

VOLUME 9

ISSUE 2

2023

ISSN 2454 – 3055



**INTERNATIONAL
JOURNAL OF
ZOOLOGICAL
INVESTIGATIONS**

***Forum for Biological and
Environmental Sciences***

Published by Saran Publications, India



Interleukin-27 Level in Patients with Inflammatory Bowel Disease in Diyala Province, Iraq

Ghazwan Ahmed Mezher* and Ibtisam Badday Hassan

Biology Department, College of Education for Pure Science, The University of Diyala, Iraq

*Corresponding Author

Received: 18th June, 2023; Accepted: 3rd July, 2023; Published online: 8th July, 2023

<https://doi.org/10.33745/ijzi.2023.v09i02.005>

Abstract: Inflammatory bowel disease (IBD), classified as an autoimmune disease, is a chronic inflammatory condition affecting the digestive system. The two most common forms of IBD are ulcerative colitis (UC) and Crohn's disease (CD). There are many genetic, environmental and immunological factors that contribute to the emergence of inflammatory bowel disease, and *Helicobacter pylori* is the most common intestinal microorganism that infects more than half of the world's population and is responsible for approximately 75% of all stomach cancers and 63.4% of all stomach ulcers. This study was conducted during the period September 20, 2022 to November 25, 2022. 45 blood samples were collected from patients infected with the stomach bacterium *H. pylori* in private pathological analysis laboratories in several parts of Diyala Governorate, Iraq. The study included the age group 16-70 years. The number of males was 22 and the number of females was 23. Also, 43 blood samples were collected from a control group, the number of males was 24 and the number of females was 19 within the age group 20-65 years. They did not suffer from any acute or chronic disease. The study included an assessment of the level of interleukin IL-27 concentration using the ELISA technique. The study concluded that the infection rate of females with colitis was 51.1% higher than that of males (48.9%), at an average age of 32.42 ± 1.81 years. With a statistically significant difference between the gender with a value of $P=0.516$. The results of the current study showed a decrease in the level of IL-27 in patients with colitis (0.56 ± 0.13 pg/ml) compared with the control group (0.86 ± 0.17 pg/ml) and with a statistically significant difference ($P=0.161$). The study concluded that IL-27 is a protective and anti-IBD agent.

Keywords: IL-27, *Helicobacter pylori*, Bowel disease, Ulcerative colitis, Crohn's disease

Citation: Ghazwan Ahmed Mezher and Ibtisam Badday Hassan: Interleukin-27 level in patients with inflammatory bowel disease in Diyala Province, Iraq. Intern. J. Zool. Invest. 9(2): 60-64, 2023.

<https://doi.org/10.33745/ijzi.2023.v09i02.005>



This is an Open Access Article licensed under a Creative Commons License: Attribution 4.0 International (CC-BY). It allows unrestricted use of articles in any medium, reproduction and distribution by providing adequate credit to the author (s) and the source of publication.

Introduction

At the turn of the 21st century, the prevalence of inflammatory bowel disease (IBD) increased

globally (Hsieh, 2020). Inflammatory bowel disease (IBD), classified as an autoimmune

disease, is a chronic inflammatory condition affecting the gastrointestinal tract. Its incidence in developed countries in the United States and Europe is relatively high, as many as 1.4 million and 2.2 million people, respectively, have been recorded as having IBD. In recent years the incidence rate has continued to rise in Asia, South America, the Pacific region and many other developing countries (Al-kinani, 2015). The two most common forms of IBD are ulcerative colitis (UC) and Crohn's disease (CD), the former is limited to the rectum and colon and invades the epithelial lining of the intestines while Crohn's disease affects every part of the gastrointestinal tract (Al-kinani, 2015). It is widely believed that many factors such as genetic, environmental and immunological factors and their interaction contribute to the emergence of inflammatory bowel disease. *H. pylori* is the most common intestinal microorganism that infects more than half of the world's population and is responsible for approximately 75% of all stomach cancers and 63.4% of all stomach ulcers (Niu *et al.*, 2020; Hemati *et al.*, 2021). *H. Pylori* is one of the most common gastrointestinal infections affecting about half of adults and only 15% of *H. pylori* carriers develop symptoms while the remaining patients are asymptomatic (Hooi *et al.*, 2017; Kotilea *et al.*, 2019).

