Frequency of UTI amongst patients taking SGLT 2 inhibitors

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Abstract

Background: SGLT-2 inhibitors are potent anti-hyperglycemic medicines that increase renal glucose excretion and enhance glycemic control. Concerns have been raised about an increased incidence of urinary tract infections in individuals who use these drugs.

Objective: The aim of this study was to find out the frequency of UTI amongst patients taking SGLT 2 inhibitors.

Material and method: The current cross sectional study was carried out at the department of medicine Ghulamm Muhammad Mahar medical college sukkur from January 2024 to June 2024 after taking permission from the ethical board of the institute. Participants of the study provided written informed permission. A total of 130 Individuals with type 2 diabetes of both genders and different age groups who were treated with sodium-glucose cotransporter-2 inhibitors alone or in combination with other drugs were included. Participants were instructed to collect midstream urine samples in a sterile the tube for microbiological analysis. A questionnaire was devised to collect patient history and demographic data. Data was entered and analyzed using SPSS version 25. Quantitative variables such as age were presented as mean ± SD. Qualitative factors such as gender, family history of diabetes, duration of diabetes, symptoms, and frequency of UTIs were provided as percentages. The Chi-square test was performed to evaluate the relationship between UTI, SGL T2 inhibitors, and other factors. P-values < 0.05 were considered significant.

Results: A total of 130 individuals were enrolled in the current study out of which 60 (46.1%) were male and 70(53.8%) were females. out of the total individuals, 27 (20.7%) used Empagliflozin, whereas 103 (79.2%) took Dapagliflozin. In males 4(6.6%) had UTI while in females 10(14%) had urinary tract infection. Of 52(40%) diabetic individuals with a family history of diabetes, 10(19%)7, experienced a urinary tract infection. Among individuals with diabetes for 6-10 years, 3 (9%) experienced UTI. Among individuals with diabetes for more than ten years, four (23%) experienced UTI. Among 27(20.7%) diabetic patients on Empagliflozin,

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4(14.8%) experienced urinary tract infection and those receiving Dapagliflozin,10(9.7%) experienced urinary tract infections

Conclusion: The present study evaluated that 10% of diabetes individuals taking SGLT 2 inhibitors experienced urinary tract infections. More research is needed to determine the prevalence of UTIs in diabetes people.

Key words: Frequency; UTI; SGLT 2 inhibitors

Introduction

Type 2 diabetes mellitus (T2DM) and is characterized by insulin resistance and insufficiency. It constitutes 90-95% of diabetes cases. [1] Diabetes has a high incidence of 16.98% in Pakistan, providing a substantial challenge to the healthcare system.[2] These alarming numbers highlight the need for effective pharmaceutical therapies, such as sodium-glucose cotransporter-2 (SGLT-2) inhibitors, to control type 2 diabetes. SGLT-2 inhibitors are oral anti-hyperglycemic medicines that block glucose reabsorption in the renal tubules, resulting in increased glucose excretion through urine. These medicines have additional therapeutic advantages beyond glucose control, such as weight loss and cardio-protection, making them a desirable alternative for controlling type 2 diabetes.[3] However, the mechanism of action of these medications poses safety concerns. Glucosuria may promote bacterial development, raising the danger of infections of the urinary tract in people.[4] People with diabetes are more likely to develop urinary tract infections (UTIs) due to immunological failure and a hyperglycemic environment that promotes bacterial growth.[5] SGLT-2 inhibitors stimulate glucose excretion, which may increase this risk. Although these medicines are effective in regulating blood sugar levels, their level of safety has been questioned due to reports of increased urogenital infections, such as UTIs.[6] The relationship between SGLT-2 inhibitors and UTIs is still a matter of discussion in literature. Some studies indicate that patients using these meds are more likely to get urinary tract infections (UTIs) than those on other antidiuretic medications.[7] Some report a slight risk increase, which may exceed the overall benefits of diabetic control.[8] With the increasing use of SGLT-2 inhibitors and worries about their ability to boost UTI incidence it is important to assess the prevalence of UTIs in specific populations. Therfore the current study was carried out to find out the frequency of UTI amongst patients taking SGLT 2 inhibitors.

