Changes in Immune Markers for Prostate Cancer Patients Pre and Post-operation

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Abstract

This study includes 15 male healthy and 30 male patients diagnosed with prostate cancer inciude (18 cases in stages I & II and 12 cases in III – stage). All the patients were suffered from urinary tract infection (UTI) . The mean age is (57.33 ± 5.02) years range (45-63) years, as cases and controls Patients with prostate cancer were treated admits an Educational Baghdad Hospital, and Central Public Health Laboratory and Radiation and Nuclear Medicine Hospital in Baghdad, during period   1/6/2008 to 1/12/2010 are included in this study. The markers Prostate-specific antigen (CA PSA), Interleukins (IL -1β , IL-2, IL-3, IL-5) and Immunoglobulins (IgG, IgM, IgE) are estimated by using ELISA method. The Clean-Catch midstream urine of the patients were collected, and cultured on blood agar and MacConky agar to isolation of the pathogenic bacteria causes and associated with prostate cancer. The isolated bacteria were identified according to morphological and using biochemical tests.

The aim of this study is to fined out changes in some immune markers in prostate cancer patients and if any correlation exists between the tumor marker in patients serum pre and post-operation, and the bacterial pathogens of the UTI and its correlation with prostate cancer risk.

The results show , a significant difference in CAPSA levels between healthy control and prostate cancer patients (stages I , II , III) pre-operation (P< 0.05), while no appear significant difference between healthy and patients post-operation , The comparison between prostate cancer pre and post-operation was showed a significant difference (t=7.042,P < 0.05) with   positive correlation. However , statistical analysis shows a significant difference in interleukins (IL–1β , IL–2 , IL -3 , IL-5) between healthy and prostate cancer patients pre-operation, whereas no significant difference between them in post-operation , only IL-5 , also is increased significantly (P<0.05) and positive correlations in interleukins levels at prostate cancer patients pre and post-operation. The results show a significant difference in immunoglobulins (IgG, IgE, IgM) between healthy control compared with prostate cancer patients pre-operation, but no significant difference post-operation. By comparing between prostate cancer pre and post-operation a significant correlation(P<0.05) but only IgM has no correlation(r=0.149,P=0. 432) were appeared.

In this study 30(100%) patients are shown to be urine culture positive. Were *inciude E. coli* with frequency rate of 43.33%, *Pseudomonas aerginosa* (16.66 %), *Klebsiella spp.* (16.66%), *Enterobacter spp.* (10 %), , *Acinetobacter spp.* (3.33%), *Serratia spp.* (3.33%), and Staphylococci spp. (6.66%).

Keywords: Prostate Cancer, PSA, Immune Markers, Tumar Markers

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التغييرات الحاصلة في بعض المعلمات المناعية لمرضى سرطان البروستات قبل وبعد الجراحة

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الخلاصة

تضمنت هذه الدراسة 15 رجل من الأصحاء و 30 رجل من المرضى شخصت اصابتهم بمرض سرطان البروستات تضمنت (18 حالة ضمن المرحلة الأولى والثانية و 12 حالة ضمن المرحلة الثالثة) , جميع المرضى كانوا يعانون من التهاب المسالك البولية . كان معدل الأعمار للمرضى والأصحاء هو 57.33± (5.02) سنة تتراوح أعمارهم ما بين (45–63) سنة . المرضى الذين شملتهم الدراسة يتلقون العلاج في مستشفى بغداد التعليمي ومختبر الصحة العام المركزي ومستشفى الطب والإشعاع النووي في بغداد للفترة من (2008/6/1) ولغاية (2010/12/1). تم استخدام طريقة (ELISA) لاستكشاف المعلمات (IL-2, , IL-1 β CA PSA, IL-1)، كما تم جمع عينات ادرار من المرضى من الجزء الاوسط للبول ، زرعت عينات الادرار على اوساط blood agar and MacConky agar لعزل البكتيريا الممرضة المسببة لالتهاب المجرى البولي والمرافقة لسرطان البروستات . شخصت البكتيريا المعزولة اعتمادا على الصفات المورفولوجية والكيموحيوية .

