Original Research Article

Effect of H. pylori among Sudanese diabetic patients living in Khartoum state

Abstract

Background: Studies suggest an association between *H. pylori* infection and extra gastrointestinal disease. Limited studies provided conflicting results on the association between H. pylori infection and diabetes. The present study was aimed at examining the association between H. pylori infection and diabetes among Sudanese patients.

Methods: This was case control study conducted among Sudanese diabetic patients during the period from 2018 to 2021. A total of 181 diabetics patients are involved in this study. Blood, stool samples were collected from each participant. All stool samples were tested for the presence of H. pylori antigen by using commercially available *H.pylori* antigen detection card. Based on the result examination for *H.pylori* the study population are sub grouped in two groups one group 124 of cases with Positive *H.pylori* antigen and another group 57 of controls with negative H. pylori infection. Both groups were assessed for the level of fasting blood glucose. Data was gathered and analyzed by using SPSS version 20.

Results: among cases group the mean of fasting blood glucose was 201.94± 90.45 mg/dl compared to 199.40± 97.83 mg/dl among control group. The statistical analysis was showed insignificant difference between cases and controls in the level of fasting blood glucose with P-value of 0.864 . In addition, among cases group the mean of male's blood glucose 213.0±91.52 mg/dl was higher than females blood glucose level 185.0 ±87.0 mg/dl.

Conclusion: They were insignificant association between blood glucose level and H. pylori infection among diabetes patents, However, the subgroup analysis suggested that H. pylori infection was possibly associated with increased risk of diabetes among males. Future cohort studies are needed to verify this association in females and to address possible implication in the prevention of diabetes.

Key words

Diabetes millets, H.pylori infection, Blood glucose level.

Introduction:

The most common infection within the world, particularly in developing countries, is Helicobacter pylori (H.P.) infection that is Associate in etiological issue for developing ulcer, internal organ cancer, and acute polymorphonuclear infiltration within the internal organ tissue layer[1,2]. The mononuclear infiltration is characterized by the local production and systemic diffusion of proinflammatory cytokines affecting remote tissues and organic systems [3,4]. This systemic inflammation causes some extra-gastrointestinal side effects of H.P. including ischemic heart disease [1], sideropenic anemia [5], idiopathic thrombocytopenic purpura [6], neurologic diseases [7], and hepatobiliary diseases [8].

It has been shown that H.P. infection plays a role in some endocrine disorders, such as autoimmune thyroid diseases, diabetes, and primary hyperparathyroidism and may have a high prevalence among patients with diabetes [9,10]. The association between H.P. and diabetes was first explored in Simon et al.'s study [11]. Recently, a meta-analysis [12] showed H.P. infection was increased to 1.33 among patients with diabetes. In addition, some studies have shown an increased incidence of diabetes among people with H.P. infection so that the first report that H.P. infection increased incidence of diabetes was in a study by Jeon et al. [13] using a prospective cohort of 782 Latino individuals >60 years of age.

Etiopathogenesis of H.P. infection in diabetic patients has not been defined clearly. However, this hypothesis is now proposed that H.P. infection is more prevalent among people with diabetes but it is not clear whether diabetics have more susceptibility to this infection or H.P. infection increases the susceptibility to diabetes. One of the hypotheses about H.P. infection as a risk factor for diabetes is increased insulin resistance in these patients. [13]

As insulin resistance will develop within the presence of inflammation or as a result of alterations in counter regulative hormones that have an effect on hormone, H.P. might therefore promote hormone resistance by causation chronic inflammation and moving insulin-regulating epithelial duct hormones [14]. The first direct evidence for an association between chronic H.P. infection and insulin resistance rose from Aydemir et al.'s study [15] showing higher homeostatic model assessment-estimated insulin resistance (HOMA-IR) scores in H.P. positive (H.P.+) individuals. In contrast, some studies have not shown this association [16].

