		
Caffeine						6.1	0.01
Yes	121	51	42	70	58		
Spicy food						7.3	0.01
Yes	121	63	52	58	48		
Chewing gatt						6.1	0.01
Yes	121	33	27.3	88	72.7		
Smoking						6.8	0.01
Yes	121	24	19.8	97	80.2		

Regarding the risk factor for H. pylori infection, it is found that 51 of 121 (42%) who had caffeine had H. pylori seropositivity. 63 of 121

(52%) who had spicy food had H. pylori seropositivity. 33 of 121 (27. 3%) who chew qat had H. pylori seropositivity. 24 of 121 (19.8%) who had smoking had H. pylori seropositivity. The difference is statistically significant.

Discussion

Serological surveys of health population group have been of major importance in mapping the epidemiology of H. pylori and documenting differences in it's behavior of among specific age group in various part of the world [32-37]. These surveys provide information on age, exposure time, potential courses of infection and possible routes of transmission, which might help in predicting the rate of clinical outcomes of this slow-acting infection and identifying the age of acquisition. The main clinical outcomes of H. pylori infection are chronic gastric cancer and gastric lymphoma [24-28]. This significant risk factor can be explained by the high level of contamination by contact with infected saliva and other excreta of users [31]. Several studies have shown variations in the prevalence rate of H. pylori antibodies according to socioeconomic status, overcrowding, personal and housing hygiene [23,29,30]. Since the prevalence of *H. pylori* infection is much higher in the less developed nations, where the socioeconomic status, low living standards and poor sanitation may be implicated. Such matter has stimulates to conduct this study to determine the prevalence of *H. pylori* infection. This study focused on young adults because they constitute the future of our society. In this study, the prevalence of *H. pylori* among students in Dar AlSalam international University at Sana'a was 61%. This result was high as many resent studies were found in Yemen or in other countries: The prevalence of *H. pylori* at Sana'a and Thamar hospital was 99%, while at Hadramout Hospital was 98% and at socatra Hospital was 100%[20]. AlsoThe prevalence of *H. pylori* at Taiz was 53% [22]. Those

high percentages are due to lack of proper sanitation, of safe drinking water, and bad hygienic habit, like eating of vegetables in some area and chewing qatt unwashed [20]. The prevalence of *H. pylori* in Saudi Arabia is 80% of adults, while in Egypt is 90%, and in Libya is 94%. The principle reasons for this variation involve socioeconomic differences between populations. Transmission of H. pylori is largely by the oral, oral or fecal, oral routes. A lack of proper sanitation, safe drinking water, and of basic hygiene, as well as poor diets and overcrowding represent major risk factors [21]. This study identified specific factor that may explain variations in H. pylori prevalence among children in Yemen. It also highlighted the early acquisition of the infection in Yemen. A possible way of eliminating H. pylori from the population would be via public health measures, improving sanitation and the standard of living.

Conclusions &Recommendations

H. pylori is commonly present among student in DarAlSalam international University for science and technology in Sana'a, Yemen, The prevention of H. pylori infection in Yemen by increasing healthy awareness about mode transmission, risk factor infection, Advice people for screening of *H. Pylori*and treatment the patient infection by H. pylori .

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