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Relationship Between Helicobacter pylori Infection Fasting Plasma Glucose Concentration Bordering

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الخلاصة:

عند الاصابة بالبكتريا من نوع *Helicobacter pylori* والمسببة لإلتهاب المعدة، يزداد افرار الكاسترين والذي يعتبر عامل فسلجي مساعد لزيادة افراز الأنسولين.

الهدف من هذه الدراسة هو إيجاد العلاقة بين الاصابة ببكتريا *H. pylori* ونسبة تركيز سكر الدم.

أجريت الدراسة على (209) مريضاً (112 أنثى و 97 ذكر)، وتم اختيار (22) شخصاً سليماً كمجموعة سيطرة، وتمت الدراسة في فرع المناعة في مختبرات الصحة المركزية للفترة من آب 2007 ولغاية حزيران 2008، حيث تم تشخيص البكتريا بالطرق السيرولوجية، كما تم قياس مستوى تركيز سكر الدم بطريقة أكسدة الكلوكوز.

أظهرت النتائج انخفاضاً ملموساً في مستوى تركيز سكر الدم عند المرضى المصابين بالبكتريا *H. pylori* عن غير المصابين. كما تم إيجاد أجسام مناعية مضادة IgG للبكتريا المسببة للمرض في 36.6% من النساء المشمولين بالدراسة (41 من 112 أنثى) ونسبة 37.1% في الذكور (36 من 97 ذكراً).

كما أظهرت نتائج البحث إلى وجود علاقة إيجابية بين الاصابة ببكتريا *H. pylori* ونسبة تركيز سكر الدم والتي تشير إلى أن الاصابة بها النوع من البكتريا واضطرابات الجهاز الهضمي قد تعود إلى حالة إنخفاض السكر.

Abstract:

Helicobacter pylori gastritis results in an increased secretion of basal and meal-stimulated gastrin, which is also a physiologic amplifier of insulin release. Aim of the study: To detect the relationship between H. pylori infection and fasting blood glucose concentration.

The study was performed on 209 patients (112 females and 97 males) and 22 control subjects were referring to Immunology Dep. in Central Public Health Laboratories for the period from August 2007 to June 2008, where H.pylori was diagnosed serologically. Fasting serum glucose concentrations had been measured by the glucose oxidase procedure.

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The fasting plasma glucose was significantly lower in H. pylori infected patients than non-infected ones. Seropositive anti-H.pylori IgG antibodies were detected in 36.6% of women participants (41/112) and in 37.1% of men participants (36/97).

The research findings indicate a positive association between H. pylori infection and fasting serum glucose concentrations, indicating that H. pylori infection and related gastrointestinal disorder may be related to glycaemic status.

Introduction:

Infection with Helicobacter pylori has been recognized as a public health problem worldwide [1] affecting approximately 50% of the world population and more prevalent in developing than the developed countries [2]. H. pylori infection has been associated with both gastrointestinal and non-gastroenterological conditions such as peptic ulcer (gastric and duodenal), gastric cancer and cardiovascular disease [3,4,5].

Many studies postulated that H. pylori may disturb normal biochemistry like increase in plasma fibrinogen [6, 7] a modification of the serum lipid profile [8], Some of the changes could affect fasting plasma glucose concentrations.

A link between H. pylori infection, serum gastrin, insulin concentrations, and serum glucose concentrations has been demonstrated in a small group of dyspeptic patients [9]. Because of the effect of gastrin on insulin release and glucose absorption, infected healthy individuals may have lower postprandial and fasting plasma glucose concentrations than non-infected people. Two population based studies have shown that H.pylori infection can also reduce iron stores in healthy people [10, 11]. Iron stores are positively correlated with blood glucose concentrations [12].

This research was based on an observation of seropositive H. pylori anti – IgG 36 year female patient who was frequently visiting immunology and biochemistry departments in central public health laboratories complaining of continuous low fasting plasma glucose concentrations and after eradication of H.pylori with treatment she started, she had a normal sugar concentration back. Therefore, it was the idea of studying the relation between H. pylori infection and fasting plasma glucose concentration among adults in general population.

