



## DETECTION THE ROLE OF SOME INFLAMMATORY MARKERS IN PATIENT WITH ACUTE AND CHRONIC TONSILLITIS

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### ABSTRACT

This study was designed to evaluate the hematological and some immunological parameters in patients with acute and chronic tonsillitis. swabs were obtained from the tonsils of 100 patients with acute and chronic tonsillitis to detect *streptococcus pyogenes* and *staphylococcus aureus*. and blood samples collected to detect the immune parameters in the patient's serum. The results of culture showed that 18 samples (11.92%) were positive to *strep. pyogenes* while 29 samples (19.21%) were positive to *staph. Aureus*. A complete blood count showed statistically significant changes in the presence of

tonsillitis. Serological test showed significantly increased in the complement protein C3, C4 and IgA level In acute and chronic tonsillitis. Serum level of IL-10 and TNF- $\alpha$  showed statistically difference due to its multiple functions, including cellular regulatory function and influence in many diseases, including tonsillitis.

**KEYWORDS:** Acute tonsillitis, Chronic tonsillitis, IL-10, TNF-  $\alpha$ , Complement, IgA.

### INTRODUCTION

The tonsils are a member of the upper respiratory system, secondary lymph organ located in a sensitive position at the back on both sides of the throat (Abd AL-Kareem, 2013). The tonsils were organized in the pharynx as a ring known as the Waldeyer's ring, it's the first defense against various bacterial and viral infections, and which participate in the formation of antibodies, particularly IgA (Mahajan *et al.*, 2017). and this may due to stimulation of lymphocytes by repeated stimulation antigens (AL-Barazinji, 2016). The important causes of tonsillitis are Group A beta-hemolytic streptococci (GABHS) and *Staphylococcus aureus* mainly in chronic and acute inflammation of the tonsils (Abidali, 2014; Babaiwa *et al.*, 2013).

The immune responses of the infection are regulated by a mechanical balance that stimulates the production of Th1 and Th2 cytokines. The cytokines derived from Th1 (TNF- $\alpha$ ) induce an immune response through a cell-mediated response. While the Th2 induce humoral response, involving the release of IL-4, IL-5, IL-6, IL-10, IL-15, IL-16 (Wang *et al.*, 2010). Also some clinical parameters can be used to refer the bacterial infections, including the total and differential count of white blood cells. (Ocal *et al.*, 2017). Therefore, the present study aimed to measuring the level of hematological and immunological parameters in patients with acute and chronic tonsillitis, further more to isolation and diagnosis of *streptococcus pyogenes* and *staphylococcus aureus* in patients with tonsillitis.

## MATERIALS AND METHODS

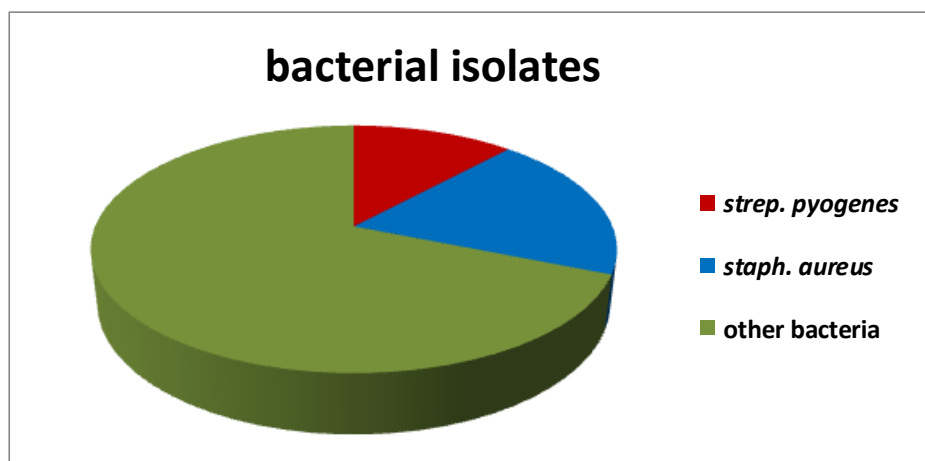
A total of 100 samples of acute and chronic tonsillitis patients were collected at the Kirkuk General Hospital in Kirkuk city. For the period from the end of November (25/11/2017) to the beginning of April(4/4/2018) and for different age groups (4-59 years) for both sexes. The samples were taken with a swab from the tonsils. were cultured on blood agar and mannitol salt agar and incubated at 37°C for 24-48 hours. the growth diagnosed using biochemical tests and the API 20 Strep and the Staph API (Tille., 2014). The serological test were also used by the Lansfield Method for diagnosis of *strep. pyogenes*. 5ml venous blood was collected from all patients and healthy subject as control group. 1.5ml put in a container containing an anticoagulant (EDTA) for of performing blood tests. The remainder was placed in a test tube and Centrifuged. The serum was immediately stored in a eppendorf tube and frozen at -20C° until assayed for immunological parameters. The complement of C3 and C4 proteins and immunoglobulin IgA was measured by single radial immunodiffusion test. The level of interleukin-10 and tumor necrosis factor- alpha was assayed by Elisa kits accordance with the instructions of the Korean company Koma biotech.

