Putative effects of Helicobacter pylori in levels of trace elements selenium and magnesium and Interleukine-10 in infected children in Tikrit city

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ABSTRACT

The study was conducted in the city of Tikrit during the period from September 2021 to September 2022. A total of 228 samples were collected from children attending Salah El-Din General Hospital. The samples were divided into two groups: children and the control group. Routine tests are used initially to confirm Helicobacter pylori infection. Including blood and stool tests. The measurement of selenium and magnesium was performed using the atomic absorption technique. Interleukin-10 was also detected, and the results of the study showed a significant decrease in selenium (73.8500 ± 3.88350 and magnesium (.7700 ± .24730), and IL-10 recorded a high level among the patients who were examined (8.18391 (134,3500 ±). At any level Likelihood (0.05) In conclusion, some trace elements as well as some immunological parameters should be monitored regularly and a patient with H. pylori should receive an adequate intake of food.

Introduction

Helicobacter pylori colonizes the stomach of nearly half of the world's population, but the vast majority of infected persons remain asymptomatic, while a minority of them show symptoms of gastritis that progresses to gastric and duodenal ulcers and gastric lymphoma [1].

The infection with this bacteria is associated with diseases of the duodenum and stomach, as it is endemic to the human stomach, causing chronic gastritis, and it is also a dangerous and distinctive factor for the emergence of peptic ulcers and gastric cancer [2].

These bacteria, when grown on saccharose medium, are characterized by small, convex colonies, translucent water-drop-like, non-hemolytic, non-sporulating, and their cells are characterized by being Gram-negative to spiral gram stains, and are characterized by polymorphism [3].

As for the old farms, they appear in a pelleted form. Also, if they are isolated from water, the bacteria appear in the bacterial culture by 90% with a spherical shape and 10% with a spiral shape [4]. Several studies have linked the prevalence of H. pylori to injection diseases, including iron, B12, folic acid and other trace elements [5, 6]. Various hypotheses have been proposed to explain the relationship between H. pylori infection and iron deficiency or iron deficiency anemia, which affects the gastric corpus and leads to hypoacidity [7]. Moreover, Helicobacter pylori gastritis has been shown to lead to a decrease in the concentration of ascorbic acid in the stomach, which leads to malabsorption of many nutrients, thus impairing the nutritional status of patients [9].

The complement system in the human body plays an important role in the immune and inflammatory response, as it is the first immune factor that stimulates in the serum and completes its work with antibodies in killing those invading microbes, and thus this system acts as a link between the acquired immune response and the autoimmune response [9]. Studies have shown that infection with *H. pylori* bacteria provokes the response of the complement immune system in the serum as a defense against this bacteria. It was noted that its levels in the serum increase after a period of infection and then return to decrease with age [11].

Many studies have dealt with the spread of H. Pylori with diseases outside the stomach and intestine diseases, including iron, B12, folic acid and other trace elements, and the heterogeneous hypotheses were suggestions to provide an explanation for the association between H. Pylori infection and deficiency of trace elements, including selenium and magnesium, which It leaves its effect on the body of the stomach and is the reason for the occurrence of a lack of gastric acid secretion. In addition to this, it has been proven that H. pylori gastritis causes a decrease in ascorbic acid in the stomach area, which results in a deterioration in the absorption of several food components, which causes damage to the condition Nutritional Patients. Concentrations of certain trace elements, including selenium and magnesium, undergo qualitative changes in persons with Helicobacter pylori infection. Our study was to understand the effect of H. pylori on selenium and magnesium levels in infected children in Tikrit, and to measure IL-10 levels to see if their levels were increased or decreased in children and H. pylori infected children.

Procedures and Measurements
Participants:
The current study was conducted during a specific period in the city of Tikrit (Salah al-Din Governorate) between September 19, 2021 and September 3, 2022 and was collected for children in Tikrit General Hospital, and a total of 228 samples were collected, including 119 injured. For 52.19% of the research community, the sample members were divided into two groups: the experimental group and the control group.

Working methods
After washing the skin with 70% alcohol, use a pediatric venous blood syringe to draw a sample of blood (5) mL, then the blood sample was stored in a plastic tube and left for 1-2 hours at room temperature. For complete coagulation and thrombosis or thrombosis, use a serum separating centrifuge (3000 cycles, 5 min) Collect serum into clean, sterile Appendroff tubes using micropipette and store in refrigerator (-10)°C until use [11].