Materials and Methods:

Subject:

A total of 209 (112 females and 97 males) H.pylori infected patients were enrolled in this study. Mean ±SD age of the 209 female/male volunteers was 34.9±11.0/33.4±9.4 years respectively, range 23 -54 / 24-49 years respectively. These patients were referred to Immunology Dep. in Central Public Health Laboratories for the period from August 2007 to June 2008, where H. pylori were diagnosed serologically by using anti -H. pylori IgG antibodies Elisa kit. A

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total of 22 anti-H.pylori-IgG seronegative subjects were used as a control group. All patients answered a detailed questionnaire to obtain sociodemographic data such as age, sex, smoking habits, and drug treatment.

Sample Collections: Five milliliters (5ml) venous blood was obtained between 08:00 and 10.00 a.m. after a 12 hour fasting period. All blood samples were dispensed into dry glass test tubes for clotting and retraction to take place. Sera were obtained after samples were centrifuged at 2000g for five minutes and stored at -20°C until assayed for laboratory investigations.

Laboratory Investigations:

Fasting serum glucose concentrations had been measured by the glucose oxidase procedure. Stored frozen sera samples were retrieved, thawed, and tested for anti-H pylori IgG antibodies by means of a quantitative enzyme immunoassay using a commercial kit (Biohit/finland). A cut off antibody titer of 500 was used to classify subjects as positive or negative, as recommended by the manufacturer (sensitivity, 92.5%; specificity, 84.3%). Reference standards were used to produce a standard curve to quantitate H. pylori antibody levels in volunteers' samples. The results were expressed in International Units per milliliter. The normal value for H.pylori IgG was up to 57 IU/mL.

Statistical analysis:

All statistical analyses were performed with Statistical Package for Social Science (SPSS) 7.5. Data were analyzed for mean and standard deviation. Proportions were expressed as percentage while significant tests were done with the X 2 test. The result was considered significant at $p < 0.05$.

Results:

Table-1 shows the demographic, lifestyle and clinical characteristics of subjects (women and men). Seropositive anti-H.pylori IgG antibodies were detected in 36.6% of women participants (41/112) and in 37.1% of men participants (36/97). Most infection in women was detected among over 45 year age, normal BMI and overweight, while in men most infection was among smokers. There was no statistically significant difference in the prevalence of H. pylori infection between women and men.

Table-2 shows the relation between the demographic, lifestyle, and H pylori infection. Table 3 shows the relation between fasting serum glucose concentrations and demographic, lifestyle, and clinical variables. Among women, fasting plasma glucose concentrations increased with age, BMI, and the use of medication that could incidentally increase plasma glucose concentration, and were lower among users of the contraceptive pill and among smokers (although not significantly so). Fasting plasma glucose concentrations were lower among H pylori infected than non-infected women, but not significantly so.

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	Women	Men
Age		
(Mean±SD)	34.9±11.0	33.4±9.4
(Range)	(23-54)	(24-49)
Contraceptive pill		
Used	12 (10.7)	
Not used	100 (89.3)	-
Hormone replacement		
Yes	6 (5.4)	
No	106 (94.6)	-
family history of diabetes		
Yes	42(37.5)	22(22.7)
No	70(62.5)	75(77.3)
Body mass index		
Underweight	3(2.7)	1(1%)
Normal	79 (70.5))	70 (72.2%)
Overweight	21 (18.8)	23 (23.7%)
Obese	9 (8.0)	3 (3.15)
Currently smoking		
Yes	1 (0.9)	34 (35.1%)
No	111 (99.1)	63 (64.9%)
Helicobacter pylori status		
Positive	41 (36.6)	36 (73.1%)
Negative	71 (63.4)	61 (62.9%)
Fasting plasma glucose	5.4±0.9	5.4±1.0
(mmol/l)	(3.9–11.1)	(4.1–7.2)
Mean±SD (range)		
Total Number	112	97

Table-1: Subjects' demographic, lifestyle, and clinical data.
*** Values are numbers (percentage) of subjects.**