Interleukin-27 It is a cytokine within the first type IL-1, a member of the family IL-6, IL-12, that acts on innate immune cells and has an effect on T cells (Brice *et al.*, 2022). IL-27 plays a major role as a link between both adaptive and innate immunity (Dower, 2019). IL-27 is mainly produced by antigen-presenting cells such as monocytes, macrophages and dendritic cells (Andrews *et al.*, 2023). IL- 27 consists of two subunits, IL-27 p28 and EBI3 (Morishima *et al.*, 2010). IL-27 binds to the receptor complex formed by IL-27Ra (also called WSX-1) and gp130 (Durum, 2023). Upon binding to its receptor in inactive CD4+T cells, IL-27 activates JAK/STAT signaling that stimulates transcription of effector genes. It has pro-inflammatory and anti-inflammatory effects, and has a role in the acute

response to infection (Sonobe *et al.*, 2005). It has been identified that the IL- 12 family may play an important role against microbial infections (Ryan and Farrelly, 2011). A previous study showed that IL-27 has an INF-like response because it induces antiviral genes and myxovirus protein 1 (Frank, 2010).

This study was conducted on blood samples collected from patients infected with the stomach bacterium *H. pylori* and assessment of the level of interleukin IL-27 concentration using the ELISA technique.

Materials and Methods

Study Samples:

This study was conducted from September 20, 2022 to November 25, 2022. 45 blood samples were collected from patients infected with *H. pylori* in private pathological analysis laboratories in several areas of Diyala Governorate. The study included the age group 16-70 years, having 22 males and 23 females. Also, 43 apparently healthy blood samples from both gender were collected and used as a control group. The number of males was 24 and the number of females was 19 within the age group 20-65 years. 5 ml of venous blood was drawn from the study samples by medical syringes, and the blood was placed in test tubes for separating the serum and then conducting immunological tests. The level of interleukin 27 was measured using the ELISA test for 88 samples according to the kits provided by Mybiosource.

Test Principle:

This assay used a number of off-the-shelf enzymes according to the immunoassay technique as an enzyme-linked immunosorbent assay (ELISA) was used to estimate the level of IL-27 incubated and after that, biotin-tagged anti-IL-27 antibody was added to bind to HRP, leading to the formation of the immune complex. After incubation, the plate was washed and the substance was added to stop the reaction, so the solution turned from blue to yellow, and the absorbance was measured at a wavelength of 450 nm.