تهدف هذه الدراسة الى ايجاد التغييرات في بعض المعلمات المناعية في مرض سرطان البروستات وفيما اذا كانت هناك علاقة بين معلمات الاورام في مصل المرضى قبل وبعد العملية الجراحية . فضلا عن علاقة البكتيريا الممرضة المسببة لاصابات المجرى البولي وعلاقتها بمخاطر سرطان البروستات.

بينت النتائج وجود فروق معنوية في مستوى سرطان (PSA) بين الاصحاء والمرضى في المراحل (I,II,III) قبل العملية الجراحية (0.05 > P) بينما لم تظهر فروق معنوية لهم بعد العملية الجراحية. وعند المقارنة بين المرضى قبل وبعد الجراحة في مستوى PSA ظهرت فروق معنوية وعلاقة موجبة (0.05 <P ,t=7.042). من ناحية اخرى بينت النتائج الاحصائية وجود فروق معنوية في مستويات الانترلوكينات (β (IL-5) , IL-2, IL-3, IL-1) بين الاصحاء والمرضى قبل الجراحة ولم تظهر فروق معنوية بينهم بعد الجراحة فقط في مستوى (IL-5) فقد ازداد مستواه في المرحلة III زيادة ملحوظة كذلك ازدادت المعنوية (0.05< P) وعلاقة موجبة بمستوى الانترلوكينات عند المرضى قبل وبعد الجراحة.

بينت النتائج وجود فروق معنوية في مستوى الاميونوكلبيولينات (IgG, IgE, IgM) بين الاصحاء والمرضى قبل الجراحة ولم تظهر فروق معنوية بعد الجراحة . وبالمقارنة بين المرضى قبل وبعد الجراحة وجد هنالك علاقة معنوية (0.05< P) و لم تظهر علاقة معنوية في مستوى (IgM) (r=0.149, P=0.432). كانت النسب المئوية الناتجة من هذه الدراسة من زرع الادرار موجبة 100% ل 30 مريض حيث كانت اغلب العينات البكتيرية 43.33% *Escherichia coli* ، *Pseudomonas aerginosa* 16.66%، *Klebsiella ssp.* 16.66% ، *Enterobacter spp.* 10%، *Acinetobacter* 3.33% *Serratia spp.* 3.33%, and *Staphylococci spp.* 6.66% .

Introduction

Prostate cancer is the most commonly diagnosed cancer and the second commonest cause of cancer related death in men in the Western world [1]. The incidence of prostate cancer increases with age and over 70% of patients with prostate cancer are over the age of 65 years [2]. With an aging society, it is therefore inevitable that prostate cancer will become an increasing health burden in years to come [3]. Treatment options for men diagnosed with prostate cancer depend on a number of factors, including patient performance status, disease tatus (tumour grade and stage) and social factors, Prostate cancer diagnosed at an early stage are potentially curable and various options are available for these patients [4]. Surgery is a common treatment for early stages of prostate cancer. Surgery to remove the entire prostate gland and surrounding tissue is called radical prostatectomy. Radical prostatectomy is performed when there is no evidence of metastases [5]. Therefore, early diagnosis of the disease can increase the cure rate for prostate cancer [6]. Although serum Prostate-specific antigen (PSA)

measurement is regarded as the best conventional serum tumor marker available, there is a protein found in the prostate cells [7]. so Cytokines , are concerned with the regulation of the development and behavior of the immune effectors cells, cytokines serve as chemical messengers within the immune system [8].

(Hsing, 2000) Studied patients within 10 years after radical prostatectomy for prostate cancer, 35% of men develop detectable levels of PSA [9].

Two studies by (McNeel, 2001), (Thun, 2002) of prostate specific antigen (PSA) recurrence after radical prostatectomy demonstrate an opportunity to offer insurance in selected cases for this common situation [10,11].

In study (Freedland, 2003) detect are the patients postoperative prostate-pecific antigen (PSA) does not reach Undetectable levels and biochemical relapse occurs [12]

(John, 2003) (Klyushnenkova,2004) involving important clinical decisions are increasingly likely to be made on the basis of tumor marker results , whether for screening such as raised PSA levels in symptomatic men leading to prostate biopsy [13, 14] .

