

Original Research Article

Immunological Assessment of Interleukin-6 in Patients with Gastric (Stomach) Ulceration of Acute and Chronic Types in Babylon Province

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Abstract: Stomach ulcers have emerged as a serious public health concern. Serum interleukin-6 (IL-6) levels in individuals with chronic and acute gastric ulcers will be examined in this study. Sixty blood samples were obtained from participants in the research. The Marjan Teaching Hospital, Al-Sadiq Hospital in Babylon Province, Iraq, treated forty patients having stomach ulcer surgery between March and November 2023; the control group consisted of twenty individuals. A high mean value for IL-6 concentration was seen in both the chronic and acute patient groups compared to the control group (44.1 ± 28.6 pg/ml) for chronic patient and (30.2 ± 15.4 pg/ml) for acute patients with significant differences ($P < 0.05$). The results conducted a noteworthy rise in the level of interleukin-6 in the age group of 71–80 years, with a mean value of 10.9 ± 9.02 pg/ml, compared to other age groups. Additionally, when considering gender, it was observed that males had a higher mean value of 73.4 ± 30.60 pg/ml, while females had a similar mean value of 73.4 ± 30.60 pg/ml. These findings were found to be statistically significant ($P < 0.05$).

Keywords: Interleukin 6, Gastritis, Peptic ulcer, *Helicobacter pylori*.

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INTRODUCTION

A stomach or gastric ulcer refers to a disruption in the tissue lining of the stomach. The primary causes of stomach ulcers are anti-inflammatory medicine or infection with the *Helicobacter pylori* bacteria, rather than stress or bad nutrition as previously believed (Qadri *et al.*, 2014, Chung and Shelat, 2017). *Helicobacter pylori* is a kind of bacteria that is Gram-negative and microaerophilic. It is responsible for causing chronic gastritis and peptic ulcer disease (PUD) in humans (Wang *et al.*, 2016). Many inflammatory cells contributors to the production of (IL-6), a pleiotropic cytokine support the development, growth, and progression of tumors (Frauenlob *et al.*, 2022). In addition to its documented importance in gastric ulcer and cancer development, the IL-6 is crucial player in tumorigenesis and oncogene-induced cell transformation (Huang *et al.*, 2022, Barchi *et al.*, 2018).

MATERIALS AND METHODS

The study had a total of 40 patients, include of 25 males and 15 females, between 40 and 80 years,

diagnosed with gastric ulcers using endoscopy. These patients were hospitalized to Marjan Teaching Hospital and Al-Sadiq Hospital in Babylon Province, Iraq, from March to November 2023.

To conduct the immunological investigation and determine the human IL-6 level by ELISA kit (Bioassay, China), five milliliters of blood were collected from each of the two groups: the stomach ulcer-infected patients and the control groups. We then transferred the blood to a gel tube and centrifuged it at 3000 rpm for five minutes. The tube was then frozen at -20°C (Lewis, Bain 2001; Theml *et al.*, 2004).

Statistical Analysis

The parameters of the immunological tests were compared between the two groups using an Anova test, which was followed by LSD and reached a significant level ($P < 0.05$). A p-value of less than 0.05 indicates statistical significance. We used SPSS v.25 to do the statistical analysis.

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RESULTS

In this investigation, IL6 concentration was shown to be higher in both the chronic and acute patient groups compared to the control group. In Table (1), there were significant differences ($p < 0.05$) between the chronic infected group and the control group, with the chronic infected group having a high mean value (44.1 ± 28.6 pg/ml) and the acute infected group reaching 30.2 ± 15.4 pg/ml.

The results demonstrated a significant elevation ($P < 0.05$) in the levels of interleukin-6 for all age categories of the afflicted individuals when compared to the control group. The age group with the highest

concentration was 61–70 years old, with a value of 10.9 ± 8.02 pg/ml, compared to the control group with a value of 0.8 ± 2.00 pg/ml. The lowest concentration was observed in the age group of 40-45 years, with a value of 1.67 ± 3.44 pg/ml, compared to the control group with a value of 0.28 ± 2.77 pg/ml (Table 2).

