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### Study of the effect of *Helicobacter pylori* bacteria on some levels of trace elements in injured patients in Samarra city

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#### ABSTRACT

The study was conducted for the period between 12/3/2019 to 12/1/2020 in the city of Samarra, and 344 samples were collected for different ages, and the number of injuries was 164, i.e. 47.6%. 18.3% of children of the age group 9-13 were injured by 6.6%. The tests of some biochemical variables showed a significant difference at the level of (0.000) in the low level of zinc in the infected with a mean of (104.2667) compared to the samples of the control group, which amounted to (152.1667). Statistical analysis showed a significant difference at the level (0.000) of iron concentration for those infected with bacteria and with a mean of (89.6667) compared to the samples of the control group, which amounted to (115.5667), while the level of copper did not show a significant difference between the injured and the uninfected persons.

#### Introduction

The world's attention turned to *Helicobacter pylori* in 1983, when Warren and Marshall indicated the close relationship of this bacterium to chronic active gastritis and duodenal ulcer [1]. Successive studies have proven the actual relationships between gastro duodenal inflammatory disease and *H. pylori*, in addition to that, a relationship between *H. pylori* and stomach cancer, where the International Agency for Research on Cancer of the World Health Organization indicated in 1994 that *H. pylori* is among the first class carcinogens and is the most dangerous class of cancer-causing agents [2]

The bacteria *H. pylori*, which causes stomach ulcers, is characterized as a gram-negative, spiral-shaped bacterium that infects the lining of the stomach.[3]. In 1982, researchers Robin Warren and Marshall Barry were able to isolate these bacteria from stomach samples of infected persons and culture them on special culture media [4]. *H. pylori* bacteria produce bacterial toxins, including the protein Vaculating toxin A, and this type of toxins is closely related to the occurrence of gastric ulcers, as it is noted that people infected with strains of *H. pylori* producing

this type of toxin suffer from acute peptic ulcers compared to people infected with non-productive bacterial strains. To these toxins, some strains of *H. pylori* bacteria also produce another type of toxin, the cagA protein, Cytotoxin associated gene A. This type of toxins is linked to the development of stomach cancer, as this type of toxins stimulates the secretion of pro-inflammatory mediators, including cellular attractants such as IL-8, a compound secreted by lymphocytes in the body, causes its secretion to cause gastritis. This inflammation develops into peptic atrophy, which is the precursor to stomach cancer, as well as the development of gastric ulcer [5]. The infection with this bacterium may be accompanied by the appearance of symptoms or the absence of symptoms in people carrying this bacteria. It is noted that 70% of the people carrying this bacteria do not show symptoms of disease, and this depends on the person's ability and immunity. It is also noted that the rates of infection with this ulcer are high in the elderly, as it reaches 50% in people over the age of 60 years, while it is noted that the rate of infection under the age of 40 reaches 20% [3].

These bacteria are characterized by causing many diseases, some of which may play an important role in atherosclerosis, some autoimmune diseases, and insulin resistance. [6, 7]

Epidemiological studies have confirmed the spread of *H. pylori* and its associated diseases all over the world and in different age groups, and in general, its spread is more frequent in developing countries, which spreads more than what is found in other countries. [8]

Several studies have linked the spread of *H. pylori* to extra-gastrointestinal diseases, including iron, B12, folic acid and other trace elements [9,10]. Various hypotheses were suggestions to explain the relationship between *H. pylori* infection and iron deficiency or iron deficiency anemia, which affects the body of the stomach and leads to hypochlorhydria [11]. In addition, it has been proven that *H. pylori* gastritis leads to a decrease in the concentration of ascorbic acid inside the stomach, which consequently reduces the absorption of many nutrients, thus detrimental to the nutritional status of patients [12].

Some international studies indicated a qualitative change in the concentrations of some trace elements in people with *H. pylori* bacteria. To the knowledge of the researcher, no previous studies were conducted in the country related to the current research variables, and more studies must be conducted to confirm such correlations and change in these elements, which The researchers push to delve into the topic of the study, as all of the evidence described above supports the importance of determining whether *H.pylori* is associated with biochemical variables. Therefore, the aim of our study was to know the effect of *H.pylori* bacteria on some levels of trace elements (iron, zinc and copper) among those infected with it in the city of Samarra.