(Andriole, 2004) suggested serum immunoglobulin analysis depicted that only IgG level was decreased significantly in the lung cancer patients, while IgA and IgM concentrations remained unchanged post-operative [15] .

(Amin, 2004) found that IgG and IgA concentrations increased in breast cancer patients [16].

(Wirth, 2007) Used number of tumor marker PSA, CA 125, CA 3-15 and laboratory tests for follow up and evaluation of prostate cancer patients[17].(Carrière,2007) found that there was no marker available sensitive enough for early diagnosis and screening, but marker can be used to evaluate response to therapy and for early detection of a relapse[18].

(Hamdy, 2008) reported that serum IgG levels were lower than the normal in patients with prostate cancer after surgery[19], while(Wigle,2008) stated that the average concentration of IgA and IgM fall in the range of normal values after operations[20].

In another study (Andriole, 2009) was opserred no relationship between IL-2, IL-4 and IL-5 in patients with benign prostate conditions and prostate cancer patients [21].

Some investigators reported (Edward, 2004) (Artus, 2009) a positive correlation between IL-1$^{\beta}$, IL-3 and IL-6 in patients with malignant prostate conditions and prostate cancer patients pre-operative [7-22].

In the present study the comparison results for prostate cancer patients pre and post-operative by employed the immune markers CA PSA, IL-1β , IL-2, IL-3, IL-5, IgG, IgM and IgE is presented.

Prostatitis refers to a disparate group of disorders that manifests with a combination of predominantly irritative or obstructive urinary symptoms and perineal pain. Some cases result from bacterial infection of the prostate gland and others [23] .

In men, the prostate gland produces secretions that slow bacterial growth. Men are less likely than women to have a first UTI. But once a man has a UTI, he is likely to have another because bacteria can hide deep inside prostate tissue.

As males age, they often have enlargement of the prostate gland. This causes an obstruction to the flow of urine. When the bladder does not completely empty, bacteria are not fully flushed out and can multiply and cause an infection. [24]

This study aimed to:

1. Determine the changes that may occur in immune system of prostate cancer patients for pre and postoperative.

2. Study the effect of CA PSA and some immune markers with early detection of prostate cancer.

3. Evaluating of recovery percentage from prostate cancer by surgical therapy.

4. The correlation between prostate cancer and pathogen bacteria which causing urinary tract infection

Material and methods

The study consisted of 15 male healthy(control) and 30 diagnosed in prostate cancer patients (18 patients in I and II stages, and 12 patients in III- stage).The patients were recruited from educational Baghdad hospital and radiation and unclear medicine hospital in Baghdad. The work is conducted in central public health laboratory through the period extending from the first of Jun, 2008 till the first of December, 2010.

The age of patients were (45-63) years , (57.33± 5.02). Serum samples are collected from each patients through 3 days before their scheduled surgery and at approximated 4 month following surgery (post-operation) , and urine samples are collected from each patients.

Methods

The tumor marker (CAPSA) is estimated by sandwich ELISA method, the Immunoglobulin by Biomaghreb Company, and Interleukins by Immunotech Manufacturer .

1-   CAPSA :-

The PSA was tested by ELISA for the quantitative determination of the concentration of prostate – specific antigen (PSA). A cancer antigen, in human serum [25].

2-   Interleukin-1β (Interleukin-1 beta)

The IL-1β was assay by ELISA applies a technique called quantitative sandwich immunoa. The microtiter plate in this kit has been pre-coated with a monoclonal antibody specific to IL-1β [26] .

3-   Interleukin -2 (IL-2)

The IL -2 test was based on the same of that for interleukin-1b assy method [27].

4-   Interleukin -3 and Interleukin -5

The immunotech IL-3 solid phase enzyme immunoassay is intended for quantitative measurement of human IL-3 and IL-5 in serum . this ELISA is two immunological step sandwich type assay [28].

5-   Immunoglobulins G and M (IgG and IgM)

Quantitative estimation of serum immunoglobulin's (IgG and IgM) was done by single radial immune diffusion method in which equal volumes of reference sera and test samples are added to wells in an agarose gel and the substance being assayed from a precipitation ring with the anti-sera. Ring diameters are measured and compared to a reference table [29, 30].

