Scientific
Research

The Role of *Helicobacter pylori* Infection, and Malnutrition among Type 2 Diabetic Medical Services Patients in the Gaza Strip

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ABSTRACT

Background: Diabetes means the blood glucose, which is too high or too low. With Type 2 DM, the more common type, the body does not make or use insulin well. In patients with DM, *Helicobacter pylori* is one of the most common infections worldwide. Available data on the possible association between *H. pylori* infection and DM are contradictory. There are a few studies in the Middle East, and this study is the pioneer study, in the Medical Services Clinics in Gaza strip. **Aims:** This study was conducted to reveal the prevalence of *H. pylori* infection, malnutrition, insulin resistance among T2DM patients, to describe the dietary requirements of T2DM patients, finally to evaluate the current information about diet, and lifestyle in the prevention of *H. pylori*, and malnutrition. **Methodology:** A cross-sectional study was conducted in the Medical Services Clinics in Gaza Strip, and there were 129 patients included in this study. Data were collected through hematological information and structured interview questionnaire. **Results:** Highly significant percentage of *H. pylori* (70%) among the DM patients includes in the study, but not indicates any significant association between gender and *H. pylori* status. **Conclusion:** *H. pylori* patients should update their sugar level values in the record, and should get exercise and diet plan for every meal.

Keywords: Type 2 Diabetes Mellitus (T2DM); *Helicobacter pylori* (*H. pylori*); Insulin Resistance (IR); Malnutrition

1. Introduction

In recent years, a significant association has been reported between cardiovascular diseases, diabetes mellitus, and dyslipidemia and *Helicobacter pylori* (*H. pylori*) infection. However, there are conflicting reports, and lack of data from the Middle East should prompt local studies for establishing the relationship between *H. pylori* and such chronic diseases [1].

In patients with diabetes mellitus (DM), chronic infections are frequent and severe, due to the impairment of their immune status. However, data on the prevalence of *Helicobacter pylori* infection in diabetics are scanty and contradictory. Patients with insulin-dependent diabetes mellitus (IDDM) are often affected by chronic infections [1].

Diabetes Mellitus means the blood glucose, or blood sugar are too high. With Type 2 diabetes mellitus, the more common type, the body does not make or use insulin

well. Insulin is a hormone that helps glucose gets into the cells to give them energy. Without insulin, too much glucose stays in the blood. Over time, high blood glucose can lead to serious problems with heart, eyes, kidneys, nerves, gums and teeth [2].

Helicobacter pylori are one of the most common infections worldwide. Available data on the possible association between *H. pylori* infection and diabetes mellitus (DM) are contradictory [3].

That is clearly indicated there is a considerable nutritional public problem. The intention of the study is to assess the nutritional status of the diabetic patients, whom have *H. pylori* bacteria in their stomach, and to determine the nutritional factors contributing in development of nutritional diabetic patients [4].

Since there are only a few studies in the Middle East, on the association of *Helicobacter pylori* and diabetes mellitus, we conducted this study and focus on the frequency of *Helicobacter pylori* infection, Insulin resis-

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tance and malnutrition, in patients with type 2 diabetes mellitus, and help in providing data that is useful in the field of medicine as well as epidemiology.

1.1. The Relationship between T2DM and *H. pylori*

Many authors have extensively explored the relationship between *H. pylori* and diabetes mellitus.

Robert P study in 2012 show there may be a link between *H. pylori* bacteria and type 2 diabetes mellitus in adults, the researchers analyzed data from people who took part in two US National Health and Nutrition Surveys and found that the presence of *H. pylori* bacteria was consistently associated with elevated levels of glycosylated hemoglobin (HbA1c), an indicator of blood glucose levels and diabetes mellitus, the association was strongest in obese people [5].

According to Albaker study from Saudi Arabia, it shows that the association of Metabolic Syndrome (MS) and *H. pylori* is still controversial with emphasis on the possible linkage between them. However, the high prevalence of both MS and *H. pylori* infection might explain the coincidence [6].

Ramazan Gen in 2010, studied the relationship between *Helicobacter pylori* infection and insulin resistance, in a prospective, open-label, single-center study which consisted of 159 patients. The study showed beneficial effects of *H. pylori* eradication on insulin resistance, atherogenic lipid abnormalities and low-grade inflammation. The results suggest that *H. pylori* eradication may prevent coronary artery disease and metabolic syndrome [7].

2. Subjects and Methods

2.1. Study Design

The current cross sectional study was conducted to determine the prevalence of *H. pylori* infection in type 2 DM patients.

2.2. Study Setting

This study was carried out in the Medical Services Clinics in the Gaza Strip [8].

2.3. Target Population

The study population consisted of 138 diabetic patient's type 2, male & female patients' presents in Medical Services clinics in the Gaza Strip, the sample number was calculated by Decision Analyst State 2.0 programs.

