UNVEILING THE DIFFERENCES:A CLINICO MICROBIOLOGICAL COMPARISION OF RECURRENT URINARY TRACT INFECTION IN PREMENOPAUSAL AND POSTMENOPAUSAL WOMEN

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ABSTRACT:

Recurrent urinary tract infection (rUTI) is defined as ≥2 episodes within 6 months or ≥3 episodes within 12 months. Urinary tract infections affect up to 50% of women in their lifetime, with almost half of these women experiencing a recurrence in 6–12 months. A subset of women experiences rUTI, with estimates ranging from 2 to 10%.

A cross-sectional study was performed to compare and assess the clinical characteristics and microbiological pattern of Recurrent Urinary Tract Infection in premenopausal women and postmenopausal women. A data collection was prepared to collect data from inpatient medical records regarding current presentation, susceptibility pattern of causative of organisms and the prescription pattern of antimicrobials in Recurrent Urinary Tract Infection in a tertiary care hospital. Overall, 120 female patients from inpatient settings, diagnosed with recurrent UTI were included in the study. Of these, 50 patients were pre-menopausal and 70 were post-menopausal women.

Fever (51.6%), dysuria (41.6%) and urinary incontinence (20.8%) were the most common symptoms of the patients in UTI. Diabetes mellitus (61.66%) was the most common comorbidity found in the patients followed by hypertension (53.33%). The study data showed that the patients in both the groups were anaemic. Elevated RBS was observed in post-menopausal women (112.41 ± 45.03) when compared to pre-menopausal women (193.41±132.40). The mean serum urea level (28.33 ± 23.58) and mean serum creatinine (0.55 ± 0.18) was higher in post-menopausal women. A significant difference in the proportions of patients with abnormal level of protien, RBC and epithelial cells in the urine between two groups was observed.

Escherichia coli [58 (48.33%)] was the most found causative agent of rUTI, followed by Enterococcus species [32 (26.67%)] and Klebsiella species [28 (23.33%)]. Multi-drug resistance was seen in 61 (50.83%) of the total 120 cases. The most resistant class of drugs found after assessing the culture reports are Penicillin antibiotics, Cephalosporins, Fluoroquinolones, Nitrofurantoin and Carbapenems. Ceftriaxone was the most prescribed antibiotic for rUTI followed by Piperacillin and tazobactam, Ciprofloxacin, Nitrofurantoin, Trimethoprim and Sulfamethoxazole, and Levofloxacin.

Keywords: Urinary tract infection, Antimicrobial susceptibility tests, Antimicrobial resistance, Multi drug resistance.

Introduction:

A urinary tract infection (UTI) is an infection in any part of the urinary system. It is defined as bacteriuria along with urinary symptoms. Urinary tract infection (UTI) is one of the most common infections in women. It is diagnosed in over 7 million women annually [1]. In acute cystitis, even 1,000 cfu/ml and, in acute pyelonephritis, 10,000 cfu/ml may be sufficient for diagnosis in a symptomatic patient. Recurrent urinary tract infection (rUTI) is defined as ≥2 episodes within 6 months or ≥3 episodes within 12 months [2]. Urinary tract infections affect up to 50% of women in their lifetime, with almost half of these women experiencing a recurrence in 6–12 months. A subset of women experiences rUTI, with estimates ranging from 2 to 10%.[3] Cystitis (lower UTI) typically presents with local symptoms dysuria, frequency, urgency, pain, and/or bladder tenderness. Pyelonephritis (upper UTI) is associated with flank pain and signs of general infection such as fever, nausea and vomiting, or costovertebral angle tenderness, with or without cystitis symptoms. [4]

When bacterial virulence increases or host defense mechanisms decrease, bacterial inoculation, colonization, and infection of the urinary tract occurs. Careful diagnosis and treatment results in successful resolution of infections in most instances. Treatment of recurrent urinary tract infection requires

understanding of the pathogenesis of UTI and the role of host and bacterial factors.[5] UTIs can be caused by (Gram-positive or Gram-negative) bacteria, viruses or fungi, with more than 80% of UTIs being of bacterial origin. Most UTIs (75%) are caused by *Escherichia coli*, followed by *Klebsiella pneumoniae, Staphylococcus saprophyticus, Enterococcus faecalis* and *Proteus mirabilis*. [6]

According to several studies, risk factors associated with recurrent UTI in sexually active premenopausal women are sexual intercourse, use of spermicides, the age of first UTI (less than 15 years of age indicates a greater risk of rUTI). Menopause predisposes women to recurrent UTI (rUTI), as normally lower levels of estrogen lead to changes in the urogenital epithelium and subsequently the urogenital microbiome [7]. In postmenopausal women Utero-vaginal prolapse, urinary incontinence and post void residual urine are important risk factors [8].

Methodology:

Study design: A cross-sectional study was performed to compare and assess the clinical characteristics and microbiological pattern of Recurrent Urinary Tract Infection in premenopausal women and postmenopausal women. A data collection was prepared to collect data from inpatient medical records regarding current presentation, susceptibility pattern of causative of organisms and the prescription pattern of antimicrobials in Recurrent Urinary Tract Infection in a tertiary care hospital.

Study site: Srinivas Institute of Medical Science and Research Centre, Mukka, Mangalore.

Study design: A hospital-based observational study.