### Procedures and Measurements

#### Participants:

The study was conducted for the period between 12/3/2019 to 12/1/2020 in the city of Samarra, and 344 samples were collected for different ages in Samarra General Hospital, and the number of injuries was 164, which represents a percentage of 47.6% of the research community, and the highest percentage among males was for the age group 26-36, as It reached 22.7%, while in females of the age group 16-26, the infection rate was 18.3%, while the percentage of infection for children of the age group 9-13 was 6.6%, the sample members were divided into two groups, experimental and control.

#### Working methods:

(5) ml of the blood sample was withdrawn by a medical syringe from the venous blood of the subjects under study after cleansing the skin with 70% alcohol. Then the blood samples were kept in plastic tubes, where they were left for 1-2 hours under temperature The chamber was for the purpose of complete coagulation and the occurrence of thrombosis or thrombosis and the serum was

separated using a centrifuge (3000 cycles for 5 minutes) The serum was collected using a Micropipette in clean, sterile Appendroff tubes and kept in the refrigerator at (-10) C until use [13].

#### *H.pylori* blood test

The bacteria were diagnosed according to the measurement kit method recommended by the manufacturer ACON, as follows:

- The test strip was placed under room temperature before opening, and after it reached room temperature, the test strip was removed from the bag and used immediately.
- The test slide was placed on a flat and clean surface. The dropper was held vertically, with three drops of serum sample approximately 100 microliters transferred to the well(s) hole of the test slide.
- The incubation was carried out at a temperature of 2-8°C away from sunlight until the color appeared in the form of a red line or pink line after 10 minutes of taking the test, indicating the presence of the antibody. If the line did not appear in an area The (T) test indicates the absence of the antibody and therefore the absence of infection, and in the event that no colored line appears in the slide, this indicates that the volume of the added sample is insufficient or air bubbles may have formed when adding the sample to the slide, which causes the failure of the color to appear because it It hinders the diffusion of serum inside the slide and the binding of antibodies with the antigen[14]

#### *H.pylori* in stool

The stool is taken and placed in the Buffer solution prepared with the test kit. The two are mixed well for a period of 2-3 minutes, after which the first three drops of the mixture are neglected, and one to two drops are placed in the measuring tape prepared to detect bacteria in the stool and left for 15 minutes. Then the reading is done according to the instructions of the German manufacturer CTC Biotech Hannover.

#### As for the biochemical examinations, the following examinations were performed:

- The level of concentration of iron, zinc and copper in the blood serum by using a flame atomic spectrometer, where the sample is placed in a dilution solution and nonionic water was used, then it is withdrawn by the atomic spectrometer and then the solution containing the sample is sprayed in a high temperature flame, so the ions of the element gain energy that makes them light It has distinctive characteristics that falls on a cell that converts it into a measurable electric current, and the amount of current is proportional to the amount of light and thus to the concentration of the metal in the sample examined. [15, 16].

#### Results

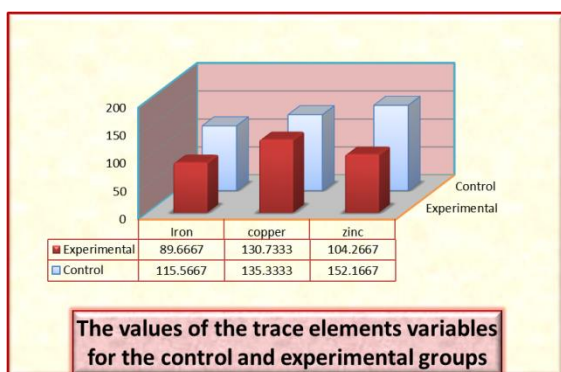
After the researcher unpacked the results of the data for the experimental and control group and processed them statistically, the results were as shown in Table (1) and (2):

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

| sample members | Number of injured | percentage |
|----------------|-------------------|------------|
| Men            | 87                | 53%        |
| Women          | 50                | 30.48%     |
| children       | 27                | 16.46%     |

**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 | Control  |                | Experimental |                | T        | Sig. (2-tailed) |
|-------------------------------|----------|----------------|--------------|----------------|----------|-----------------|
|                               | Mean     | Std. Deviation | Mean         | Std. Deviation |          |                 |
| <b>Iron</b>                   | 89.6667  | 2.26416        | 115.5667     | 11.92125       | -11.202- | .000            |
| <b>copper</b>                 | 130.7333 | 13.17765       | 135.3333     | 7.46640        | -1.604-  | .119            |
| <b>zinc</b>                   | 104.2667 | 22.17164       | 152.1667     | 14.34569       | -11.028- | .000            |



**Fig. 1: illustrates this**

## Discussion

During this study, it was revealed that there were significant differences in the iron and zinc variables among people infected with *H.pylori* bacteria in the city of Samarra. Because iron deficiency affects the production of red blood cells indirectly. [17].

