



Sudan University of Science and Technology  
College of Graduate Studies



**Frequency of *Helicobacter pylori* IgG Antibodies among Diabetic patients in Khartoum state, Sudan**

معدل انتشار الأجسام المضادة المناعية من النوع G لجرثومة المعدة بين مرضي السكري في ولاية الخرطوم , السودان

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قال تعالى :

((وَأَنْقُضْ يَوْمًا تَرْجَعُونَ فِيهِ إِلَى اللَّهِ ثُمَّ تُوَفَّى كُلُّ نَفْسٍ مَّا كَسَبَتْ وَهُمْ لَا يُظْلَمُونَ)).

سورة البقرة ((281)).

## DEDICATION

To the fountain of patience and optimism and hope

To the big heart my dear father

To each of the following in the presence of God and His Massinger , my dear mother

To those who have demonstrated to me what is the most beautiful of my brother's life

To the people who paved our way of science and knowledge All our a Distinguished teachers

To the taste of the most beautiful moments with my friends

## ACKNOWLEDGEMENT

Firstly I would like to thank ALMIGHTY ALLAH for giving patience and health to complete this work .

Special thanks for my supervisor Prof . Yousif Fadl alla , for his patience , guidance and support .

Great thanks to all patients and non patients who participated in this study

## ABSTRACT

This study was conducted for serological detection of *Helicobacter pylori* antibodies in serum of diabetic patients and non diabetic individuals in Khartoum State during the period April to September 2022. Blood samples were collected from 180 individuals ( 120 diabetic patients and 60 non diabetic patients ),Two milliliters of blood sample was collected in plain containers from each diabetic patient and non diabetic patient and let it until clot and serum was separated used centrifuge and tested for the presence of *Helicobacter pylori* IgG antibodies using rapid test device(ECO test). *Helicobacter pylori* IgG antibodies were detected in 35 (58.3%) of the diabetic patients that treated with insulin total of 60 patients, and detected in 39 (65%) of the diabetic patients treated with anti diabetic agent total of 60 patients , in the non diabetic individual were detected in 27 (45%) positive total of 60 non diabetic individuals, It was in agreement with other studies,in (Vafaeimanesh *et al.*,2015) found that the prevalence of HP seropositive was (65.9%) versus (50.5%) in diabetic and non diabetics, respectively, and the difference was statistically significant, this result is close to present study, (Jamshid *et al.*,2014) found that the prevalence of *Helicobacter pylori* infection was (55.8%) in diabetics and (44.2%) in non diabetics ,(Roussos and Angeliki ,2002) reported that the prevalence of *H. pylori* between diabetics (37.3%) and non diabetics (35.2%) .The high frequency of positive subject among diabetic treated with anti diabetic agent 39 (65%) and the correlation was statistically not significant more than ( $P>0.05$ ).And detection of *Helicobacter pylori* should be routine in diabetic patient and further studies in diabetic mainly those treated with antidiabetic agent.

