

Knowledge Attitude and Practices Regarding Urinary Tract Infection Among Pakistani Diabetic Females

Afsheen Atta¹, Wajid Hussain¹, Javaria Malik¹, Salman Abbasi¹, Ather Mehmood¹, Attiya Hameed Khan², Amna Parvez¹, Arsalan Abdullah¹, Abdul Samad Abbasi¹, Adnan Shah²
South East Hospital and Research Center¹, Islamabad, Peshawar Institute of Cardiology², Peshawar.

Abstract

Background: Urinary tract infections (UTIs) in women are one of the most prevalent infections occurring at various stages of life. UTI represents one of the most common, challenging and widely misunderstood infectious diseases among women as outpatient and nosocomial infections leading to morbidity.

Aim: The objective of our study was to determine the knowledge, attitude and practices of urinary tract infection among Pakistani diabetic females and create awareness regarding its preventive measures.

Study type, settings & duration: This observational study was carried out at South East Hospital and Research Center, Islamabad over a period of six month from February to August 2022.

Methodology: The non probability convenient sampling method technique was used. Data was collected through pre-structured proforma and entered in SPSS version 25.0. Questionnaire written in English and local language was handed over to each diabetic patient. All the responses were collected and the same was entered in the software for analysis.

Results: The mean age of patients was 52 years, Weight 70kg, mean duration of diabetes 8 years and random blood glucose level was 268.63 mg/dL. Total of 36.3% diabetic females had knowledge that they are at increased risk of developing UTI. Only 24.7% knew that interrupted urinary stream can be a symptom of UTI, 27.9% knew about fever and 12.4% knew about abdominal pain. Only 7.1% diabetic females knew that incontinence of urine can be its symptom. Almost 60% of the patients knew about the importance of timely treatment of UTI.

Conclusion: Urinary tract infection is a common infection among diabetic females in Pakistan. Our study concluded that most of the educated women had adequate knowledge regarding UTI and they also had a positive attitude towards the symptoms and management of UTI. We need to design awareness programs for uneducated females regarding UTI.

Key words: Urinary tract infection, knowledge, attitude, practices, preventive measures, diabetes, awareness.

Introduction

Urinary tract infection (UTI) is defined as the colonization of a pathogen in any part of the

Corresponding Author:

Attiya Hameed Khan

Peshawar Institute of Cardiology
Peshawar.

Email: attiyahameed864@gmail.com

Received: 11 September 2022, Accepted: 22 May 2023,

Published: 23 November 2023

Authors Contribution

AA conceptualized the project. WH, JM, AP, AA, ASA & AS did the data collection. AHK did the literature search and perform the statistical analysis. Drafting, revision & writing of manuscript were done by AA, AHK & AS.

Copyright © 2023 The Author(s). This is an Open Access article under the CC BY-NC 4.0 license.

urinary tract, including the kidney, ureter, bladder, and urethra. The presence of bacteria without any symptoms is known as asymptomatic bacteriuria (ASB) and does not require any treatment. UTI is one of the most prevalent, difficult and widely misunderstood infectious diseases. One of the most serious health problems in the world today is UTI.^{1,2} At least 50% of women report having at least one UTI in their lifetime, and about 3% of all women in the United States develop UTI at least once a year.³ Raheela et al. showed that simple UTIs frequently affect adult women with mean annual incidences of 15% and 10% in those aged 15 to 39 and 40 to 79 years, respectively.⁴ Due to anatomical and physiological factors, women have UTIs far more frequently than men.^{5,6} Numerous studies have shown that people with diabetes mellitus (DM),

particularly women have a higher risk of both asymptomatic bacteriuria (ASB) and UTI than the general population.⁷ Dysuria, frequent urination, and urgency are typical UTI symptoms.⁸ A urine dipstick, which is the most often used diagnostic tool, provides quick results. Detection of bacteriuria and pyuria using microscopy and gram staining is a standard part of urine examination in Pakistan. For outpatients with simple UTIs, urine cultures are unimportant.⁹ However, for those with a history of recurrent UTIs and hospital acquired UTI urine cultures are necessary.¹⁰ The bacterial culture is a crucial test in UTIs, not only because it aids in the documentation of infection but also because it's crucial for identifying the pathogenic microorganism(s) and determining the susceptibility of those microorganisms to various antibiotics.¹¹ Not only bacteria can cause UTI but the presence of *Candida* species in urine (candiduria) is a common clinical finding, which may frequently represent colonization or contamination of specimens, however, they may be etiological agents in UTIs as well.¹²

Incorrect analysis can have a serious influence on the patient's health or antibiotic resistance in cases of over diagnosis or under diagnosis. Pakistani diabetic females very commonly present to medical OPD with the symptoms of UTI. Major part of our diabetic female population is uneducated due to which they are unaware about the symptoms, diagnostic methods, management, complications of UTI and its effects on pregnancy. Pakistani females are hesitant in consulting physicians about their gynecological and urological symptoms due to cultural reasons.