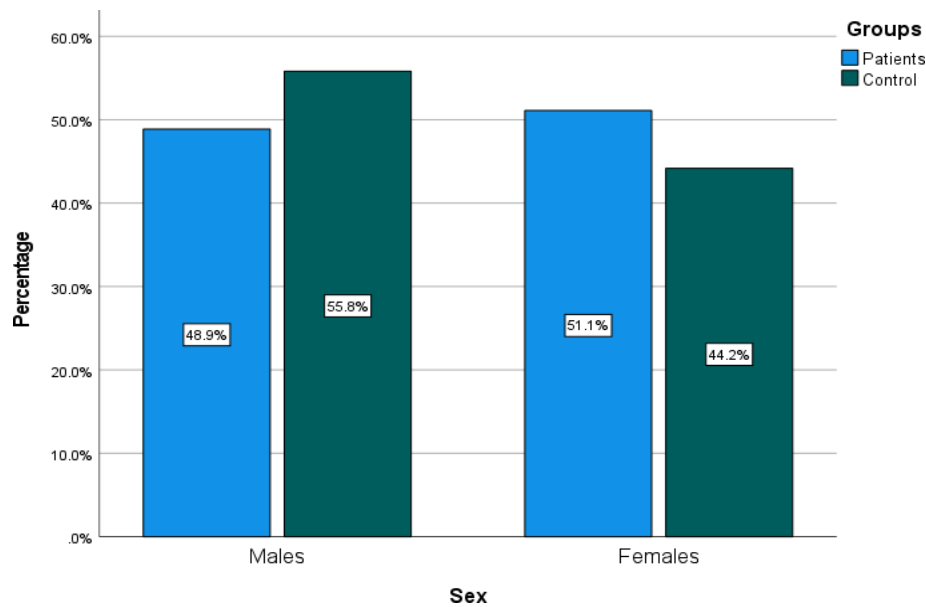


Fig.1: Percentage of males and females in the study.

Table 1: Distribution of IBD patients, and control groups according to gender and age

Data		Frequency (%)		Probability
		Patients group	Control group	
Sex	Males	22 (48.9)	24 (55.8)	0.516
	Females	23 (51.1)	19 (44.2)	
Mean ± SE (Years)				
Age		32.42 ± 1.81	38.60 ± 2.16	0.030

Results and Discussion

The current study included 45 patients with IBD in Diyala Governorate, with an average age of 32.42 ± 1.81 years, the number of males 22, with a rate of 48.9%, and the number of females 23 with a rate of 51.1%. The control group included 43 apparently healthy people with an average age 38.60 ± 2.16 years, the number of males 24 (55.8%) and 19 females (44.2%) with a statistically significant difference between the gender with a value of $P = 0.516$ as shown in Figure 1 and Table 1.

This study indicated that the infection rate is more in females than males. The results of present study are in agreement with the study of Alizadeh *et al.* (2009) who have concluded that the prevalence of *H. pylori* infection in females is more than males. However, Valliani *et al.* (2013) reported that the prevalence of infection in males is higher than in females. Abebaw *et al.* (2014) proved that the prevalence of *H. pylori* infection in females is a little higher than of males. The results of our study also agreed with the study of Zhu *et al.* (2014), who reported that females are more susceptible to infection. These differences were

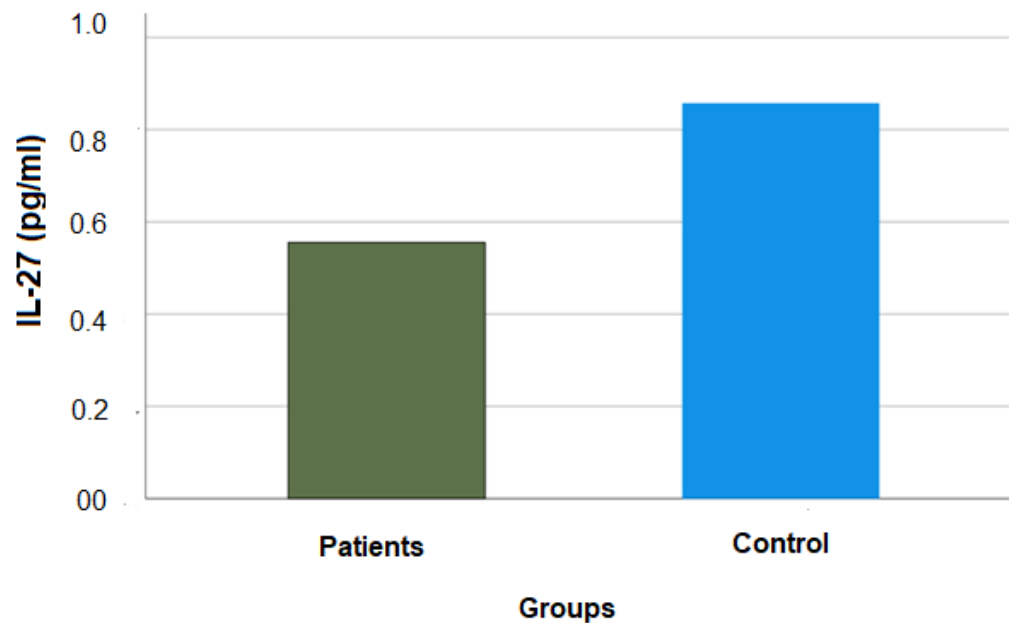


Fig. 2: IL-27 levels in IBD patients and control.