The researchers add the reason for the deficiency of the above two elements is the result of closing the proton pumps responsible for the secretion of acid in order to reduce the acidity in them to a sufficient degree to allow the *H. pylori* bacteria to live. This is very acidic, and to help deal with this high acidity, the bacteria *H. pylori*, secrete a special enzyme called urease, which converts urea to ammonia that helps neutralize stomach acid, and thus the stomach does not reach the pH appropriate for its work, which results in countless problems, among which minerals such as calcium, magnesium, iron, zinc, copper, selenium and boron are not absorbed. Anemia that will result from iron deficiency will cause everything in the body to work less because cells starve for oxygen. [18, 19]

The results of this study are consistent with the findings of (Yuan, W. El.) [20] (Collett; Burt.,

Frampton) [21] that *H.pylori* bacteria significantly affect some trace elements.

It was noted during the current results in this study that there are no significant differences in the element copper, and the researchers attribute this to the fact that copper is found almost throughout the body, but the body needs only small amounts of it, which can be obtained from foods rich in it, and there are a large number of Foods that contain high levels of copper and are frequently eaten in our environment, such as whole grains such as beans, beans, potatoes, yeast, dark leafy vegetables, cocoa, dried fruits, black pepper and some nuts such as cashews and almonds, in addition to meat sources, and the upper limit of copper intake for adults over the age of 19 years, about 10,000 micrograms per day, and therefore there was no deficiency in the level of copper in the infected sample due to the lack of the body's need for it first and the inadvertently eating rich foods from it secondly. [22]

## Conclusions

Significant differences appeared between the experimental and control groups, due to the significant decrease in iron and zinc in *H.pylori* infected persons. As for copper, the results show that there are no significant differences between the two groups for copper.

In light of the results, the researchers recommend that in the case of *H. pylori* infection serum, the trace elements zinc, iron and copper should be monitored regularly to avoid complications that result if they are low. Patients infected with *H. pylori* bacteria should take nutrition rich in zinc, copper and iron or receive nutritional supplements Finally, more studies should be conducted on the effect of *H.pylori* infection on the levels of these elements with the duration of infection, with a study of repeated infection twice compared to repeated infection once in infection with *H. pylori* bacteria.

