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Some immunological parameters in prostate cancer patient

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Abstract

Background: The prostate can be affected by enlargement, inflammation, infection, and cancer. Benign Prostatic Hyperplasia (BPH) is defined as an enlargement of the prostate caused by a non-cancerous increase in the number of prostate cells (hyperplasia). In a clinical context, the necessity for treatment is determined by whether the condition is life-threatening and whether it impacts bodily functions of other organs; last, affects patients' quality of life (QoL). Method: A total of 45 specimens (serum)(30)patients (15)control were collected from patients laboratory diagnosed with prostate cancer from Hospital and Private Clinics in Babylon province. A total number of (45) patient and control were distributed into age (58-85) years old. The blood samples (serum) saved at – 20 Cº until systemic and innate immunological study.In this study correlation among in systemic immunity parameters for patients., it was found significant positive correlation IgM with IgA (0.049) . IgG showed significant Negative correlation with IgA (- 0.104) and IgM (- 0.122) . C3 demonstrated a notable positive relationship with IgM (0.124) and significant negative correlation with IgA (- 0.309) and IgG (- 0.076) C4 demonstrated a notable positive correlation. with IgA (0.342) and significant negative correlation with IgM (- 0.265) , IgG (- 0.203) and C3 (- 0.147).

Keywords: Prostate cancer; Immunological parameters; Benign prostatic hyperplasia; Immunoglobulins; Complement system

1. Introduction

Those who expect to work daily in hospitals find a high percentage of prostate patients, especially among men who are over forty years old, as this disease is one of the common diseases in the modern era**.**The prostate is a male specific genital accessory gland found in the pelvic region, below the urinary bladder, and surrounds the urethra. The prostate has a surface layering known as the prostatic fascia. The prostate, with its secretions of seminal fluid and possibly with an immune-protective function by by acting as a physical or immune barrier against invading microbes. This role makes the prostate organ significant within the urogenital system as part of the prostate fluid that is continually ejected with the urine and can act as a protective mechanism against ascending microbes from the distal urethra [1]. The prostate include enlargement, inflammation, infection, and prostate cancer. Benign Prostatic Hyperplasia BPH is an enlargement of the prostate due to the increased number of cells that make up the prostate, a hyperplasia from a cause that is not a malignancy. In clinical practice, the need for intervention depends on whether the disease is first; life-threatening; second, affecting the functions of other organs; last, affects patients' quality of life QoL. With BPH, it is seldom a life-threatening disease; severe obstruction leading to hydronephrosis and infection in an immunocompromised patient may cause death [2]. Prostatitis is inflammation of the prostate gland, it may also be induced by other non-infective factors. Bacteria, viruses, fungi, and other pathogens are known to cause prostatitis, and bacterial infections are one of

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the major causative factors leading to this condition [3]. Prostate cancer, abbreviated as PCa, is among the most prevalent types of cancer in older men in the UK, US, North Europe, and Australia, as well as a major cause of death among older individuals worldwide .In 2019, an estimated that about 174,650 men in the United States will be diagnosed with PCa and accounts for approximately 1 in 5 new diagnoses [4]. Most deaths from PCa are as a result of the development of a metastatic disease state [5]. That patients with metastatic prostate cancer have a low survival rate of five years [6].

2. Methodology

2.1. Samples collection

A total of 45 specimens (serum)(30)patients (15)control were collected from patients laboratory diagnosed with prostate cancer from Hospital and Private Clinics in Babylon province. A total number of (45) patient and control were distributed into age (58-85) years old. The blood samples (serum) saved at – 20 Cº until systemic and innate immunological study.

2.1.1. Estimation of Immunoglobulin (IgG, IgM, IgA) and Complement (C3,C4) Levels.

ESAY RID(Radial immune diffusion) These plates contain wells for quantitative analysis in radial immune diffusion for human serum: The antibodies IgG, IgM, IgA, and complement components C3 and C4 were used in this study.

2.1.2. Principle of method

The diffusion of antigen from a wells into an agar containing properly diluted antiserum takes place because at first, a large amount of antigen is present in a relatively higher concentration in a dissolved state, and with increasing diffusion, its concentration gradually decreases until a stage when the proportion of reactants is closer to optimality, and a ring of precipitation is formed, with its size depending on the amount of dissolved antigen.

2.1.3. Testing procedure

- Withdraw ESAY RID from the envelope and open the plate and leave it standing for 5 minutes at room temperature in order that the water in the well might be evaporated.
- The well was loaded with 5 µL of the undiluted patient sample.
- The plate was sealed with the lid, once the diffusion of the sample had occurred into the gel for about 20,leaved to stand,turned upside down into the envelope and left at room temperature for 96 hours**.**

2.2. Interpretation of results

The precipitating ring should be measured to the nearest 0.1mm after the required time as stated in the procedure and depending on the protein. Fig(1) Show Interpretation of result radial immune diffusion.

