British Journal of Medicine & Medical Research
17(11): 1-8, 2016, Article no.BJMMR.24777
ISSN: 2231-0614, NLM ID: 101570965

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Impact of Dietary Behavior, Lifestyle & Socioeconomic Status on Patients Infected with *H. pylori*

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJMMR/2016/24777
Editor(s):
(1) Faris Q. B. Alenzi, Department of Medical Laboratories, College of Applied Medical Sciences Salman bin Abdulaziz University (Al-Kharj), Saudi Arabia.
(2) Masahiro Hasegawa, Department of Orthopaedic Surgery, Mie University Graduate School of Medicine, 2-174 Edobashi, Tsu City, Mie, 514-8507, Japan.
Reviewers:
(1) Przemysław Tomasik, Jagiellonian University, Poland.
(2) Anonymous, Kyoto Prefectural University of Medicine, Japan.
(3) Anonymous, Misr international hospital, Egypt.
(4) Wagih Mommtaz Ghannam, Mansoura university, Egypt.
(5) Anonymous, University of Foggia, Italy.
Complete Peer review History: http://www.sciencedomain.org/review-history/16239

Original Research Article

Received 1st February 2016
Accepted 11th September 2016
Published 19th September 2016

ABSTRACT

Introduction: *Helicobacter pylori* (*H. pylori*) is bacterial infection, has become a primary cause for peptic and duodenal ulcers and an etiologic agent in the development of gastric cancer.
Aim: To assess the impact of patient's dietary behavior, socioeconomic factors, and lifestyle on patient's infectivity status by *H. pylori*.
Methodology: A case – Control study consisted of 100 participants that were divided into two groups *n* = 46 Cases (IgG Positive), and *n* = 54 Controls (IgG Negative), conducted on patients with upper digestive tract problems in the endoscopic clinics in Gaza in order to determine the impact of patient's dietary behavior, socioeconomic factor and life style on *H. pylori* infecting status using an interview questionnaire for data collection after getting consent of the participants, SPSS

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was used for data entry and analysis.
Results: One hundred patients were assessed, 43.5% male with positive IgG, while female with 56.5% positive IgG. Most of cases 91.3% were < 45 of age, and 58.7% were married. About 21.7% of cases had past family history of *H. pylori*, while zero percent for controls. Also, 84.4% of cases were suffered from stress with statistical significance.
Conclusion: *H. pylori* infection is a phenomenon in Gaza Strip, and dietary behavior, socioeconomic status and lifestyle play an important role on patient's infection.

Keywords: H. pylori; infection; lifestyle; dietary behavior; socioeconomic status.

1. INTRODUCTION

Gastrointestinal problems are a common cause for attendance at primary health care units as well as referrals to tertiary care centers in developed countries. Similarly, poor sanitation, poor hygiene and poor standards of living contribute to large magnitudes of gastrointestinal (GI) problems in developing countries [1].

Helicobacter pylori (*H. pylori*) is bacterial infection, has become a primary cause for peptic and duodenal ulcers since its discovery by two Australian doctors, Barry Marshall, M.D., and Robin Warren, M.D. in 1982, and antibiotics have become the primary "cure". One of the major consequences of *H. pylori* infection is its effect on acid production in the stomach and occurrence of peptic ulcer [2].

Recent studies trying to explore the relationship between *H. pylori* infection and dietary behaviors personal preferences, ethnic heritage and tradition, habit, economy, social interactions, and emotional comfort [2,3].

Many studies showed that *H. pylori* infection is the most common bacterial infection, exceeds 50% of the world's population in general and Palestine in particular as well [4]. *H. pylori* infection is the primary cause of peptic ulcer disease and an etiologic agent in the development of gastric cancer [1,3]. In addition the *H. pylori* infection is related to many diseases as diabetes, hypertension, ovarian polycystic disease and other diseases. Also previous studies showed there is relationship between dietary factors, lifestyle, socioeconomic status and *H. pylori* infection [5].

The current study aimed to assess the impact of patient's dietary behavior, socioeconomic factors, and lifestyle on patient's infectivity status by *H. pylori*.

2. SUBJECTS AND METHODS

2.1 Study Design

A retrospective case control study.