## المستخلص

أجريت هذه الدراسة للكشف المصلي عن الأجسام المضادة لجرثومة المعدة في مصلى مرضى السكري والأفراد غير المصابين بداء السكري في ولاية الخرطوم خلال الفترة من أبريل إلى سبتمبر في العام 2022. تم جمع عينات الدم من 180 فرداً (120 مريض بالسكري و 60 فرد غير مصاب بالسكري). تم جمع أثنين ملي ميتر من عينة الدم في عبوات عادية من كل مريض مصاب بالسكري وغير المصابين بالسكري وتركها حتى تتجلط ثم يتم فصل العينة بعد التجلطة وتم اخذ المصل باستخدام جهاز الطرد المركزي وتم اختبارها للكشف عن الأجسام المضادة لجرثومة المعدة (اميونوجلوبولين اي جي جي IgG) باستخدام جهاز الكشف السريع (اي سي تي تست من شركة اي كو ECO). وتم الكشف عن هذه الاجسام في عدد 35 مصاب بالسكري بنسبة (58.3%) وهي نسبة الاكتشاف عند مرضى السكري الذين يأخذون الادوية المضادة في علاج السكري وأيضا قد اكتشف في عدد 39 فرد بنسبة (65%) وذلك في المصابين الذين يأخذون جرات الانسلين كوسيلة في العلاج ، وقد كانت نسبة الأفراد غير المصابين بالسكري 27 فردا بنسبة (45%)، هذه الدراسة اتفقت مع دراسات أخرى حول ان نسبة العدوي في المصابين بالسكري بالجرثومة اعلي من الافراد الذين لايعانون من مرض السكري ، ففي دراسة اجراها الباحثون ( et al, 2015, Vafaeimanesh) وجدو أن معدل انتشار الجسم المضاد كان بنسبة (65.9%) مقابل (50.5%) في الافراد المصابين بمرض السكري وغير المصابين بالسكري على التوالي ، ودراسة أخرى تبين هذه النسبة ، حيث وجدت مجموعة اخري من الباحثين وهم (Jamshid et al., 2014) أن المعدل كان بنسبة (55.8%) في المصابين بداء السكري و بنسبة (44.29%) في الافراد الغير مصابين ، وتتوالي الدراسات حيث وجد الباحثان وهم (and Angeliki, 2002, Roussos) أن العدوي كانت اعلي بنسبة (37.3%) في المصابين بالسكري , واقل بنسبة (35.2%) في الافراد الغير مصابين . وقد أثبتت الدراسة التي قمت بها ان نسبة العدوي ايضا اعلي في الافراد المصابين بمرض السكري بصورة عامة وهي نسبة تأكيدية للدراسات السابقة , وبنسبة خاص في المرضى السكري الذين يأخذون الحبوب المنظمة للسكري وهي 39 فرد بنسبة (65%) وبعد عمل التحليل الاحصائي باستخدام ال ا س بي ا س اس (SPSS) كان المعدل اعلي وهو ( $P < 0.05$ ). وعليه يجب أن يكون الكشف عن الجسم المضاد للبكتيريا روتينياً لكل مريض سكري , وارجو من اخوتي الباحثين إجراء مزيد من الدراسات على مرضى السكري وخاصة أولئك الذين يعتمدون على المضادات (المنظم) في علاجهم.

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## LIST OF ABBREVAITION

Abbreviation	Meaning
<i>H. pylori</i>	<i>Helicobacter pylori</i>
SPSS	Statistic package for social science
P value	Probability value
ICT	Immuno chromatography test
IgG	Immunoglobulin G

**CHAPTER ONE**  
**INTRODUCTION**

# 1. INTRODUCTION

## 1.1 Background

### **Diabetes :**

Diabetes, also known as diabetes mellitus, is a group of metabolic disorders characterized by a high blood sugar level (hyperglycemia) over a prolonged period of time.( Diabetes Mellitus,2022) Symptoms often include frequent urination, increased thirst and increased appetite. If left untreated, diabetes can cause many health complications.( Diabetes,2022) Acute complications can include diabetic ketoacidosis, hyperosmolar hyperglycemic state, or death.( Kitabchi *et al.*, 2009) Serious long-term complications include cardiovascular disease, stroke, chronic kidney disease, foot ulcers, damage to the nerves, damage to the eyes, and cognitive impairment.

Diabetes is due to either the pancreas not producing enough insulin, or the cells of the body not responding properly to the insulin produced(Shoback and Gardner,2011) Insulin is a hormone which is responsible for helping glucose from food get into cells to be used for energy.( NIDDK,2022).

### ***Helicobacter pylori* :**

*Helicobacter pylori*, previously known as *Campylobacter pylori*, is a Gram-negative, microaerophilic, spiral (helical) bacterium usually found in the stomach.( Alfarouk *et al* .,2019). Its helical shape (from which the genus name, helicobacter, derives) is thought to have evolved in order to penetrate the mucoid lining of the stomach and thereby establish infection(Yamaoka,2008) The bacterium was first identified in 1982 by the Australian doctors Barry Marshall and Robin Warren. *H. pylori* has been associated with cancer of the mucosa-associated lymphoid tissue in the stomach, esophagus, colon, rectum, or tissues around the eye (termed extranodal marginal zone B-cell lymphoma of

the cited organ),( Nocturne *et al.*,2019). and of lymphoid tissue in the stomach (termed diffuse large B-cell lymphoma).( Paydas, 2015).

*H. pylori* infection usually has no symptoms but sometimes causes gastritis (stomach inflammation) or ulcers of the stomach or first part of the small intestine. The infection is also associated with the development of certain cancers.( Blaser,2006). Many investigators have suggested that *H. pylori* causes or prevents a wide range of other diseases, but many of these relationships remain controversial.( Bravo *et al.*,2018).

