

STUDY ROLE OF INTERLEUKIN-10 AND INTERLEUKIN-1 α ON PATIENTS WITH PROSTATITIS IN BABYLON PROVINCE, IRAQ

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Abstract: One of the most prevalent prostatic diseases among young and middle-aged men is prostatitis. The prostate gland infections constitute a significant problem that affects men at all ages. Due to shortcomings in the diagnostic procedures, the prevalence of this type of prostate gland inflammation is still unknown. The goal of this investigation is to quantify the level of two anti-inflammatory and pro-inflammatory cytokines such as Interleukin 10 and Interleukin 1 α , respectively in the framework of prostatic gland infections sickness. The result showed an increase of cytokine concentration (level) such as IL-10 and IL-1 α in the serum of prostatitis patients. Average serum IL-10 and IL-1 α levels in serum of patients was 332.01 ± 9.07 and 54.55 ± 7.69 , respectively compared with control was 205.98 ± 17.41 and 55.25 ± 13.11 . IL-10 and IL-1 α concentrations in patient sera were significantly higher than those in control sera, respectively, and this demonstrated their significance.

Keywords: Prostatitis, Prostate gland infections, IL-10, IL-1 α .

Introduction

Prostatitis, an inflammatory condition of the prostate, is thought to affect men of all ages. Its assessment prevalence of about 2-16% is

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unaffected by ethnicity. One of the most prevalent infections in men over 50 is inflammation of the prostate gland. An estimated 50% of men may encounter this unpleasant situation at some point in their lives. Estimates of the prevalence of symptomatic prostatitis in male between the ages of 20 and 79 range from 9 to 12%. Lower urinary tract symptoms include suprapubic, lower back, or perineal pain, with or without mild urgency, which is present in 46–54% of cases, dysuria that is present in 45% of cases, and frequency being the most prevalent symptom with an 80% incidence. Only 1% of cases of acute Prostatitis are painful, and the most common type, NIH Type IV, is asymptomatic.¹

The main symptoms of Chronic prostatitis (CP) include pain, sadness, and symptoms of the reproductive, and urinary systems.² According to US National Institutes of Health (NIH) there are 4 classes of CP. These consist of: I- Acute bacterial prostatitis, II- Chronic bacterial prostatitis, III- Chronic Pelvic pain Syndrome (CPPS), which is categorized as either inflammatory (IIIa) or noninflammatory (IIIb) based on the leukocyte count in prostatic gland secretions and seminal fluid. NIH IV Asymptomatic Inflammatory Infection.³

Both acute and chronic bacterial prostatitis are characterized by uropathogenic infections, the causal pathogens of which can be identified in the urine (after prostatic massage), expressed prostatic secretions (EPS), or semen. CP/CPPS or type III prostatitis is a complex condition with symptoms that are challenging to be diagnosed and effectively treated.^{4,5}

Among all cases of prostatitis, 5 to 10 % are caused by chronic bacterial prostatitis CBP (type II). It is characterized by recurrent infections with positive EPS culture results over a period of more than 3 months. Once

a urinary tract infection and suprapubic, lower back, or perineal symptoms are present, CBP is typically asymptomatic. These people have to deal with frequent urination and dysuria between acute infectious episodes, patients with CBP typically don't exhibit any symptoms in between acute infectious episodes.^{6,7}

Interleukin-10, a soluble protein factor secreted by keratinocytes, mast cells, monocytes/macrophages, T cells, and B cells, is crucial for controlling immune reactivity. Although interleukin-10's distinguished by immunosuppressive activity, it also has the potential to stimulate the immune system. IL-10 was formerly referred to be a cytokine synthesis inhibitory factor due to its capacity to stop T cells from producing cytokines (CSIF). IL-10 – induced T-cell activation *in vitro* has also been linked to long- term allergy due to, IL-10 has a potent immunosuppressive capacity that is crucial not only for the establishment of peripheral tolerance to allergens, but also in protecting the host from exaggerated inflammatory responses to pathogens as well as to autoimmune diseases,⁸ and the development of a negative regulatory T-cell fraction. Supplementary, IL-10 is a well-studied pleiotropic immunosuppressive and immune stimulatory cytokine. Additional studies have revealed that IL-10's immunosuppressive effects frequently occur at the level of antigen-presenting cell (APC) as compared to the T cell.⁹