2.2 Study Duration, Population, and Setting

The study was conducted in March 2012 and continued till the end of July, 2012. The target population was all patients who are suffering from upper digestive tract problems & undergone upper GIT endoscopy in different endoscopic centers in Gaza city as Al-Shifa Hospital, Public Aid Hospital, Patient's Friend Society and Al Basma Health Center. Study populations consisted of 100 participants that were divided into two groups n = 46 Cases (IgG Positive), and n = 54 Controls (IgG Negative).

2.3 Sample Size and Sampling

According to previous studies, prevalence of *H. pylori* infection was 50%, accordingly the study sample size was calculated by using Epi Info version 6 (USA), and sample size was 96 participants with confidence level of 95% when the worst acceptable result was 40%. The researcher selected a sample of 100 to consider drop out of cases, and used convenience sampling technique.

2.4 Data Collection Tools

2.4.1 Interview questionnaire

Semi-structured interviews were conducted. Face to face interview of each patient in the sample used for data collection including personal data like gender, age, marital status, residency, education level, occupation of patient, household information, family history of disease and history of patient. Also including dietary behavior and lifestyle as the type of food, dietary behavior and medications. The questioner asked about the symptoms, and focus on groups of

foods, the number of times per day the patient eats.

2.5 Statistical Analysis

Statistical Package for the Social Sciences (SPSS) program version 18, was used for data analysis which includes cross tabulations of the results and Chi square test for categorical data, odds ratio and the confidence interval was the statistical tool used to assess the association between family members, income per month, and family history, and smoking status. P value was used for measuring statistical difference between discrete variables, and values are statistically Significant when ($P < 0.05$).

2.6 Ethical Consideration

We get all of required ethical approvals including dean of postgraduate studies & research affairs, Ministry of Health and informed consent of the participants.

3. RESULTS

3.1 Distribution of Participants by Age, Gender and Marital Status

Table 1 clarified 91.3% of cases were younger than 45 years; and 58.7% got married with statistical significance ($P = 0.01$). Also, 56.5% of cases were females without statistical significance.

3.2 Distribution of Participants by Socioeconomic and Demographic Status

Table 2 showed that cases are poorer (54.3%) than controls however, they are more employed (32.6%) than controls (25.9%) but without statistical significance ($P > 0.05$).

Table 1. Distribution of participants by age, gender, and marital status

Personal characteristic	Cases IgG positive	Controls IgG negative	Total	*P value*
Gender	**No (%)**	**No (%)**	**No (%)**	
Male	20 (43.5)	29 (53.7)	49 (49)	
Female	26 (56.5)	25 (46.3)	51 (51)	0.2
Total	46 (100)	54 (100)	100 (100)	
Age	**No (%)**	**No (%)**	**No (%)**	
< 45	42 (91.3)	39 (72.2)	81 (81)	
≥ 45	4 (8.7)	15 (27.8)	19 (19)	0.01
Total	46 (100)	54 (100)	100 (100)	
Marital status	**No (%)**	**No (%)**	**No (%)**	
Single	19 (41.3)	9 (16.7)	28 (28)	
Married	27 (58.7)	45 (83.3)	72 (72)	0.006
Total	46 (100)	54 (100)	100 (100)	

Table 2. Distribution of participants by socioeconomic and demographic characteristics

Socioeconomic characteristics	Cases IgG positive	Controls IgG negative	Total	*P value*
Education	**No (%)**	**No (%)**	**No (%)**	
Illiterate	0 (0)	2 (3.7)	2 (2)	
Basic	15 (32.6)	32 (59.3)	47 (47)	
Secondary	5 (10.9)	2 (3.7)	7 (7)	0.01
University & Higher	26 (56.5)	18 (33.3)	44 (44)	
Total	46 (100)	54 (100)	100 (100)	
Occupation	**No (%)**	**No (%)**	**No (%)**	
Employed	15 (32.6)	14 (25.9)	29 (29)	
Unemployed	25 (54.3)	33 (61.1)	58 (58)	
Craftsmen	6 (13)	7 (13)	13 (13)	0.7
Total	46 (100)	54 (100)	100 (100)	
Income	**No (%)**	**No (%)**	**No (%)**	
Less than 2 USD	25 (54.3)	24 (44.4)	49 (49)	
2 USD & More	21 (45.7)	30 (55.6)	51 (51)	0.2
Total	46 (100)	54 (100)	100 (100)	

3.3 Distribution of Participants by Medical History

Table 3 showed that about fifth of cases (21.7%) had positive family history of *H. pylori* infection with statistical significance (P = 0.01). While, 17.4% of cases had family history of peptic ulcer and 26.1% of them reported history of GIT bleeding but without statistical significance.