6-   Immunoglobulin -E (IgE)

The test untilized the " Sandwich " immunodetect principle. Dymeconjugatedd polyclonal antibody against human IgE and immobilized mouse monoclonal anti – human IgE antibody bind to IgE in the sample specimen to produce a distinctive pattern [31].

7- Specimen urine of the all patients were collected in a sterile tube and immediately transported to the laboratory to centrifuged , and the suspenion is removed ,and using sediment to direct microscopic examination to determine of bacterial cells [32].

The isolation of the bacteria:

The urine specimens were cultured for isolation of the bacteria of UTI by using Standard loop method is inoculated on blood agar and MacConky agar media by streking method , and at (37° C) are incubated for 24 hours . The result is considered positive when the arrival of the number of bacteria cells to 10^5 cells / ml or more (100 colony Or more in one plat).

All the bacteria isolated from urine were identified according to morphological and biochemical tests [33].

Coagulase test was examined to determine the species of Staphylococcus isolates [33] .

Statistical analysis

All markers values were estimated in healthy and prostate cancer cases to statistically analyze by using mean with standard deviation, and compared with independent two-samples t-test [34] .

The markers values in the patients pre-operation are compared with post-operation to assess correlation. Statistical significance is defined as $p<0.05$.

Results and discussions

The results was showed significant elevation of ($p<0.05$) with CA PSA level in healthy control (2.286 ± 0.80) compared with CA PSA level in prostate cancer patients preparative, in stages I and II (16.20 ± 2.73), but in stage III was (25.66 ± 5.64), whereas no significant difference with CA PSA level between healthy and prostate cancer patients post-operation was (2.44 ± 0.82,P=0.626) in stages I and II , and was (2.80 ± 1.2 , p=0.172) in stages III Table (1)and Figures (1 and 1a) .This agree with that which referred Edward J et al., [7].

The statistical analysis indicates when serum CAPSA values are compared between healthy control and prostate cancer patients (stages I , II and III) pre and post-operation significant difference ($p<0.05$) is found.

Van den Bergh et al., also indicate that PSA measurements can enhance early prostate censer detection [35].

Serum CAPSA values are compared for patients (stages I, II and III) pre and post-operation, a significant difference (t=7.042 , P< 0.05) was appeared with a positive correlation (r=0.627 p < 0.05), table-1a.

D Amico et al., was suggested that serum PSA is one of the most useful tumor markers in oncology. It may serves as an accurate marker for assessing response to treatment in persons with prostatic cancer . Therefore measurement of serum PSA concentrations can be an important tool in monitoring persons with prostate cancer and in determining the potential and actual effectiveness of surgery or other therapies. The accuracy and the clinical value of the PSA test could be strongly increased by combining with a test like interleukins or Thymidine Kinase (TK-immuno) which gives additional information about the aggressiveness of the tumor [36].

Table 1- Means of CA-PSA level for prostate cancer patients pre and post-operation.

	Level of prostate cancer	No.	Mean $\pm$ SD	P. value
	Control	15	2.286 ± 0.8	
Pre operation	stage I,II	15	16.2 ± 2.73	< 0.05
	stage III	15	25.66 ± 5.64	< 0.05
Post operation	stage I,II	15	2.44 ± 0.82	0.626
	stage III	15	2.8 ± 1.2	0.172

Table 1a- Statistical analysis of immune tumors for prostate cancer patients pre and post-operation.