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	Women		Men	
	Infected n (%)	Non-Infected n (%)	Infected n (%)	Non-Infected n (%)
Age				
<40	33(80.5)	39(54.9)	27(65.9)	26(42.6)
≥40	8(19.5)	32(45.1)	9(34.1)	35(57.4)
Contraceptive pill				
Used	3(7.3)	9(12.7)		
Not used	38(92.7)	62(87.3)		
Hormone replacement				
Yes	1(2.4)	5(7.0)		
No	40(97.6)	66(93.0)		
family history of diabetes				
Yes	24(58.5)	18(25.4)	17(47.2)	5(8.2)
No	17(41.5)	53(74.6)	19(52.8)	56(91.8)
Body mass index				
Underweight	0(0)	3(4.2)	0(0)	1(1.6)
Normal	29(70.7)	50(70.4)	26(72.2)	44(77.1)
Overweight	8(19.5)	13(18.3)	9(25.0)	14(23.0)
Obese	4(9.8)	5(7.0)	1(2.8)	2(3.3)
Currently smoking				
Yes	0(0)	1(1.4)	18(50)	16(26.2)
No	41(100)	70(8.6)	18(50)	45(73.8)
Total Number	41	71	36	61

Table-2: Relation between Helicobacter pylori infection and demographic, lifestyle.
***Values are number (percentage) of subjects.**

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	Fasting serum glucose (mmol/L)(Mean±SD)(Range)	
	Women	**Men**
Age **<40** **≥40**	49±1.1(2.8-6.9) 4.7±1.0(2.8-6.8)	5.2±1.2(2.5-7.1) 5.3±1.2(3.0-7.1)
Contraceptive pill **Used** **Not used**	4.7±0.8(3.0-5.5) 4.9±1.1(2. 4-7.3)	
Hormone replacement **Yes** **No**	5.3±1.4(2.8-7.0) 4.9±1.1(2.5-6.8)	
family history of diabetes **Yes** **No**	4.4±1.2(2.1-7.0) 4.8±2.1(2.1-7.2)	4.8±1.1(2.8-6.6) 4.7±1.2(2.1-6.7)
Body mass index **Underweight** **Normal** **Overweight** **Obese**	5.1±0.9(4.3-6.1) 4.8±1.3(2.1-9.0) 4.4±1.4(2.3-7.3) 4.0±0.9(4.9-0.7)	3.1 4.8±1.3(2.1-8.6) 4.8±1.5(2.8-8.5) 4.9±1.0(3.9-6.0)
Currently smoking **Yes** **No**	4.2 5.5±1.6(2.9-6.4)	4.7±09(1.9-6.1) 4.5±1.4(2.1-9.0)
Helicobacter pylori status **Positive** **Negative**	4.6±1.4(2.1-8.4) 5.7±2.9(3.8-10.2)	5.4±2.1(4.0-9.4) 5.3±1.2(5.3-12.0)
Total Number	112	97

Table-3: Relation between fasting plasma glucose and demographic, lifestyle, and clinical variables.

Discussion:

The research findings indicate a positive association between H. pylori infection and fasting serum glucose concentrations. The fasting plasma glucose was significantly lower in H. pylori infected respondents than non-infected ones, indicating that H. pylori infection and H. pylori related gastrointestinal/gastro duodenal disorder may be related to glycaemic status.

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These results are in agreement with the findings of Ko et. al.[13], Peach and Barnnet[14] who had previously shown that women infected with H. pylori had lower mean fasting plasma glucose concentration than did non-infected women. Although no histological study was done in this study the lower fasting plasma glucose in H. pylori-infected than non-infected respondents may partly be attributed to alteration in gastric mucosa as high prevalence of severe acute gastritic inflammation/ulcer disease has been reported in diabetic patients with little or no symptoms of dyspepsia [15]. H. pylori gastritis has been found to enhance glucose- and meal- stimulated insulin release, probably by increasing gastrin secretion [16]. Gastrin can inhibit glucose absorption in the small intestine, [17] and amplifies glucose stimulated insulin release [18]. However, no association has yet been documented between H. pylori infection and delayed gastric emptying or upper gastrointestinal symptoms in diabetics [19]. Dursun et. al. reported that H. pylori infection has no effect on insulin sensitivity/glucose metabolism in non-obese young adults [20]. It has also been demonstrated that glycaemic controls deteriorate with age in healthy non-diabetic individuals, a phenomenon which has been attributed to small but steady decline in pancreatic beta cell function [21].

Infected women had lower fasting plasma glucose concentrations than infected men, although one study found no effect of sex on basal serum gastrin concentration [22] another found women had higher basal and meal stimulated serum gastrin concentrations than men[23]. This might explain the effect of H pylori infection on fasting plasma glucose concentrations in women but not in men. Alternatively, in some populations H pylori may be a greater stressor on iron stores in women than in men [24].

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