## **1.2 Rationale**

*H. pylori* infection usually has no symptoms but sometimes causes gastritis (stomach inflammation) or ulcers of the stomach or first part of the small intestine. The infection is also associated with the development of certain cancers.( Blaser,2006). Many investigators have suggested that *H. pylori* causes or prevents a wide range of other diseases, but many of these relationships remain controversial.( Bravo *et al.*,2018).

*H. pylori* has been associated with cancer of the mucosa-associated lymphoid tissue in the stomach, esophagus, colon, rectum, or tissues around the eye (termed extranodal marginal zone B-cell lymphoma of the cited organ),( Nocturne *et al.*,2019). and of lymphoid tissue in the stomach (termed diffuse large B-cell lymphoma)( Paydas, 2015).

## **1.3 Objectives**

### **1.3.1 General objective**

- To study the frequency of *H pylori* IgG antibodies among diabetic patients

### **1.3.2 Specific objectives**

- To detect the prevalence of *H pylori* IgG antibodies among diabetic patients using rapid test *H pylori* device .

- To detect the association between *H pylori* seropositivity and possible risk factors ( treatment ).

**CHAPTER TWO**  
**LITERATURE REVIEW**



## 2. LITERATURE REVIEW

### 2.1 BACKGROUND

#### 2.2 Diabetics

Diabetes, also known as diabetes mellitus, is a group of metabolic disorders characterized by a high blood sugar level (hyperglycemia) over a prolonged period of time. (Diabetes Mellitus, 2022) Symptoms often include frequent urination, increased thirst and increased appetite. If left untreated, diabetes can cause many health complications. (Diabetes, 2022) Acute complications can include diabetic ketoacidosis, hyperosmolar hyperglycemic state, or death. (Kitabchi *et al.*, 2009) Serious long-term complications include cardiovascular disease, stroke, chronic kidney disease, foot ulcers, damage to the nerves, damage to the eyes, and cognitive impairment.

Diabetes is due to either the pancreas not producing enough insulin, or the cells of the body not responding properly to the insulin produced (Shoback and Gardner, 2011) Insulin is a hormone which is responsible for helping glucose from food get into cells to be used for energy. (NIDDK, 2022). There are three main types of diabetes mellitus: . (Diabetes, 2022)

Type 1 diabetes results from failure of the pancreas to produce enough insulin due to loss of beta cells. This form was previously referred to as "insulin-dependent diabetes mellitus" or "juvenile diabetes". The loss of beta cells is caused by an autoimmune response. (Norman and Henry, 2015) The cause of this autoimmune response is unknown. (Diabetes, 2022) Although Type 1 diabetes usually appears during childhood or adolescence, it can also develop in adults. (Type 1 diabetes - Symptoms and causes, 2022).

Type 2 diabetes begins with insulin resistance, a condition in which cells fail to respond to insulin properly. (Diabetes, 2022) As the disease progresses, a lack of insulin may

also develop.( RSSDI textbook of diabetes mellitus,2012) This form was previously referred to as "non insulin-dependent diabetes mellitus" or "adultonset diabetes".( Diabetes,2022) Type 2 diabetes is more common in older adults, but a significant increase in the prevalence of obesity among children has led to more cases of type2 diabetes in younger people.( "Type 2 diabetes - Symptoms and causes ,2022) The most common cause is a combination of excessive body weight and insufficient exercise.( Diabetes,2022).

### **2.2.1 Treatment**

#### **2.2.2 Glucose control**

Most medications used to treat diabetes act by lowering blood sugar levels through different mechanisms. There is broad consensus that when people with diabetes maintain tight glucose control – keeping the glucose levels in their blood within normal ranges – they experience fewer complications, such as kidney problems or eye problems.( MacIsaac *et al.*,2018) There is however debate as to whether this is appropriate and cost effective for people later in life in whom the risk of hypoglycemia may be more significant.( Pozzilli *et al.*,2014)

There are a number of different classes of anti-diabetic medications. Type 1 diabetes requires treatment with insulin, ideally using a "basal bolus" regimen that most closely matches normal insulin release: long-acting insulin for the basal rate and short-acting insulin with meals.( "Type 1 diabetes in adults: diagnosis and management",2020)Type 2 diabetes is generally treated with medication that is taken by mouth (e.g. metformin) although some eventually require injectable treatment with insulin or GLP-1agonists.( *Type 2 diabetes in adults: management*",2020)