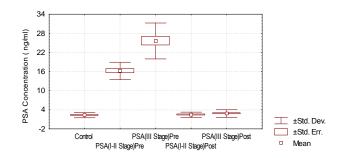|	T- test		Correlation	
Immune marker	t	p. value	r.	p. value
PSA	7.042	< 0.05	0.627	< 0.05
IL-1B	8.262	< 0.05	0.666	< 0.05
IL-2	11.676	< 0.05	0.585	0.001
IL-3	8.272	< 0.05	0.373	0.042
IL-5	13.77	< 0.05	0.761	< 0.05
IgM	8.44	< 0.05	0.149	0.432
IgG	8.71	< 0.05	0.478	0.008
IgE	13.856	< 0.05	0.617	< 0.05

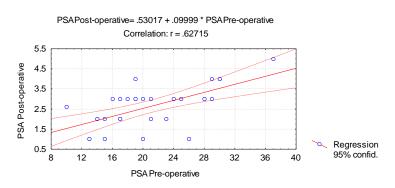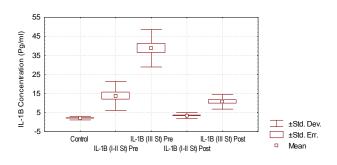**Figure 1-** PSA levels in healthy and prostate cancer patients (stage I,II,III).

Figure 1a- PSA levels in prostate cancer patients pre and post-operation.

Table -2, Figures-(2 and 2a) show serum Interleukin -1 β concentration in healthy control was (1,98 ± 0.9) mg /dl compared with prostate cancer patients pre-operation in stages I , II was (13.69 ± 7.58 P<0,05) while in stage III was (38.73 ± 9.85 P< 0.05) , but the prostate cancer patients post-operation in stages I,II was (3.34 ± 1.578 , P=0.0069) whereas in stage III was (10.6 ± 3.83 , P<0.05). So a significant difference between control and prostate cancer patients (stages I , II) pre-operation was observed , but there is no significant difference post-operation. By comparing between prostate cancer patients pre and post-operation an increased significantly (t=8.262 , P< 0.05) is found , and significant correlation (r = 0.666,P<0.05) Table (1a) . This results were agreement with Al-Humaidi observed [37] .

Table 2- Means of IL-1 β level for prostate cancer patients pre and post-operation.

	Level of prostate cancer	No.	Mean ± SD	P. value
	Control	15	1.98 ± 0.9	
Pre operation	stage I,II	15	13.69 ± 7.58	< 0.05
	stage III	15	38.73 ± 9.85	< 0.05
Post operation	stage I,II	15	3.34 ± 1.578	0.0069
	stage III	15	10.6 ± 3.83	< 0.05

Figure 2- IL-1 β levels in healthy and prostate cancer patients (stage I,II,III).
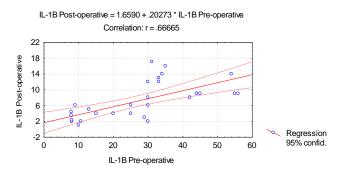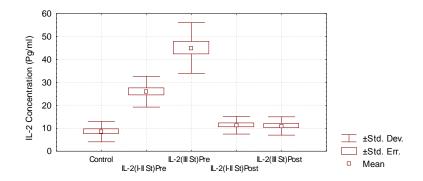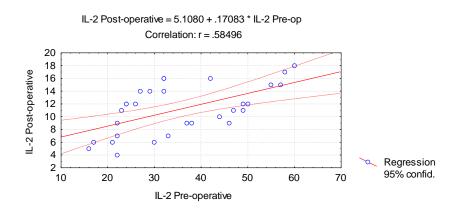

Figure 2a- IL-1 β levels in prostate cancer patients pre and post-operation.

Table-3 and Figures-(3 and 3a) show the distribution of the ELISA reading of IL-2 for healthy control and patients with prostate cancer at I,II and III stages of disease , pre and post-operation. The mean reading for healthy control was (8.5 ± 4.45). By comparing the control patients in stage I,II with patients in three stages pre-operation was (25.93 ± 6.7,P<0.05) , in stage III is (45.0 ± 11.058, P<0.05) while reading for patients post-operation, in stages I,II was (11.33 ± 3.86 , P=0.0865), and in stage III was (11.0 ± 3.98 , P=0.068) .

Results analysis were indicated that the concentrations of serum IL-2 level increase significantly (P <0.05) in prostate cancer .

Patients pre-operation compared with control, while decreased significantly (P< 0.05) in prostate cancer patients post-operation compared with control ,also by comparing between prostate cancer

patients, pre and post-operation a significant difference (t =11.676,P<0.05) was observed, and positive correlation (r=0.585, P=0.001) was detected. Table-1a.