Material and method

The current cross sectional study was carried out at the department of medicine Ghulamm Muhammad Mahar medical college sukkur from January 2024 to June 2024 after taking permission from the ethical board of the institute. A total of 130 Individuals with type 2 diabetes of both genders and different age groups who were treated with sodium-glucose cotransporter-2 inhibitors alone or in combination with other drugs were included while non-diabetes, gestational diabetes, or history of urinary tract infections were excluded from the study. Participants were instructed to collect midstream urine samples in a sterile the tube for microbiological analysis. A questionnaire was devised to collect patient history and demographic data. Data was entered and analyzed using SPSS version 25. Quantitative variables such as age were presented as mean ± SD. Qualitative factors such as gender, family history of diabetes, duration of diabetes, symptoms, and frequency of UTIs were provided as percentages. Data was presented using tables and graphs for both quantitative and qualitative features. The Chi-square test was

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performed to evaluate the relationship between UTI, SGL T2 inhibitors, and other factors. P-values < 0.05 were considered significant.

Results

A total of 130 individuals were enrolled in the current study out of which 60 (46.1%) were male and 70(53.8%) were females (figure 1). The mean age of the study participants were 45.18+ 8.717 years. 100 (77%) of them were up to 50 years old and 30(23%) were above 50 years. Among 130 diabetic patients, 20 (15.3%) had diabetes for less than a year, 60 (64.1%) for 1-5 years, 33 (25.3%) for 6-10 years, and 17 (13%) for more than 10. out of the total individuals, 27 (20.7%) used Empagliflozin, whereas 103 (79.2%) took Dapagliflozin as presented in **table 1.** Among 100 diabetic individuals under 50 years old, 5 got UTI and 95 did not. Out of 30 diabetes individuals over 50 years old, only 6 (20%) had urinary tract infection (UTI), whereas the remaining 24 (80%) did not. In males 4(6.6%) had UTI while in females   10(14%) had urinary tract infection. Of 52(40%) diabetic individuals with a family history of diabetes, 10(19%)7, experienced a urinary tract infection. Out of 78(60%) diabetic patients with no family history of diabetes, only 6(7%) experienced a urinary tract infection. Out of 20 diabetic patients with diabetes for less than a year, only 2 (10%) acquired a urinary tract infection (UTI) while individuals with a duration of 1-5 years, 5 (8%) got UTI. Among individuals with diabetes for 6-10 years, 3 (9%) experienced UTI. Among individuals with diabetes for more than ten years, four (23%) experienced UTI. Among 27(20.7%) diabetic patients on Empagliflozin, 4(14.8%) experienced urinary tract infection and those receiving Dapagliflozin,10(9.7%) experienced urinary tract infections as presented in **Table 2**.

Table 1.Demographic features of the study population	
Features	Frequency /percentage
Age in years	
Up to 50	**100 (77%)**
Above 50	**30(23%)**
Total	**130 (100%)**
Gender	
Male	**60 (46.1%)**
Female	**70(53.8%)**
Total	130(100%)
Family history of diabetes	
Yes	52(40%)
No	78(60%)
Total	
Duration of diabetes (years)	
<1	20(15.3%)
1-5	60(64.1%)
6-10	33(25.3%)
>10	17(13%)
Total	130
Drug group	

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Empagliflozin	27(20.7%)
Dapagliflozin	103(79.2%)
Total	130(100%)