The goal of this research was to correlate levels of anti-inflammatory and pro-inflammatory interleukins such as Interleukin 10 and Interleukin 1 α , respectively in prostatic gland infections sickness.

Methodology

The current study used 96 blood samples, which were divided into 50 patient specimens and 40 control specimens for the scientific work.

Additionally, six specimens were used to perform stander curve (Figure 1 and Figure 2). All investigated samples were collected from Merjan Medical City, Al Hillah General Teaching Hospital and Al-Mhawel hospital in Al-Mhawel town as well as private clinic during the period from January 2022 to March 2022. The immune system's response to prostatic inflammation has been evaluated through studies using immunological indicators like IL-10 and IL-1 α .

Serum prostatic patients' and controls' levels of Interleukin-10 and Interleukin-1 α were estimated using an ELISA kit (Bioassay Technology laboratory, China). In this study, determinate the levels IL-10 and IL-1 α in the serum of patients and compared them with those non infection people.

Determination of Human Interleukin-10 (IL-10) and IL-1 α concentration by Enzyme-Linked Immunosorbent Assay (ELISA) Kit

The plate has been pre-coated with human IL-10 and IL-1 α antibody. IL-10 and IL-1 α present in the samples were added and binds to the wells' coated antibodies. Then biotinylated human IL-10 and IL-1 α antibodies were added and bind to the IL-10 and IL-1 α in the samples. Afterwards streptavidin-HRP was added in order to recognize and later to quantify biotinylated IL-10 and IL-1 α antibody.

After incubation unbound Streptavidin-HRP is washed away during a washing step. Substrate was then added and the color intensity was proportional the amount to of human IL-10 and IL-1 α . The reaction was terminated by adjusting the pH using an acidic solution and the absorbance was measured at 450 nm. The absorbance value is proportional to the concentration of IL-10 and IL-1 α in the samples. The concentration of IL-10 and IL-1 α in the samples was calculated by comparing the absorbance of the samples to the standard curve.

Statistical Analysis

Differences between the two groups were assessed by IBM SPSS Statistics 23 based on the mean of optical density \pm standard deviation. A value of 0.05 was deemed statistically important.

Results and Discussion

The study has shown elevated of anti-inflammatory, and pro-inflammatory cytokine such as IL-10 and IL-1 α in the sera of prostatitis patients. The mean IL-10 concentration in serum of patients was 332.01 ± 9.07 while control was 205.98 ± 17.412 there significantly.

On the other hand, the mean IL-1 α concentration in serum of patients was 54.55 ± 7.68 while control was 55.25 ± 13.11 there significantly, and showed there no significant difference of IL-1 α concentration in sera of patients in comparison with control (Table 1).

Table 1. Estimated concentration of IL – 10 and IL – 1 α in prostatic patients and control serum.

Parameter	Variables (Group)	N	Mean	Std. Deviation	Std. Error Mean	P. Value
IL-10	Patients	50	332.01	64.16	9.07	0,000
	Control	40	205.98*	110.12	17.412*	
IL-1 α	Patients	50	54.55	53.79	7.68	0.961
	Control	40	55.25	82.95	13.11	

