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Original Article

Effect of Diabetes Mellitus and Glycemic Control on the Prognosis of Invasive Bladder Cancer

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ABSTRACT

A patient's prognosis for cancer treatment is thought to be affected by their presence of diabetes mellitus (DM). Epidemiological studies show that type 2 diabetes raises the risk of a wide range of cancers, including colorectal, breast, endometrial, and hepatocellular carcinoma. Findings for bladder cancer were hard to comprehend and thus no proof has been presented. **Objective:** Invasive bladder cancer prognosis will be examined in this study in relation to diabetes and glycemic control. **Methods**: It was a cross-sectional study conducted between January 2016 and January 2021 at Galway Hospital, Ireland and The University Lahore Teaching Hospital, in Lahore, Pakistan. The data was collected from 136 bladder cancer patients during the period of these five years. The data was collected with the permission of ethical committee of hospitals. Patients with last two years of DM were include in this study. **Results:** The mean age was 53.2 ± 8.4 years (range: 36-61 years). There were more males than females (60% vs. 40%) **Conclusions:** Diabetes mellitus is a metabolic condition that affects all main bodily systems, although it is not linked to the advancement of bladder cancer, according to the findings. However, poor glycemic management is linked to a greater recurrence rate. In patients with DM and invasive bladder cancer, glycemic management should be one of the therapy aims.

INTRODUCTION

Cancer of the urinary system is relatively frequent, especially in nations with high incomes. Non-muscle invasive bladder tumours had much improved 5-year survival rates (89-98 percent) with high 5-year progression (5-20 percent) and recurrence rates compared to muscle invasive bladder malignancies (35-40 percent) (28-50 percent) [1]. Costs for treatment of bladder cancer are significantly greater than those of other malignancies because patients typically need to have recurrent tumours removed. Therefore, individuals with bladder cancer should have regular follow-ups following treatment [2]. Because of dietary and lifestyle changes, diabetes has shown increased prevalence recently. Cancers of the liver, colorectum, breast, endometrium and pancreas have also been related to diabetes. Both bladder and prostate cancer have an increased risk in those with diabetes. Insulin resistance and hyperinsulinemia have really been connected to a higher risk and worse prognosis for bladder cancer in individuals with diabetes and overweight [3]. Cancer therapy results may be affected by DM. In epidemiological studies, multiple cancers, including colorectal, breast, endometrial, and hepatic, have been linked to type 2 diabetes [4]. There has been no conclusive evidence that bladder cancer is linked to the disease. Studies have indicated a link between diabetes and bladder cancer. Because of the link between hyperglycemia and bladder cancer, it's likely that DM plays a role in the development of bladder cancer [5]. A patient's glycemic control, for example, can have a major clinical influence on the characteristics of their urinary bladder cancer.

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Oxidative stress, activation of many cell components and inflammation have all been associated to deteriorating cancer prognosis when inadequate glycemic control is present [6]. Because of this, we don't know how glycemic control affects bladder cancer survival rates. A single HbA1C measurement may not accurately reflect long-term glycemic management in most researches. DM has been associated to a higher risk of bladder cancer and a debilitating disease [7-8].

METHODS

This cross-sectional study was conducted between January 2016 and January 2021 at Galway University Hospital, Ireland and University of Lahore Teaching Hospital in Lahore, Pakistan. The data was collected from 136 bladder cancer patients during the period of these five years. The data was collected with the permission of ethical committee of hospitals. Patients with last two years of DM were included in this study. Patients who had urothelial carcinoma were excluded from the study. Demographic data of patients including age, socio economic status, tumor size, diagnosis and progression were collected. People with diabetes and those without it were separated into two groups. Glycemic control of all the patients were collected and HbA1c levels were routinely done in all bladder cancer patients. A semi-structured questionnaire was constructed to record demographic, clinical, and biochemical information, and outcome of stroke. No additional investigations were performed. Departmental protocol was followed for the management of the patients. The statistical software for social sciences (SPSS) was used to analyse the data. Mean and standard deviation over all continuous variables were determined. A breakdown of the frequency and percentage of each category was done. The chi square test was used to uncover the statistical correlation.

RESULTS

The mean age was 53.2 ± 8.4 years (range: 36-61 years). There were more males than females (60% vs. 40%). Table 1 provides an overview of patient demographic data.

