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Original Article

Prevalence of urinary incontinence in males with type 2 diabetes mellitus

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ABSTRACT

Aim: To find the prevalence of Urinary Incontinence (UI) in males with Type 2 Diabetes Mellitus (T2DM) in Belagavi city and also to understand the severity of UI and the impact of variables like age, duration of diabetes, BMI (Body mass index), waist circumference, glycemic control (fasting blood glucose), and medications on the prevalence of UI in males with T2DM.
Methodology: This was a cross-sectional, observational study conducted in a tertiary hospital and medical research centre of Karnataka, India in which males aged 35 years or more and suffering with T2DM for at-least 10years were enrolled. UI was assessed using International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF).
Results: Out of 123 male subjects having T2DM screened for the prevalence of UI, 19 subjects were diagnosed to be having UI as per ICIQ-SF questionnaire, accounting to 15.4% of the total sample. The mean ICIQ score of the 19 subjects having UI was 9.2 ± 1.54 showing that the mean severity of UI was moderate in nature. Study also found that the duration of diabetes was significantly high (mean $= 18 \pm 4.6$ years) and glycemic control was significantly poor (Mean FBS $= 210 \pm 64.21$ mg/dL) in subjects with UI than in subjects without UI.
Conclusions: Prevalence of UI among adult patients with T2DM was 15.4% and is of moderate severity, as assessed by ICIQ-SF. Long duration of Diabetes and poor glycemic control could possibly increase the risk of UI among T2DM patients.

1. Introduction

Diabetes mellitus (DM) is a spectrum of metabolic disorders arising from various pathogenic mechanisms resulting in persistent hyperglycemia. Its pathogenesis involves insufficient insulin secretion, reduced responsiveness to endogenous or exogenous insulin, increased glucose production, or abnormalities in fat and protein metabolism. Both genetic and environmental factors contribute for the development of pathogenesis [1]. The latest data suggests that the global burden of diabetes has spread to an alarming extent affecting 425 million people across the world. One-third of the diabetic population is older than 65 years. The regions facing the rising impact of the disease are South-East Asian regions, most prominently, India and China. China records 121 million people with diabetes while India is placed at the 2nd rank with 72 million [2]. Rapid socioeconomic development and demographic changes, along with increased susceptibility for Indian individuals, have led to the explosive increase in the prevalence of diabetes mellitus in India over the past four decades [3]. If uncontrolled, individuals with diabetes are at risk of developing chronic complications of diabetes such as retinopathy, nephropathy, neuropathy, foot disease, and heart disease, which have the potential to endanger the life [4].

One of the complication caused by diabetes is urinary incontinence (UI) [5] which is defined by International Continence Society as any involuntary leakage of urine [6]. In simple words, the involuntary leakage of urine is called as urinary incontinence. It is commonly seen in elderly population especially in women [5]. UI has widespread human and social implications causing discomfort, shame, and loss of self-confidence. It not only affects the quality of life but also has significant cost implications [7].

Clinically 3 forms of urinary incontinence have been identified [5].

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1. Stress incontinence
2. Urge incontinence
3. Overflow incontinence

Therefore, it is worth to note that the pathogenesis of urinary incontinence is associated with diseases that cause frailty, muscle weakness or atrophy and neurodegeneration. Diabetes is associated with multiple hormone dysregulation, a proinflammatory state, and excess oxidative stress. Given these characteristics, it is not surprising that patients with diabetes mellitus are more likely to be frail and at high risk of developing urinary incontinence [5].

Several studies have demonstrated that diabetes mellitus contributes to urinary incontinence [8–11]. It is known that incontinence is more common in patients with diabetes, but mechanisms by which type 2 diabetes may contribute to its development or severity are not well defined. A likely etiology for incontinence in diabetic patients is microvascular damage that leads to diabetic neuropathy [12]. This may increase involuntary bladder contractions and decrease bladder sensation [13,14]. With severe neuropathy, function of the detrusor muscle may be affected [15], resulting in increased bladder volume and overdistention [14].