3.4 Distribution Participants by Dietary Behavior and Life Style

Table 4 showed that more than half of cases (52.2%) shared eating utensils and 26.1% of cases ate from vendors and restaurants with statistical significance (P = 0.01).

Table 3. Distribution of participants by medical history

Family & personal history	Cases IgG positive	Controls IgG negative	Total	*P value*
Family history of *H. pylori*	**No (%)**	**No (%)**	**No (%)**	
Positive	10 (21.7)	0 (0)	10 (10)	
Negative	36 (78.3)	54 (100)	90 (90)	0.00
Total	46 (100)	54 (100)	100 (100)	
Family history of peptic ulcer	**No (%)**	**No (%)**	**No (%)**	
Positive	8 (17.4)	9 (16.7)	17 (17)	
Negative	38 (82.6)	45 (83.3)	83 (83)	0.9
Total	46 (100)	54 (100)	100 (100)	
Patient history of GIT bleeding	**No (%)**	**No (%)**	**No (%)**	
Yes	12 (26.1)	7 (13)	19 (19)	
No	34 (73.9)	47 (87)	81 (81)	0.09
Total	46 (100)	54 (100)	100 (100)	

Table 4. Distribution of participants by diet & eating behavior

Diet behavior	Cases IgG positive	Controls IgG negative	Total	*P value*
Spicy food	**No (%)**	**No (%)**	**No (%)**	0.13
Excess spices	23 (50)	20 (37)	43 (34)	
Less spices	23 (50)	34 (63)	57 (57)	
Total	46 (100)	54 (100)	100 (100)	
Salty food	**No (%)**	**No (%)**	**No (%)**	0.48
High Salt	20 (43.5)	19 (35.2)	39 (39)	
Less Salt	26 (56.5)	34 (63)	60 (60)	
Total	46 (100)	54 (100)	100 (100)	
Cooking oil	**No (%)**	**No (%)**	**No (%)**	0.16
Olive oil	1 (2.2)	4 (7.4)	5 (5)	
Corn oil	38 (82.6)	36 (66.7)	74 (74)	
Sunflower oil	7 (15.2)	14 (25.9)	21 (21)	
Total	46 (100)	54 (100)	100 (100)	
Eating behavior	**Cases IgG positive**	**Controls IgG negative**	**Total**	***P value***
Sharing eating utensils	**No (%)**	**No (%)**	**No (%)**	
Yes	24 (52.2)	15 (27.8)	39 (39)	0.01
No	22 (47.8)	39 (72.2)	61 (61)	
Total	46 (100)	54 (100)	100 (100)	
Eating from vendors & restaurants	**No (%)**	**No (%)**	**No (%)**	
Daily	12 (26.1)	10 (18.5)	22 (22)	
Once/week	25 (54.3)	19 (35.2)	44 (44)	
Twice/week	9 (19.6)	25 (46.3)	34 (34)	0.01
Total	46 (100)	54 (100)	100 (100)	

Table 5. Distribution of participants by lifestyle (stress exposure, smoking, sleeping hours and domestics animals)

Variable	Cases IgG positive	Controls IgG negative	Total	*P value*
Stress	**No (%)**	**No (%)**	**No (%)**	
Yes	39 (84.4)	28 (51.9)	67 (67)	
No	7 (15.2)	26 (48.1)	33 (33)	0.00
Total	46 (100)	54 (100)	100 (100)	
Smoking	**No (%)**	**No (%)**	**No (%)**	
smoker	10 (21.7)	9 (16.7)	19 (19)	
No smoker	32 (69.6)	39 (72.2)	71 (71)	0.7
Ex-smoker	4 (8.7)	6 (11.1)	10 (10)	
Total	46 (100)	54 (100)	100 (100)	
Sleeping hours	**No (%)**	**No (%)**	**No (%)**	
<6 hours	18 (39.1)	16 (29.6)	34 (34)	
6-8 hours	20 (43.5)	35 (64.8)	55 (55)	0.5
>8 hours	8 (17.4)	3 (5.6)	11 (11)	
Total	46 (100)	54 (100)	100 (100)	
Domestic animals	**No (%)**	**No (%)**	**No (%)**	
Yes	11 (23.9)	7 (13)	18 (18)	
No	35 (76.1)	47 (87)	82 (82)	0.1
Total	46 (100)	54 (100)	100 (100)	

The results showed in above Table 5 that most of cases were suffering from stress 84.4% with statistical significance (P = 0.00). However, 21.7% of cases were smokers and 39.1 sleeps less than 6 hours per day without statistical significance, about 23.9 % of cases had demotic animal without statistical significance (P = (0.1).