The current study clearly demonstrated an enhanced level of IL6-concentration with a significant increase ($P < 0.05$) in both male and female patients compared to the control group. It was discovered that males had a higher mean value (73.4 ± 30.60 pg/ml) compared to the control group, while females attained a mean value of (61.53 ± 28.94 pg/ml). The number of elements in the table is 3.

Table 1: The concentration of IL-6 in individuals with stomach ulcers varies according on the severity of the condition

Severity	Mean \pm STD.	T value	df	SED	P value *
Acute	30.2 ± 15.4	2.6713	55	19.368	0.06
Chronic	44.1 ± 28.6				
Control	12.30 ± 3.50	4.3112	70	17.223	0.04 0.01

P value = < 0.05 significantly differences among group.

Table 2: IL-6 concentration in stomach ulcer patients according to age groups

Age group	NO.	Stomach ulcer IL6-pg/ml STD \pm Mean	Control IL6-pg/ml STD \pm Mean	p-value
40-45	4	3.44 ± 1.67	2.77 ± 0.28	0.03
46-50	6	3.02 ± 2.62	1.15 ± 0.11	
51-60	8	6.14 ± 4.47	1.83 ± 0.31	
61-70	12	9.02 ± 10.9	2.00 ± 0.8	
71-80	10	10.33 ± 8.34	1.66 ± 0.23	

p value = < 0.05 significantly differences among group

Table 3: Correlation of IL-6 in stomach cancer with sex

Sex	Mean \pm STD	T	df	SED	p value
Male	73.4 ± 30.60	0.12	50	20.560	0.8
Female	61.53 ± 28.94				
Control	13.39 ± 2.43	2.5114	71	15.128	0.03 0.02

Significant differences among groups $p < 0.05$

Table 4: Relation of IL-6 in stomach cancer with severity of disease

Severity of disease	IL-6	IL-6
	Female Mean \pm SD	Male Mean \pm SD
Acute	59.36 ± 13.95	68.15 ± 20.21
Chronic	70.2 ± 26.02	80.21 ± 39.3
Control	14.37 ± 2.43	15.30 ± 2.44

DISCUSSION

Stomach ulcer illness can elevate the production of cytokines, leading to persistent inflammatory conditions in stomach inflammation. IL-6 plays a crucial role in facilitating the development of naïve CD4+ T cells, hence serving as a key mediator in connecting the innate and acquired immune responses (Korn *et al.*, 2009, Ahmed *et al.*, 2020). Nevertheless, a significant

contributing factor (accounting for 60% of gastric ulcers and 90% of duodenal ulcers) is the persistent inflammation caused by *Helicobacter pylori* bacteria that inhabit the mucous lining of the antrum. The immune system is incapable of eliminating the infection, even while antibodies are present (Milosavljevic *et al.*, 2011, Rawaa *et al.*, 2021). IL-6 is a crucial factor in both acute and chronic inflammation and is essential for the prompt

resolution of wound healing. During the progression of inflammation, the transition to a reparative environment is facilitated by IL-6 signaling (Nishikai-Yan *et al.*, 2017). Importantly, wound healing must be regulated: improper proinflammatory signaling can lead to infected wounds that take significantly longer to heal. There is mounting evidence that the pro-inflammatory cytokine interleukin-6 (IL-6) plays a pivotal role in the development of gastric cancer (Han, Ceilley 2017, Frauenlob *et al.*, 2022).

Consistent with the findings of Abaurrea *et al.*, (2021), this investigation found that patients with acute and chronic stomach ulceration infections had elevated levels of IL-6, in which the IL-6 act as leading role in the development of gastric cancer. New evidence suggests that IL-6 can raise its own levels in the stomach's microenvironment, which may lead to ulceration and carcinogenic effects (Fang *et al.*, 2022). Two recent investigations linked elevated IL-6 levels to the onset and progression of stomach ulcers and cancer. The early detection of stomach cancer is largely dependent on IL-6, which is thought to have significant clinical importance (Gabay, 2006, Yu *et al.*, 2023).

