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

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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


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

<table>
<thead>
<tr>
<th>Data</th>
<th>Frequency (%)</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patients group</td>
<td>Control group</td>
</tr>
<tr>
<td>Sex</td>
<td>Males</td>
<td>22 (48.9)</td>
</tr>
<tr>
<td></td>
<td>Females</td>
<td>23 (51.1)</td>
</tr>
<tr>
<td>Mean ± SE (Years)</td>
<td>Age</td>
<td>32.42 ± 1.81</td>
</tr>
</tbody>
</table>

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
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


Alizadeh AH, Ansari S, Ranjbar M, Shalmani HM, Habibi