## STATISTICAL ANALYSIS

Statistical package for social science (spss) version 13 was used for statistical analysis of data were given as mean  $\pm$  SD, and differences means were assessed by analysis of variance (ANOVA), followed by least significant difference (LSD). P. Value less than 0.05 were considered as statistical significance.

## RESULTS

Fig. (1) showed 151 isolates were obtained from 100 sample. the rate of *strep. pyogenes* are 11.92% which represent 18 isolates. while *staph. aureus* represent 29 isolate with rate 19.21%.



**Fig. 1: Distribution of *Strep. pyogenes* and *Staph. aureus* among the 100 samples.**

The hematological results showed no significant differences ( $p \geq 0.05$ ) in the number of red blood cells, hemoglobin and platelets, while there were significantly increased in the number of white blood cells, number of neutrophils and lymphocyte in tonsillitis patients compared to control, and the number of monocyte increased significantly in the chronic patients compared to acute tonsillitis and control group ( $p > 0.05$ ) as show in table (1).

**Table (1): Mean level of hematological parameters in patients with chronic and acute tonsillitis compared with control group.**

Hematology test	the mean $\pm$ S.D		
	patients with chronic tonsillitis No.= 35	patients with acute tonsillitis No.= 35	control group No.= 20
Hb( g/dL)	14.554 <sup>a</sup> $\pm$ 1.335	14.171 <sup>a</sup> $\pm$ 1.119	14.475 <sup>a</sup> $\pm$ 2.114
RBCs(cell /m <sup>3</sup> . blood)	4.812 <sup>a</sup> $\pm$ 0.634	4.597 <sup>a</sup> $\pm$ 0.487	5.850 <sup>a</sup> $\pm$ 2.181
PLT (Platelet /m <sup>3</sup> . blood)	255.7 <sup>a</sup> $\pm$ 61.7	238.3 <sup>a</sup> $\pm$ 50.0	264.5 <sup>a</sup> $\pm$ 112.4
T Wb $\alpha$ (cell/m <sup>3</sup> . blood)	10.077 <sup>a</sup> $\pm$ 1.218	10.329 <sup>a</sup> $\pm$ 0.824	5.942 <sup>b</sup> $\pm$ 1.155
Neutrophile (cell /ml <sup>3</sup> . blood)	5675 <sup>a</sup> $\pm$ 500.7	5880 <sup>a</sup> $\pm$ 516.7	4133 <sup>b</sup> $\pm$ 500.3
Monocyte(cell /ml <sup>3</sup> . blood)	763.7 <sup>a</sup> $\pm$ 29.8	560 <sup>b</sup> $\pm$ 8.98	350 <sup>b</sup> $\pm$ 27.3
Lymphocyte(cell /ml <sup>3</sup> . blood)	3825 <sup>a</sup> $\pm$ 651.9	3740 <sup>a</sup> $\pm$ 371.4	2150 <sup>b</sup> $\pm$ 365.3