2.4. Study Period

The proposed study was conducted from October 2011 to May 2012.

2.5. Sampling

A Cross-Sectional Study was done randomly selected on 129 Diabetic patients with Type 2, from the Medical Services Patients in the Gaza Strip.

2.6. Data Collection & Health Records

Health records of each type 2 diabetic patients were reviewed through the Medical Services Clinics in the Gaza strip conform A, B, C and D methods.

1) Anthropometric Measurements
- Weight in kg measured by a seca scale
- Height in cm measured by a stadiometer
- Body Mass Index (BMI)
- Waist circumference

2) Biochemical Assessment
- FBS
- HbA1c
- C-Peptide
- *H. pylori* (IgG)

3) Clinical findings

It includes a complete physical examination, to investigate signs of malnutrition, medical history e.g. including acute and chronic illness, diagnostic procedures, therapies, treatments that may increase nutrient needs or induce malabsorption, current medications.

4) Dietary assessment

It involves estimating food intake. This can be achieved by interview techniques (usually retrospective) and recording of intake.

3. Results

The frequency and percentage of *H. pylori* are given in **Table 1**, and around 70.5% of the sample found has positive *H. pylori*.

3.1. Correlation between Gender and *H. pylori*

It is found there is no significant difference between the means of chemical variables due to the gender, and there is insignificant association between *H. pylori* and the gender as seen in **Table 2**.

Table 1. Distribution of *H. pylori*.

H. pylori	No. (%)
Positive	91 (70.5%)
Negative	38 (29.5%)
Total	129 (100.0%)

Table 2. Test of association between gender and *H. pylori*.

H. pylori		Gender		Chi square	P-value
		Male	Female		
Positive	No. (%)	49 (53.9%)	42 (46.1%)	1.478	0.224
Negative	No. (%)	16 (42.1%)	22 (57.9%)		

3.2. Diabetes History

Results in **Table 3** shows that there are significant differences between the means of the C-peptide and HbA1c categories at 0.05 level of significant where there is a significant difference between the means of the FBS categories at 0.1 level of significant.

3.3. Physical Activity

The results showed that the most popular physical activity of sample practice is walking (46.51%) of sample practice it, followed by house work (38.76%). The present study observed a statistically significant association between the means of the C-peptide for different activity classes. On the other hand, almost half of the samples sleep less than 8 hours, where the other half of the samples sleeps more than 8 hours.

3.4. Dietary Assessment

The results of this study highlights Grains, starches, bran and mixed bread, fruit and vegetables, desserts, animal fat, fried food, olive oil, fish, vegetables, fruits, proteins, legumes, nuts, cold drinks, soda beverages and hot drinks, tea, coffee, and nuts which considered as the main dietary factors that may associated positively or negatively with type 2 DM.

4. Discussion

4.1. Distribution of *H. pylori*

The results of this study showed a highly significant percentage of *H. pylori* (70.5%) among the diabetic patients including in the study, this result is consistent with some literature and inconsistent with others.

The results are supported by the study of Bener, and Simon's their results found that *Helicobacter pylori* infection was significantly higher in diabetic patients than non-diabetic subjects [9,10].

4.2. Correlation between Gender and Chemical Variables

The current study revealed no significant association between the means of chemical variables (FBS, C-peptide, and HbA1c) according to the gender.

Table 3. The chemical variables based on the diabetes mellitus history.

How long have you diabetes?	N	FBS		C-peptide		HbA1c	
		Mean	SD	Mean	SD	Mean	SD
Less than or 1 year	25	127.64	58.19	1.01	0.20	6.26	1.14
1 - 5 years	32	148.06	56.37	1.70	0.30	6.53	1.0
5 - 10 years	26	131.23	25.81	1.08	0.21	6.53	1.14
More than 10 years	46	154.35	41.03	0.88	0.13	7.40	1.19
Total	129	142.95	47.47	1.23	0.11	6.79	1.21
F-value		2.487		3.554		7.408	
P-value		0.064[**]		0.016[*]		0.000[*]	

[*]Significant at 0.05 level of significant. [**]Significant at 0.1 level of significant.

No statistically significant difference found between the socioeconomic variables according to the gender. This does not indicate any significant association between gender and *H. pylori* status.

4.3. Diabetes History

This study identifies significant differences between the presence of *H. pylori* and diabetes mellitus history.

This result similar to Robert P study, the findings show there may be a link between *H. pylori* bacteria and type 2 diabetes mellitus in adults, and found that the presence of *H. pylori* bacteria was consistently associated with elevated levels of glycosylated hemoglobin (HbA1c) [5].

4.4. Dietary Habits

In general the current study shows that there are insignificant correlation between food groups and Chemical variables, but there are significant correlation between vegetables and C-peptide, legumes and C-peptide. And there is a statistically significant correlation detected between vegetables, hot drink and HbA1c.