Metformin is generally recommended as a first-line treatment for type 2 diabetes, as there is good evidence that it decreases mortality.( Ripsin *et al.*,2009) It works by decreasing the liver's production of glucose.( *Krentz and Bailey,2005*) Several other groups of drugs, mostly given by mouth, may also decrease blood sugar in type 2

diabetes. These include agents that increase insulin release (sulfonylureas), agents that decrease absorption of sugar from the intestines (acarbose), agents that inhibit the enzyme dipeptidyl peptidase-4 (DPP-4) that inactivates incretins such as GLP-1 and GIP (sitagliptin), agents that make the body more sensitive to insulin (thiazolidinedione) and agents that increase the excretion of glucose in the urine (SGLT2 inhibitors) .( *Krentz and Bailey,2005*) When insulin is used in type 2 diabetes, a long-acting formulation is usually added initially, while continuing oral medications.( *Ripsin et al.,2009*) Doses of insulin are then increased until glucose targets are reached.( *Consumer Reports; American College of Physicians,2012*)

### ***2.3 Helicobacter pylori***

*Helicobacter pylori*, previously known as *Campylobacter pylori*, is a Gram-negative, microaerophilic, spiral (helical) bacterium usually found in the stomach.( *Alfarouk et al .,2019*). Its helical shape (from which the genus name, helicobacter, derives) is thought to have evolved in order to penetrate the mucoid lining of the stomach and thereby establish infection(*Yamaoka,2008*) The bacterium was first identified in 1982 by the Australian doctors Barry Marshall and Robin Warren. *H. pylori* has been associated with cancer of the mucosa-associated lymphoid tissue in the stomach, esophagus, colon, rectum, or tissues around the eye (termed extranodal marginal zone B-cell lymphoma of the cited organ),( *Nocturne et al.,2019*). and of lymphoid tissue in the stomach (termed diffuse large B-cell lymphoma).( *Paydas, 2015*).

*H. pylori* infection usually has no symptoms but sometimes causes gastritis (stomach inflammation) or ulcers of the stomach or first part of the small intestine. The infection is also associated with the development of certain cancers.( *Blaser,2006*). Many investigators have suggested that *H. pylori* causes or prevents a wide range of other diseases, but many of these relationships remain controversial.( *Bravo et al.,2018*).

Some studies suggest that *H. pylori* plays an important role in the natural stomach ecology, e.g. by influencing the type of bacteria that colonize the gastrointestinal tract.( Blaser ,2006).Other studies suggest that non-pathogenic strains of *H. pylori* may beneficially normalize stomach acid secretion(Ackerman,2012). and regulate appetite(Ackerman,2012).

In 2015, it was estimated that over 50% of the world's population had *H. pylori* in their upper gastrointestinal tracts(Hooi ,2017).with this infection (or colonization) being more common in developing countries.In recent decades, however, the prevalence of *H. pylori* colonization of the gastrointestinal tract has declined in many countries(Minalyan,2017).

### 2.3.1 Signs and symptoms

Up to 90% of people infected with *H. pylori* never experience symptoms or complications.( Bytzer et al.,2011). However, individuals infected with *H. pylori* have a 10% to 20% lifetime risk of developing [peptic ulcers](#).( Chang,2010). [Acute](#) infection may appear as an acute [gastritis](#) with [abdominal pain](#) (stomach ache) or [nausea](#).( Butcher and Graham,2003). Where this develops into chronic gastritis, the symptoms, if present, are often those of non-ulcer [dyspepsia](#): Stomach pains, nausea, [bloating](#), [belching](#), and sometimes [vomiting](#).( Ryan,2010). Pain typically occurs when the stomach is empty, between meals, and in the early morning hours, but it can also occur at other times. Less common ulcer symptoms include nausea, vomiting, and loss of appetite.

Bleeding in the stomach can also occur as evidenced by the passage of black [stools](#); prolonged bleeding may cause anemia leading to weakness and fatigue. If bleeding is heavy, [hematemesis](#), [hematochezia](#), or [melena](#) may occur. fInflammation of the [pyloric antrum](#), which connects the stomach to the [duodenum](#), is more likely to lead to [duodenal](#) ulcers, while inflammation of the [corpus](#) (i.e. body of the stomach) is more likely to lead to [gastric](#) ulcers.( Wagner *et al.*, 2017). Individuals infected

with *H. pylori* may also develop colorectal(Wu et al .,2013). or gastric(Markowski *et al.*,2016). [polyps](#), i.e. non-cancerous growths of tissue projecting from the [mucous membranes](#) of these organs. Usually, these polyps are asymptomatic but gastric polyps may be the cause of dyspepsia, heartburn, bleeding from the upper gastrointestinal tract, and, rarely, gastric outlet obstruction(Markowski *et al.*,2016).while colorectal polyps may be the cause of rectal bleeding, anemia, constipation, diarrhea, weight loss, and abdominal pain.( Soetikno *et al.*,2008).