World experts at the Fourth International Consultation on Incontinence (4th ICI) collated, and reviewed the best available evidence and estimated the prevalence of urinary incontinence. Some degree of urinary incontinence was noted in 25%–45% of women; "daily UI" is reported by 9%–39% of women aged more than 60 years. Prevalence of UI in men is approximately half of that in women: UI is seen in11%–34% of older men, with 2%–11% reporting daily UI [16]. The 2001–2002 National Health and Nutrition Examination Survey found that prevalence of weekly incontinence was 16.8% among non-diabetic individuals whereas it was 35.4% among diabetic patients [12]. Thus, it is evident that UI is a health problem that is highly prevalent in diabetes patients. An evaluation of the problem of urinary incontinence is crucial to planning services dedicated to the care of incontinent patients. The precise quantification of the prevalence of urinary incontinence in the population will allow rational and specifically aimed medical care [17].

Although several large-scale studies have focused on epidemiology of urinary incontinence in western countries, limited data are available from Asian countries. A study conducted in India reported a prevalence of 25.7% of UI among women [7]. But there is a paucity of data related to UI, especially among male diabetes population. Considering the limited knowledge of the epidemiology of urinary incontinence in India, with essentially no data available on male diabetes subjects, the present study was undertaken to determine the prevalence of UI among male diabetic subjects and also to find the severity of UI and its correlation with duration of type 2 diabetes and glycemic control (fasting blood glucose) on the prevalence of UI in males with type 2 diabetes mellitus.

2. Methodology

2.1. Study design and sample

This was a cross sectional, observational, single centre study conducted at a tertiary care Hospital and Medical Research Centre in Karnataka, India. A non-probability sample design was used in the study. Study was conducted for a period of 3 months and a convenience sample was drawn from the subjects visiting the study centre. Eligible were consenting male patients, aged 35 years and above, diagnosed with T2DM for at-least 10 years by their treating physician in accordance with common diagnostic criteria and/or clinical guidelines. Subjects with type 1 diabetes mellitus, subjects with any neurological conditions (Except diabetic neuropathy), subjects who have undergone pelvic surgery and heavy weight lifting professionals were excluded from the study.

2.2. ICIQ-SF questionnaire

International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF) is a questionnaire to assess urinary incontinence and its impact on quality of life (QoL). It allows the assessment of the prevalence, frequency, and perceived cause of urinary incontinence, and its impact on everyday life. The ICIQ is a brief and robust questionnaire that is used in epidemiological research as well as routine clinical practice [18].

ICIQ-SF has a total of 6 items of which first 2 are demographic details and remaining 4 are main items. They ask for rating of symptoms in the past 4 weeks. Final score is calculated by taking the sum of 3rd, 4th and 5th items. 6th item is an unscored self-diagnostic item. The final score can be anything between 0 and 21. A high correlation between the ICIQ-UI SF and the incontinence severity index (ISI) was found. The ICIQ-UI SF may be divided into the following four severity categories: slight (1–5), moderate (6–12), severe (13–18) and very severe (19–21) [19]. Permission to use the ICIQ-UI SF in this study has been taken from ICIQ study group.

2.3. Procedure

Ethical clearance was obtained from the Institutional Ethical Review committee (IERC). All the male subjects with T2DM attending Prabhakar kore hospital of Belagavi were screened for inclusion and exclusion criteria. Informed consent was taken from the participants. Consenting patients who fulfilled the inclusion and exclusion criteria were included in the study. The following patient data were collected at entry into the study: socio-demographics; relevant physical exam data; relevant medical history; history of present disease; prior anti-diabetic medications; and comorbidities. ICIQ-SF questionnaire was administered and the responses were noted. The total score was calculated by adding scores of 3rd, 4th and 5th items of ICIQ-SF. The severity of incontinence was thus decided based on the final score.

2.4. Statistical analysis

We expressed estimates as means with SDs or proportions, as appropriate. We used unpaired t tests with Welch's correction to compare the continuous variables.