Study period: 6 months

Study sample size: 120

Ethics committee: Srinivas Institute of Medical Science and Research Centre, Mukka –574146

Study criteria:

Inclusion criteria:

- Female patients from inpatient settings diagnosed with rUTI

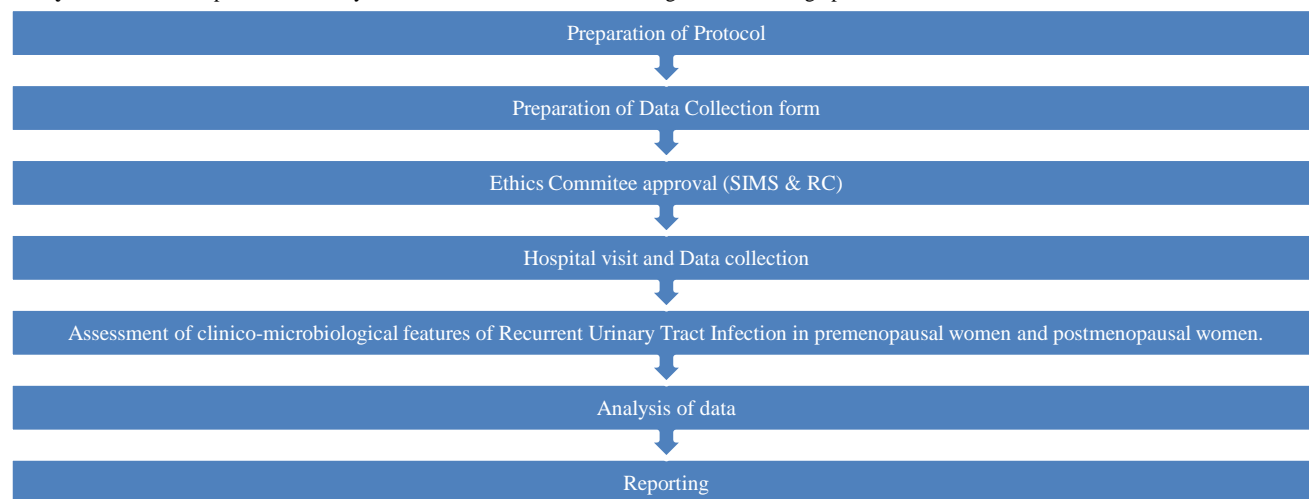- Patients with positive urine culture and sensitivity report

Exclusion criteria:

- Patients below 18 years of age

- Patients suffering from renal impairment

Data source: Medical records from inpatient and outpatient settings

Materials used: Data collection form

Study method: A hospital-based study which will be conducted according to thefollowing operational modalities.

Preparation of Protocol
Preparation of Data Collection form
Ethics Commitee approval (SIMS & RC)
Hospital visit and Data collection
Assessment of clinico-microbiological features of Recurrent Urinary Tract Infection in premenopausal women and postmenopausal women.
Analysis of data
Reporting

Statistical analysis:

Results were expressed as mean ± standard error of mean. All the data were analysed using a one-way analysis of variance, followed by Dunnett's test (*$p < 0.05$)

Results

Patient Socio-demographics

Overall, 120 female patients diagnosed with recurrent UTI were included in the study. Of these, 50 patients were pre-menopausal and 70 were post-menopausal women (Figure 01). The mean age of pre-menopausal women was 24.91 ± 12.83 years and post- menopausal was 61.10±10.54 years.
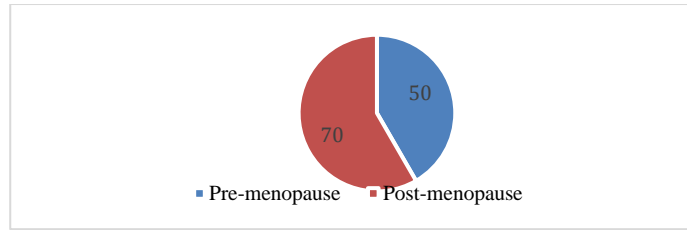
Figure 01: Distribution of subjects based on menopause status

Clinical Characteristics

Fever (51.6%), dysuria (41.6%) and urinary incontinence (20.8%) were the most common clinical presentation of the patients in UTI. Comparison of clinical characteristics between pre and post-menopausal patients are shown in Table 01 and Figure 02.