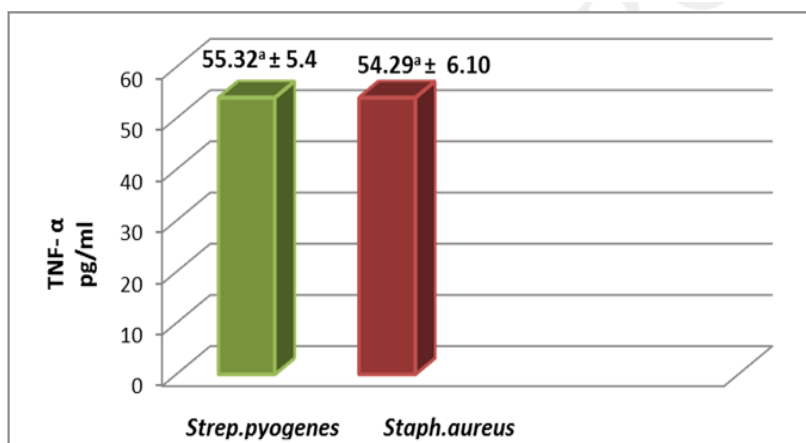
Immunological parameters revealed that the serum level of C3 was significantly increased in the group of chronic tonsillitis ( $37.42 \pm 81.93$  mg / dl) and acute tonsillitis ( $26.0 \pm 92.4$  mg / dl) Compared to control group ( $14.80 \pm 49.77$  mg / dl). While there were significant differences in the serum levels of C4 and IgA in acute, chronic tonsillitis and control groups.

The pro-inflammatory cytokine TNF- $\alpha$  was significantly increase in tonsillitis group compared with control. While the anti-inflammatory cytokine IL-10 elevated in chronic tonsillitis compared to acute and control groups. as show In table (2).

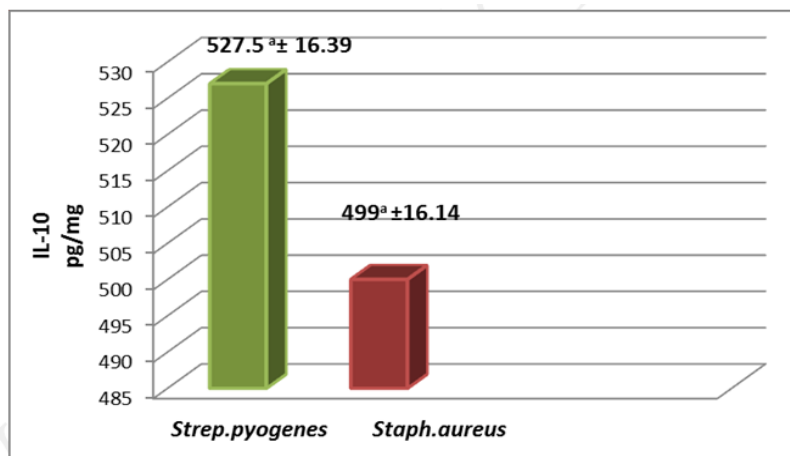
**Table (2): Mean serum levels of immunological parameters in chronic and acute tonsillitis patients compared to control group.**

parameters	the mean $\pm$ S.D		
	patients with chronic tonsillitis No.= 35	patients with acute tonsillitis No.=35	Control group No.= 20
C3(mg/dl)	81.93 <sup>a</sup> $\pm$ 37.42	92.4 <sup>a</sup> $\pm$ 36.0	49.77 <sup>b</sup> $\pm$ 14.80
C4 (mg/dl)	23.81 <sup>b</sup> $\pm$ 9.53	32.47 <sup>a</sup> $\pm$ 6.2	14.59 <sup>c</sup> $\pm$ 6.41
IgA (mg/dl)	182.6 <sup>b</sup> $\pm$ 36.8	266.1 <sup>a</sup> $\pm$ 24.3	84.29 <sup>c</sup> $\pm$ 21.47
TNF- $\alpha$ (pg/ml)	55.72 <sup>a</sup> $\pm$ 3.7	56.21 <sup>a</sup> $\pm$ 5.06	42.82 <sup>b</sup> $\pm$ 3.35
IL-10 (pg/ml)	517.5 <sup>a</sup> $\pm$ 19.81	455 <sup>b</sup> $\pm$ 30.7	437.5 <sup>b</sup> $\pm$ 14.88

When we measured the level of TNF-  $\alpha$  and IL-10 in tonsillitis patients infected with *strep. Pyogenes* and *staph. Aureus*. the results showed no significantly differences in the serum level of cytokine above(TNF-  $\alpha$  and IL-10) as shown in fig.2 and fig.3.