## References

- [1] Warren, J.R.; Marshall, B.J. (1983). Unidentified curved bacilli on gastric epithelium in active chronic gastritis, *Lancet*, i: 1273.
- [2] Versalovic, J. & Fox, J.G. (1999). *Helicobacter* Manual of clinical microbiology, Vol. 1, Washington. 727-738.
- [3] Olson, J.W. & Maier, R.J. (2002). Molecular hydrogen as an energy source for *Helicobacter pylori*. *Science* . 298 (5599): 1788–90.
- [4] Blaser, M.J. (2005). An endangered species in the stomach. *Sci. Am.* 292 (2): 38–45.
- [5] Mayer, E.A.; Bradesi, S.; Chang, L.; Spiegel, B.M.R.; Bueller, J.A. & Naliboff, B.D. (2008). Functional GI disorders: from animal models to drug development. *Gut*. 57: 384–404
- [6] Manco, M.; Putignani, L. and Bottazzo, G.F. (2010). Gut microbiota, lipopolysaccharides, and innate immunity in the pathogenesis of obesity and cardiovascular risk. *Endocr Rev.* 31(6): 817–844.
- [7] Assal, A.H. Gad, M.A. El Badawy, R.M. Emar, N.M. and Soliman, M.S. (2013). The Association between *Helicobacter pylori* Infection and Insulin Resistance. *The International Medical Journal Malaysia*. 12 (1): 49-52.
- [8] Forman, D. & Webb, P. (1993). Geographic distribution & association with gastric cancer. In: *Helicobacter pylori* infection, by: Northfield, T.C.; Mendall, M. & Goggin, P.M., Kluwer academic publishers, Dordrecht, U.K., pp. 11-20.
- [9] Salgueiro J, Zubillaga M, Goldman C, et al. (2004). Review article: is there a link between micronutrient malnutrition and *Helicobacter pylori* infection? *Aliment Pharmacol Ther*; 20:1029–34.
- [10] Bohr UR, Annibale B, Franceschi F, et al. (2007). Extragastric manifestations of *Helicobacter pylori* infection—other *Helicobacters*. *Helicobacter*; 12 (Suppl 1):45–53.
- [11] Capurso G, Ricci R, Panzuto F, et al. (2003). Intragastric ascorbic but not uric acid is depleted in relation with the increased pH in patients with atrophic body gastritis and *H. pylori* gastritis. *Helicobacter*; 8: 300–6.
- [12] Baysoy G, Ertem D, Ademoglu E, et al. (2004). Gastric histopathology, iron status and iron deficiency anemia in children with *Helicobacter pylori* infection. *J Pediatr Gastroenterol Nutr*; 38:146–51
- [13] Lewis, S.M.; Bain, B.J. & Bates, I. (2001). *Dacie and Lewis practical hematology*. 19<sup>th</sup> ed. Churchill livingstone : 1-5.
- [14] Megraud, F. et al. (1989). Seropidemiology of *Campylobacter pylori* infection in various populations. *J. Clin. Micro* .27:1870- 3.
- [15] Pesce, A.J., and Kaplan, L.A . (1987). *Methods in Clinical Chemistry*. Mosby Company.527,543-596.
- [16] Jacques, V., and Rita, C. (1989). *Trace Elements in Human Plasma or Serum*. CRC Press. P:37-135.
- [17] Francesco, F.; et al.( 2014 ) Role of *Helicobacter Pylori* infection on nutrition and Metabo-lism. *World. J. Gastroenterol.* 20 (36) PP.12809-12817
- [18] Akcam, M. (2010). *Helicobacter pylori* and Micronutrients. *Indian Pediatrics*. 47:119-120.
- [19] Victor, M.; et al . (2006). Iron Deficiencyand *Helicobacter pylori* Infection in the Unit-ed States. *Ame. Journal. of Epid.* 163 PP. 127–134. 2006.
- [20] Yuan, W.El.( 2010). Iron deficiency anemia in *Helicobacter Pylori* in fection ; meta-anaiysi of randomized controlled triais.Sca J Gas.45(6) PP.665-676.
- [21] Collett, J.A.; Burt, M.J.; Frampton, C.M. (1999). Seroprevalence of *Helicobacter Pylori* in the adult population of Christchurch: risk factors and relation shipto dyspeptic symptoms and iron studies. *J. N. Z.* 112:292-5.
- [22] Health benefits and risks of copper", [www.medicalnewstoday.com](http://www.medicalnewstoday.com), Retrieved 27-01-2020. Edited.

## دراسة تأثير بكتريا *H.pylori* على بعض مستويات العناصر النزرة لدى المرضى المصابين في مدينة سامراء

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### الملخص

اجريت الدراسة للفترة بين 12/3/2019 الى 2020/1/12 في مدينة سامراء وتم جمع 344 عينة لمختلف الاعمار وكان عدد الاصابات هو 164 اي 47.6% وكانت اعلى نسبة لدى الذكور للفئة العمرية 26\_36 اذ بلغت 53% بينما في الاناث ذات الفئة العمرية 16\_26 كانت نسبة الاصابة 30.48% اما نسبة اصابة الاطفال ذات الفئة العمرية 9\_13 بنسبة 16.46%. اظهرت الاختبارات لبعض المتغيرات الكيمو حيوية وجود فرق معنوي عند مستوى (0.000) في انخفاض مستوى الزنك لدى المصابين وبمتوسط حسابي قدرة (104.2667) مقارنة بعينات المجموعة الضابطة التي بلغت (152.1667) كما اظهر التحليل الاحصائي فرقا معنوياً عند مستوى (0.000) لتركيز الحديد لدى المصابين بالبكتريا وبمتوسط حسابي (89.6667) مقارنة بعينات المجموعة الضابطة التي بلغت (115.5667) اما مستوى النحاس لم يظهر فرق معنوي بين المصابين والاشخاص غير المصابين.