H.pylori blood test
The bacteria were diagnosed according to the method of measuring instruments recommended by the manufacturer ACON, as follows:
- Keep the test strip at room temperature before opening it, and when it reaches room temperature, remove the test strip from the bag and use it immediately.
- Place the test slide on a flat, clean surface using the pipette in an upright position and transfer three drops of approximately 100 μl of the serum sample into the test slide hole.
- Incubate at 8-2°C away from sunlight until 10 minutes after the test color appears as a red or pink line indicating the presence of antibodies, but if the line does not appear in the test region (T), this indicates the absence of antibody , so no infection. Any colored lines in this slide indicate that insufficient sample has been added or air bubbles have formed when the sample is added to the slide, which prevents color development because it impedes the diffusion and binding of serum inside the slide with antibodies [12]. **H.pylori in stool**

A stool sample was taken, placed in Buffer's solution prepared with the test kits, the two pieces were mixed well for 2-3 minutes, then discarded the first three drops of the mixture, put one or two drops in the measuring tape prepared for the detection of bacteria in the stool and placed it 15 minutes and then Read according to the instructions of the German biotechnology manufacturer Hannover.

Measure the level of essential elements
The tests were carried out in the automated analysis laboratory of the College of Engineering, Department of Chemical Engineering at the University of Tikrit by using an Atomic Absorption Spectrophotometer, and the serum was diluted with non-ionic water. Standard solutions containing different concentrations of selenium and magnesium were prepared using deionaized water as a solvent (1. 2,3,4,5ppm), and the device was filtered to non-ionic water, then the absorbance of the prepared standard solutions was measured and the straight line equation was drawn for the absorbance values against the concentrations of the prepared standard solutions. Then the absorbance of the samples was measured and from the standard solution graph the concentration of selenium and magnesium in the sample can be obtained from the straight line equation[13].

Immunological tests
In these tests, an ELISA technique was used to determine the levels of cytokines in the sera of the samples under study, as follows:
- Estimation of levels of cytokine 10 (IL-10).

ELISA test principle
Levels of cytokines including IL-10 were measured using a biotin enhanced ELISA sandwich assay. The conjugated enzyme used for cytokinesis 10 (HRP) conjugated streptavidin avidin- Horseradish Peroxidase.

Coating was carried out to etch the micro-titration plate with monoclonal antibodies, then samples containing the Ag antigen were added, and incubated for a specified period to allow the antigens to bind with the fixed mAb, then the enzyme-labeled avidin-conjugated enzyme was added, then the base material that was given at They were analyzed by enzyme as color products, then the optical density of the unknown samples was measured, from which the unknown concentrations were known based on the standard curve that was drawn for the known standard concentrations against the optical density for each concentration [14].

The general principle of the IL-10 test

Since the general principle of the test is similar for the interleukins measured in the study, we have referred to them as shown below.

The supplier company Elabscience used ELISA technology to determine the level of interleukin (IL-10) in vitro and is used for quantitative measurement in serum, plasma and other biological fluids. sera) in the small pits and fixation of IL-10 with the antibodies present in the titration plate, then the small vessels are washed with the washing solution and a solution of the dilute biotinyiated antibody is added to it. Each container is then washed again, and a reagent solution (TMB) is added to each container, so a blue color is formed and the intensity of the color is according to the ratio of the interleukin union. MUJI 450 nanometers.

Estimation of cytokine level 10 (IL-10)

Serum cellular kinetic level 10 was estimated by following the steps included with the special assay kit and according to the manufacturer's Elabscience ELISA instructions for the Elabscience IL-10 ELISA technology. As shown in Figure [3].

Results

After the researcher unpacked the results of the data for the experimental and control group and processed them statistically, the results were as shown in Table (1) and (2):

Table 1: It shows the total number of the research sample infected with *H.pylori* bacteria in the city of Tikrit and the percentage

sample members	ages	the number	percentage
Injured	6-12 years old	119	52.19%
The most affected age group is	8-12 years	89	74.78%
uninfected		109	47.80%

Table 2: It shows the means, standard deviation, calculated (t) values and (sig) values for the two experimental and control groups in the biochemical variables.

Trace elements for the injure	patients		Control		T	Sig. (2-tailed)	indication
	Mean	Std. Deviation	Mean	Std. Deviation			
selenium	73.8500	3.88350	110.3500	7.63148	-19.726-	.000	Moral *
magnesium	.7700	.24730	2.1550	.20641	-15.625-	.000	moral
IL-10	134.3500	8.18391	96.2000	7.20088	18.087	.000	moral

* Significant when the (sig) value is less than or equal to (0.05)
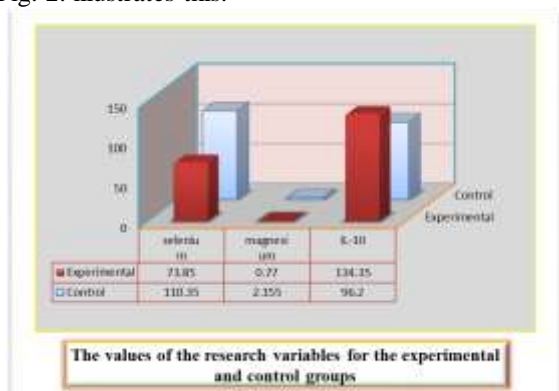
Fig. 2: illustrates this.