Figure 1 Interpretation of results radial immune diffusion

2.3. Statistical analysis

The data was analyzed with the aid of one way ANOVA in the statistical program for social sciences (SPSS version 23), and the results were expressed in the form of(Mean ± S.D). The value of P-variables less than 0.05 showed the results to be statistically significant.

3. Results and discussion

3.1. Concentration immunological parameters

3.1.1. A- Concentration of total prostate specific antigen (TPSA)in prostate cancer patients and healthy group

The Table (1) show that the mean levels of total prostate specific antigen TPSA was (58.16 ± 32.61) ng/ml in prostate cancer patients and control group was (1.02 ± 0.17) ng/ml; the mean levels was higher in prostate cancer patients in comparison with control group and the difference was significant ($P \leq 0.05$).

Table 1 Concentration of TPSA ng/ml in prostate cancer patients and control group

Total Prostate-Specific Antigen (TPSA)			
Characteristic	PCa patients No.=30	Control subjects No.=15	*P-value*
Mean ± SD	58.16 ± 32.61	1.02 ± 0.17	0.01

3.1.2. Concentration of IgA mg/dl in patients and control

The table (2) show concentration of IgA mg/dl in patients and control not significant difference at p value (0.574). In this study, it was found that Mean ± SD in patients (393.67 ± 172.67) higher than control (187.38 ± 152.09**) .**

Table 2 Concentration of IgA mg/dl

IgA mg/dl	**N**	**Mean ± SD.**	***P. Value* of T - Test**
Patient	30	393.67 ± 172.67	(0.574)
Control	15	152.09	

3.1.3. Concentration of IgG mg/dl in patients and control

The table (3) show concentration of IgG mg/dl in patients and control significant difference at p value (0.000**). In this study, it was found that Mean ± SD (2415.25 ± 698.10) in patients higher than control.

Table 3 Concentration of IgG mg/dl

IgG mg/dl	**N**	**Mean ± SD.**	***P. Value* of T - Test**
Patient	30	2415.25 ± 698.10	(0.000**)
Control	15	1320.70 ± 1283.47	

3.1.4. Concentration of IgM mg/dl in patients and control

The Table (4) show concentration of IgM mg/dl in patients and control significant difference at p value (0.001**). In this study, it was found that Mean ± SD in patients (184.80 ± 85.18) higher than control (74.34 ± 42.88).

Table 4 Concentration of IgM mg/dl

IgM mg/dl	**N**	**Mean ± SD.**	***P. Value* of T - Test**

Patients	30	184.80 ± 85.18	(0.001**)
Control	15	74.34 ± 42.88	

3.1.5. Concentration of C3 mg/dl in patients and control

The table (5) show concentration of C3 mg/dl in patients and control significant difference at p value (0.000**). In this study, it was found that Mean ± SD in patients (234.10 ± 27.84) higher than control (121.89 ± 110.84).

Table 5 Concentration of C3 mg/dl

C3 mg/dl	**N**	**Mean ± SD.**	***P. Value* of T – Test**
Patients	30	234.10 ± 27.84	(0.000**)
Control	15	121.89 ± 110.84	

3.1.6. Concentration of C4 mg/dl in patients and control

The table (6) show concentration of C4 mg/dl in patients and control significant difference at p value (0.000**). In this study, it was found that Mean ± SD in patients (54.36 ± 11.30) higher than control (28.86 ± 24.64).

Table 6 Concentration of C4 mg/dl

C4 mg/dl	**N**	**Mean ± SD.**	***P. Value* of T – Test**
Patients	30	54.36 ± 11.30	(0.000**)
Control	15	28.86 ± 24.64	

(**) mean significant difference in comparison with control at the 0.01 level.

3.1.7. Correlation among in systemic immunity parameters of patients.

The table (7) show correlation among in systemic immunity parameters for patients. In this study, it was found significant positive correlation IgM with IgA (0.049) . IgG showed significant Negative correlation with IgA (- 0.104) and IgM (- 0.122) . C3 showed a significant positive correlation with IgM (0.124) and significant negative correlation with IgA (- 0.309) and IgG (- 0.076). C4 showed a significant positive correlation with IgA (0.342) and significant negative correlation with IgM (- 0.265) , IgG (- 0.203) and C3 (- 0.147).