Once started on oral antibiotics they have the unknown fear of adverse effects related to medications leading to incomplete course of treatment. Literature search has revealed that there is negligible literature available about the knowledge, attitude and practices about UTI in diabetic females in Pakistan. Most of literature is drafted from other countries like India, USA, Russia and European countries. The results of the current study could be useful in knowing the awareness level of our educated and uneducated diabetic female patients regarding UTI. It can act as a baseline in implementing a community-based awareness program which will promote the importance of prevention and timely management of UTI.

Methodology

This KAP observational study was carried out at South East Hospital and Research Center, Islamabad, Pakistan over a period of six months from February to August 2022. Data was collected

through pre-structured proforma by using non probability convenient sampling method technique. We included (n=380) diabetic females in this study. Diabetic females presenting to medical outpatient were given the predesigned questionnaire to record their response about their knowledge, attitude and practices regarding UTI. The trial was conducted in compliance with the international harmonization guidelines for good clinical practices and according to the declaration of Helsinki.

Females of age ranging from 20-80 years having type 1 and type 2 diabetes for more than 06 months were included. Patients having cardiac or renal failure, stroke with disability, mentally disabled and blinded persons were excluded.

Data was entered in SPSS version 25.00. Descriptive statistics were used to calculate mean and SD. Frequency and percentage were calculated for qualitative variables e.g., marital status, diabetic history etc. Linear regression model was applied for the prediction of significant effect of demographics towards knowledge, attitude and practices regarding Urinary Tract Infection among diabetic females.

The ethical approval was obtained from the Ethical Review Committee of South East Hospital and Research Centre, Islamabad vide reference 005-ERC-SEH.

Results

A total of (n=380) diabetic females were included in this study after meeting the inclusion criteria.

Table-1 depicts that mean age of patients was 52 years, weight 70kg, mean duration of diabetes 8 years and random blood glucose level 268.63 mg/dl. It also shows that 78.2% women were married, 3.7% unmarried and 1.6% divorced. It was observed that 45.3% females were uneducated, 18% were educated up to primary level, 14.7% were highly educated.

Table-2 Shows that 36.3% diabetic females have knowledge that they are at increased risk of developing UTI. 24.7% patients knew that interrupted urinary stream can be a symptom of UTI, 27.9% knew about fever and 12.4% knew about abdominal pain. Only 7.15 diabetic females knew that incontinence of urine can be its symptom. Almost 60% of the patients knew about the importance of timely treatment of UTI.

Only 5.8% of patients had a Random blood glucose of less than 200 and 47.9 % knew that uncontrolled blood sugar can lead to increased risk of developing UTI. The 63.2% women knew that if a diabetic has UTI and does not get timely treatment there can be worsening of symptoms and

complications. In our study only 31.85 patients knew about Urine culture test.

Table 1: Demographic profile of the patients and clinical characteristic of patients. (n=380)

Characteristics	Mean	±SD
Age of the patients	52.18	±12.213
Weight (kg)	70.69	±12.251
Duration of diabetes	8.34	±6.416
Pulse	84.41	±9.792
Systolic BP	131.34	±15.018
Diastolic BP	83.36	±9.073
SPO2 level	97.26	±3.036
Random Blood Glucose level	268.63	±94.273
<i>Marital Status</i>		
Characteristics	Frequency (n)	Percentage (%)
Married	297	78.2
Unmarried	14	3.7
Divorced	6	1.6
Widow	63	16.6
<i>Education Level</i>		
Uneducated	172	45.3
Primary	72	18.9
Matric	80	21.1
Higher Education	56	14.7

Table-3 predicts the attitude regarding UTI among diabetic females, which shows that 82.4% females in our study suffered at least once or more from UTI. The 79.5% of females seek early medical advice and urine test when they suffer from the symptoms of UTI. In our study 83.9% knew that they should drink plenty of water if they develop UTI and 73.9% female knew that they should complete the course of medication for getting recovered if they suffer from UTI.