Compared to healthy controls, both men and women showed an increase in IL-6 levels; this finding may be related to the cytokines' functions in stomach ulcers. After the age of 60, stomach ulcers are more common in males than in women (Obayash *et al.*, 2021).

Most ulcers in the stomach and duodenum are caused by an infection with the *Helicobacter pylori* bacterium. Gastritis was more common in males than in women. Although anybody can get a stomach ulcer, those 60 and older are at increased risk (Levenstein *et al.*, 2015).

Levels of IL-6 also increased with age particularly in the 61–70 age range, according to the present study. While most stomach ulcers occur in males after the age of 65, women often experience them between the ages of 55 and 70. The chance of developing a stomach ulcer also increases with age and is strongly associated with advanced age (Hurst *et al.*, 2001, Lau *et al.*, 2011). Mortality and morbidity from stomach ulcer disease are disproportionately high among the elderly. There is a significant prevalence of problems, and it often manifests in an unusual way. *Helicobacter pylori* is more common in older infected people and may have a significant influence in ulcer formation (Li *et al.*, 2019, Ajayi, *et al.*, 2019).

CONCLUSION

Gastric ulcer illness is a prevalent ailment. Prompt identification and treatment not only address the patient's symptoms but also mitigate the risk of severe and perhaps fatal consequences. Stomach ulcer illness exhibits a higher prevalence in males compared to females, particularly among individuals aged 61-70

years. In this age range, susceptibility to infection is heightened, with chronic infection being the most prevalent form and often resulting in little consequences. The study demonstrated a substantial elevation in the concentration of cytokines IL-6 in individuals with stomach ulcers as compared to the control group.

Acknowledgments: The authors declare that no competing exist.

Conflict of Interest: None

REFERENCES

- Ajayi, A. F., & Olaleye, S. B. (2020). Immunohistochemical studies of age-related changes in cell proliferation and angiogenesis during the healing of acetic acid-induced gastric ulcers in rats. *The Scientific World Journal*, 2020.
- Alberto, B., Chiara, M., Alessandra, V., Ginevra, C., Antonio, N., Mario, C., ... & Gian, L. D. A. (2018). A non-invasive method for the diagnosis of upper GI diseases. *Acta Bio Medica: Atenei Parmensis*, 89(Suppl 8), 44.
- Ali, R. A., Khudhur, H. R., & Hasan, A. A. (2021). Microbiology and histological study of gallbladder among acute and chronic cholecystitis in Babylon City, Iraq. *Reviews and Research in Medical Microbiology*, 32(2), 95-101.
- Chung, K. T., & Shelat, V. G. (2017). Perforated peptic ulcer-an update. *World journal of gastrointestinal surgery*, 9(1), 1.
- Fang, Y., Chen, M., Li, G., Yang, Y., He, P., Chen, J., ... & Wu, H. (2022). Cancer-associated fibroblast-like fibroblasts in vocal fold leukoplakia suppress CD8+ T cell functions by inducing IL-6 autocrine loop and interacting with Th17 cells. *Cancer Letters*, 546, 215839.
- Frauenlob, T., Neuper, T., Mehinagic, M., Boraschi, D., & Horejs-Hoeck, J. (2022). *Helicobacter pylori* infection of primary human monocytes boosts subsequent immune responses to LPS. *Frontiers in immunology*, 13, 847958.
- Frauenlob, T., Neuper, T., Mehinagic, M., Boraschi, D., & Horejs-Hoeck, J. (2022). *Helicobacter pylori* infection of primary human monocytes boosts subsequent immune responses to LPS. *Frontiers in immunology*, 13, 847958.
- Gabay, C. (2006). Interleukin-6 and chronic inflammation. *Arthritis Res*, 8, S3.
- Han, G., & Ceilley, R. (2017). Chronic wound healing: a review of current management and treatments. *Advances in therapy*, 34, 599-610.
- Hasan, A. A., Ali, R., & Majeed, H. A. (2020). ASSESSMENT OF IMMUNOLOGICAL AND BIOCHEMICAL MARKER IN DIABETIC AND NON-DIABETIC PATIENTS WITH KIDNEY FAILURE. *Biochemical & Cellular Archives*, 20.
- Huang, B., Lang, X., & Li, X. (2022). The role of IL-6/JAK2/STAT3 signaling pathway in cancers. *Frontiers in oncology*, 12, 1023177.