Individuals with chronic *H. pylori* infection have an increased risk of acquiring a [cancer](#) that is directly related to this infection.( Chang and Parsonnet ,2010). These cancers are [stomach adenocarcinoma](#), less commonly [diffuse large B-cell lymphoma](#) of the stomach(Paydas,2015). or extranodal marginal zone B-cell lymphomas of the [stomach](#),( Smedby and Ponzoni,2017). or, more rarely, of the [colon](#)(Smedby and Ponzoni,2017). [rectum](#),( Kobayashi *et al.*,2008). [esophagus](#)(Ma *et al.*,2017). or [ocular adenexa](#) (i.e. [orbit](#), [conjunctiva](#), and/or [eyelids](#)).( Guffey *et al.*,2016).

### **2.3.2 Morphology**

*Helicobacter pylori* is a helix-shaped (classified as a curved rod, not spirochaete) Gram-negative bacterium about 3 µm long with a diameter of about 0.5 µm . *H. pylori* can be demonstrated in tissue by Gram stain, Giemsa stain, haematoxylin–eosin stain, Warthin–Starry silver stain, acridine orange stain, and phase-contrast microscopy. It is capable of forming biofilms(Stark et al.,1999).and can convert from spiral to a possibly viable but nonculturable coccoid form.( Chan *et al.*,1994).

*Helicobacter pylori* has four to six flagella at the same location; all gastric and enterohepatic *Helicobacter* species are highly motile owing to flagella.( Josenhans et al.,2000 ).The characteristic sheathed flagellar filaments of *Helicobacter* are composed of two copolymerized flagellins, FlaA and FlaB.( Rust *et al.*,2008).

### 2.3.3 Diagnosis

Colonization with *H. pylori* is not a disease in itself, but a condition associated with a number of disorders of the upper gastrointestinal tract.( Kusters *et al.*,2006).Testing is recommended if peptic ulcer disease or low-grade gastric MALT lymphoma (MALToMa) is present, after endoscopic resection of early gastric cancer, for first-degree relatives with gastric cancer, and in certain cases of dyspepsia.( Stenström *et al.*,2008). Several methods of testing exist, including invasive and noninvasive testing methods.

Noninvasive tests for *H. pylori* infection may be suitable and include blood antibody tests, stool antigen tests, or the carbon urea breath test (in which the patient drinks <sup>14</sup>C – or <sup>13</sup>C-labelled urea, which the bacterium metabolizes, producing labelled carbon dioxide that can be detected in the breath).( Stenström *et al.*,2008). It is not known which non-invasive test is more accurate for diagnosing a *H. pylori* infection, and the clinical significance of the levels obtained with these tests is not clear.( Best *et al.*,2018).

An endoscopic biopsy is an invasive means to test for *H. pylori* infection. Low-level infections can be missed by biopsy, so multiple samples are recommended. The most accurate method for detecting *H. pylori* infection is with a histological examination from two sites after endoscopic biopsy, combined with either a rapid urease test or microbial culture.( Logan and Walker,2001).

### 2.3.4 Treatment

Superficial gastritis, either acute or chronic, is the most common manifestation of *H. pylori* infection. The signs and symptoms of this gastritis have been found to remit spontaneously in many individuals without resorting to *Helicobacter pylori* eradication protocols. The *H. pylori* bacterial infection persists after remission in these cases.

Various antibiotic plus proton pump inhibitor drug regimens are used to eradicate the bacterium and thereby successfully treat the disorder(Burkitt *et al.*, 2017) with triple-drug therapy consisting of clarithromycin, amoxicillin, and a proton-pump inhibitor given for 14–21 days often being considered first line treatment.( Azer and Akhondi,2019).

**CHAPTER THREE**  
**MATERIALS AND METHODS**



## **MATERIALS AND METHODS**

### **3.1 Study design**

This was prospective , cross-sectional study, to detect *H pylori* antibody in plasma of diabetic patients and non diabetic healthy individuals .

### **3.2 Study area**

The study was carried out in Jabir Abu Aliz diabetic health center , Khartoum state , Sudan .

