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URINARY TRACT INFECTION IN DIABETIC PATIENTS OF NORTH CHENNAI AREA, TAMIL NADU, INDIA

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Abstract

The most common non-intestinal infection observed worldwide is Urinary tract infection (UTI). Diabetic patients are more prone to Urinary tract infections (UTI). The susceptibility of the infection can vary in different individuals especially when there is underreporting from the patients having a risk of acquiring infections. The present investigation was carried out to evaluate the incidence of UTI in patients with Diabetes and the control. It was reported that between 2013 – 2014, about 150 diabetic and 50 non diabetic urine samples were collected from the people visiting JPM Paramedical Institute at Kolathur area of North Chennai. The collected urine samples were processed by following the Standard laboratory protocol. Prevalence of UTI in the lower socioeconomic status was 20 %, moderate socioeconomic status 35 % and UTI in higher socioeconomic status was 45 %. The type of toilets used by these patients revealed that, 45 % were in use of common toilet (public), 40 % western toilet and about 15 % were in use of Indian toilet respectively. The common UTI Symptoms observed frequently in Diabetic patient as compared to non Diabetic patients were frequent urination, itching, burning, pain and fever etc. The purpose of this study was to evaluate the prevalence of UTI among the diabetic patients and compare them with those of non diabetic ones from the areas of lower socio - economic groups, moderate socioeconomic and higher socioeconomic group.

Key words: Diabetes, Urinary Tract Infection (UTI), Lower socio-economic groups, Moderate socioeconomic, Higher socioeconomic group and Types of toilet used.

1. Introduction

One of the most common infection experienced by humans are Urinary tract infections (UTIs), which exceeded in frequency among ambulatory patients only by respiratory and gastrointestinal infections (Levi *et al.*, 2005) and it is the most common non-intestinal infection in women worldwide (Dielubanza, 2011). According to Nicole and Jon (2008), every woman has a 60 % life time risk of developing bacterial cystitis, which builds up mostly before the age of

24. But, men have a lifetime risk of only 13 %. Jensen *et al.* (2006) reported that in children approximately 5 % of girls and 1 % of boys have a UTI by 11 years of age.

Generally UTI is not considered a cause of significant mortality, UTI do represent an important cause of morbidity. Typical symptoms associated with UTI include painful urination (triad of dysuria), urgency (the enhanced desire to void the bladder) and frequency (increased frequency of urination) which is not thought to cause significant mortality, UTI have the potential for serious and life - threatening consequence if

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left untreated or undertreated. This is more likely to be the case where access to or availability of timely and appropriate medical intervention is limited due to inadequate numbers of health care providers such as in much of Central America. Possible sequel includes pyelonephritis which can lead to renal scarring and sepsis (Litwin and Saigal, 2007).

It is difficult to determine the actual prevalence of UTI in the population from these data; however, we believe, based on our clinical observations, the prevalence of UTI in north Chennai is likely to be significantly higher than what has been previously reported in other parts of Chennai. North Chennai has more slum dwellers, unplanned habitation and socioeconomically backward population. Underrepresentation of urban poor inside the major city of Chennai may have contributed to this under estimation. Hence, the present investigation was carried out in Kolathur area of North Chennai.

2. Material and Methods

The present investigation was carried out to evaluate the incidence of UTI in Diabetics and the control. About 150 known diabetic and 50 non diabetic urine samples were collected from the people visiting JPM Paramedical Institute at Kolathur area of North Chennai.

Specimen Collection

Clean voided midstream urine samples were collected in sterile containers. Urine samples were processed in the laboratory within 2 hrs of collection. Self prepared questionnaires were given to the subjects (known diabetic and control subjects) to obtain information on age, sex, history of urinary frequency, abdominal pain, burning sensation, itching and fever, etc.

Statistical Analysis

The Statistical software Statpack was used for the analysis of the data. Results were calculated on the basis of number and percentages. The P values were calculated using a 2 test. P

<0.01, 0.001 were considered to be statistically significant.

3. Results

UTI was diagnosed clinically by providers in 200 patients and 100 normal persons. Among these 200 UTI, 150 was known diabetic and 50 non-diabetic. Based on age the UTI variation in patients (47.44 %) and normal persons (48.75 %) were found to be insignificant. The females are more prone to UTI (60 %) as compared to male (40 %) respectively. Similarly, an insignificant relation was observed in UTI patients using Public Toilet, Western Toilet and Indian Toilet (58 %, 42 % and 58 %) as compared to normal subjects (50 %, 67 % and 63 %). The UTI prevalence was significantly high in Low Socioeconomic Status (62 %) and Moderate Socioeconomic Status patients (60 %) as compared to high Socioeconomic Status (48 %) and normal person. The prevalence of UTI was considerably high in patients with Diabetes (75 %) and less in non diabetics (25 %) (Table - 1).

The Table - 2 shows the Comparison of Clinical Symptoms in UTI patients (Diabetics and non Diabetics) and control population. Symptoms like Frequent Urination (48 %), Itching (40 %), Burning (45 %), pain (20 %) and fever (18 %) was found to be significant at <0.001, as compared to the control population (27 %, 17 %, 15 %, 12 % and 10 %) respectively.