Fig. 2

Discussion

It was revealed during this study that there are significant differences for the variables investigated among children infected with H.pylori bacteria in Tikrit city within the age group under study compared with the control, and the reason for this is attributed to the role of this bacteria in the process of absorption of elements of selenium and magnesium through the destruction of epithelial cells of the membrane The mucous membrane of the stomach, which in turn affects the absorption of minerals [15].

The reason for the low level of selenium and magnesium during infection can be attributed to the fact that the body loses a large amount of fluid as a result of diarrhea during infection, and this in turn affects the level of elements in the body (Frances and Marshall, 2015). Selenium and magnesium are absorbed in the ileum and colon by simple passive diffusion [16].

There are also many reasons that lead to a low level of selenium and magnesium, such as malnutrition, as well as the role of bacteria that use carbohydrates, fats, minerals and nutrients as a food source for them from the host to produce the basic energy needed to sustain the life of those bacteria [17].

Diarrhea, fluid loss from the body and bleeding is one of the most important symptoms caused by H.pylori bacteria, and thus affects the mineral levels in the body, as well as the low level of nutrient absorption from the intestine as a result of damage to the intestinal epithelium due to infection with intestinal parasites [18]. The changes that occur in the metabolism of basic elements in the body are among the most important physiological characteristics caused by inflammation and diseases that affect the intestines [19]. This leads to the release of harmful cytopathic cellular substances that cause damage and

damage to the intestinal epithelium, and this in turn leads to impaired absorption of nutrients [20]. Malnutrition is closely related to *H.pylori* infection, as this bacterium affects the amount of food a person eats through its effect on the digestion and absorption of nutrients within the intestinal cavity through its pathological effect on the mucous membrane lining the intestines [12].

The results of this study are consistent with the results of [21, 8] that *H. pylori* has a strong effect on some trace elements.

Also, IL-10 is an important factor in controlling the replication of *H. pylori* infection, thus helping to avoid an excessive immune response, which may lead to severe inflammatory conditions and damage to host tissues [22].

Elevated IL-10 levels in chronic infections may play a role in the pre-regulation of the inflammatory response by decreasing the cystic burden that serves the host [23].

The high incidence of infection was observed in the age group 8-12 years, and this may be due to the fact that this group is the least familiar with hygiene conditions and the ease of transmission of bacteria through hands and contaminated dust, and then to food [18]. The immune factor is important in infecting people with this bacteria, as these ages have not completed their immune system, and this in turn reduces the body's ability to resist infection [24].

The researchers added that the deficiency of both components is due to the shutdown of the proton pump responsible for acid secretion to reduce the acidity in it to a level high enough for H. pylori to survive. This is a very acidic substance, to help deal with this high acidity, H. pylori secretes a special enzyme called urease, which converts urea into ammonia that helps neutralize the acidity of the stomach, so the stomach cannot do its job. In countless problems where minerals such as calcium, magnesium, iron, zinc, copper, selenium and boron are not absorbed [25].

Conclusions

There are statistically significant differences between the experimental group and the control group due to the decrease in trace elements (selenium and magnesium), and the increase in IL-10 and significantly in *H.pylori* infected.

Looking at the results, the researchers recommend if you have a *Helicobacter pylori* infection. Certain trace elements such as selenium and magnesium as well as some immunological parameters such as IL-10 should be monitored regularly to avoid complications resulting from their decrease, and patients with *H. pylori* should receive an adequate nutritional intake. Finally, further studies should be conducted to investigate the effect of *H. pylori* infection on levels of these elements and duration of infection, "with a study of recurrent infection twice compared to recurrent infection once" in *H. pylori* infection. "With a study of the levels of some interleukins"

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تأثير بكتريا Pyloriteria على مسنوى السيلينيوم والمغنيسيوم وبعض الجوانب المناعية في الاطفال المصابين في مدينة تكريت

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الملخص

هذه الدراسة اجرت في مدينة تكريت (محافظة صلاح الدين) في الفترة مابين ايلول2021 لغاية ايلول 2022 قد جمعت 228 عينة من الاطفال في مستشفى تكريت العام مع 119 حالة مصابة اي مايقارب 2.19 % من التعداد السكاني و اصحاب العينة قسموا الى فريقين: مجموعة تجريبية ومجموعة الرقابة. اظهرت التجارب التي حدثت على تفاعلات السيلينيوم والمغنيسيوم اختلاف ملحوظ (0.000) وفي المستوى المتوسط (73.8500) للمرضى مقارنة بتفاعلات التي اظهرها فريق الرقابة (110.3500) والسيلينيوم المنخفض. و اظهر التحليل الاحصائي تركيز المغنسيوم بأنه اختلاف ملحوظ في المستوى (0.000) مقارنة مع فريق الرقابة . وكان الوسط الحسابي (0.7700)(2.1550) مستوى الانترلوكين (LI-10) كان ذو اختلاف ملحوظ في المستوى (0.000) وكان الوسط الحسابي (134.3500) و فريق الرقابة كان (96.2000).