Identification of Some Specific Hematological Indicators as Bladder Cancer Risk Factors

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Abstract

Background: Our study’s objectives were measuring the levels of blood glucose, blood pressure, glomerular filtration rate GFR, body mass index BMI and creatinine in the blood of patients with bladder cancer in order to control the development of a relationship between those hematological parameters in the case of bladder cancer.

Methods and Results: Blood samples were collected during the application of this work on 155 participants diagnosed with bladder cancer were admitted to medical –Baghdad city and Al-Kindey teaching hospital. All the participants were with the age ranged (25-70 years). There are many people who have been excluded because of their young age under 20 years old and those who have any type of common cancer, which was outlined as any malignant neoplasm, including those with hematological or lymphoid origin and other tissues associated with them. All the participants wearing light clothing and no shoes in order to measure their height and weight. Blood pressure was recorded using a standard mercury sphygmomanometer after an average of 2 readings taken with a 10 min interval. Creatinine and GFR and DM also were measured meanwhile.
It was noticed through the results that there is a high percentage of patients who are of advanced ages about 67(43.2%) with age ≥65 years, and those with high weights BMI ≥ 30 were 64(41.3%). After conducting pathological analyzes of blood samples, it was found that patients were having high levels of sugar, especially those with long duration of diabetics type 2, as well as high blood pressure, creatinine levels, and low GFR levels, and it was clear that males outperformed females in the height of all measurements, which is the dominant characteristic in this research.

**Conclusion:** This study concluded that males are more likely to develop the disease with bladder cancer than female. The disease is directly related with an increase the age and obesity, BP, creatinine, low GFR and long duration of DM.

**Keywords:** Cancer, Bladder, Creatinine, Glomerular, Filtration.

**Abbreviate:** BC. Bladder Cancer, GFR: Glomerular Filtration Rate, DM: Diabetes Mellitus.

**INTRODUCTION**

Bladder cancer (BC) is (referred to be) any tumor that develops from the bladder. It is the most prevalent urinary tract tumor, and urothelial carcinoma (UC) is the most prevalent histologic subtype of the tumor. (1) Especially in high-income areas, urinary bladder cancer is fairly common. (2) There are two different types of bladder cancer as Muscle-invasive and non-muscle-invasive. (3-5) Bladder cancer represents 3% of all malignancies and is the tenth most frequent cancer in the world. (6,7) In the US, bladder cancer is the sixth most prevalent type of cancer. (8) Smoking, drinking water toxins such chlorinated byproducts and arsenic, and other risk factors for bladder cancer have been identified. (9-12) and BC connection to metabolic risk factors as blood hypertension (Bp) and obesity According to a
meta-analysis of epidemiological data, diabetes mellitus (DM) was associated with a higher risk of bladder cancer\textsuperscript{(13,14)} A correlation exists between BC and occupational exposure to paint, rubber, petroleum compounds, and colors. Chemicals linked to BC include arsenic, aryl amine dye, aniline dye, cyclophosphamide (a cytostatic medication) and an analgesic (phenacetin).\textsuperscript{(15, 16)} Bladder cancer (BC) is one of the most common cancer forms in developed countries. The prevalence of BC rises with age and is twice as common in Caucasians as it is in African Americans. The prevalence of BC is twofold as high in developing nations when compared to developed countries. Squamous cell carcinoma accounts for the majority of BC cases in underdeveloped nations, which is associated with endemic schistosomiasis.\textsuperscript{(17, 18)} BC is frequently present with the following symptoms: minimal hematuria obstructive or infectious gross hematuria. Painful urination, frequency, constitutional symptoms like weariness and weight loss, and a pelvic mass are some other, less prevalent symptoms. For the early detection of BC, there are no screening tests available. Advanced disease stage is correlated with gross hematuria.\textsuperscript{(19)}

**Materials and Methods**

Samples were collected from twelve of September to the first of December of the year twenty twenty-one in medical city –Baghdad at the biochemistry Department. 155 samples of participants including (80) males and (75) females diagnosed with bladder cancer were analyzed within three month period. Urea, creatinine, and blood glucose levels were the primary study variables.

**Results:**

The data in table (1) clarified that there are 155 patients pre-diagnosed bladder cancer were including this study with 80 males and 75 females aged 25 – 70 years. As noted the percentage of patients with advanced ages is more prevalent
67(43.2%) (P=0.123) with age range ≥65, especially in males than in females 36(45%), 31(41.3%) respectively.