Regarding these conflicting findings and the fact that proving a causal role between H.P infection and insulin resistance increase has important role in controlling the important and common diseases such as diabetes and nonalcoholic fatty liver, we aimed to evaluate the association between H.P. infection and Glucose level in type 2 diabetic patients.

Material and Method:

Study setting and population:

This was case control study conducted among Sudanese diabetic patients during the period from 2018 to 2021. A total of 181 diabetics patients are involved in this study. Blood, stool samples were collected from each participant. All stool samples were tested for the presence of H. pylori antigen by using commercially available *H.pylori* antigen detection card. Based on the result examination for *H.pylori* the study population are sub grouped in two groups one group 124 of cases with Positive *H.pylori* antigen and another group 57 of controls with negative H. pylori infection. Both groups were assessed for the level of fasting blood glucose.

Detection of H. pylori antigen in stool sample

The stool samples were evaluated by the card test according to the manufacturer's protocol. A single red band appearing across the central window in the site marked with the control line was considered negative. A red band appearing in the site marked with the result line and in the site marked with the control line was considered positive. A total absence of the control band, regardless of the appearance of the result site was considered invalid.

Estimation of blood glucose by enzymatic method

Blood glucose concentration was measured using routine enzymatic method. Kits was provided from Biosystem Company, glucose is oxides by POD to gluconic acid and hydrogen peroxide, reacts with choro-4phenol and PAP to form a red quinonimine the absorbance proportional to the concentration of glucose in sample by spectrophotometer (520nm). Reference range was 70-110 mg/dl.

Quality control

Pathological and normal control sera were used to assure the accuracy of the result.

Data collection and analysis

The cases and controls demographic data as well as laboratory test data were obtained and recorded. Data was analyzed by using computer software package for social science (SPSS). Independent T test was used to compare between cases and controls in the level of blood glucose. The probability value <0.05 was considered to indicate a statistically significant value

Ethical consecrations

All individuals signed informed consent prior to their enrolment in the study. Also, the study was planned according to the ethical guidelines following the Declaration of Ethics Committee of Karary University of Medical Sciences approved it.

RESULTS

This study was involved a total of 181 participants, about one third of them 58 (32.0%) are aged 53 – 63 years, while only 6 (3.3%) of them are aged less than 20 years old (Table 1). More than half 103 (56.9%) of the study participants are males while he rests 78 (43.1%) are females (Table 2). Results showed that 49 female and 75 males are positive for *H.pylori* while 29 females and 28 male are negative. There was insignificant correlation between the gender and *H.pylori* test result with P-value of 0.102 (Table 3).Our results found that among cases group the mean of fasting blood glucose was 201.94± 90.45 mg/dl compared to 199.40± 97.83 mg/dl among control group. The statistical analysis was showed insignificant difference between cases and controls in the level of fasting blood glucose with P-value of 0.864 (Table 4). The results showed that there was insignificant correlation between participants age group and the result of *H.pylori* test (Figure1). Our study results showed that among cases group the mean of male's blood glucose 213.0±91.52 mg/dl was higher than females blood glucose level 185.0 ±87.0 mg/dl. While among control group the mean of male's blood glucose 188.8±99.7 mg/dl was lower than females blood glucose level 209.5 ±96.6 mg/dl (Table 5). The current study results showed that there were insignificant association between cases and controls age groups and the level of blood glucose (Tables 6,7).

DISSCUSSION

Helicobacter pylori is a common infection in type 2 diabetics and these patients have colonization of helicobacter pylori in the gastric antrum. This is probably because of certain chemotactic factors like tumors necrosis factor (TNF), interleukins like IL1, IL2, IL8 which are present in the gastric epithelium which do not confer protective immunity against helicobacter pylori but cause a number of changes in the gastric epithelium that promote inflammation and epithelial damage.[17] The normal (helper T cell) TH1 cells boost cell mediated immunity to cancer and intracellular infection, TH2 cells seems more general and secretory immune response in mucosa. In helicobacter pylori infection TH1 cells predominate but TH2 cells are totally absent in Type 2 diabetic patients hence the helicobacter pylori infection is persistent[18].