Table 01: Clinical characteristics between pre and post-menopausal patients

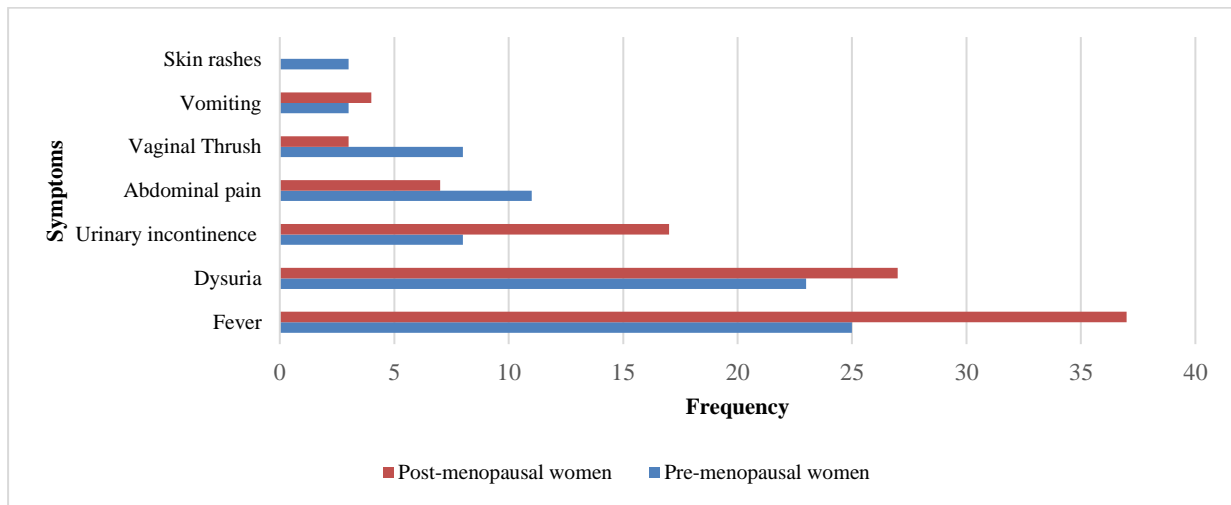| Symptoms	Total (%)	Pre-menopausal women n (%)	Post- menopausal women n (%)	P value
Fever	62 (51.6)	25 (50)	37 (52.8)	>0.05
Dysuria	50 (41.6)	23 (46)	27 (38.5)	>0.05
Urinary incontinence	25 (20.83)	08 (17)	17 (24.2)	>0.05
Abdominal pain	18 (15)	11 (22)	7 (10)	>0.05
Vaginal Thrush	11 (09)	8 (17)	3 (04)	>0.05
Vomiting	7 (06)	3 (06)	4 (05)	>0.05
Skin rashes	3 (02)	3 (06)	0 (0)	>0.05

Figure 02: Clinical characteristics between pre and post-menopausal patients

Medical history of the patients was studied and it was found that out of 120 patients, 74 (61.66%) were diabetic. 64 (53.33%) were suffering from hypertension. Other comorbidities present in the patients were Hypothyroidism (17.5%), IHD (15%), COPD (3.33%), Atrial fibrillation (3.33%) and CAD (5.83%), as shown in Table 02 and Figure 03.

Table 02: Frequency of comorbidities

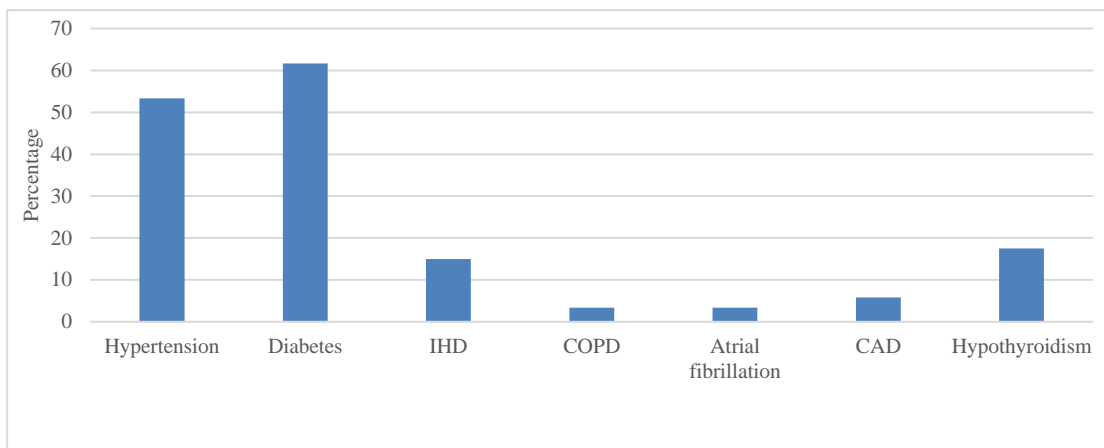| Sl. No	Co-Morbidities	Frequency	Percentage
1	Hypertension	64	53.33
2	Diabetes	74	61.66
3	IHD	18	15
4	COPD	4	3.33
5	Atrial fibrillation	4	3.33
6	CAD	7	5.83
7	Hypothyroidism	21	17.5

Figure 03: Frequency of comorbidities

The study data showed that the patients in both the groups were anaemic and there was no significant difference in the mean hemoglobin levels and RBC count between the groups. The mean Total Leukocyte Count was 11662.5 ± 6804.92 and 10126.21±5342.05 in pre and post-menopausal women respectively which was higher than the normal range (3000-10000 cells/cumm of blood). However, the difference was found to be non-significant. According to the study data, patients of both the groups had elevated Erythrocyte Sedimentation Rate. In comparison, there was a significant increase of the Erythrocyte Sedimentation Rate in post- menopausal women (22.58± 19.84) than pre-menopausal women (55.96±64.07).

Biochemical investigations showed significant difference of RBS, serum urea and serum creatinine between pre-menopausal women and post-menopausal women as shown in Table 03. Elevated RBS was observed in post-menopausal women (112.41 ± 45.03) when compared to pre-menopausal women (193.41±132.40). The mean serum urea level was observed to be higher post-menopausal women (28.33 ± 23.58) in contrast to pre-menopausal women (44.4 ± 10.54). It was observed that the mean value of serum creatinine was higher in post-menopausal women (0.55 ± 0.18) compared to pre-menopausal women (1.41 ± 1.36).

