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Association of Helicobacter Pylori on Blood Glucose Levels in Diabetes Mellitus Patients in Tertiary Care Hospital

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ABSTRACT

Helicobacter pylori infection was predominantly found in Type II Diabetes Mellitus patients where eradication of infection is the key to cease worsening of DM to its complications. The study was aimed to assess the effect of Helicobacter pylori on blood glucose levels in Diabetes Mellitus patients in a tertiary care hospital. The six months prospective – retrospective analysis was done with 120 diabetic patients, of which 30 were enrolled in Control group (newly diagnosed DM), 30 enrolled in Group A (DM patients taking OHA's alone) and Group B (H. pylori positive DM patients) including 30 patients. All necessary documentation were recorded including demographic details, social history (smoking and alcohol), diet, blood glucose levels (FBS, PPBS and HbA1c), culture sensitivity test for assessment of H. pylori and treatment data. The results were analyzed using ANOVA and sample t test. HbA1c was found to be statistically significant (95% CI, p = 0.05), whereas FBS and PPBS results were non-significant, for which percentage difference was calculated. Percentage difference of FBS in control with group B was higher than with Group A (22.48% and 10.46% respectively) and PPBS in control with group B was higher than with group A (9.16% and 0.78% respectively). The present study concluded that H. pylori positive DM patients were observed with higher blood glucose levels when compared to diabetic patients. Therefore, the eradication of H. pylori is crucial for the reduction of blood glucose levels in DM patients.

Keywords: H. pylori, Diabetes mellitus (DM), FBS, PPBS, HbA1C.

INTRODUCTION

Helicobacter pylori is a gram negative microaerophilic bacteria[1] which is the causative agent of chronic gastric infection, and it was estimated that at least half of the world's population were getting infected.[2] Helicobacter Pylori (H. Pylori) was identified from the human stomach[1], after it had transited to the gastric lumen, helicobacter pylori localized to specific

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locations such as the antrum and corpus, where it was well adapted to survive in acidic conditions and established has a persistent infection.[2] Laboratory tests were available for diagnosing helicobacter pylori. Two types of groups were available for testing helicobacter pylori: Invasive group and Non-invasive group. Invasive group tests were found to be endoscopy, which seen about histopathology examination, rapid urease test, and polymerase chain reaction, whereas, non-invasive group test shows urea breath test, serological Immunoglobulin G (IgG) and Immunoglobulin M (IgM) detection, saliva and urinary antibody test, and stool antigen test.[3]

Diabetes Mellitus is a metabolic disorder characterizing with hyperglycemia resulting from flaw in insulin secretion, insulin action or both[4]. In Type II Diabetes Mellitus insulin response is diminished so, there occurs insulin resistance. Due to the defect in pancreatic Beta cells, demand for the insulin is increased.Type II Diabetes Mellitus is mostly not dependent on insulin where insulin secretion continues and insulin depletion rarely occurs. 90% accounts for Type II Diabetes Mellitus around all Diabetes Mellitus cases. Metabolism abnormalities in Carbohydrates, Lipids, and Proteins resulting inincreased glucose level in blood. Obesity is the main reason behind insulin resistance which is responsible for Diabetes Mellitus[5]. At this stage, insulin is not effective and initially it is encountered by increase in insulin production to maintain glucose haemostasis, but insulin decreases resulting in Type II Diabetes Mellitus.For establishing the diagnosis, several criteria may be used, Fasting Blood Glucose, Random Blood Glucose level, Post Prandial Blood Glucose, Haemoglobin A1c or Glycosylated haemoglobin[6].

Helicobacter pylori is associated with many diabetes and insulin-related processes, but findings of certain studies show that there may not be a role for past H. pylori infections in the development of diabetes, impaired glucose tolerance, diabetic nephropathy, or poor glycemic control. In order to support this fact the deficiency of associations held true for cases that used serological and histological methods for determining the status of H. pylori.It is important to consider that the development of DM or the worsening of glycemic control may not be induced by a significantly strong inflammatory response. According to the article by Jeung Hui Pyo, Hyuk Lee, Sung Chul Choi, et. al., large cohort studies failed to detect the evidence that the past H. pylori infection has an association in the development of DM, IGT, diabetic nephropathy, or poor glycemic control.[7] While in another study, the association of H. pylori with a medical history of DM was examined. It was seen that in overall, DM prevalence was significantly higher in those with H. pylori infection than those without. Infection among adults, though possible, is highly limited. Therefore, certain studies show that positive H. pylori may not be a risk factor for diabetes.[8]

Pre-existing as well as existing studies have shed light on the association between Helicobacter pylori (HP) infection. However, the evidence to support this obvious link is few. We aimed to demonstrate in our study the association between Helicobacter pylori infection and Diabetes Mellitus.[9] Interestingly, there are certain factors involved in the relationship between Helicobacter pylori infection and diabetes. The lifestyle changes (e.g., obesity, physical inactivity, poor diet) of a person is one of the crucial factor that affect both Diabetes Mellitus.There are many other physiologic factors that provide a concrete evidence to prove that there is a link between H. pylori infection and Diabetes Mellitus. The link between H. pylori infection and ghrelin and leptin (two gastrointestinal hormones), have been reported of with glycatedhemoglobin levels (Hb1Ac).[10] In addition, H. pylori infection may influence in insulin resistance, and metabolic syndrome potentially mediated by rise in inflammatory markers such as C reactive protein (CRP) and Interleukin - 6 (IL-6). Raised levels of inflammatory cytokines may lead to phosphorylation of serine residues on the insulin receptor substrate, which obstructs its interaction with insulin receptors, thereby suppressing insulin action.[11]