### **3.3 Study duration**

This study was conducted from April 2022 to September 2022

### **3.4 Study population**

The subjects include in this study were diabetic patients whom attended to Diabetic Health Clinic in the above mentioned health center.

### **3.5 Inclusion and exclusion criteria**

The study included patients who are diabetic and other not , attended the Diabetic Health Center and provided signed consent forms and interviewed questionnaire .

### **3.6 Data collection**

Data was collected from each subject using interviewed questionnaire, which include : name ,gender , age , area ,type of patient ,taking insulin or not ,symptoms of infection ,other symptoms .

### **3.7 Ethical consideration**

Ethical approval for this study was obtained from Research and Ethical Committee at College of Graduate Studies , Sudan University of sciences and Technology . All subjects were informed about the study and consented before enrolment .

### **3.8 Sample size**

A total of 120 diabetic patients and 60 non diabetic healthy apparent individuals and serum specimens (n=180) were collected in plain containers, and analyzed after separation plasma.

### **3.9 Method**

#### **3.9.1 Collection of specimens**

Two milliliters of blood sample was collected in plain containers from each diabetic patient and non diabetic patient and let it until clot and plasma was separated .

#### **3.9.2 *H pylori* Antibody Rapid Test Device**

##### **3.9.2.1 Introduction**

The *H pylori* Antibody Rapid Test Device (whole blood/Serum/Plasma) is rapid visual immunoassay for the qualitative presumptive detection of specific IgG antibodies to *Helicobacter pylori* in human whole blood, serum, or plasma.

##### **3.9.2.2 Principle**

The *H pylori* Antibody Rapid Test Device (ECO TEST) (whole blood/Serum/Plasma) detect IgG antibodies specific to *Helicobacter pylori* through visual interpretation of color development on the internal strip. Anti human IgG is immobilized on the test region of the membrane. When specimen is added to sample well, specific IgG antibodies, if present, will bind to the *H pylori* antigens conjugated to colored particles on the conjugate pad. As the specimen migrate along the strip by capillary action and interacts with reagent on the membrane, the complex will be captured by anti-human IgG antibodies immobilized on the test regions(s).

The presence of colored band on the test region indicates a positive result for the particular IgG antibodies, while its absence indicates a negative result. Excess colored particular are captured at the internal control region

### **3.9.2.3 Procedure**

The following technique were used according to the instruction of the manufacture.

The test was removed from sealed pouch, and place it on a clean, level surface. The device was labeled with patient or control identification. For best result the assay should be performed within one hour.

Transfer 3 drops of serum or plasma to the specimen well (S) of the device with the provided disposable pipette and start timer.

Wait for the colored band (s) to appear. The result was read at 10 minutes.

### **3.9.2.4 Interpretation of result**

Positive : two red colored bands appear on the membrane . one band appears in the control region (C) and another band appear in the test region (T).

Negative : only one colored band appears, in the control region (C). No apparent colored band in the test region (T).

### **3.9.2.5 Data analysis**

The data was analyzed using SPSS analyzing method.

**CHAPTER FOUR**  
**RESULTS**

## 1. Results

Out of 180 patients aged up to 23 years who were chosen for analysis, 95 were men (age up to 23 years) and 85 were women (age up to 30 years); A total of 120 patients (62 men and 58 women aged up to 23 years) were diabetics. Patients who reported a history of diabetes had been treated with insulin (60 patients), oral anti-diabetic agents (60 patients). The remaining 60 subjects (32 men and 28 women aged up to 30 years) were non-diabetics. Gender and mean age did not differ significantly between the two groups (diabetics vs. non-diabetics).

Regarding the relationship between variables (age, gender and symptoms) affecting prevalence of H. pylori as described in tables.

### 4.1 Detection of H. pylori IgG antibodies in diabetic patient treated with anti-diabetic agent using H. pylori rapid test device.