- Hurst, S. M., Wilkinson, T. S., McLoughlin, R. M., Jones, S., Horiuchi, S., Yamamoto, N., ... & Jones, S. A. (2001). IL-6 and its soluble receptor orchestrate a temporal switch in the pattern of leukocyte recruitment seen during acute inflammation. *Immunity*, 14(6), 705-714.
- Korn, T., Bettelli, E., Oukka, M., & Kuchroo, V. K. (2009). IL-17 and Th17 Cells. *Annual review of immunology*, 27, 485-517.
- Levenstein, S., Rosenstock, S., Jacobsen, R. K., & Jorgensen, T. (2015). Psychological stress increases risk for peptic ulcer, regardless of *Helicobacter pylori* infection or use of nonsteroidal anti-inflammatory drugs. *Clinical Gastroenterology and Hepatology*, 13(3), 498-506.
- Lewis, S., & Bain, B. (2001). *Paractical heaaematology.cd9*; Edinburgh. Churchill Living stone.
- Li, W., Zhang, X., Wu, F., Zhou, Y., Bao, Z., Li, H., ... & Zhao, S. (2019). Gastric cancer-derived mesenchymal stromal cells trigger M2 macrophage polarization that promotes metastasis and EMT in gastric cancer. *Cell death & disease*, 10(12), 918.
- Milosavljevic, T., Kostić-Milosavljević, M., Jovanović, I., & Krstić, M. (2011). Complications of peptic ulcer disease. *Digestive diseases*, 29(5), 491-493.
- Nishikai-Yan Shen, T., Kanazawa, S., Kado, M., Okada, K., Luo, L., Hayashi, A., ... & Tanaka, R. (2017). Interleukin-6 stimulates Akt and p38 MAPK phosphorylation and fibroblast migration in non-diabetic but not diabetic mice. *PloS one*, 12(5), e0178232.
- Obayashi, Y., Kawano, S., Sakae, H., Abe, M., Kono, Y., Kanzaki, H., ... & Okada, H. (2021). Risk factors for gastric cancer after the eradication of *Helicobacter pylori* evaluated based on the background gastric mucosa: a propensity score-matched case-control study. *Internal Medicine*, 60(7), 969-976.
- Qadri, Q., Rasool, R., Afroze, D., Naqash, S., Gulzar, G. M., Yousuf, A., ... & Shah, Z. A. (2014). Study of TLR4 and IL-8 gene polymorphisms in *H. pylori*-induced inflammation in gastric cancer in an ethnic Kashmiri population. *Immunological investigations*, 43(4), 324-336.
- Theml, H., Diem, H., & Haferlach, T. (2004). *Color atlas of hematology: practical microscopic and clinical diagnosis*. Thieme.
- Wang, Y. M., Li, Z. X., Tang, F. B., Zhang, Y., Zhou, T., Zhang, L., ... & Pan, K. F. (2016). Association of genetic polymorphisms of interleukins with gastric cancer and precancerous gastric lesions in a high-risk Chinese population. *Tumor Biology*, 37, 2233-2242.
- Yu, B., Xiang, L., Peppelenbosch, M. P., & Fuhler, G. M. (2023). Overlapping cytokines in *H. pylori* infection and gastric cancer: A tandem meta-analysis. *Frontiers in Immunology*, 14, 1125658.