These findings support the conjecture that H. pylori infection may influence in the aetiology of the appearing pandemic DM and its related complications.[10]

MATERIALS AND METHODOLOGY

This prospective retrospective study was conducted in Vivekanandha Medical Care Hospital, Elayampalayam, Tiruchengode with the approval of the Institutional Ethical Committee from January 2020 to June 2020. 120 subjects were enrolled, from which 90 subjects included were18 years old and above, type 2 DM patients and patients with H. pylori positive DM. Severely-ill patients, pregnant and lactating women, Type 1 DM and subjects who have more than 2 co-morbid conditions were excluded from the study. A specially designed data entry form was used to collect the details of the patients, such as name, age, sex, past medical history, past medication history, social history, laboratory investigations (FBS, PPBS, HbA1C), diagnosis, therapeutic chart and discharge summary.

The study population was segregated into three main groups. First group (Control) included newly diagnosed diabetes mellitus patients, second group (Group A) subjects were diabetic patients administered with OHAs alone and third group (Group B) consisted of H. pylori positive DM patients. Above groups were assessed for FBS, PPBS, HbA1C and culture and sensitivity tests.
The data obtained was analyzed using Microsoft Excel 2013 and SPSS version 16.0. Results were analyzed using mean, standard deviation, percentage difference, ANOVA and paired sample t test. p value <0.05 was considered significant in the study.

RESULTS

Age Distribution: Age wise distribution from Table (1) it was found that the age group with maximum number of patients were 51-60 years (27) followed by 61-70 years (25). The least number of patients were seen in age group 30-40 years (11) and in age group 41-50 years (11).

Gender Distribution: According to Gender wise distribution from table (2), the maximum number of patients were male (48) than female (42). From the above table it shows that male population with H. pylori tend to have elevated blood sugar levels.

Social Habits: From a total number of 50 men and 40 women, consumption of alcohol was found in 14 men and 11 men were smokers. From the Table (3) men were found to be higher in consumption of alcohol and smoking than women.

According to the results analysed, HbA1c was found to be statistically significant (95% CI, p = 0.05), but FBS and PPBS attenuated non-significant results (FBS: p = 0.18, PPBS: p = 0.31). Therefore, percentage difference was calculated for both FBS and PPBS.

The Percentage Difference of Fasting Blood Sugar (FBS) in Control with Group B was higher (22.48 %) than Control with Group A (10.46 %). Also, the Percentage Difference of Post Prandial Blood Sugar (PPBS) in Control with Group B was higher (9.16 %) when compared to Control with Group A (0.78 %).

Table1: Age Wise Distribution

AGE	NO. OF PERSONS			TOTAL
	Control	Group A	Group B	
30-40	6	3	2	11
41-50	4	4	3	11
51-60	7	11	9	27
61-70	7	7	11	25
71-80	6	5	5	16
TOTAL	30	30	30	90

Table 2: Gender Distribution of Patients

MALE			FEMALE		
CONTROL	GROUP A	GROUP B	CONTROL	GROUP A	GROUP B
18	19	16	12	11	14

Table 3: Distribution of Social Habits

Sex	SOCIAL HABITS	
Male	Alcohol	Smoking
30 – 40	6	5
41 – 50	2	3
51 – 60	3	2
61 – 70	2	[i]
71 – 80	1	0
Total	14	11

DISCUSSION

In this study, the effect of H. pylori on the blood glucose levels, including FBS, PPBS and HbA1c were compared between the control and groups A and B, and the results showed that H. pylori positive DM patients had an elevation in the blood sugar levels than the others.Certain studies have pointed out that those patients who were seropositive for H. pylori (H. pylori positive) were

2.7 times more prone to acquire type 2 DM than seronegative subjects (95% Cl 1.10-6.60).[12]

Out of the 90 patients included in the study, when categorized age wise, individuals with 51 -61 years (27) proved to have higher association between H. pylori and the risk of diabetes mellitus. It has been determined in various other studies that increase in age increases the risk of H. pylori induced elevated blood glucose levels.[13,14]

In our study the male patients with type 2 DM were found to be more prone to H. pylori infection when compared to women. Even though the role of gender in such infection is still debated, it can be considered as a potential risk factor since most H. pylori related diseases are associated with the male gender.

In our study we found that men were higher in the consumption of alcohol and smoking when compared to women. Social history of the subjects was considered so as to confirm the association with H. pylori infection. It is known that smoking decreases gastric mucosal blood flow and mucus secretion which in turn reduces the delivery and absorption of drugs given for DM and eradication of the infection. Smoking also increases the gastric acid secretion which causes ulcers to form and leads to infection.[21]
In our study, we found significant association between H. pylori infection and diabetes, when HbA1c was analysed for groups A and B.HbA1c is a more reliable diagnostic test to understand the glycemic control of a patient for the past 2 – 3 months. When HbA1c was analysed for both groups A and B, it was found to be statistically significant (95% CI, p = 0.05).

In our study we found no significant association between H. pylori infection and diabetes, when the blood sugar levels (FBS and PPBS) were compared between control, groups A and B.

The relationship between H. pylori infection and diabetes mellitus has remained controversial and many studies have shown non-significance in the association between the infection and DM.

To get a more reliable answer to our aim, we analysed FBS and PPBS levels using percentage difference, where the results proved that group B subjects (H. pylori positive DM) had elevated FBS and PPBS levels (22.48% and 9.16%) respectively) than group A and control.[15]

CONCLUSION

The present study concluded that a positive association was found between H. pylori and blood glucose level. Presence of h pylori positive leads to elevated blood glucose level.

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