**Fig. 2: Mean Serum level of tumor necrosis factor in patients with bacterial species.**



**Fig. 3: Mean Serum level of IL-10 in patients with *Streptococcus pyogenes* and *staphylococcus aureus*.**

## DISCUSSION

Acute and chronic tonsillitis was clinically diagnosed and identified throughout the patient's medical history, clinical symptoms and laboratory tests for diagnosis the isolates of *streptococcus pyogenes* and *staphylococcus aureus*. The isolates of *Strep. pyogenes* were found to be 18 isolates (11.92%). This result is agreed with (Al-Badri 2014) who obtained 18 isolates, and (Al-Khalifawi 2013) stated that the isolates were 20 isolates. The spread of these bacteria is a serious risk to the lives of those affected by complications, as reported by the World Health Organization (WHO, 1991) on acute respiratory infections in children. The isolates of *Staph. aureus* had 29 isolates (19.21%) This result is agreed with (Dakhil & Hamim, 2016; Babaiwa *et al.*, 2013) reported that the isolates of *Staph. aureus* was higher than *Strep. Pyogenes* isolates which cause tonsillitis. while (Abidali *et al.*, 2014) reported that most of the tonsillitis factors were *Strep. pyogenes*, followed by *Staph. aureus*. Blood tests related to hemoglobin, total number of red blood corpuscles, and total number of blood platelets did not show any significant differences. This result is agreed with the other results of studies (Sakat *et al.*, 2018; Ocal *et al.*, 2017; Furuncuoglu *et al.*, 2016). The penetration of invading organisms such as bacteria into the body led to changes in the ratio of total and differential levels of white blood cells as a result of the immune defense against invasive organisms (Wu *et al.*, 2003). the our results indicated an increase in the total number of white blood cells in people with acute and chronic tonsillitis compared with the control group and this observed is an agreement with (Christensen *et al.* 2014). Also there was a significant increase in the number of neutrophils may be due to the fact that neutrophils are the first line of defense of the body which is the first self-defense elements against bacterial invasion and

the main purpose is to distinguish and Absorbing and killing invading organisms such as bacteria. and the infection of the tonsils lymphatic tissue with bacteria lead to migration of monocyte from the blood stream to inflamed site (Abbas *et al.*, 2018; Saraiva & O`Garra., 2010). and it may lead to increased in the number of monocyte.

The results of the present study are consistent with the study of (AL-Barazinji 2016), which indicated an increase in the levels of complement proteins in the group of patients with tonsillitis compared with control group. High serum levels of C3 and C4 are associated with acute inflammatory reactions. (Xie *et al.*, 2004). IgA is the second most abundant immunosuppressive globulin found in lymphatic tissue and has increased its concentration during inflammation as the importance of this antibody in the protection of mucous surfaces (Povoa, 2002). The results showed an increase in the serum level of tumor necrosis factor-alpha in the group of patients with chronic tonsillitis and acute tonsillitis. The reason is that TNF- $\alpha$  activates the vascular lining and increases vascular permeability, increasing immune cell entry, complement proteins, and Immunoglobulin, including IgG and IgA. It also increases fluid discharge to the lymph nodes (Todorović *et al.*, 2013.) Several studies have shown various anti-inflammatory activities by interleukin-10 (IL-10) and its role in infection as a major regulator of innate immunity. Studies have also shown that IL-10 caused by the response to microorganisms and their products plays a central role in the formation of pathogenesis (Murphy & Weaver, 2016).

## REFERENCES

1. Abbas, A. K., Lichtman, A. H., & Pillai, S. (2018). 9Ed Cellular and molecular immunology E-book. Elsevier Health Sciences.
2. Abd-AL-Kareem, F.E., (2013) Comparative study of some immunological aspects in children with tonsillitis and carriers of group A  $\beta$ -hemolytic Streptococci. Master thesis. College Of Medicine, Al–Mustansiriyah University, Iraq.
3. Abidali, ZN, (2014). Immunological and molecular study of the bacteria that cause Tonsillitis. Master thesis. College of Science for Girls Babylon University, Iraq.
4. Al Barzinji, R. M. G. Estimation of Complement Components C3, C4 and Immunoglobulins IgA, IgM and IgG Among Patients with Tonsillitis. Diyala Journal of Medicine, 2016; 10(2): 48-54.