Table 2.Factors contributing to urinary tract infections in diabetes individuals.				
Urinary tract infections				
Features	YES	NO	Total	P value
Age in years				
Up to 50	**5 (5%)**	**95(95%)**	**100(77%)**	
Above 50	6 (20%)	**24(80%)**	**30(23%)**	**0.000**
Total	**11 (8.4%)**	119(91.5%)	130 (100%)	
Gender				
Male	4(6.6%)	**56(93.3%)**	**60(46.1%)**	
Female	10(14%)	**60(86%)**	**70(53.8%)**	**0.451**
Total	14(10.7%)	116(89.2%	130(100%)	
Family history of diabetes				
Yes	10(19%)	42(90%)	52(40%)	
No	6(7%)	72(93%)	78(60%)	0.127
Total	16(12%)	114(88%)	130	
Duration of diabetes (years)				
<1	2(10%)	18(90%)	20(15.3%)	
1-5	5(8%)	55(92%)	60(64.1%)	
6-10	3(9%)	30(91%)	33(25.3%)	
>10	4(23%)	13(27%)	17(13%)	0.432
Total	14(10.7%)	116(89.2%)	130	
Drug group				
Empagliflozin	4(14.8%)	24(88.8%)	27(20.7%)	0.837
Dapagliflozin	10(9.7%)	93 (90.2%)	103(79.2%)	
Total	14(10.7%)	116(89.2%)	130(100%)	

Discussion

Diabetics are more likely to get urinary tract infections. Using sodium-glucose transporter -2 inhibitors for blood sugar control leads to higher amounts of glucose in urine. Glycosuria raises vulnerability to urinary tract infections. In the current study the incidence of UTI in diabetic individuals on SGL T2 inhibitors were evaluated. A total of 130 individuals were enrolled in the current study.). The mean age of the study participants were 45.18+ 8.717 years. Most of them 100 (77%) were up to 50 years old. According to the findings of a study conducted by Shrikrishna and teammates, the majority of diabetes patients were older, with a mean age of 54.4

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± 7.7 years.[9] Khan et al. (2022) found that the average age of the patients was 55.2 ± 6.2 years.[10] Hussain et al. Found that the average age of patients was 38 ± 12 years.[11] This study revealed that 70 (53.8%) of diabetes individuals were female and 60 (46.1%) were male. A research by Khan et al. (2022) found that 56.5% of participants were male and 43.5% were female.[10] A research conducted by Shrikrishna et al found that 51.7% of the participants were male and 48.3% were female.[9] The study found that the majority of individuals had diabetes for one to five years. In a recent study by Azhar et al., individuals with diabetes had an average duration of 6.1±2.6 years.[12] In the current study 27 (20.7%) individuals used Empagliflozin, whereas 103 (79.2%) took Dapagliflozin. A research by Shrikrishna et al. found that empagliflozin was used by 60% of individuals, while the remaining 40% received dapagliflozin or canagliflozin.[9] Azhar et al., found that 48.0% of the participants received dapagliflozin, whereas 52% obtained empagliflozin.[12] Our study found a 10.7% prevalence of UTI among individuals on SGL T2i. These findings are not similar reported by Caro et al., who found that 55.7% of patients experienced urinary tract infections after using SGL T2.[13] Khan et al.[10], Shrikrishna et al.[9], found that the prevalence of UTI among SGL T2i patients was only 5.3% and 3.3%, respectively. The study reported significant outcomes (P<0.05) for age and UTI symptoms, but no significant results (P>0.05) for gender, family history of diabetes, diabetes duration, or medication group. A research by Shrikrishna et al., found no significant relationship between UTI and patient age, gender, disease duration, or type of SGL T2i.[9] Azhar and colleagues (2023) found a strong connection between UTI and gender, but not with drug dose.[12] Personalized treatment methods are crucial for individuals on SGLT-2 inhibitors. Improved hygiene and hydration consumption, together with regular monitoring of urine cultures, can reduce the incidence of urinary tract infections (UTIs) in high-risk individuals. Maintaining optimal glycemic control is crucial for minimizing infection risk. More study on the dose-response relationship and multicenter trials across varied populations are needed to better understand the safety profile of SGLT-2 inhibitors and influence therapeutic decisions. These findings highlight the need for a balanced strategy to maximize the advantages of SGLT-2 inhibitors while minimizing the risk of side effects like UTIs.

Conclusion

The present study evaluated that 10% of diabetes individuals taking SGLT 2 inhibitors experienced urinary tract infections. More research is needed to determine the prevalence of UTIs in diabetes people.

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