In the present study there was no significantly different between *H. pylori* and diabetes (P-value was 0.864), this was disagreed with studies reported the link between *H. pylori* infection and diabetes remains controversial, as some studies indicate a higher prevalence of infection in diabetic patients [19,20], while others report no difference [21,22,23]. In other study which found relationship between *H. pylori* and diabetes mellitus was first explored in 1989 by Simon et al [24] who found that the prevalence of *H. pylori* infection in patients with diabetes mellitus was significantly higher than in asymptomatic controls.

Additional supportive data have come from groups in the Netherlands [28], Italy [29], and Africa [30]. Recently, a meta-analysis conducted by Zhou et al [31] involved 14080 patients from 41 studies with a total *H. pylori* infection rate of 42.29%. The first demonstration that *H. pylori* infection leads to an increased incidence of diabetes was in a study by Jeon et al [32] using a prospective cohort of 782 Latino individuals > 60 years of age. in contrast, other studies have found no association between *H. pylori* infection and diabetes [21,23,30,31]. In a large, well-designed study by Xia et al [31], the seroprevalence of *H. pylori* infection was not significantly different in patients with diabetes mellitus compared to nondiabetic controls. Another agreement with study conducted in Nigeria, Oluyemi et al [32] found no significant difference in *H. pylori* prevalence between T2DM patients and controls. The discrepancies reported concerning the association of *H. pylori* and diabetes are likely due to inconsistencies in the methods used to define *H. pylori*

positivity and diabetic status, the limited sample sizes, and adjustments for potential confounders such as age and socioeconomic status [31].

The relationship between *H. pylori* infection and diabetes remained controversial for the last years. Several studies supported our results on the lack of association between *H. pylori* infection and diabetes [33,34,35]. In contrast, others found *H. pylori* infection to be positively associated with diabetes [36,37,38]. A meta-analysis that included 41 case-control studies concluded that *H. pylori* infection could be a potential risk factor for type 2 diabetes, while among them, two studies conducted in China both showed a negative result [39]. Nevertheless, few of these previous studies had adjusted family history of diabetes in their analysis. Since there has been compelling evidence supporting the strong role of genetics in the development of diabetes [40], the relationship between *H. pylori* infection and diabetes cannot be truly clarified without adjusting family history of diabetes.

Conclusion

From our findings we conclude that, there were insignificant association between Glucose and *H. pylori* infection. There were insignificant association between Glucose and gender among both cases and control. Larger prospective studies investigating the impact of *H. pylori* infection on diabetes and corresponding mediating factors are warranted. Long-term evaluation studies are urgently needed *Helicobacter pylori* eradication for prevention and progression of diabetes. Evidence supporting an etiological role of *H. pylori* in the development of T2DM would indicate that preventive measures, such as increased hygiene and treatments using antibiotics and proton pump inhibitor combinations, should be explored as targets of intervention in high-risk communities.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we

do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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Table (1): Distributions of study populations according to their ages (age groups).

Age group/years	**Frequency**	**Percent%**
less than 20 years	6	3.3
20-30	10	5.5
31-41	22	12.2
42-52	47	26.0
53-63	58	32.0
64-74	31	17.1
75-85	7	3.9
Total	181	100.0

Table (2): Distributions of study populations according to their gender

Gender	**Frequency**	**Percent**
Female	78	43.1
Male	103	56.9
Total	181	100.0

Table (3): correlation between Gender and H. pylori result

Gender	***H.*pylori positive** ***(N=124)***	***H.*pylori negative** ***(N=57)***	***Total***
Female	**49**	**29**	**78**
Male	**75**	**28**	**103**
P.value	**0.102**		

Table (4): the mean and Std of Glucose among study of case and control populations.