Naturally, in response to tumors, T-lymphocyte are activated by IL-2 and are recruited to mark tumors with antibodies and thus allow macrophages and natural killer (NK) cells to kill them [38].

Table 3- Means of IL-2 level for prostate cancer patients pre and post-operation.

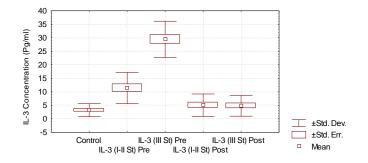|	Level of prostate cancer	No.	Mean $\pm$ SD	P. value
	Control	15	8.5 $\pm$ 4.45	
Pre operation	stage I,II	15	25.93 $\pm$ 6.7	< 0.05
	stage III	15	45.0 $\pm$ 11.058	< 0.05
Post operation	stage I,II	15	11.33 $\pm$ 3.86	0.0865
	stage III	15	11.0 $\pm$ 3.98	0.068

Figure 3- IL-2 levels in healthy and prostate cancer patients (stage I,II,III).

Figure 3a- IL-2 levels in prostate cancer patients pre and post-operation.

   Table-4 and Figures-(4 and 4a) show the distribution of the ELISA reading of IL-3 for healthy control was (3.21 ± 2.4) compared with prostate cancer patients pre-operation in stages I , II was (11.4 ± 5.79 , P=0.00062) and in stage III was (29.42 ± 6.719 , P<0.05), while the prostate cancer patients post-operation in stages I , II is (5.06 ± 4.13 , P=0.21) , and in stage III was (4.8 ± 3.82, P= 0.259). From the results observed a significant difference between control and prostate cancer patients (stages I , II and III) pre-operation was found, while there is no significant difference post-operation also observed in compared between prostate cancer patients pre and post-operation is found significant difference (t= 8.272, P<0.05) and positive correlation (r=0.373, P=0.040) shown in Table (1a) . Van der et al. suggest serum levels of the interleukin -3 ; interleukin -5 , and granulocyte − macrophage were undetectable in their patients when first measured after two weeks of surgery [39]

Table 4- Means of IL-3 level for prostate cancer patients pre and post-operation.

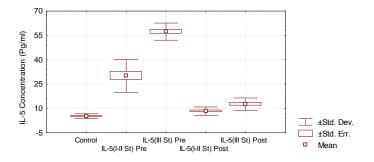|	Level of prostate cancer	No.	Mean $\pm$ SD	P. value
	Control	15	3.21 ± 2.4	
Pre operation	stage I,II	15	11.4 ± 5.79	0.00062
	stage III	15	29.42 ± 6.719	< 0.05
Post operation	stage I,II	15	5.06 ± 4.13	0.21
	stage III	15	4.8 ± 3.82	0.259

Figure 4- IL-3 levels in healthy and prostate cancer patients (stage I,II,III).

Figure 4a- IL-3 levels in prostate cancer patients pre and post-operation.

Table(5) and Figures (5 and 5a) show serum IL-5 concentrate in healthy control was (5.2 ± 1.47) mg /dl by comparing with prostate cancer patients pre-operation in stages I , II was (30.13 ± 10.19 , P<0.05) and in stage III was (57.3 ± 5.273, P<0.05), while the prostate cancer patients post-operation in stages I , II is (8.33 ± 2.58, P=0.001) and in stage III was (12.6 ± 3.79 , P=0.00001).

These results show significant difference between control and prostate cancer patients (stages I , II and III) pre and post-operation, while by comparing between prostate cancer patients pre and post-operation an increased significantly (t=13.77,P<0.05) and positive correlation (r=0.761,P<0.05) were detected in Table(1a).

A positive correlation between prostate cancer patients pre and post-operation in Iterleukins IL-3 , IL-4 , and IL-5 serum levels. After four weeks of treatment by surgery we found elevated serum levels of IL-2 and IL-5 [40].

Table 5- Means of IL-5 level for prostate cancer patients pre and post-operation.