Differences		H pylori positive NO(%)	H pylori negative NO(%)	Total	P. value
Age	20 to 30 year	0 (0)	1 (1.7)	1(1.7)	0.165
	31 to 40 year	7 (11.7)	0 (0)	7(11.7)	
	41 to 50 year	3 (5)	4 (6.7)	7 (11.7)	
	51 to 60 year	15 (25)	9 (15)	24 (40)	
	Up to 61 year	14 (23.3)	7 (11.7)	21 (35)	
Gender	Male	22 (36.7)	10 (16.7)	32(53.4)	0.915
	Female	17 (28.3)	11 (18.3)	28(46.7)	
Symptoms	Present	13 (21.7)	8 (13.3)	21 (35)	0.604
	Absent	26 (43.3)	13 (21.7)	39 (65)	
Total		39 (65)	21 (35)	60 (100)	

P.value >0.05

**4.2 Detection of H pylori IgG antibodies in diabetic patient treated with insulin using H pylori rapid test device**

Differences		H pylori positive NO(%)	H pylori negative NO(%)	Total	P. value
Age	20 to 30 year	2 (3.3)	0 (0)	2 (3.3)	0.256
	31 to 40 year	3 (5)	0(0)	3 (5)	
	41 to 50 year	8 (13.3)	11 (18.3)	19 (31.7)	
	51 to 60 year	10 (16.7)	6 (10)	16 (26.7)	
	Up to 61year	12 (20)	8 (13.3)	20 (33.3)	
Gender	Male	19 (31.7)	14 (23.3)	33 (55)	0.666
	Female	16 (26.7)	11 (18.3)	27 (45)	
Symptoms	Present	11 (18.3)	6 (10)	17 (28.3)	0.332
	Absent	24 (40)	19 (31.7)	43 (71.7)	
Total		35 (58.3)	25 (41.7)	60 (100)	

P.value >0.05

### 4.3 Detection of H pylori IgG antibodies in non diabetic patient using H pylori rapid test device

Differences		H pylori positive NO(%)	H pylori negative NO(%)	Total	P. value
Age	20 to 30 year	4 (6.7)	16 (26.7)	20 (33.4)	0.291
	31 to 40 year	6 (10)	8 (13.3)	14 (23.4)	
	41 to 50 year	9 (15)	5 (8.3)	14 (23.4)	
	51 to 60 year	4 (6.7)	3 (5)	7 (11.70)	
	Up to 61year	4 (6.7)	1 (1.7)	5 (8.3)	
Gender	Male	11 (18.3)	18 (30)	29 (48.3)	0.319
	Female	16 (26.7)	15 (25)	31 (51.7)	
Symptoms	Present	5 (8.3)	6 (10)	11 (18.3)	0.974
	Absent	22 (36.7)	27 (45)	49 (81.7)	
Total		27 (45)	33 (55)	60 (100)	

### 4.4 Prevalence of H pylori antibodies among diabetic that treated with insulin and diabetic that treated with anti diabetic agent and healthy individuals

	H pylori positive NO(%)	H pylori negative NO(%)	Total	P.value
Diabetic treated with antidiabetic agent	39 (65)	21 (35)	60 (100)	0.561
Diabetic treated with insulin	35 (58.3)	25 (41.7)	60 (100)	0.418
Non diabetic individuals	27 (45)	33 (55)	60 (100)	0.528
Total	101 (56.2)	79 (43.8)	180 (100)	

P.value >0.05



**CHAPTER FIVE**  
**DISCUSSION**

## 5.1 Discussion

This was cross-sectional study aimed to determine the detection of *H pylori* in diabetic and non diabetic patients in Khartoum State. The study was carried out during the period April-June 2022 among 120 diabetic and 60 non diabetic patients using antibody Rapid Test Device by was collected two milliliters of blood sample in plain containers from each diabetic patients and non diabetic patients and let it until clot and plasma separated and three drops added to device and result was read.

In this study, the prevalence of *H pylori* antibodies was (58.3%) among diabetics that treated with insulin while it was (65%) among diabetic treated with anti diabetic agent, while it was 45% among non diabetic individuals, and it was more prevalent among patients with diabetes. It was in agreement with other studies, in (Vafaeimanesh *et al.*,2015) found that the prevalence of HP seropositive was (65.9%) versus (50.5%) in diabetic and non diabetics, respectively, and the difference was statistically significant, this result is close to present study, (Jamshid *et al.*,2014) found that the prevalence of *H. pylori* infection was (55.8%) in diabetics and (44.2%) in non diabetics, (Roussos and Angeliki, 2002) reported that the prevalence of *H. pylori* between diabetics (37.3%) and non diabetics (35.2%).