Table 03: Comparison of laboratory parameters between pre and post-menopausal patients

Parameters	Pre-menopause mean±SD	Post-menopause mean±SD	P value
Hemoglobin	10.72±1.95	10.87±2.49	0.71
RBC	3.95 ± 0.67	3.81±0.75	0.29
Total Leukocyte Count	11662.5 ± 6804.92	10126.21±5342.05	0.16
Erythrocyte Sedimentation Rate	22.58± 19.84	55.96±64.07	**<0.01****
RBS	112.41 ± 45.03	193.41±132.40	**<0.001*****
Urea	28.33 ± 23.58	44.4 ± 10.54	**<0.001*****
Creatinine	0.55 ± 0.18	1.41 ± 1.36	**<0.001*****
Values are expressed as mean ±SEM; n=6. One-way ANOVA followed by Dunnet's t-test compared to control. *p<0.05, **p<0.01, ***p<0.001.			

Out of the 120 patients, 6 (05%) patients had brownish coloured urine (1 in pre and 5 in post menopausal women). In total 80 (66.8), 29 (24.2) and 11 (09.2) patients had urine pH value of 5,6 and 6.5 respectively. Total of 92 (76.7%) patients had turbid urine. 31 (25.8%) of the patients had sugar present in urine. 31 (25.8%) out of 120 patients also had presence of protien in the urine.

Microscopical analysis of urine showed that 61 (50.8%) out of the total 120 patients had higher than normal levels of RBC in the urine. 80 (67%) had increased amount of pus cells and 54 (45%) had abnormal value of epithelial cells in the urine. The study data from urine analysis revealed significant difference in the proprtions of patients with abnormal level of protien, RBC and epithelial cells in the urine between pre and post-menopausal women, as shown in Table 04.

Table 04: Comparison of Urine analysis between pre and post-menopausal patients

Parameters		Total n(%)	Pre-menopause n (%)	Post-menopause n (%)	P value
Colour	Pale yellow	114 (95)	49 (98)	65 (92.8)	0.20
	Brownish	6 (05)	1 (2)	5 (7.14)	
pH	5	80 (66.8)	32 (63.63)	48 (68)	0.69

	6	29 (24.2)	14 (27.27)	15 (21.4)	
	6.5	11 (09.2)	4 (9.09)	7 (10.71)	
Transparency	Clear	28 (23.3)	13 (26)	15 (21.42)	0.56
	Turbid	92 (76.7)	37 (74)	55 (78.6)	
Sugar	Present	31 (25.8)	9 (18)	22 (32)	0.098
	Absent	89 (74.2)	41 (82)	48 (68)	
Blood	Present	34 (28.3)	14 (27.27)	20 (28.57)	0.945
	Absent	86 (71.7)	36 (72.73)	50 (71.42)	
Protein	Present	31 (25.8)	4 (9.09)	27 (39.2)	**<0.01**[**]
	Absent	89 (74.2)	46 (90.91)	43 (60.71)	
RBC	0-2/hpf	59 (49.2)	4 (9.09)	53 (75)	**<0.01**[**]
	>2/hpf	61 (50.8)	46 (90.91)	17 (25)	
Pus cells	0-5/hpf	40 (33)	18 (36.36)	22 (32.14)	0.60
	>5/hpf	80 (67)	32 (63.63)	48 (67.86)	
Epithelial cells	0-3/hpf	66 (55)	13 (27.27)	53 (75)	**<0.01**[**]
	>3/hpf	54 (45)	37 (72.73)	17 (25)	
Values are expressed as mean ±SEM; n=6. One-way ANOVA followed by Dunnet's t-test compared to control. *p<0.05, **p<0.01, ***p<0.001.					

MICROBIOLOGICAL PROFILE IN RECURRENT UTI

By assessing the culture reports of the patients, it was found that in both pre and post-menopausal women Escherichia coli [58 (48.33%)] was the most found causative agent of rUTI, followed by Enterococcus species [32 (26.67%)] and Klebsiella species [28 (23.33%)]. However, the incidence of E. coli caused rUTI was significantly higher in pre-menopausal women compared to post-menopausal women. List of organisms isolated by urine culture of the patients are given in Table 05 and Figure 04.