3. Results

123 male subjects who fulfilled inclusion and exclusion criteria were included in the study. The mean age of the subjects was 61.5 years. The mean duration of diabetes was 13.4 years. 45 subjects (36.58%) were smokers and 41 (33.3%) were alcoholic. 40 subjects had no associated co-morbidities whereas 61 had 1 co-morbidity, 20 had 2 and 1 subject had 3 co-morbiditties. The co-morbidities included hypertension, athero-sclerotic cardio-vascular disease, infections blindness etc. The mean BMI of the subjects was 24.16 ± 3.26 kg/m2 and the mean waist circumference was 89.9 ± 10.04 cm. Mean FBS was 155.5 ± 46.40 mg/dL 114 subjects (92.6%) were taking oral anti-diabetic drugs (OADs) where as 37 subjects (30.08%) were receiving insulin therapy (see Table 1 for Baseline Characters).

On administering ICIQ-SF questionnaire, 19 subjects (15.4% of the total sample) were found to be having UI. Thus, the prevalence of UI among male T2DM patients was found to be 15.4%. The mean ICIQ score of the subjects having UI was 9.2 ± 1.54. Thus, as per the

Table 1
Base line characteristics.

Sr No.	Parameter	Findings (N = 123)
1.	Age	61.5 years
2.	Duration of Diabetes	13.4 years
3.	Smokers	45 (36.58%)
4.	Alcoholics	41 (33.3%)
5.	Subjects with Co-morbities	83 (67.47%)
6.	BMI	24.16 ± 3.26 kg/m2
7.	Waist Circumference	89.9 ± 10.04 cm
8.	Fasting blood glucose	155.5 ± 46.40 mg/dL
9.	Subjects taking oral anti-diabetic drugs	114 (92.6%)
10.	Subjects receiving insulin therapy	37 (30.08%)

ICIQ, the mean severity of UI among positive subjects was found to be Moderate (see Table 2).

Duration of Diabetes and Fasting blood glucose were significantly higher among subjects with UI compared to subjects without UI (see Figs. 1 and 2). BMI, waist circumference among subjects with UI were higher but not significant compared to subjects without UI. All subjects with UI were taking OADs whereas only 91.34% of subjects without UI were taking OADs. 52.63% subjects with UI were receiving insulin therapy whereas 25.96% subjects without UI were receiving insulin therapy.

4. Discussion

The present study estimated the prevalence of UI among male T2Dm subjects using ICIQ-SF questionnaire which was found to be 15.4%. This is contrary to a study conducted to determine the prevalence of urinary incontinence among 839 institutionalized elderly people in Italy. The overall prevalence of urinary incontinence was 54.5%, higher in women (59.8%) than in men (39.2%) [17].

Institutionalized subjects were only included in the present study and could be responsible for higher prevalence of UI. Several studies have shown higher prevalence of UI in women. A study was conducted to determine the prevalence of, and risk factors for, incontinence among U.S. women with diabetes and impaired fasting glucose. Of the 1461 women, 17% had diabetes and 11% met criteria for IFG. Prevalence of weekly incontinence was similar among women in these two groups (35.4 and 33.4%, respectively) and significantly higher than among women with normal fasting glucose (16.8%) [12]. In another study, of 435 (43%) diabetic and 576 (57%) nondiabetic women, a total of 676 (66.8%) women reported incontinence. The prevalence of weekly urge and stress incontinence was significantly higher in diabetic than in nondiabetic women, 13.8% and 20% versus 5.9% and 14.2% respectively [20].

Other investigators have used different questionnaires for assessing UI. A study conducted in Malaysia used AUA-SI questionnaire in a population based, cross-sectional study evaluated the prevalence of lower urinary tract symptoms (LUTS), erectile dysfunction (ED) and incontinence in 418 men aged 40 years and above. The overall prevalence of incontinence in Malaysian men aged ≥40 years was 8.2%; it was 6.6%, 7.9%, 10.6% and 10.3% in those aged 40–49, 50–59, 60–69 and ≥ 70 years, respectively [21].