Patient characteristics	Frequency n (%)
Age in years	
Mean SD	53.2 ± 8.4
Less than 40	42 (30.9%)
40 or more	94 (69.1%)
Gender	
Male	81 (59.6%)
Female	55 (40.4%)
Risk factors	
Hypertension	81 (59.6%)
Smoking	57 (49.3%)
Stage (T1) of bladder cancer	54 (39.7%)
Hba1c	
Less than 10%	54 (39.7%)
10% or more	82 (60.3%)

Table 1: Demographical and clinical characteristics of patients (n=136)

Poor clinical outcome and glycemic control was reported in 94 (69.1%) patients and the remaining 42 (30.9%) patients had good functional outcome. Outcome was correlated with patient factors which is summarized in table 2. Table 2 showed that poor functional outcome was statistically related to older age (≥40 years), hypertension (HTN), smoking, and stage of bladder cancer ≥10% (table 2).

Patient characteristics	Glycemic control		P value
	DM group (n=94)	Non-DM group (n=42)	
Age in years			
Less than 40	14 (14.9%)	28 (66.7%)	0.000
40 or more	81 (86.2%)	13 (30.9%)	
Gender			
Male	53 (56.4%)	28 (66.7%)	0.12
Female	42 (44.7%)	13 (30.9%)	
Risk factors			
Hypertension	68 (72.3%)	13 (30.9%)	0.000
Smoking	54 (57.4%)	14 (33.3%)	0.01
Stage T1 of bladder cancer	40 (42.5%)	14 (33.3%)	0.24
Hba1c			
Less than 10%	26 (27.6%)	28 (66.7%)	0.000
10% or more	69 (73.4%)	13 (30.9%)	

Table 2: Functional outcomes of bladder cancer patients with DM and without DM

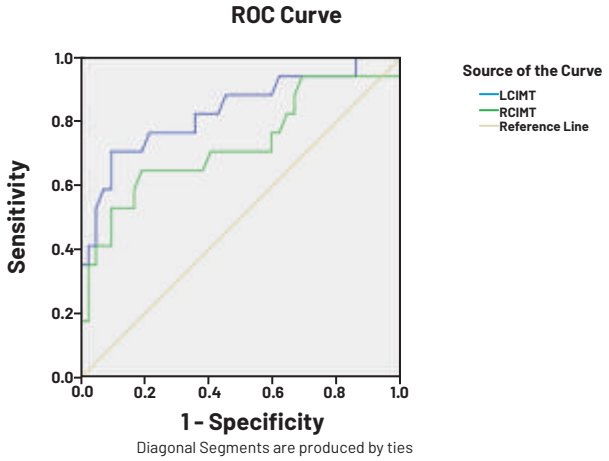

Figure 1: ROC curve of statin therapy in patients

DISCUSSION

Diabetes carries a bad prognosis since it increases the risk

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of developing a variety of cancers, including colorectal and breast cancers. A number of research have examined the influence of DM on bladder cancer [9-11]. Twenty-one cohort studies with more than 13 million participants have linked to an increased risk of DM leading to bladder cancer or death [12]. It's no secret that diabetes and cancer are on the increase across the board. In the future, more and more people will be afflicted with two or more medical conditions [13]. Diabetic malignancies include breast, colorectal, endometrial, pancreatic, and liver cancers. Epidemiological research on diabetes and bladder cancer have yielded conflicting results. Bladder cancer has been found to have a 1.3 to 2.5-fold increased risk for diabetics, according to many cohort studies [14]. There is currently no evidence that diabetes and bladder cancer are linked. People with type 2 diabetes are more sensitive to insulin resistance, which increases the chance of developing hyperinsulinemia. Insulin's bioactive form, IGF-I, exhibits mitogenic properties, which means it can aid tumour growth by enhancing cell proliferation and inhibiting apoptosis [15-17]. IGFBP-3, the primary IGF binding protein, binds to IGF-I in the bloodstream. Prostate, breast, and colorectal cancer have been related to IGF-I and IGFBP-3 through several observational studies [18]. It is possible that growth factors IGF-I and IGFBP-3 might have had a role in the development of bladder cancer [19-20].

CONCLUSION

Diabetes mellitus adversely affects the body's major systems, however it is not associated with bladder cancer's growth. Poor glycemic control, on the other hand, has been associated to a higher recurrence rate. Diabetes mellitus through hostile bladder cancer patients should have glycemic control as a treatment goal.

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