Table 7 Correlation among immunity parameters of patients

Correlation	**IgA**	**IgM**	**IgG**	**C3**	**C4**
IgA	1				
IgM	0.049	1			
IgG	- 0.104	- 0.122	1		
C3	- 0.309	0.124	- 0.076	1	
C4	0.342	- 0.265	- 0.203	- 0.147	1
* Correlation is significant at the 0.05 level					

Comparable with the results obtained in previous studies, this data also shows similar results. The structure of serum IgG oligosaccharide chains in 12 PCa (prostate cancer) patients (6 with localized disease, 6 patients with metastatic disease) and 10 normal controls was investigated using FACE (fluorophore-associated carbohydrate electrophoresis). The concentration of PSA (prostatic specific antigen) in serum was measured using an enzyme immunoassay. Results: Fr 1 (monogalactosyl oligosaccharide), Fr 2 (digalactosyl oligosaccharide) were decreased significantly ($p<0.05$), while Fr 4 (agalactosyl IgG oligosaccharide) was increased during tumor progression in PCa. The ratio Fr 4/Fr 1 + 2 in metastatic PCa patients was higher than in controls ($p<0.05$), which was positively correlated ($r=0.84$, $p<0$. p\0.05\

among serum levels of Prostate-Specific Antigen (PSA) and the Fr4/Fr1+2 ratio in all patients with PCa [7]. Elevated levels of PSA- IgM were found in 40% (20/50) of PC patients and in 12% (6/51) of the BPH ones, while the corresponding percentage for PSA positives was 22% (11/50) and 29% (15/51). The co-determination of the two indicators increasedthe sensitivity in the detection of cancer markedly, from 22% to 60% in 30/50 patients. There was a highly significant difference in the level of PSA-IgM in 13 out of 30 patients with PC, PSA- .-IgM in 13 out of 30 patients with PC, with a PSA value between 4-10 ng/mL, whereas in 4 out of 34 patients with BPH, PSA- .-IgM was observed [8]. However, another study indicate that a significant difference in Ca (cancer antigen) PSA levels between healthy control and patients with prostate cancer (stages I, II, III) prior to operation (P> 0.05), whereas no significant difference among healthy and patients was noticed, whereas the difference between prostate cancer patients prior to and following operation showed a significant difference (t=7.042, P> 0.05) with positive correlation. However , On performing the statistical analysis, it has been found that there exists a significant difference in the level of interleukins (IL-1 , IL-2, IL-3, IL-5) for healthy individuals and those with prostrate cancer pre-operative, but there exists no significant difference among them post-operative for all interleukins. Among them, only IL-5 exists significantly (P<0.05) but IgM does not have any relation (r=0.149,P=0.432) [9]. This observation can easily be matched with the result of the previous study carried out that have similarities. The mean value of C3 for BPH, PCa, and normal controls was found to be 24.0 ± 9.94, 28.04 ± 11.86, and 5.69 ± 2.02 respectively. groups respectively; the mean levels of PSA-ER expression showed a higher increase in PCa patients comparatively to other groups and the was highly significant (P < 0.001) [10]. In this research, it was observed that the concentration of serum C3 was higher in patients with BPH patients and further elevated in patients with PCa patients compared to healthy people, The C3 part of the complement system has traditionally been identified as an integral part of the innate immune system, with complement components contributing to tumor development during inflammation [11]. which showed that patients with BPH patients have a higher concentration of C3 significantly than the control group, with the cause for this elevation being due to infection within the body caused by the presence of microorganisms which trigger the immune system within the body. The infection within the prostrate as well as the higher concentration of C3 within the prostrate fluid form the risk factor for inflammation within the prostrate of BPH patients. Moreover, the alternative pathway is also triggered through the deposition of complement fragments on the bacterium, as well as antigen-antibody complexes triggering the classical pathway. Research suggests an association between the activation of the complement system and the prostate tumor development, hence the augmentation in the serum concentration level of C3 in the serum of patients with PCa, especially in the older population, as well as C3 in patients suffering from BPH [12]. In the study, the level of C4 was higher in BPH patients, as well as in patients with PCa compared to the control group. In agreement with studies previously conducted by[13]. Stated that there is an increased level of C4 present in serum significantly higher than control subjects for BPH patients by a study[14]. Stated that increased values for C4 at some point post-permanent prostate brachytherapy for PCa patients. The dual role of the complement system regarding tumor promotion and inhibition within prostate cancer with recognition of the balance between prostate tissue and prostate fluid as a pro-inflammatory condition. The older tissues of the prostate have an established chronic low-grade inflammation condition known to result in progression and development to that of a tumor within the prostate [11].

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

No conflict of interest to be disclosed

Statement of ethical approval

This study was approved by the Ethics Committee of the College of Science, University of Babylon, Iraq. All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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