Table 05: Frequency and distribution pattern of pathogens

| Sl. No.	Organism	Total		Pre-menopausal women		Post-menopausal women	
		Frequency	%	Frequency	%	Frequency	%
1.	Escherichia coli	58	48.33	19	38	39	55.71
2.	Enterococcus faecium	28	23.33	8	08	20	28.57
3.	Enterococcus faecalis	4	3.33	0	00	4	5.71
4.	Klebsiella pneumonia	21	17.5	6	12	15	21.42
5.	Klebsiella oxytoca	7	5.83	0	00	7	10
6.	Pseudomonas aeruginosa	8	6.67	2	00	6	10
7.	Group b Beta Haemolytic Streptococcus agalactiae	11	9.17	2	04	9	12.85
8.	Proteus mirabillis	11	9.17	3	06	8	11.42
9.	Coagulase Negative Staphylococcus	4	3.33	4	08	0	0
10.	Gram B Beta Haemolytic Streptococci	4	3.33	4	08	0	0
11.	Candida species	9	7.5	6	12	3	4.28
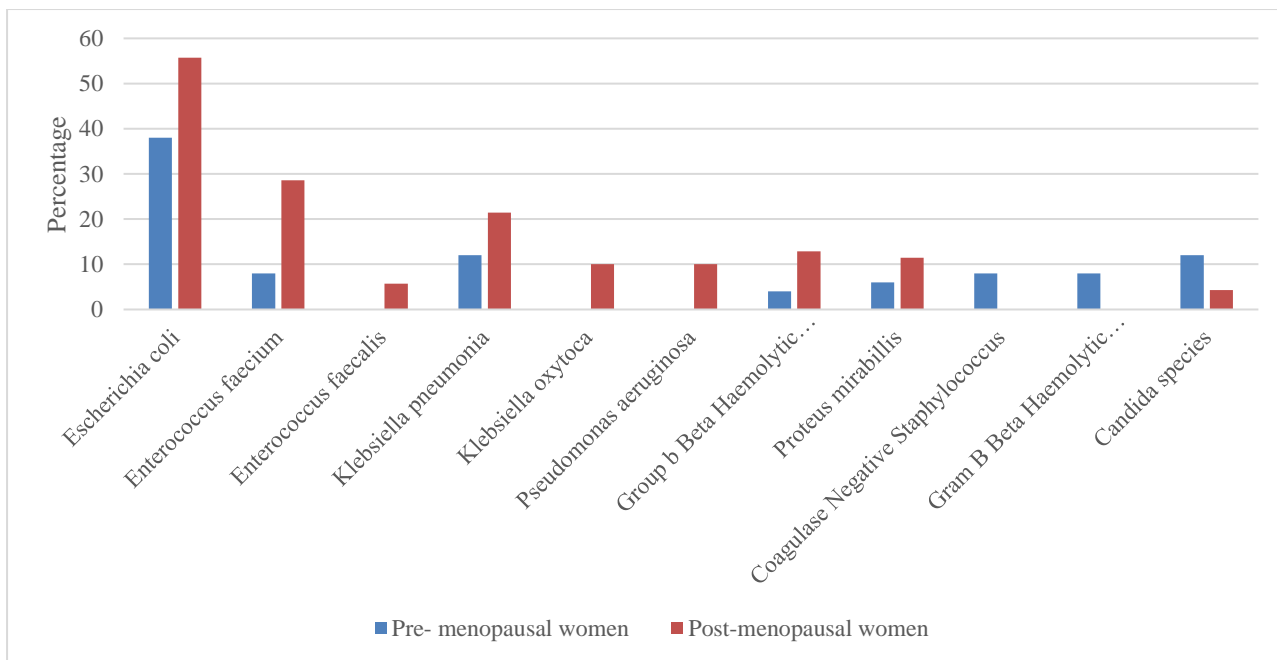
Figure 04: Frequency and distribution pattern of pathogens

Multi-drug resistance was seen in 61 (50.83%) of the total 120 cases. Prevalence of drug resistance pathogens are depicted in Table 06 and Figure 05. It was found that the there was significant difference in the prevalence of Multi-drug Resistance (MDR) in pathogens ($p<0.05$).

Table 06: Prevalence pattern of Multi-drug Resistance (MDR) in pathogens

| Sl. No.	Organism	Total		Pre-menopausal women		Post-menopausal women		P value
		Frequency	%	Frequency	%	Frequency	%	
1.	Escherichia coli	25	20.83	10	20	15	21.42	
2.	Enterococcus faecium	21	17.5	5	10	16	22.85	
3.	Enterococcus faecalis	6	5	1	2	5	7.14	
4.	Klebsiella pneumonia	4	3.33	2	4	2	2.85	
5.	Klebsiella oxytoca	7	5.83	1	2	6	8.57	$<0.05^*$
6.	Pseudomonas aeruginosa	21	17.5	13	26	8	11.42	
7.	Group b Beta Haemolytic Streptococcus agalactiae	32	26.67	13	26	19	27.14	
8.	Proteus mirabillis	8	6.67	2	4	6	8.57	
9.	Coagulase Negative Staphylococcus	1	0.83	0	0	1	1.43	
10.	Gram B Beta Haemolytic Streptococci	1	0.83	0	0	1	1.43	
Values are expressed as mean ±SEM; n=6. One-way ANOVA followed by Dunnet's t-test compared to control. *$p<0.05$, **$p<0.01$, ***$p<0.001$.								
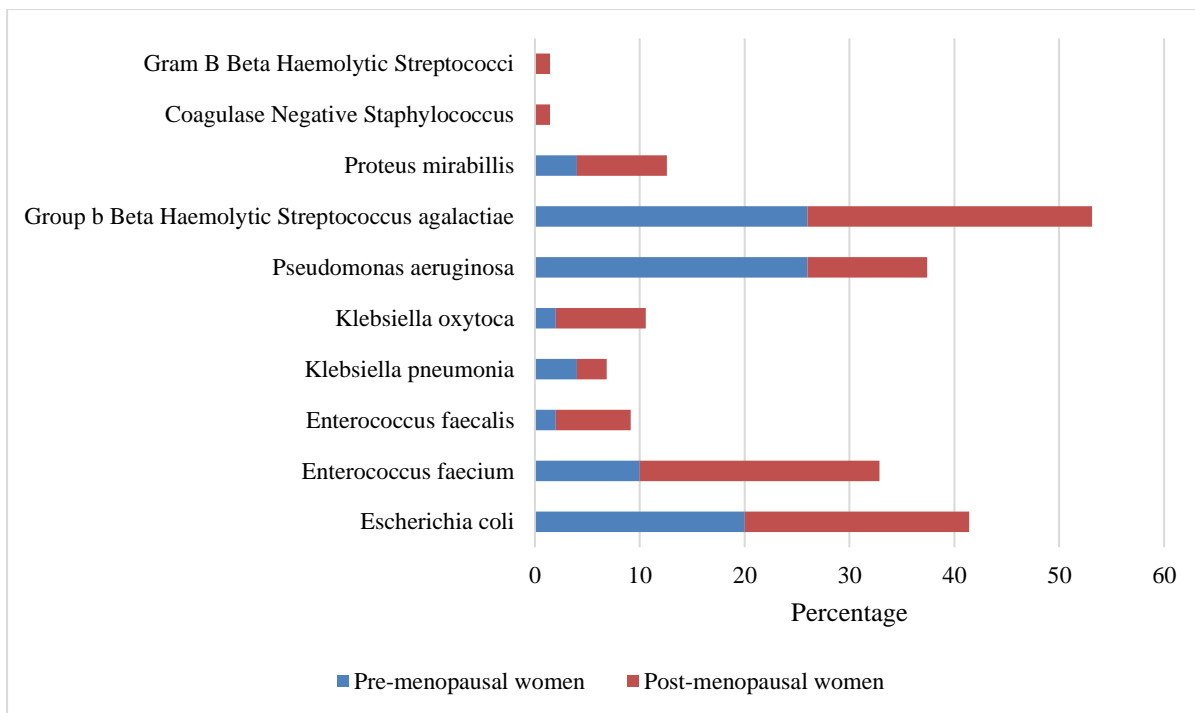
Figure 05: Prevalence pattern of Multi-drug Resistance (MDR) in pathogens