The results also reported that there is no significant difference between the means of the food groups with respect to the *H. pylori* status.

4.5. Grains, Starches

The result of the present study showed that slightly more than two thirds (84.5%) of patients which is the high percentage of white breads intake of grains, starches once or more weekly, 15% eating saj breads once or more weekly, and more than a half of patients about 68.2% didn't eat brown breads with bran at all, and 56.6%

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didn't eat brown breads without bran at all. The present study results show that 11.6% from the samples eating macaroni/spaghetti once per day or more, and 47.3% of patient didn't intake it at all.

In general terms, most of the studies revealed that consumption of refined sugars is directly associated with diabetes mellitus disease [11].

4.6. Fruit

The current study shows that more than two thirds (79.1%) of patients eating and drinking citrus as orange grapefruits and lemons, once per day or more, and only 1.6% percentage didn't intake it at all.

The results show that 60.5% of patients eating the apples once or more per day, then 34.9% patients eaten watermelon once or more per day, in the end of the fruits list comes the pineapple (fresh/canned) which taken by 17.8% of the diabetic patients.

4.7. Vegetables

Some studied shows that the regular consumption of fruit and vegetables is associated with reduced risks of chronic diseases, where they contain significant amounts of bioactive components and fibers that may provide desirable health benefits beyond basic nutrition [12]. The current study shows that (34% - 44%) of patients eating a cooked vegetables as okra, molokhia, zucchini, potato (cooked/boiled/or mashed), green beans, spinach, once or more per day, and the results shows that about 67.4% from patients are eating vegetable salad daily, and in other patients taken once or more per day.

4.8. Proteins

The study results show that more than 40% from diabetic patient intake milks, yogurts, cheeses, eggs, and between 18% - 30% from the samples didn't eat them at all.

And about 69.8% from chickens, that's because the diabetic patients including in the study prefer the chicken more than other meats and intake it once or more per weeks, where 1.6% from patients don't eat it at all.

4.9. Legumes

The results show that diabetic patients often eating legume as lentil, pea, chickpeas, bean with sesame paste, green beans, about 50% - 55% of patients eating legumes one or more per day, and 10% from patients didn't eat legumes at all.

4.10. Nuts

The results show that 20% - 24% from patients eats nuts as (peanuts, walnuts, sunflower, watermelon, almonds),

once or more per weeks, and the higher percentage of patients didn't eat it at all.

4.11. Desert

The results show that 11.6% only from the diabetic patients eat keck (others), and 30.6% from samples eat home sweats, but the higher percentage of diabetic patients didn't eats keck or oriented sweats at all, because of their effects of elevated the blood sugar.

4.12. Cold & Hot Drinks

The results found that 57.4% drinks the fresh fruits juice, and 31% from patients didn't drink it at all, about 21.7% drink soda, and 57.4% from the samples didn't drinks it at all, about 76.7% from patients drinks tea, 55% drinks coffee, and 20% - 24 % from them drinking cinnamon, ginger, and herbal tea.

4.13. Fried Food

The study showed consumption of fried foods and excessive oil about 52.7% eats (flafel, potato, eggplants, cauliflower), and 18.6% only didn't eat it at all.

4.14. Fast Food

The results showed little consumption of fast foods (as pizza, shawerma, borger, thailandy) only about 3.9% - 9.3% eats fast foods, and 85% didn't eat it at all.

4.15. Spices

The results found that all the samples takes spices as red/green pepper black pepper, curcuma, other spices with in the foods, 79.8% - 82% eat it once or more per day.

4.16. Pickles

The results show that 43.4% intake the pickles as homemade olives once or more per day, and 37.2% didn't eat the homemade, and 70.0% from the patient didn't eat any pickles from market at all.

5. Conclusions & Recommendation

In the present study, *H. pylori* infection, insulin resistance and malnutrition in type 2 DM patients, were done for all subjects.

1) An adequate lifestyle, socioeconomic factors, and some biochemical alterations could play an important role in the etiology of type 2 DM patients.

2) This study demonstrates the strong relationship of *H. pylori* infection as a risk factor for insulin resistance, more than 70.5% of the samples found to have positive *H. py-*

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3) Greater attention of the eradication of *H. pylori* has been shown to play important roles in the etiology of other chronic diseases.

4) We can conclude that there is insignificant association between the *H. pylori* and diabetes mellitus history (the duration of diabetes). *H. pylori* infection is not associated with duration of diabetes,

5) The study exhibited a positive significant difference between the means of weight for persons with positive and negative *H. pylori* status. Consequently, the mean of BMI of positive groups is significantly higher than the mean BMI for the negative group.

6) The results suggest that data seem to indicate a potential association between *H. pylori* infection, malnutrition and IR, and further studies are needed to strengthen this association and to clarify whether there is a causative link between them.

Serum *H. pylori* should be integrated into routinely para-clinical investigations in all patients with type 2 DM.

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