

# Relationship Between Serotonin And H.Pylori Infection In Human Body

Rusul Thabit Hamid<sup>1</sup> , Nour Taqi Khudair<sup>2</sup> , Mustafa Saleam Khalaf<sup>3</sup>

<sup>1,2</sup>Al-Farahidi University Iraq.

<sup>3</sup>AL-Rasheed University College Iraq.

---

## Abstract

Helicobacter pylori (H. pylori) is helical form of bacterium and normally present in stomach as normal flora . H. pylori infection able to penetrate of mucous layer of stomach at pathogenesis condition. H. pylori has relationship with lymphomas and ulcers in mucosa layer of stomach, colon and others , therefore individuals infected with H. pylori have a 10% to 20% lifetime risk of developing peptic ulcers. Serotonin hormone is synthesis from essential amino acid (tryptophan) ,and has various function in human body such as happiness, feelings of well-being and stabilizes mood .This hormone act to communication function between nervous cells ,so any reduce of serotonin level can lead to depression condition . This study include selection of 30 subjects classified into group1 (15 subjects) with H.pylori infection cases and group 2 (15 subjects) refer to control . For both groups measured level of serotonin in serum, then compared between them by T-test statistic method and P-value . Current study explained reduce of serotonin hormone level at group 1 comparison with group 2 . Also concluded the study to effect of h.pylori infection on level of serotonin ,this study demonstrated decrease of serotonin level in serum at H.pylori infection cases .

---

## Introduction

Helicobacter pylori (H. pylori) is one of the gram-negative specie of bacterium first identified in 1982 by Australian doctors Barry Marshall and others , it has helical form and normally present in stomach as normal flora (1) . H. pylori infection able to penetrate of mucous layer of stomach at pathogenies condition. H. pylori has relationship with lymphomas and ulcers in mucosa layer of stomach, colon and others , therefore individuals infected with H. pylori have a 10% to 20% lifetime risk of developing peptic ulcers (2) . Infected individual mostly appear various of signs and symptoms such as ache of stomach, bloating, depression, nausea, dyspepsia and other features .H. pylori infection can diagnosis via clinical examination and laboratory investigations, included blood H. pylori antibody, stool H. pylori antigen and carbon urea breath tests (3) .

Serotonin is protein's hormone , it synthesis from tryptophan that consider as essential type of amino acid , essential amino acid must be enter body via foods , therefore the human body need tryptophan in

diet for example meat , nuts and other foods (4) . Serotonin hormone has various function in human body such as happiness, feelings of well-being and stabilizes mood .This hormone act to communication function between nervous cells ,so any reduce of serotonin level can lead to depression condition . Serotonin inhibits gastric acids secretion and may be an endogenous enterogastrone. It appears to has other functions like stimulate the production and release of gastric and colonic mucus (5) .

### Materials and Methods

The current study was included selected 15 H.pylori infection cases ( consider as group 1) with 15 healthy individuals as control ( consider as group 2) , age of all subjects that included in this study were 40-55 years of both genders , the current study done in The Al-Yarmouk Teaching Hospital – Iraq . The blood sample collection from all subjects in this study were done by drawing whole blood then separation immediately without any clotting factors to obtain serum for measurement of serotonin at P.M. period . ELISA technique was used to measure serotonin level in serum of all subjects .

T-test was used for statistic analysis for comparison between H.pylori infection cases and control groups according to serotonin level in serum (mean  $\pm$  Standard Deviation (SD) ) and used P-value for refer to significant value (p-value < 0.05 consider as significant value).

### Results

This study showing decrease of serum serotonin level in H.pylori infection cases group (group 1) compare with control group (group 2) , expression of serotonin level by mean  $\pm$  SD statistic method with P-value . serotonin level in group 1 was  $64.2 \pm 1.87$ , and in group 2 was  $147.1 \pm 1.16$  , P-value was <0.001 , table 1.

**Table 1:** Comparison of serum serotonin C level between H.pylori infection cases (group 1) and control (group 2) groups according to mean  $\pm$  standard deviation (SD)

Parameters	Group 1 (No. =15) Mean $\pm$ SD	Group 2 (No. =15) Mean $\pm$ SD	P-value
Serotonin (ng/ml)	$64.2 \pm 1.87$	$147.1 \pm 1.16$	<0.001*

\*Significant value

### Discussion and Conclusion

The present study included effect of H. pylori infection on serotonin level. The H.pylori has helical form and normally present in stomach as normal flora. H. pylori infection able to penetrate of mucous layer of stomach at pathogenesis condition such as ulcer (6) . On other hand ,the serotonin secreted from enterochromaffin cells of the gastrointestinal mucosa and neurons into blood stream or gut lumen .Serotonin has various roles in gastrointestinal tract for example inhibits gastric acid secretion and shared at digestion process in stomach (7) .