Table 2: Interleukin -27 concentration rate pg / ml in serum of both study groups

Interleukins	Mean ± SE (pg/ml)		Probability
	Patients group	Control group	
IL-27 (pg/ml)	0.56 ± 0.13	0.86 ± 0.17	0.161

explained by the difference in the style and pattern of infection.

The results of the current study showed a decrease in the level of IL-27 in patients with IBD (0.56 ± 0.13 pg/ml) compared with the control group (0.86 ± 0.17 pg/ml) and with a statistically significant difference ($P = 0.161$) (Table 2; Fig. 2).

The results of our study are in agreement with studies of Bijun Cui *et al.* (2017) who have showed that IL-27 has an anti-inflammatory function on epithelial cells to fight cancer associated with colitis. The study of Xiufang *et al.* (2021) are inconsistent with the results of the current study. The levels of IL-27 in the serum of Crohn's patients were evaluated by ELISA, and the results showed that serum IL-27 levels were significantly elevated in all Crohn's patients. These results showed that the higher the serum level of IL-27 in CD patients, the greater the disease activity.

Another study indicated that IL-27 could induce antibacterial gene through p38 and STAT3 signaling and thus inhibit intestinal bacteria and protect mice colon (Diegelmann *et al.*, 2012). The study concluded that IL-27 is a protective and anti-IBD agent.

Conclusion

The current study concluded that there is a decrease in interleukin-27 in patients with IBD compared to the control group. Therefore, interleukin-27 is considered a protective factor against Inflammatory bowel disease.

References

- Abeba W, Kibret M and Abera B. (2014) Prevalence and risk factors of *H. pylori* from dyspeptic patients in northwest Ethiopia: a hospital based cross-sectional study. *Asian Pac J Cancer Prev.* 15(11): 4459-63.
- Alizadeh AH, Ansari S, Ranjbar M, Shalmani HM, Habibi