*Mean significant difference in comparison with control at the 0.05 level

One of the most prevalent urological disorders is prostatitis, which many urologists find challenging to effectively treat. According to estimates, symptoms of prostatitis appear in more than half of men at some point in their lives.¹⁰ Patients with prostatitis, which typically affects elderly men worldwide, frequently get urinary tract infections as a serious consequence.¹¹ IL-10, a cytokine with multiple roles in inflammation and immunological regulation, is crucial for host defense against a variety of pathogenic microorganisms. It inhibits the expression of MHC class II antigens, co-stimulatory molecules, and Th1 cytokines on macrophages. IL-10 has the capacity to inhibit the production of pro-inflammatory cytokines like IFN- γ , IL-2, IL-3, TNF, and GM-CSF by macrophages and Th1 T cells.¹²

The interleukin 10 concentration levels were found to be significantly higher in the sera of patients with prostatitis when compared to healthy individuals, as shown in Table 1. This finding may be consistent with another study,¹³ which discovered that the levels of IL-10 in the EPS of patients with CPII and CP IIIa were significantly higher than those of the CP IIIb group and the control group ($P \leq 001$).

IL-1 is a crucial modulator of inflammation and immunity.^{14,15} By encouraging the production of angiogenic genes and growth factors, it is known to be up-regulated in many prostatic infections and is likely to contribute to tumor invasiveness and metastasis¹⁵. Seven agonists, three receptor antagonists, and one anti-inflammatory cytokine compete for IL-1 receptor (IL-1R).¹⁶

Another study discovered that IL-1 molecules produced by cells transfected with the precursor IL-1 α are able to attract neutrophils or macrophages. These findings indicate that neutrophil recruitment by IL-1 α produced by apoptotic cells trigger sterile inflammation by causing.¹⁷

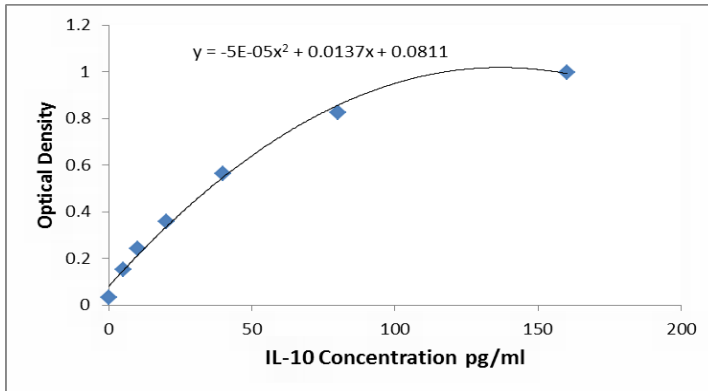


Figure 1. Standard curve of IL-10 using ELISA assay.

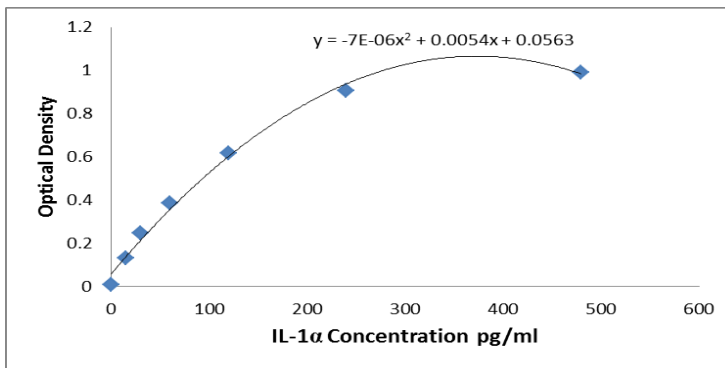


Figure 2. Standard curve of IL -1Alpha (1 α) using ELISA assay.

Conclusion

Most of the prostatic gland infection patients still cannot be diagnosed by a single test. Variations in the levels of IL-10 and IL-1 α have a substantial impact on the etiology of prostatitis and can be used to diagnose and classify the condition. Simple prostate gland inflammation biomarkers like IL-10 and IL-1 α undoubtedly provide physicians with more precise diagnosis information through CP reports, allowing patients to begin the appropriate treatment as soon as possible.

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