The most resistant class of drugs found after assessing the culture reports are Penicillin antibiotics, Cephalosporins, Fluoroquinolones, Nitrofurantoin and Carbapenems. Resistance pattern and its distribution in pre and post-menopausal women is depicted in Table 07 and Figure 06. Resistance pattern of individual drugs in pre and post-menopausal women is shown in Table 08.

Table 07: Resistance pattern and distribution of the pathogens to various antibiotic class

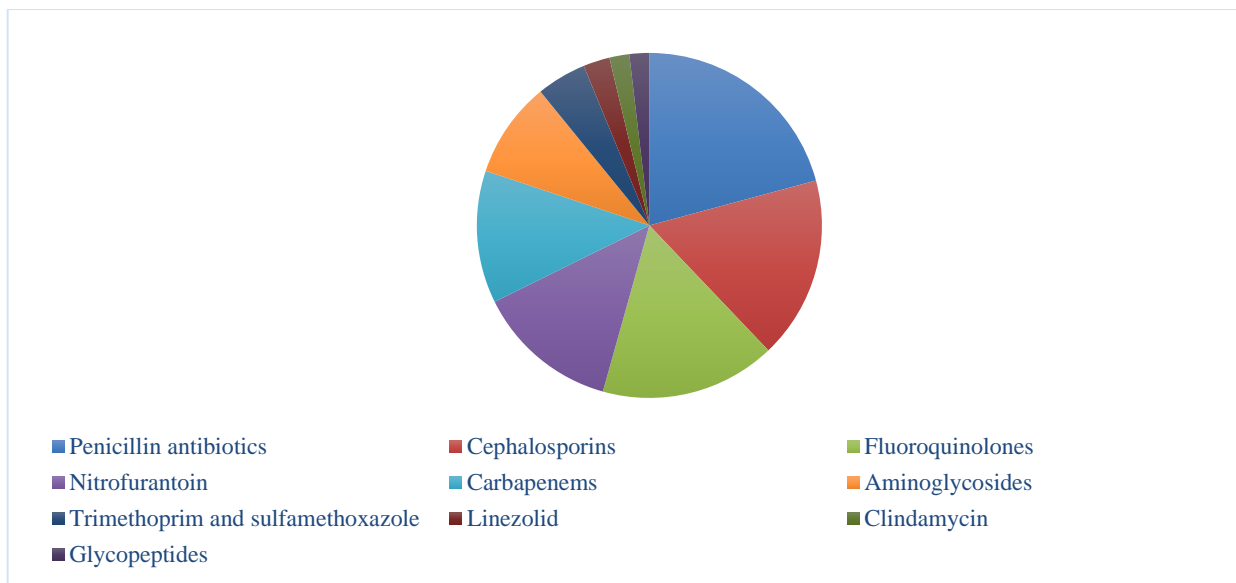| Sl. No.	Antimicrobial class	Total		Pre-menopausal women		Post-menopausal women	
		Frequency	%	Frequency	%	Frequency	%
1.	Penicillin antibiotics	67	55.83	35	70	32	45.71
2.	Cephalosporins	55	45.83	25	50	30	42.85
3.	Fluoroquinolones	53	44.17	15	30	38	54.28
4.	Nitrofurantoin	43	35.83	20	40	23	32.85
6.	Carbapenems	40	33.33	20	40	20	28.57
7.	Aminoglycosides	29	24.16	20	40	9	12.85
8.	Trimethoprim and sulfamethoxazole	15	12.5	3	6	12	17.14
9.	Linezolid	8	6.66	4	8	4	5.71
10.	Clindamycin	6	5	0	0	6	8.57
11.	Glycopeptides	6	5	0	0	6	8.57

Penicillin antibiotics   Cephalosporins   Fluoroquinolones

Nitrofurantoin   Carbapenems   Aminoglycosides

Trimethoprim and sulfamethoxazole   Linezolid   Clindamycin

Glycopeptides

Figure 06: Resistance pattern and distribution of pathogens to various antibiotic class

Table 08: Resistance pattern and distribution of the pathogens to various antibiotics