The H.pylori infection can cause defect in serotonin secretion and action at gastrointestinal tract level (especially in stomach ) that can lead to many of disorders such as functional dyspepsia , anxiety and

depression (8) . Infection of stomach organ by H.pylori bacteria can cause stimulation of various inflammation processes . Chemokines and signaling pathways active during inflammatory processes can affect the synthesis and degradation of serotonin , Chemokines such as Interlukines 1,6 and 2 act to degrade of precursor of tryptophan (that consider precursor to serotonin synthesis ) via activation of indoleamine 2,3-dioxygenase enzyme (that is rate-limiting enzyme in the L- tryptophan –kynurenine pathway that converts L- tryptophan, the precursor of serotonin, to N-formylkynurenine, resulting in a diminished synthesis of central serotonin ) . These tryptophan degradation can result serotonin level decrease in gastrointestinal tract, especially in stomach .Reduce of serotonin level has relationship with psychological disorders and functional dyspepsia (9) .

The current study demonstrate the previous effect of H.pylori infection on reduce of serotonin level , and this study agree with Stone TW and Darlington LG 2002 , that also confirmed the chemokines generated from h.pylori infection can lead to decrease serotonin level (10) . Also this study agree with Haugen M, Dammen RH and et al 2012 that demonstrated the h-H.pylori infection can cause decrease of serotonin level (11) .

Present study demonstrate the effect of H.pylori bacteria infection on serotonin level decrease and cause many of psychological disorders and functional dyspepsia via stimulation of various of pro-inflammatory markers .

## References

- 1-Mohamed NM. Detection of Helicobacter Pylori By using Culture and PCR Techniques in Khartoum state (Doctoral dissertation, Sudan University of Science and Technology).
- 2- Charitos IA, D'Agostino D, Topi S, Bottalico L. 40 years of Helicobacter pylori: A revolution in biomedical thought. *Gastroenterology Insights*. 2021 Jun;12(2):111-35.
- 3- Hussein RA, Al-Ouqaili MT, Majeed YH. Detection of Helicobacter Pylori infection by invasive and non-invasive techniques in patients with gastrointestinal diseases from Iraq: A validation study. *Plos one*. 2021 Aug 23;16(8):e0256393.
- 4- Connelly MK, Cheng AA, Hernandez LL. Graduate Student Literature Review: Serotonin and calcium metabolism: A story unfolding. *Journal of Dairy Science*. 2021 Dec 1;104(12):13008-19.
- 5- Kanova M, Kohout P. Serotonin—Its Synthesis and Roles in the Healthy and the Critically Ill. *International Journal of Molecular Sciences*. 2021 Jan;22(9):4837.
- 6- Tshibangu-Kabamba E, Yamaoka Y. Helicobacter pylori infection and antibiotic resistance—from biology to clinical implications. *Nature Reviews Gastroenterology & Hepatology*. 2021 Sep;18(9):613-29.
- 7- Liu N, Sun S, Wang P, Sun Y, Hu Q, Wang X. The mechanism of secretion and metabolism of gut-derived 5-hydroxytryptamine. *International journal of molecular sciences*. 2021 Jan;22(15):7931.

8- Toyoshima F, Oshima T, Nakajima S, Sakurai J, Tanaka J, Tomita T, Hori K, Matsumoto T, Miwa H. Serotonin transporter gene polymorphism may be associated with functional dyspepsia in a Japanese population. *BMC Medical Genetics*. 2011 Dec;12(1):1-6.

9- Meng WP, Wang ZQ, Deng JQ, Liu Y, Deng MM, Lü MH. The role of *H. pylori* Cag A in regulating hormones of functional dyspepsia patients. *Gastroenterology Research and Practice*. 2016 Oct 20;2016.

10- Stone TW, Darlington LG. Endogenous kynurenes as targets for drug discovery and development. *Nature reviews Drug discovery*. 2002 Aug;1(8):609-20.

11- Haugen M, Dammen RH, Svejda B, Pfragner R, Gustafsson BI, Kidd M. 200 Differential Signal Pathway Activation and 5-HT Function: the Role of Gut Enterochromaffin Cells as Oxygen Sensors. *Gastroenterology*. 2012;5(142):S-49.