Parameter	***Case (N=124)*** ***(mean ±Std)***	***Control (N=57)*** ***(mean ±Std)***	***P. value***
Glucose	201.94± 90.45	199.40± 97.83	0.864

The table shows the mean ± SD (mini - max) and probability (P). Independent T-test was used for comparison. P value ≤ 0.05 was considered significant.

Table (5): Cases and controls blood glucose level according to their gender

Participants	**Gender**	***Glucose***
Case	Female	185.0 ±87.0
	Male	213.0±91.52
Control	Female	209.5 ±96.6
	Male	188.8±99.7

Table (6): Association between age group and Glucose among cases group

Age group	**Glucose**
less than 20 years	166.6±57.73
20-30	159.4±56.38
31-41	205.0 ±119.5
42-52	235.7±99.3
53-63	195.4±77.8

64-74	147.9±42.6
75-85	252.0±34.1

Table (7): Association between age group and Glucose, among control group

Age group	**Glucose**
less than 20 years	354.0±125.5
20-30	200.6±30.5
31-41	247.0 ±141.4
42-52	214.8 ±134.2
53-63	180.4±67.5
64-74	174.9±90.9
75-85	179.3±80.2

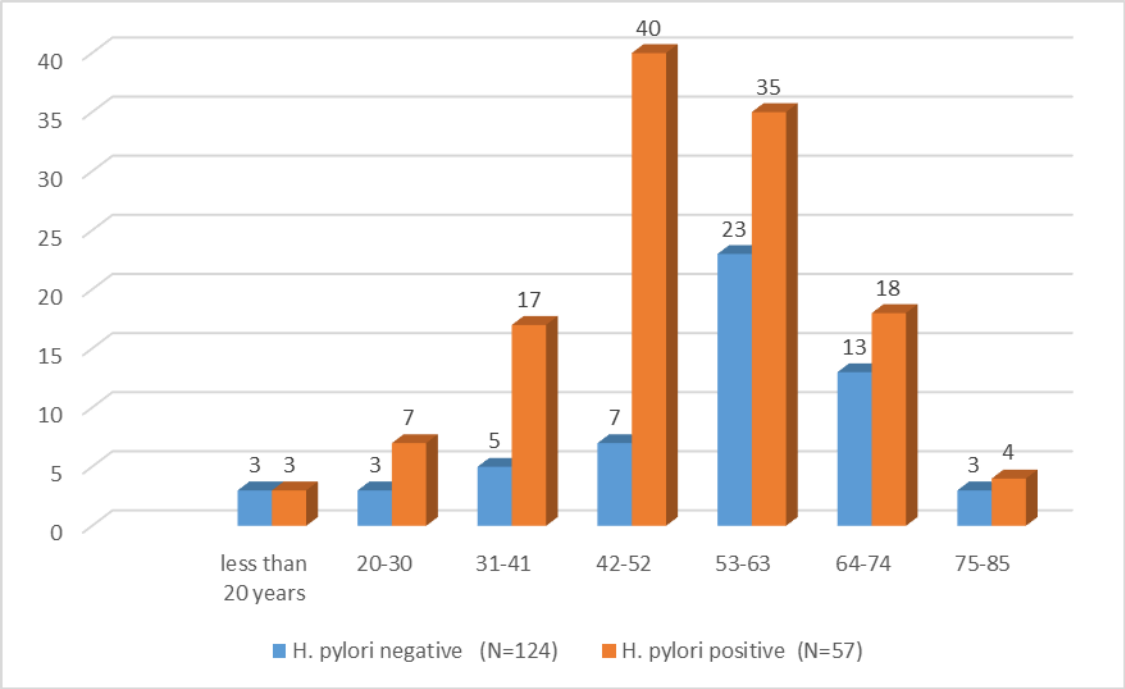

Figure (1): correlation between participants age groups and H. pylori test result