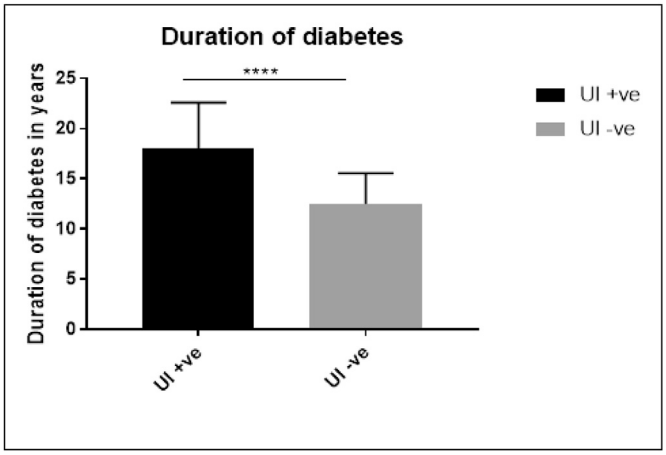

Fig. 1. Duration of Diabetes among subjects with and without UI.

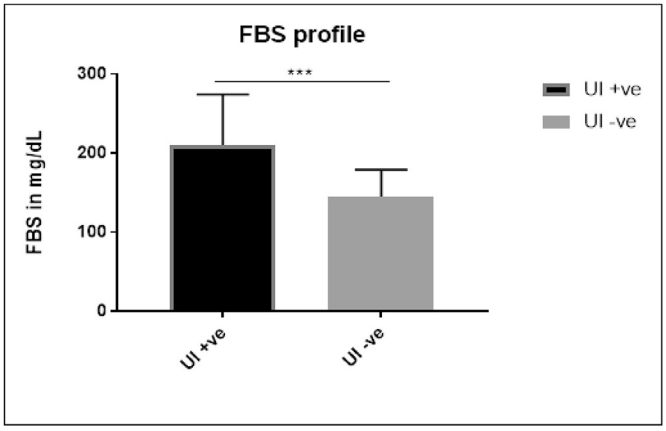

Fig. 2. Fasting blood glucose levels among subjects with and without UI.

In our study, Duration of Diabetes and Fasting blood glucose were significantly higher among subjects with UI compared to subjects without UI showing that these factors could increase the risk of UI in T2DM subjects. This is comparable to several studies who have also found similar results. Poor glycemic control and long-standing diabetes will increase the risk of microvascular complications like diabetic peripheral neuropathy and therefore are responsible for the increased incidence of UI in such subjects. In our study, BMI and waist circumference was similar in both subjects with UI and without UI. High BMI and waist circumference predispose to poor glycemic control in T2DM subjects and therefore could increase the risk of micro-vascular complications and UI. In our study the mean BMI was 24.16% which means most of the

Table 2
Variables in subjects who had UI compared to subjects who were not having UI.

Sr No.	Parameter	UI + ve group (n = 19)	UI -ve group (n = 104)	P Value
1	Duration of Diabetes	18 ± 1.055	12.5 ± 0.302	0.0124
2	BMI	24.71 ± 0.913	24 ± 0.305	0.1333
3	Waist circumference	92.7 ± 2.20	89.4 ± 0.98	0.8742
4	Fasting blood glucose	210 ± 14.73	145 ± 3.35	<0.0001
5	Subjects on OADs	100%	91.34%	–
6	Subjects on Insulin Therapy	52.63%	25.96%	–

subjects were near normal to overweight but not obese. This can be responsible for the similar BMI trends in subjects with and without UI.

5. Limitations

Open ended study sample with small sample size is a major limitation of the study. A large sample would have predicted the prevalence of UI in T2DM subjects more precisely. Our results also do not provide information on the prevalence of UI among T2DM individuals younger than 35 years because this was beyond the scope of the study. In our study we have not assessed central obesity and its impact on UI. If assessed, it would have given insights about the correlation between obesity and UI in T2DM.

6. Conclusions

The present study highlights the importance of assessing UI in T2DM male patients. Using simple, easy to administer, less time-consuming questionnaire like ICIQ-SF clinical practitioners can easily assess presence of UI in T2DM subjects. Study concludes that the prevalence of UI among adult patients with T2DM was 15.4%. Long duration of Diabetes and poor glycemic control could possibly increase the risk of UI among T2DM patients. Further studies with multi-centre and large sample size are recommended.

Declaration of interests

We declare no competing interests.

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