	Level of prostate cancer	No.	Mean $\pm$ SD	P. value
	Control	15	5.2 ± 1.47	
Pre operation	stage I,II	15	30.13 ± 10.19	< 0.05
	stage III	15	57.3 ± 5.273	< 0.05
Post operation	stage I,II	15	8.33 ± 2.58	0.00119
	stage III	15	12.6 ± 3.79	0.000014

Figure 5- IL-5 levels in healthy and prostate cancer patients (stage I,II,III).
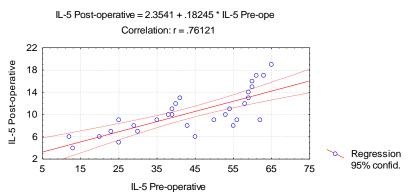

Figure 5a- IL-5 levels in prostate cancer patients pre and post-operation.

Serum concentrations of IgG , IgM , IgE for prostate cancer patients (stages I, II) pre-operation are found to be (1341.1 ± 239.5 ,
P<0.0003) mg / dl , (232.13 ± 50.48 , P<0.05) , (384.46 ± 48.57 , P<0.05) mg/dl , (390.8 ± 58.33 , P<0.05) mg/dl , respectively while in control (998.3 ± 99.35) mg/dl (145.6 ± 43.059) mg/dl, (119.3 ± 27.58) mg/dl, respectively. Tables (6,7 and 8) and Figures (6,6a,7,7a,8 and 8a).
Serum analysis indicates that serum concentration of IgG, IgM and IgE levels have significant difference (P < 0.05) in prostate cancer patients pre-operation at early and late stages comparing with healthy control.
Schroder et al., also suggested defective immune activity in prostate cancer patients [41]. When comparing serum immunoglobulins
values for prostate cancer patients (I, II and III stages) pre and post-operation patients it was found significant difference with IgG (t = 8.71, P < 0.05), and IgE (t = 13.856, P < 0.05), also significant correlation was found between pre and post-operation patients in serum IgG levels (r = 0.478, P < 0.008), and IgE level (r = 0.617, P < 0.05), while there was no significant correlation was found only IgM level (r = 0.149, P < 0.432) . Table (1a)
In prostate cancer , the concentrations of immune complex IgG correlate significantly [42].
Increase in the levels of immunoglobulins could be explained by the fact of increasing antigenic stimulation in patients with cancer with humoral defensive reaction against increasing tumor load [43].

Table 6- Means of IgM level for prostate cancer patients pre and post-operation.

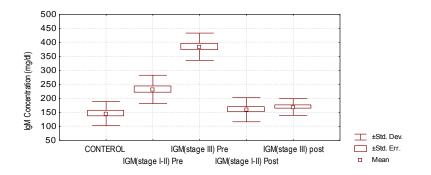|	Level of prostate cancer	No.	Mean ± SD	P. value
	Control	15	145.6 ± 43.059	
Pre operation	stage I,II	15	232.13 ± 50.48	< 0.05
	stage III	15	384.46 ± 48.57	< 0.05
Post operation	stage I,II	15	159.6 ± 43.11	0.259
	stage III	15	169.06 ± 29.75	0.069

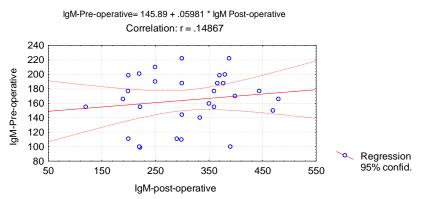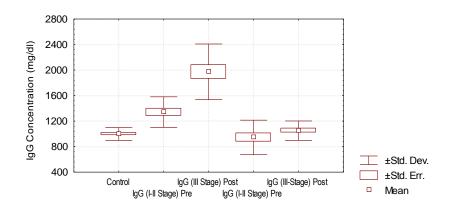**Figure 6-** IgM levels in healthy and prostate cancer patients (stage I,II,III).

Figure 6a- IgM levels in prostate cancer patients pre and post-operation.