4. DISCUSSION

The results in Table 1 showed that *H. pylori* infection is a disease of young adults where the most positive *H. pylori IgG* of age participants were married, female and less than 45 years with statistical significance (P = 0.01). The results in Table 2, showed the majority of IgG positive was participants with university and higher education (56.5 %) with statistical significance (P = 0.01). The results in Table 2 showed approximately half of study participants are living under poverty line (< $2/day/capita).The current study conducted on 100 participants which PCBS findings from broad survey conducted all over the Gaza Strip. The current study showed that those infected with *H. pylori* were minimally higher than those uninfected.

Young adults usually depend on the fast food and restaurant foods, which could be contaminated with *H. pylori* however, this current result contradicts with a study carried out in Bangladesh which showed that *H. pylori* infection increased with increased age [5]. The results of the current study showed that *H. pylori* infection is more common among females which contradicts with a study conducted in Leeds, England that revealed male gender, is associated with increased risk of *H. pylori* infection [6].

The results of the current study showed that *H. pylori* infection is more common among unmarried participants; due to the unmarried people usually depend on the fast food and restaurant foods, which could be contaminated with *H. pylori*. However, this contradicts with Moayydi's study [6], which found that living with a partner is associated with increased risk of *H. pylori* infection.

As shown in Table 2, the majority of IgG positive was participants with university and higher education. Secondary and university students usually have their meals and snacks from the school canteen where the food safety is less strict that food prepared at home.

The results in Table 2 showed approximately half of study participants are living under poverty line (< $2/day/capita). The current study conducted on 100 participants which PCBS findings from broad survey conducted all over the Gaza Strip. The current study showed that those infected with *H. pylori* were minimally higher than those uninfected.

As shown in Table 3, there were high percent of positive family history of *H. pylori* (21.7%), and a positive family history of peptic ulcer (17.4%) among cases with statistically significant differences in both, and there was 20% of cases with history of GIT bleeding without statistical significance (0.09). This results due to our community is closed. In addition to the transmission of these bacteria are direct as oral-oral, oral-fecal, and oral-gastric routes and indirect as animals these routes allow transmission clearly between family members. Poor socioeconomic status having an *H. pylori* infected sibling give chance to increase the *H. pylori* infection. According to a study conducted in West African, the families of 32 children with suspected *H. pylori*-related disease, were studied. *H. pylori* status was determined by fecal antigen testing, a method that we have validated against the urea breath test in children which the result was poor socioeconomic status and having an *H. pylori* infected sibling are significant risk factors for *H. pylori* in children, suggesting that infection may be transmitted horizontally within families [7]. Other study in China suggest that person-to-person transmission is the most plausible route of *H. pylori* infection among rural Chinese population, but waterborne exposures deserve further investigation [8].

About 50% of cases prefers excess spicy food, 43.5% of cases prefers high salty food, Moreover, cases consumes olive oil less 2.2 % than controls 7.4% without statistical significance (Table 5). Most participants sharing their tools with family member gave positive IgG, and they eats outside once per week 54.3% with statistical significance (P = 0.01). The results of eating outside (restaurants) generally increased the risk of infection and these results agree with Begue [9-11], increased prevalence of infection was associated with increased consumption of food from street vendors, and decreased consumption of fruits in the subgroup that denied consuming food from street vendors, most participants sharing their tools with family member gave positive IgG, most participants who took less salt gave negative IgG and were more protective than who ate high salty food, most participants who took less spicy food gave negative IgG and more protective than who took high spicy foods and , most participants who used the olive oil gave negative IgG, because the olive oil contains poly phenols that can kill *H. pylori*. Most participants, who used corn oil gave positive IgG. This difference of result was availability and usage of corn oil.