The age factor has no significant relationship with UTI in male diabetic population, but it was found to be significant in female diabetic population at <0.02 in the age group of 36 - 55 yrs (45 %). The data on Public Toilet and Indian Toilet used was found to be 43 %, 35 %, 22 % and 50 %, 35 % and 15 %) significant at <0.05 and <0.001 as compared to Western Toilet used (25 %, 35 % and 40 %). Forty per cent of UTI patient were using Western Toilet in the age group of 56 - 75 years, but 25 % and 35 % of the population used Western Toilet in the age group of 15 -35 years and 36 - 55 years respectively. Except fever all other clinical symptoms shows a



Table – 1: Prevalence of UTI in the population based on Age, Sex, Types of toilet used and Socioeconomic Status (%)

S. No	Parameter	UTI % in patients n = 200	UTI % in normal n = 100	P Value
1	Age (Yrs)	47.44	48.75	0.590
2	Male (%)	40	45	0.408
3	Female (%)	60	55	0.408
4	Using Public Toilet (%)	58	50	0.408
5	Using Western Toilet (%)	42	37	0.189
6	Using Indian Toilet (%)	58	63	0.406
7	Low Socioeconomic Status (%)	62	40	<0.001**
8	Moderate Socioeconomic Status (%)	60	62	0.408
9	High Socioeconomic Status (%)	48	70	<0.001**
10	Diabetics (%)	75	25	<0.001**
11	Non Diabetics (%)	25	75	<0.001**

Table – 2: Comparison of Clinical Symptoms for UTI in diabetic and control population

S. No	Parameter	UTI % n = 200	Non UTI % n = 100	P Value
1	Frequent Urination	48	27	<0.001**
2	Itching	40	17	<0.001**
3	Burning	45	15	<0.001**
4	Pain	20	12	0.085
5	Fever	18	10	<0.001**

Table – 3: Comparison of Prevalence of UTI between Diabetic population based on age, sex and clinical symptoms

S. No	Parameter	UTI % (n = 200)			
		Age 15-35 yrs	Age 36-55 yrs	Age 56-75 yrs	P-value
1	Male (%)	28	32	40	0.326
2	Female (%)	34	45	21	<0.02*
3	Using Public Toilet	43	35	22	<0.05*
4	Using Western Toilet	25	35	40	<0.173
5	Using Indian Toilet (%)	50	35	15	<0.001**
6	Frequent Urination	18	34	48	<0.002**
7	Itching	15	45	40	<0.001**
8	Burning	20	30	50	<0.001**
9	Pain	17	53	30	<0.001**
10	Fever	42	30	28	0.179
11	Diabetic n=150 (%)	5	30	65	<0.001**

Table – 4: Comparison of Prevalence of UTI between male and female based on age, types of Toilet used and Clinical Symptoms

S. No	Parameter	UTI (n = 200)		
		Male (n=120)	Female (n=80)	P-value
1	Age % (15-35 yrs)	25	42	<0.02*
2	Age % (36-55 yrs)	35	34	0.884
3	Age % (56-75 yrs)	40	24	<0.02*
4	Using Public Toilet (%)	65	35	<0.001**
5	Using Western Toilet (%)	60	40	<0.01*
6	Using Indian Toilet (%)	40	60	<0.01*
7	Frequent Urination (%)	66	34	<0.001**
8	Itching (%)	40	60	<0.01
9	Burning (%)	20	80	<0.001**
10	Pain (%)	10	15	0.287
11	Fever (%)	45	55	0.167



significant ($p < 0.001$) relationship with all the age group studied. The overall prevalence of UTI in known Diabetic ($n=150$) was 65 % in the age group of 56 - 75 years and observed to be clinically significant (<0.001) (Table - 3).

The sex factor has significant relationship with the age group. In the 15 - 35 yrs age group the females (42 %) showed more prevalence of UTI as compared to males (25 %). But, in the 56 - 75 yrs age group the vice versa was seen (male 40 % and females 24 %) and it is significant at <0.02 in UTI population. The data on Public Toilet and Western Toilet used in male (65 % and 60 %) and in female (35 % and 40 %) and it was found significant at $p < 0.001$, $p < 0.01$. as compared to Indian Toilet used and found to be (40 % in male and 60 % in female) and significant at $p < 0.01$. Clinical Symptoms like, Frequent Urination (66 % in male and 34 % in female) was found significant at $p < 0.001$, whereas in female the symptoms like itching (60 %) burning (80 %) was significant (<0.01 , <0.001) but Pain (15 %) and Fever (55 %) was recorded insignificant (Table - 4).

4. Discussion

The main findings of this study were: the prevalence of UTI among known Diabetic and the control population based on Age, Sex, types of toilet used, Clinical Symptoms and Socioeconomic Status. Our findings suggest that the relevant clinical data which identify the prevalence of UTI in diabetic patients and the control are lacking in Kolathur area of North Chennai. This area is fast growing developing zone of Chennai city with a dense urban population. Many patients do not undergo regular diagnosis for diabetes unless they showcase the symptoms. UTI goes unnoticed in slums, as a consequence of poor economic status. The treatment for UTI appears to be costly for slum dwellers. Many UTI patients in the urban slums face unhygienic conditions, malnutrition and no proper sanitation making the situation worse. Diabetic patients with UTI in slums use over the counter prescriptions which does not eradicate the infection but leads to recurrent infections. The

severe cases of UTI are untreated as a consequence of costly antibiotic treatment.