5. Al-Badri, Maha M.S.M. (2014). Antibiotic Resistance with bacteria Isolated from children who suffering from upper Respiratory tract infections in Samarra city. Master Thesis, Girls College of Education, Tikrit University.
6. Alkalifawi, Esam J., (2013) Bacterial Causes Tonsillitis in Children, Study the Resistance to Antimicrobials and the Effect of Clove Extracts on Selected Isolated Bacteria. *Baghdad Journal of Science*, 10(4): 1135-1143.
7. Babaiwa, UF1; Onyeagwara, NC and Akerele, JO. Bacterial tonsillar microbiota and antibiogram in recurrent tonsillitis. *Bio. Med. Res.*, 2013; 24(3): 298-302.
8. Christensen, A. M. G., Thomsen, M. K., Ovesen, T., & Klug, T. E. Are procalcitonin or other infection markers useful in the detection of group A streptococcal acute tonsillitis. *Scandinavian journal of infectious diseases*, 2014; 46(5): 376-383.
9. Dakhil, B. R., & Hamim, S. S. Antibiotic susceptibility of *Streptococcus pyogenes* and *Staphylococcus aureus* isolated from Pharyngitis and Tonsillitis patients in Nasiriyah City, Iraq *World Journal of Pharmaceutical Sciences*, 2016; 2321-3086.
10. Furuncuoglu, Y., Saglam, F., & Kutluhan, A. (2016). Acute exudative tonsillitis in adults: the use of the Centor score and some laboratory tests. *Turkish journal of medical sciences*, 2016; 46(6): 1755-1759.
11. Mahajan. GD, Mayur Ingale. Study of common bacterial isolates in acute tonsillitis in India. *Indian Journal of Basic and Applied Medical Research – Otorhinolaryngology special issue*, 2017; 6(2): 59-62.
12. Murphy, K., & Weaver, C. (2016). *Janeway's immunobiology*. Garland Science.
13. Ocal, F. C., Ocal, R., & Kuscu, F. Can McIsaac scores prevent the unnecessary use of antibiotics in tonsillitis?. *B-ENT*, 2017; 13(3): 183-187.
14. Povoia, P. C-reactive protein: a valuable marker of sepsis. *Intensive Care Med.*, 2002; 28: 235-243.
15. Sakat, M. S., Kilic, K., Kars, A., Kara, M., & Gozeler, M. S. Can Red Blood Cell Distribution Width be a Potential Marker in the Decision to Perform Tonsillectomy?. *The Eurasian journal of medicine*, 2018; 50(1): 11.
16. Saraiva, M. & O'Garra, A. The regulation of IL-10 production by immune cells. *Nat Rev Immunol*, 2010; 10: 170-81.
17. Tille, P. (2014). *Bailey & Scott's Diagnostic Microbiology-E-Book*. Elsevier Health Sciences. 13<sup>th</sup> Edition.
18. Todorović, M. M., & Zvrko, E. Z. Immunoregulatory cytokines and chronic tonsillitis. *Bosnian journal of basic medical sciences*, 2013; 13(4): 230.

19. Wang, JH; Chung, YS, Cho, YW, Kim, DY, Yi, JS, Bae, JS, Shim, MJ. "Palatine tonsil size in obese, overweight, and normal-weight children with sleep-disordered breathing". *Otolaryngology--head and neck surgery: official journal of American Academy of Otolaryngology-Head and Neck Surgery*, 2010; 142(4): 516–9.
20. WHO. (1991). Acute respiratory infection, program for control of acute respiratory infection. In dem program report. Document, WHO / ART.
21. Wu, H.P.; Chang, C.F. and Lin, C.Y. Predictive inflammatory parameters in the diagnosis of acute appendicitis in children. *Acta Paediatr. Taiwan*, 2003; 44: 227-731.
22. Xie Y, Chen X, Nishi S, Narita I and Gejyo F, Relationship between tonsils and IgA nephropathy as well as indications of tonsillectomy. *Kidney International*, 2004; 65(4): 1135-1144.