Abdulbari B *et al.*,2020) showed a positive significantly higher antibody titer for *H pylori* infection (IgA >250) in diabetic patients (50.7%) compared to control (38.2%), conforming that prevalence is high in diabetic than non diabetic individuals,

The result also agreed with Talebi-Taher *et al.*'s(2012) study, were prevalence among diabetic and non diabetic patients were 60% and 26.66%, respectively (P = 0.001) Bener *et al.*'s(2007) study, it has been reported 76.7% versus 64.8% in diabetic and non diabetic subjects (P = 0.009). This finding was confirmed in a study by Candelli *et al.* The strength point of this study was that in 3 years follow-up, the re infection rate was

higher in diabetic patients. On the other hand, on the previous study, we found that HP eradication in patients with diabetes was lower than non diabetic subjects. Although, some studies have not supported this association. In Anastasios *et al.*,(2002) study, the difference of HP prevalence between diabetics and non diabetics was not significant (37.3% vs. 35.2%).In Mallecki *et al.*'s study, the rate of HP infection in Hong Kong Chinese subjects with type 2 diabetes was around 50%, which is similar to control subjects. And these studies disagreed with the present results and this disagrees may be attributed to differences in techniques used and standard of living or the standard of hygiene and medical standard.

## **5.2 CONCLUSTION**

*H pylori* seropositive was 35 (58.3) in diabetic patient treated with insulin and 39 (65%) in diabetic patient treated with anti diabetic agent , however it was 27 (45%) in non diabetic individuals. The high frequency of positive subject among diabetic treated with anti diabetic agent 39 (65%) .

## **5.3 RECOMMENDATION**

1. Detection of *H pylori* should be routine in diabetic patient
2. Further studies in diabetic patients , mainly those treated with anti diabetic agent in treatment

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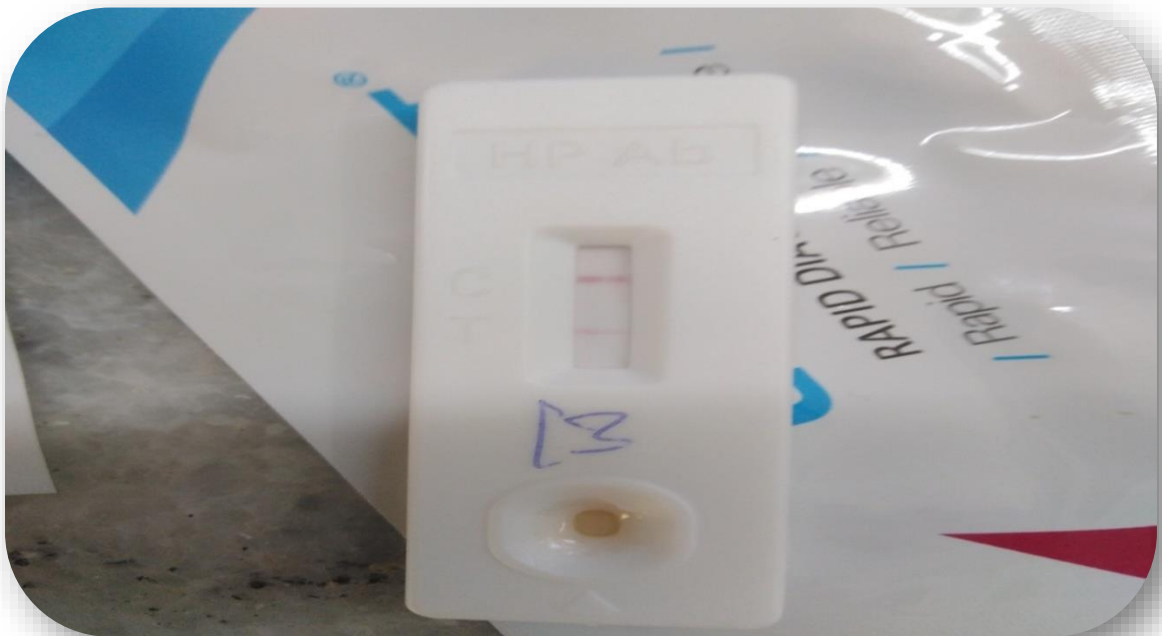
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Positive and negative results of *H pylori* antibodies

*Helicobacter PYLORI* Rapid Test Device ECO TEST



Positive and negative results of *H pylori* antibodies





Sudan University of Science and Technology

College of Graduate Studies

### Frequency of *Helicobacter pylori* IgG Antibodies among Diabetic patients in Khartoum state, Sudan

#### Questioner

Name .....Gender .....Age.....

Type of individual :      Diabetic            Non diabetic     

Type of diabetic :      Type one            type two     

Treatment : Insulin:            diabetic Agent :     

Sign and Symptoms : Present :            sent :