<table>
<thead>
<tr>
<th>Age (year)</th>
<th>Male n (%)</th>
<th>Female n (%)</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-34</td>
<td>2(2.5)</td>
<td>2(2.7)</td>
<td>4(2.6)</td>
<td>0.158</td>
</tr>
<tr>
<td>35-44</td>
<td>8(10)</td>
<td>9(12)</td>
<td>17(11)</td>
<td>0.124</td>
</tr>
<tr>
<td>45-54</td>
<td>14(17.5)</td>
<td>15(20)</td>
<td>29(18.7)</td>
<td>0.10</td>
</tr>
<tr>
<td>55-64</td>
<td>20(25)</td>
<td>18(24)</td>
<td>38(24.5)</td>
<td>0.098</td>
</tr>
<tr>
<td>≥65</td>
<td>36(45)</td>
<td>31(41.3)</td>
<td>67(43.2)</td>
<td>0.123</td>
</tr>
<tr>
<td>Total</td>
<td>80(100)</td>
<td>75(100)</td>
<td>155(100)</td>
<td>0.005</td>
</tr>
</tbody>
</table>

It is noted from the data listed in Table (2) that the majority of patients are of high weight, as the measurements of BMI 64(41.3%) (P=0.0049) at range ≥ 30 Kg/m² was 34 (42.5%), 30(34.3%) for males and female respectively.

<table>
<thead>
<tr>
<th>BMI (Kg/m2)</th>
<th>Male n (%)</th>
<th>Female n (%)</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 20</td>
<td>3 (3.75)</td>
<td>4(5.3)</td>
<td>7(4.5)</td>
<td>0.008</td>
</tr>
<tr>
<td>20 - 24.9</td>
<td>14 (17.5)</td>
<td>17(22.7)</td>
<td>31(20)</td>
<td>0.0067</td>
</tr>
<tr>
<td>25 – 29.9</td>
<td>29 (36.25)</td>
<td>24(30.0)</td>
<td>53(34.2)</td>
<td>0.0055</td>
</tr>
<tr>
<td>≥ 30</td>
<td>34 (42.5)</td>
<td>30(34.3)</td>
<td>64(41.3)</td>
<td>0.0049</td>
</tr>
<tr>
<td>Total</td>
<td>80(100)</td>
<td>75(100)</td>
<td>155(100)</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The percentage of participants with diabetes represents 115(74.19%) (P-value = 0.0002), including 64(80%) males and 51 (68%) females, as shown in Table (3). Among the results of this research, according to what is shown in Table (4), is that there is a direct relationship between the risks of developing BC with people with the highest period of diabetes for the period ≥10 years about 59(38.1%) (P= 0.003) represent 31(38.75%) males and 28(37.3%) females.
Table 3. The metabolic factors for the male and female participants.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Male n (%)</th>
<th>Female n (%)</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Mellitus</td>
<td>64(80)</td>
<td>51 (68)</td>
<td>115(74.19)</td>
<td>0.0002</td>
</tr>
<tr>
<td>Blood Pressure (mmHg)</td>
<td>45 (56.25)</td>
<td>36 (48)</td>
<td>81(52.25)</td>
<td>0.000</td>
</tr>
<tr>
<td>Glomerular Filtration Rate ≤ 60 mL/min</td>
<td>26 (32.5)</td>
<td>29 (38.66)</td>
<td>55(35.48)</td>
<td>0.003</td>
</tr>
<tr>
<td>Creatinine</td>
<td>46 (57.5)</td>
<td>——</td>
<td>46(29.67)</td>
<td>0.0001</td>
</tr>
<tr>
<td>≥ 97μmol/l (male)</td>
<td>——</td>
<td>36(48)</td>
<td>36(23.22)</td>
<td>0.0002</td>
</tr>
<tr>
<td>≥80μmol/l (female)</td>
<td>——</td>
<td>——</td>
<td>——</td>
<td>——</td>
</tr>
</tbody>
</table>

When observing the data listed in Table (3), the height of each of blood pressure (mmHg) (81(52.25%), Glomerular Filtration Rate ≤ 60 mL/min 55(35.48%) and Creatinine 46(29.67%) for males and 36(23.22%) for females concentration accompanies patients with BC.

Table 4. Comparison of the duration of Diabetes mellitus disease between male and female participants (years).

<table>
<thead>
<tr>
<th>Duration (year)</th>
<th>Male n (%)</th>
<th>Female n (%)</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>6(7.5)</td>
<td>6(8)</td>
<td>12(7.74)</td>
<td>0.01</td>
</tr>
<tr>
<td>1 - &lt;2</td>
<td>10(12.5)</td>
<td>8(10.7)</td>
<td>18(11.61)</td>
<td>0.06</td>
</tr>
<tr>
<td>2 - &lt;5</td>
<td>13(16.25)</td>
<td>12(16)</td>
<td>25(16.1)</td>
<td>0.004</td>
</tr>
<tr>
<td>5 - &lt;10</td>
<td>20(25)</td>
<td>21(28)</td>
<td>41(26.45)</td>
<td>0.003</td>
</tr>
<tr>
<td>≥10</td>
<td>31(38.75)</td>
<td>28(37.3)</td>
<td>59(38.1)</td>
<td>0.003</td>
</tr>
<tr>
<td>Total</td>
<td>80(100)</td>
<td>75(100)</td>
<td>155(100)</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Discussion:

This research found that as shown in table (1) older ages over 65 years 67(43.2%) (p=0.123) are at risk for BC 36(45%) among men and 31(41.3%) among women this finding was not statistically significant but it is consistent with previous studies that found the BC affecting persons older than 65 years which postulated the age-related decrease in the immune response and changes in infection-fighting defenses cause prevalence of the disease to rise. Additionally,
this population group has significant comorbidity, instrumentation, and frequent hospitalization, all of which raise the risk of nosocomial infections. \((20)\)

BC is the one of the most prevalent cancer types in developed nations which has a connection to metabolic risk factors like obesity, which is typically assessed using the BMI \((\text{Kg/m}^2)\), our results at table (2) demonstrated that a positive correspondence between BMI and BC \(\geq 30\) \(64(41.3\%)\) \((p=0.0049)\) especially for man \(334(42.5\%)\) more than in women \(30(34.3\%)\) this findings are in deep synchronization with research that was previously conducted. \((21-23)\)

In this study, as indicated in table (3), we observed a higher incidence of BC in patients with type2 diabetes in the latter years following diagnosis, as it turns out, the percentage of BC patients with diabetes was \(115(74.19\%)\) \((p=0.0002)\) higher in male \(64(80\%)\) than that of female \(51(68\%)\)

These results are consistent with those that were previously established. Most studies did not consider the possibility of BC in DM type1, which is consistent with the findings in Sweden. \((24-26)\)

In affluent countries, a 69% increase in the proportion of persons with DM is anticipated between 2010 and 2030. Previous investigations have demonstrated a link between type 2 DM and an increased risk of BC. The individuals having the highest BC risk among those who have had diabetes the longest history this is illustrated in table (4) \((27-33)\). The best explanation for the increased risk of cancer in type 2M adults is insulin, which has been hypothesized to be a cancer growth promoter. In addition, poor glycemic control causes an increase in oxidative stress, upregulation of a number of cell molecules, and inflammation processes, all of which are thought to have a negative impact on cancer prognosis. \((34-40)\)
Additionally, we discovered a stronger positive linear connection between BP and the probability of BC showed in table (3) the percentage of BC patients with high blood pressure 81(52.25%) (p=0.000) for males is higher 45(56.25%) than for women 36(48%). Once more, these results are in line with earlier research that discovered a relationship between BP and BC.

The following are some of the explanations for the connection between BC and hypertension: There is convincing evidence from animal studies supporting a causal role for oxidative stress in the pathogenesis of hypertension, and oxidative stress has been known to play a causal role in the development of cancer. Hypertension is one component of the metabolic syndrome which has been shown to associate with subsequent cancer development.

Participants in the healthcare system who are being treated for hypertension are undoubtedly subjected to extra tests that could lead to the early diagnosis of BC, which could affect the relationship between BP and BC.\(^{(41-43)}\)

It is well recognized that a significant percentage of BC patients have impaired renal function. Attributable to a variety of causes, including concomitant conditions, aging-related reduction in glomerular filtration rate, and ureteral blockage.\(^{(44,45)}\)

As shown in the data of table (3). Glomerular Filtration Rate ≤ 60 mL/min 55(35.48%) (p=0.003) for male was 26(32.5%) and for female was 29(38.66%), which are agreed with other researches. As illustrated below: Bladder cancer is the most frequent solid tumor and the most common malignancy affecting the urinary system. About 40% of patients with bladder cancer diagnosed with renal impairment measured by a creatinine clearance ≤60ml/min. There are several possible causes of renal insufficiency, including age-related decreased glomerular filtration rate, ureteral obstruction, previous nephrectomy, and illness. Creatinine is
the most often utilized endogenous marker for the evaluation of glomerular function. \(^{(46, 47)}\). From table (3) the Creatinine levels ≥ 97μmol/l (male) was 46(57.5%) (p=0.0001) and ≥80μmol/l (female) was 36(48%) (p=0.0002), also this results are deeply consistent with what was found in previous studies, which can be explained as follows, the body at a constant rate produces creatinine, which is a by-product of the chemical of creatine phosphate in muscle. Creatinine is primarily removed from the blood totally by the kidney. Creatinine levels in the blood rise as a result of decreased renal clearance by the kidney. The daily production of creatinine is influenced by muscle mass. Raised creatinine levels are a sign of renal failure, which is negatively effects the body. \(^{(48-51)}\) Hydronephrosis is frequently caused by advanced bladder cancer that has infiltrating the ureter's bladder orifices. Due to the kidney's impaired ability to filter urine, there is a rise in the concentration of creatinine when the kidney obstructed outflow of urine from the body. \(^{(52-58)}\)

**References**


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   • Comprehensive review of the current options in patients unfit for cisplatin.