Sl. No.	Antimicrobial	Total		Pre-menopausal women		Post-menopausal women	
		Frequency	%	Frequency	%	Frequency	%
1.	Ampicillin	67	55.83	35	70	32	45.71
2.	Ciprofloxacin	55	45.83	25	50	30	42.85
3.	Levofloxacin	53	44.17	15	30	38	54.28
4.	Cefazolin	45	37.5	15	30	30	42.85
5.	Nitrofurantoin	43	35.83	20	40	23	32.85
6.	Imipenem	40	33.33	20	40	20	28.57
7.	Amoxicillin and Potassium Clavulanate	36	30	10	20	26	37.14
8.	Gentamicin	35	29.16	15	30	20	28.57
9.	Meropenem	30	25	10	20	20	28.57
10.	Cefuroxime	30	25	10	20	20	28.57
11.	Amikacin	29	24.16	20	40	9	12.85
12.	Cefoperazone and Sulbactam	25	20.83	5	10	20	28.57
13.	Piperacillin	22	18.33	5	10	17	24.28
14.	Cefotaxime	20	16.66	5	10	15	21.43
15.	Trimethoprim and sulfamethoxazole	15	12.5	3	6	12	17.14
16.	Ceftriaxone	10	8.33	4	8	6	8.57
17.	Linezolid	8	6.66	4	8	4	5.71
18.	Clindamycin	6	5	2	4	4	5.71
19.	Vancomycin	6	5	0	0	6	8.57
20.	Teicoplanin	6	5	0	0	6	8.57
21.	Ampicillin + gentamycin synergy	6	5	0	0	6	8.57

| 22. | Cefixime | 3 | 2.5 | 1 | 2 | 2 | 2.85 |
| 23. | Ceftazidime | 2 | 1.66 | 1 | 2 | 1 | 1.42 |

Antibiotic prescription pattern in recurrent uti

Assessment of the prescriptions of the patients showed that Ceftriaxone (40.83%) was the most prescribed antibiotic for rUTI followed by Piperacillin and tazobactam (16.67%), Ciprofloxacin (10.83%), Nitrofurantoin (7.5%), Trimethoprim and Sulfamethoxazole (5.83%), Levofloxacin (5.83%), Meropenem (3.33%), Amikacin (2.5%), Amoxicillin and Potassium Clavulanate (2.5%), Clindamycin (0.83%), Linezolid (0.83%), Cefixime (0.83%), Ceftazidime (0.83%) and Cefuroxime (0.83%), as shown in Table 09 and Figure 07.

Table 09: Prescription pattern of antimicrobials in pre and post-menopausal women

| Sl. No.	Antimicrobial	Total		Pre-menopausal women		Post-menopausal women	
		Frequency	%	Frequency	%	Frequency	%
1.	Ceftriaxone	49	40.83	21	42	28	40
2.	Piperacillin	20	16.67	9	18	11	15.71
3.	Ciprofloxacin	13	10.83	10	20	3	4.28
4.	Nitrofurantoin	9	7.5	8	16	1	1.43
5.	Trimethoprim and sulfamethoxazole	7	5.83	2	04	5	7.14
6.	Levofloxacin	7	5.83	7	14	0	0
7.	Meropenem	4	3.33	1	02	3	4.28
8.	Amikacin	3	2.5	0	0	3	4.28
9.	Amoxicillin and potassium clavulanate	3	2.5	3	06	0	0
10.	Clindamycin	1	0.83	1	02	0	0
11.	Linezolid	1	0.83	0	0	1	1.43
12.	Cefixime	1	0.83	1	02	0	0
13.	Ceftazidime	1	0.83	1	02	0	0
14.	Cefuroxime	1	0.83	1	02	0	0
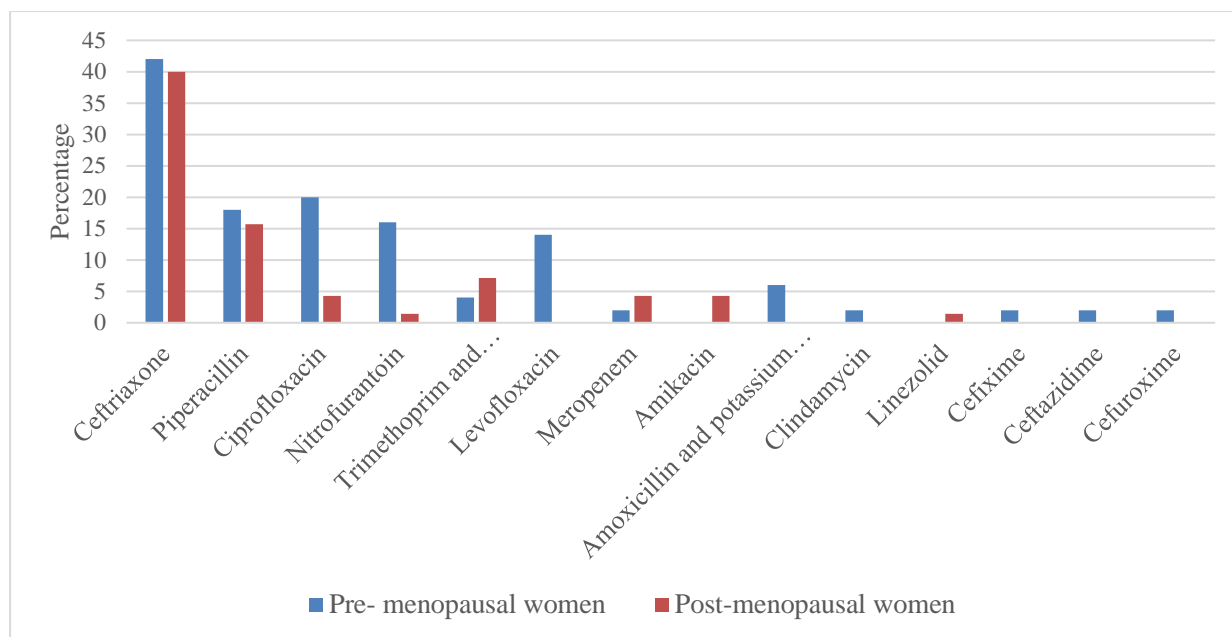
Figure 07: Prescription pattern of antimicrobials in pre and post-menopausal women