The results showed that smoking increases the risk of *H. pylori* infection. In a prospective study, there was a strong association between *Helicobacter pylori* infection and current cigarette smoking in patients with normal endoscopy. The associations of peptic ulcer both with *H. pylori* infection and cigarette smoking were also confirmed. The excess of peptic ulcer disease in cigarette smokers may be explained by their increased susceptibility to *H. pylori* infection [12]. This result arising our study because of the number of smokers is very few. The study showed that, there is the daily diet intake impact on patients as carbohydrate intake (cereals), protein intake (red meat, fishes, eggs, poultry and dairy products), vegetables & fruits intake and beverages.

Whole bread, pizza and biscuits from carbohydrate intake give statistically significant results, the results of high intake whole bread give decrease the risk of infection, this result is due to the whole bread is example of whole grains rich fibers which are important and enhance immune system by supply more antioxidants. In addition intake the whole bread helps to relieve ulcer pain and discomfort. Pizza and biscuits results give increase the risk of infection, which Dr. David said unfortunately, many people will never eradicate *H. pylori* until they alter their diet and remove foods that weaken the immune system and cause inflammation in the intestines. Wheat, rye and barely are grains that are eaten on a daily basis by most people. Bread, pasta, crackers, pizzas, biscuits, pastry and other baked goods are all examples. There is a protein substance found in these grains called gluten. In many people, gluten causes inflammation in the small intestine. *H. pylori* also cause inflammation in the small intestine. So gluten and *H. pylori* can cause exactly the same symptoms [13].

Yogurt from dairy products and take cup of yogurt per day give statistically significant results and decrease the risk of *H. pylori* infection, this result is due to the yogurt had probiotics and studies indicate that taking probiotics can: enhance the effectiveness of triple therapy antibiotics, reduce the side-effects of antibiotics, assist in killing *H. pylori* and help maintain a healthy immune system [13,14].

In other study conducted in Poland found high dietary intake of probiotic bacteria, mainly Lactobacillus, and antioxidants, mainly vitamin C (contained in fruits and vegetables), decrease

the risk of *H. pylori* re-infection. The important role of nutritional factors that might facilitate infection, such as low intake of antioxidants, mainly vitamin C, and high salt consumption, is also stressed [15].

Red meat from protein intake gave statistically significant result which the low intake of red meat increase the risk of *H. pylori* infection, in spite of in the most of literatures showed that, the high intake of red meat can increase the *H. pylori* infection. Protein high diet could enhance the immune system of the body combat infection.

Consuming more serving size of vegetables per day are significantly protective against *H. pylori* infection and the results show that consuming cabbage, garlic, onion, and avocado are significantly associated between *H. pylori* prevalence [16-18].

In this study the broccoli had negative result in the *H. pylori* IgG positive due to few numbers of participants consumed broccoli and it is not famous or preferred food in Gaza strip. The studies showing the impact of broccoli on *H. pylori* infection, daily intake of sulforaphane-rich broccoli sprouts for 2 months reduces *H. pylori* colonization in mice and improves the sequelae of infection in infected mice and in humans. This treatment seems to enhance chemo-protection of the gastric mucosa against *H. pylori*–induced oxidative stress [19].

Apples, guava and strawberries from fruits intake give statically significant results. This because fruit is rich in vitamins (as vitamin C, E, A), antioxidants, some minerals and fibers. All these contents support the immune system and had good effective on bacteria growth. A particular study was done in order to determine the effects of the berries alone and in combination with a drug, clarithromycin, which *H. pylori* can become resistant against clarithromycin. The study found that, when compared with controls, all berries significantly inhibited growth of *H. pylori*, and that the berry extracts also increased the susceptibility of *H. pylori* to clarithromycin [20]. Moreover, the current study agrees with many studies, concluded high dietary intake of probiotic bacteria, mainly Lactobacillus, and antioxidants, mainly vitamin C (contained in fruit and vegetables), might decrease the risk of *H. pylori* re-infection [21-24].

5. CONCLUSION

The majority of participants subjected to endoscopy were aged less 45 years, married, poor, less educated with positive family history of *H. pylori*, shared eating utensils, exposed more to stress, eat more carbohydrates, less yogurt, less meat, vegetable, fruits and more pickled food.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/16239