- I, Firouzi M and Zali MR. (2009) Seroprevalence of *Helicobacter pylori* in Nahavand: a population-based study. *East Mediterr Health J*. 15(1): 129-135.
- Al-kinani Ibtisam BH. (2015) Single nucleotide polymorphisms of some cytokines in inflammatory bowel disease of Iraqi patients. PhD dissertation, Baghdad University.
- Andrews C, McLean MH, Hixon JA, Pontejo SM, Starr T, Malo C, Cam M, Ridnour L, Hickman H, Steele-Mortimer O, Wink DA, Young HA, McVicar DW, Li W and Durum SK. (2023) IL-27 induces an IFN-like signature in murine macrophages which in turn modulate colonic epithelium. *Front Immunol* 14: 1021824.
- Brice DP, Murray GI, Wilson HM, Porter RJ, Berry S, Durum SK and McLean MH. (2022) Interleukin-27 regulates the function of the gastrointestinal epithelial barrier in a human tissue-derived organoid model. *Biology (Basel)* 11(3): 427.
- Cui B, Lu S, Lai L, Xie Y, He J, Xue Y, Xiao P, Pan T, Chen L, Liu Y, Cao X, Wang Q. (2017) Protective function of interleukin 27 in colitis-associated cancer via suppression of inflammatory cytokines in intestinal epithelial cells. *Oncoimmunology* 6(2): e1268309.
- Diegelmann J, Olszak T, Goke B, Blumberg RS and Brand S. (2012) A novel role for interleukin-27 (IL-27) as mediator of intestinal epithelial barrier protection mediated via differential signal transducer and activator of transcription (STAT) protein signaling and induction of antibacterial and anti-inflammatory proteins. *J Biol Chem*. 287: 286-298.
- Dower WJ. (2019) Orally-active peptide agonists of the IL-27 receptor for treatment of inflammatory bowel disease and other autoimmune disorders. <https://grantome.com/grant/NIH/R43-DK119050-01>
- Frank AC. (2010) Interleukin-27, an anti-HIV-1 cytokine, inhibits replication of hepatitis C virus. *J Interferon Cytokine Res*. 30: 427-431.
- Hemati S, Rahmatian A, Takee G, Bastani E, Rahmatian A, Shams M and Mahdavi Z. (2021) Prevalence of *Helicobacter pylori* and its seasonality in Ilam, Iran. *Jordan J Biol Sci*. 14(1): 187-189.
- Hooi JKY, Lai WY, Ng WK, Suen MMY, Underwood FE, Tanyingoh D, Malfertheiner P, Graham DY, Wong VWS and Wu JCY. (2017) Global prevalence of *Helicobacter pylori* infection: systematic review and meta-analysis. *Gastroenterology* 153(2): 420-429.
- Hsieh MS, Hsu WH, Wang JW, Wang YK, Hu HM, Chang WK, Chen CY, Wu DC, Kuo FC and Su WW. (2020) Nutritional and dietary strategy in the clinical care of inflammatory bowel disease. *J Formos Med Assoc*. 119(12): 1742-1749.
- Kotilea K, Bontems P and Touati E. (2019) Epidemiology, Diagnosis and risk factors of *Helicobacter pylori* infection. *Adv Exp Med Biol*. 1149: 17-33.
- Morishima N, Mizoguchi I, Okumura M, Chiba Y, Xu M, Shimizu M, Matsui M, Mizuguchi J and Yoshimoto T. (2010) A pivotal role for interleukin-27 in CD8+ T cell functions and generation of cytotoxic T lymphocytes. *J Biomed Biotechnol*. 2010: 605483.
- Niu Q, Zhu J, Yu X, Feng T, Ji H, Li Y, Zhang W and Hu B. (2020) Immune response in *H. pylori*-associated gastritis and gastric cancer. *Gastroenterol Res Pract*. 2020: 9342563.
- Ryan EJ and Farrelly CO. (2011) The effect of chronic hepatitis C infection on dendritic cell function: a summary of the experimental evidence. *J Viral Hepat*. 18: 601-607.
- Sasidharan S, Lachumy SJ, Ravichandran M, Latha LY and Gegu SR. (2011) Epidemiology of *Helicobacter pylori* among multiracial community in Northern Peninsular, Malaysia: effect of age across race and gender. *Asian Pac J Trop Med*. 4(1): 72-75.
- Sonobe Y. (2005) Production of IL-27 and other IL-12 family cytokines by microglia and their subpopulations. *Brain Res*. 1040: 202-207.
- Valliani A, Khan F, Chagani B, Khuwaja AK, Majid S, Hashmi S, Nanji K and Valliani S. (2013) Factors associated with *Helicobacter pylori* infection, results from a developing country - Pakistan. *Asian Pac J Cancer Prev*. 14(1): 53-56.
- Xiufang C, Chunhua J, Di W, Ziping Y, Jingjing M, Nana T and Hongjie Z. (2021) Elevated levels of IL-27 are associated with disease activity in patients with Crohn's disease. *Mediators Inflamm*. 2021: 5527627.
- Zhu Y, Zhou X, Wu J, Su J and Zhang G. (2014) Risk factors and prevalence of *Helicobacter pylori* infection in persistent high incidence area of gastric carcinoma in Yangzhong City. *Gastroenterol Res Pract*. 2014: 481365.