Table 7- Means of IgG level for prostate cancer patients pre and post-operation

	Level of prostate cancer	No.	Mean $\pm$ SD	P. value
	Control	15	998.3 $\pm$ 99.35	
Pre operation	stage I,II	15	1341.1 $\pm$ 239.5	0.00003
	stage III	15	1972.13 $\pm$ 436.83	< 0.05
Post operation	stage I,II	15	943.93 $\pm$ 270.88	0.46
	stage III	15	1050.6 $\pm$ 151.4	0.38

Figure 7- IgG levels in healthy and prostate cancer patients (stage I,II,III).

IgG Post-operative = 624.04 + .22529 * IgG Pre-operative

Correlation: r = .47832

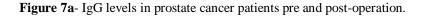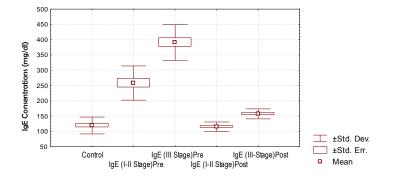**Figure 7a**- IgG levels in prostate cancer patients pre and post-operation.

Table 8- Means of IgE level for prostate cancer patients pre and post-operation.

	Level of prostate cancer	No.	Mean $\pm$ SD	P. value
	Control	15	119.3 $\pm$ 27.58	
Pre operation	stage I,II	15	258.2 $\pm$ 55.97	< 0.05
	stage III	15	390.8 $\pm$ 58.33	< 0.05
Post operation	stage I,II	15	115.46 $\pm$ 15.35	0.639
	stage III	15	157.26 $\pm$ 16.34	0.0001

Figure 8- IgE levels in healthy and prostate cancer patients (stage I,II,III).

IgE Post-operative = 75.828 + .18656 * IgE Pre-operative

Correlation: r = .62080

Figure 8a- IgE levels in prostate cancer patients pre and post-operative.

Table 9- Type of bacteria isolated from urine specimens.

Microbial agentes	No of isolates	No (%)
Escherichia coli	13	43.33
Pseudomnas aerginosa	5	16.66
Klebsiella spp.	5	16.66
Enterobacter spp.	3	10
Acinetobacter	1	3.33
Serratia spp.	1	3.33
Staphylococci spp.	2	6.66
Total	30	100

The results of the analysis of urine samples showed the of pus cells, epithelial cells, red blood cells, white blood cells and bacteria at high rates, where each pure culture show growth of more than 10^5 cells / cm ³, as a result of infection of the urinary tract, which was confirmed with Hooton TM, et al; [44] ,which observed the presence of pus cells and more than three white cells in the microscopic examination refers to a bacterial infection in the urine.

Inflammatory prostatitis causes no symptoms and was discovered incidentally during evaluation for other prostate diseases when WBCs were present in the urine[45] .

The results of urine culture for cancer patient were show 30(100%) diagnosis as urinary tract infection (UTI) . The most isolated bacterium is *E. coli* with frequency rate of 43.3%. The other bacteria were include *Pseudomonas spp.* (16.66 %), *Klebsiella spp.* (16.66%), *Enterobacter spp.* (10 %), , *Acinetobacter spp.* (3.33%), *Serratia spp.* (3.33%), , *Staphylococci spp.* (6.66%). The results were agree with that which referred by Tolkoff-Rubin NE, et al ; [46] . Table (9) .

The bacterial prostatitis can be acute or chronic and was usually caused by urinary pathogens (eg, *Klebsiella*, *Proteus*, *Escherichia coli*) [47].

Bacterial prostatitis are harder to cure because antibiotics may be unable to penetrate infected prostate tissue effectively. For this reason, men with bacterial prostatitis often need long-term treatment with a carefully selected antibiotic. UTIs in men are frequently associated with acute bacterial prostatitis, which can be life threatening if not treated urgently [45, 47].

Conclusions

This study shows the considerable changes of immune system in prostate cancer patients that tumor increase of their activity in patients serum pre-operation and decrease in serum early and late stages post-operation. A blood test to measure PSA is considered the most effective test currently available for the early detection of prostate cancer .

There is a correlation between prostate inflammation and infection of the urinary tract infection, when a patient infected with a bacterial infection of the prostate, was showing signs and symptoms of urinary tract infection accepted , and Occurring bacterial infection of the prostate gland due to infection of the urethra was a bacterial infection or due to reflux urine contaminated channels in the prostate that were in the urethra.

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