Discussion :

Recurrent UTI remains an important public health problem in women of all ages. The data reported here and in other recent studies of recurrent UTI suggest that the factors underlying rUTI differ by age and functional status. The study aimed at comparing the clinico-microbiological pattern between pre and post-menopausal women. A total of 120 patients suffering from rUTI were included in the study, out of which 50 were in pre-menstrual period and 70 were in post-menstrual period.

According to the study data, it was found that fever, dysuria and urinary incontinence were the most common clinical presentation of the patients in UTI. These results were consistent with study done by Eshwarappa M. *et al*., which showed that most observed clinical symptoms of rUTI in women were fever and dysuria. [9] Assessment of medical history of the patients was study showed that most of the patients were diabetic. Diabetes may cumulate to the risk of developing rUTI, as indicated by a study done by Subramani J. *et al*., which showed that besides the micro and macrovascular complications, diabetes can dysregulate the immune mechanisms and thereby increasing the risk of UTIs.[10]

It was observed that both the group had lower levels of hemoglobin. This can be explained by the study done by Shobha B. *et al.,* which showed that the hemoglobin levels in pre-menopausal women is affected by menstruation, whereas co-morbidities in old age might affect the hemoglobin levels of women after menopause. Interpretation of the study data showed that there was a significant increase of the Erythrocyte Sedimentation Rate in post- menopausal women compared to pre-menopausal women.[11]

Similarly, biochemical investigations such as RBS, serum urea and serum creatinine between pre-menopausal women and post- menopausal women showed significant difference. According to the study, most common abnormal results obtained by urine routine and microscopy were turbid urine, proteinuria and presence of elevated pus and epithelial cells. A possible explanation for these variations could be explained by the results of the study done by Oluboyo A.O *et al.,*, which concluded that metabolic changes and the appearance of many diseases tend to occur following the onset of menopause that may cause further damage to kidney functions.[12]

The study data revealed that the most common pathogen of rUTI was E. coli, followed by Enterococcus species and Klebsiella species. These results were consistent with a study conducted by Bhuvanesh S. K *et al*. in a tertiary care hospital of South India.[13]

The proportion of causative organisms differed significantly pre-menopausal women in comparison with post-menopausal women. these results were consistent with the study conducted by Mazokopakis E. *et. al.,* where there was noticeable difference in the percentages of causative organisms. Decrease in estrogenic levels after menopause leads to decrease in rate of replenishment of normal flora of urinary tract, allowing infections by various microorganisms.[14]

Assessment of urine cultures of the patients revealed that a significant proportion of isolated bacteria were multi-drug resistant. Prevalence of drug resistance pathogens were significantly higher in post-menopausal women compared to pre-menopausal women. these results might be the result of imbalanced natural flora of urinary system and prolonged exposure to antibiotics leading to increased antibiotic resistance in post-menopausal women. According to susceptibility reports studied, most resistant class of drugs to pathogens were Penicillin antibiotic followed by Cephalosporins, Fluoroquinolones, Nitrofurantoin and Carbapenems**.** Similar results were concluded in a study conducted by Amna K *et al.*[15]

Most prescribed antibiotics were Ceftriaxone followed by Piperacillin and tazobactam, Ciprofloxacin, Nitrofurantoin, Trimethoprim and Sulfamethoxazole, Levofloxacin, Meropenem and Amikacin. These results were consistent with the findings of a study carried out by Chowta M. *et al.*[16] The possible reason is that these agents are used as first-line drugs for the treatment of UTIs in the country.

Future Prospectives:

The results obtained from our study can help in the following aspects:
- Identification of the right drug for initiating empiric treatment of Recurrent UTI
- Aiding in early detection and diagnosis of Recurrent UTI.
- Creating awareness in healthcare professionals concerning antimicrobial resistance.

Conclusion :

The present study aimed at providing information of current scenario of clinical features and microbiological susceptibility data of pre- menopausal and post-menopausal women suffering from rUTI. Clinical symptoms of rUTI were similar between both the groups. However, Biochemical investigations showed that rUTI had higher physiological effects on the patients after menopause. Most of the pathogens isolated by urine culture were found to be multi-drug resistance indicating the need for proper diagnosis and rational use of antibiotics.

The cause for such increase in resistance to various antibiotics can be controlled if proper empiric treatment is being administered to the patients. This would also help to minimize further complications and better recovery from rUTI.

Periodic assessment of antibiotic susceptibility of pathogens causing UTI is necessary to revise the guidelines for administering initial treatment. The prevalence of pathogen and its resistance can vary between various ethnicities and geographical locations. Hence, it is recommended to regularly evaluate the susceptibility of infective microorganisms.

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