UTI was found significantly high in diabetic patients of the low socioeconomic status (62 %) as compared to moderate (60 %) and high socioeconomic status (48 %). Interestingly high prevalence of urinary tract infection has been reported among Sudanese females with genital mutilation (Almroth, 2005), which was widely practiced in Central Sudan (El Dareer, 1983). Based on age the UTI variation in patients (47.44 %) and normal persons (48.75 %) were found to be insignificant. The females are more prone to UTI (60 %) as compared to male (40 %) in the present investigation. Wheat (1980) in his study reported that the frequency of UTI was high in diabetic women as a result of *Staphylococcus aureus* and this might also be attributed to frequent sexual activity and close proximity of vagina with Urethra.

Factors like low socio-economic status, sexual activity, washing genitals pre-coitus, post-coitus, not voiding urine post-coitus and washing genitals from back to front have observed as risk factors for UTI during pregnancy by Dimetry *et al.* (2007) and Amiri *et al.* (2009). These factors have not been investigated in the current study. Otherwise, the results would have been changed. UTI was significantly high in diabetic patients of the Lower socioeconomic status (62 %) as compared to high Socioeconomic Status (48 %) in the present study and was found to be in consistent with the work of Wheat (1980). The prevalence of UTI was considerably high in Diabetic patients (75 %) and less in non diabetics (25 %) in the present work. Mehvish Saleem and Betty Daniel (2011) also revealed that there was an alarming increase in UTI in diabetic patients belonging to the lower socioeconomic status as compared to high socioeconomic status.

Out of 200 UTI patients, had symptoms suggestive of Frequent Urination (48%), Itching (40 %), Burning (45 %), Pain (20 %) and Fever (18 %) as compared to normal population (27 %, 27 %, 27 %, 27 % and 27 %).



17 %, 15 %, 12 % and 10 %) respectively in the present study. The studies of Hamdan *et al.* (2011) revealed a significant difference in the prevalence of clinical symptoms like Dysuria, Urgency, Fever to be (24.2 %), (3 %), (100 %) and Vomiting (100 %) between the women with bacteriuria who had a history of UTI in current pregnancy and received antibiotic for that UTI. They further found no significant difference in the sociodemographic and clinical data between bacteriuric and abacteriuric women, Muder *et al.* (2006) reported in their studies that the frequency of symptoms among the diagnosed patients of urinary tract infection was recorded as 48 % of 33 patients had at least 1 new symptom (hematuria, dysuria, suprapubic pain or flank pain) specific to the urinary tract (79 %) of 33 had pyuria.

The age factor has no significant relationship with UTI in male diabetic population, but it was found to be significant in female diabetic population at <0.02 . The data on Public Toilet and Indian Toilet used was found to be significant at <0.05 and <0.001 as compared to Western Toilet used between all age groups. Except fever all other clinical symptoms shows a significant ($p < 0.001$) relationship with all the age group studied. The overall prevalence of UTI in known Diabetic ($n = 150$) was (65 %) in the age group of 56 - 75 years and observed to be clinically significant (<0.001). Yu *et al.* (2014) also indicated that the risk of UTI increased among diabetic patients are associated with the enhance in the incidence of type 2 diabetes mellitus worldwide in recent years, which may impose a substantial burden on medical costs.

The sex factor has significant relationship with the age group. In the 15 - 35 yrs age group the females (42 %) showed more prevalence of UTI as compared to males (25 %). But, in the 56 - 75 yrs age group the vice versa is seen (male 40 % and females 24 %) and it is significant at <0.02 in UTI population. Orna Nitzan *et al.* (2015) also reported in their review that previously diagnosed diabetic women had a higher risk of UTI than those with recently diagnosed diabetes (within 6 months) in London.

The data on Public Toilet and Western Toilet used in male (65 % and 60 %) and in female (35 % and 40 %) and it was found significant at $p < 0.001$, $p < 0.01$. as compared to Indian Toilet used (40 % in male and 60 % in female) and found significant at $p < 0.01$. Diagnosis of clinical symptoms in male and female reveal that symptoms like, Frequent Urination (66 % in male and 34 % in female) was found significant at $p < 0.001$, whereas in female the symptoms like itching (60 %), burning (80 %) was significant (<0.01 , <0.001) but Pain (15 %) and Fever (55 %) was insignificant. Muder *et al.* (2006) reported similar difference between male and female with regard to the expression of clinical symptoms.

5. Conclusion

The present study recorded that UTI are common among patients with diabetes and it is more severe, caused by more resistant pathogens, and is associated with worse outcomes than in patients without diabetes. Treatment should be tailored according to severity of infection and culture results. Further studies are needed to improve the treatment of patients with diabetes and UTI.

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