Table-4 depicts the practices regarding UTI among diabetic females, which shows that when our patients suffer from UTI 76.8% of them consult a doctor in routine, 64.7%, complete the duration and course of medication, 39.7% get their urine test repeated after completion of medications. 78.9% of patients were using their diabetic medications regularly during UTI. The results show that 14.5% females use homemade cotton pad, 29.5% commercial sanitary pads, 7.6% cloth piece. 48.4% of patients were post-menopausal in our study.

Table-5 depict the association of age and education level towards knowledge, attitude and practices, which shows that there is a significant association of age with attitude and practices at p value <0.05 and no significant association with knowledge, similarly education level also shows a significant result at p value <0.05 with attitude and practices and non-significant with knowledge.

Discussion

One of the most prevalent, difficult, and misunderstood infections that affects women on an outpatient basis is UTI.

In comparison to the general population, patients with diabetes mellitus, particularly women, have a higher chance of developing both asymptomatic bacteriuria (ASB) and UTI.¹⁰ Women with diabetes frequently report to the medical OPD with UTI symptoms. In our study, only 15% of respondents who were asked about UTI symptoms were aware that dysuria is one of them. 12.4% of people knew about abdominal pain, 24.7% understood that an interrupted urinary stream could be a symptom of UTI, and 27.9% knew about fever. Only 12.65 ladies were aware that UTIs might manifest with frequent urination; the remainder thought it was a result of high blood sugar.

In this study 23.75 females had knowledge about ASB. Thus, it was observed that Pakistani diabetic females do not have adequate knowledge about the symptoms of UTI. Due to poor knowledge, they take their symptoms easy and do not try to take medical advice. This is a serious issue as it leads to increased suffering and chronicity of disease leading to complications. Almost 60% of the patients knew about the importance of timely treatment of UTI and that it can lead to complications if left untreated. There is a need to create awareness among Pakistani females regarding these symptoms.

Pregnancy is a time when UTI is both significant and common. UTIs are quite common during pregnancy due to poor hygienic practices. Our uneducated diabetic females of childbearing age are uninformed about the adverse effects which urinary infections on can cause on the developing fetus. Urinary tract infections are associated with considerable morbidity in both the mother and the baby during pregnancy. The mechanical, hormonal, and physiological changes that occur during pregnancy cause significant changes in the urinary system that have a considerable impact on the acquisition of bacteriuria. Infections of the urinary tract during pregnancy can result in poor pregnancy outcomes and complications such as preterm delivery, low birth weight, preeclampsia and anemia. Therefore, it is important to check and treat it as soon as possible.¹³ Screening and treatment of ASB by urine culture is recommended for all women at least once in early pregnancy in high-income countries, by the Infectious Diseases Society of America, Canadian Task Force on Preventive Care, and National Institute of Health and Clinical Excellence of the United Kingdom (UK).^{14,15}

Table 2: Frequency and percentage of knowledge regarding UTI among diabetic females. (n=380)

Sr.#	Statement	(n)	(%)
1	Do you know that diabetic females are more prone to develop UTI than normal individuals?	138	36.3
2	Do you know that following symptoms might appear if you are suffering from UTI?		
A	Pain and burning during urination	58	15.3
B	Increased Frequency of Urination	48	12.6
C	Poor or Interrupted Urinary stream	94	24.7
D	Fever	106	27.9
E	Abdominal Pain	47	12.4
F	Incontinence of Urine	27	7.1
3	Do you know that if a diabetic has UTI and does not get timely treatment there can be worsening of the disease and symptoms	230	60.5
	What was your average random blood sugar before developing UTI?		
A	150 to 200	22	5.8
B	200 to 250	56	14.7
C	250 to 300	154	40.5
D	300 to 350	63	16.6
E	350 to 400	32	8.4
F	Above 450	11	2.9
G	Don't Know	42	11.1
5.	Do you know that if a diabetic has UTI and does not get timely treatment there can be worsening of symptoms and related complications?	240	63.2
6.	Do you know that repeated UTI can affect your sexual life?	91	23.9
7.	Do you know that repeated UTI can affect your quality of life?	226	59.5
8.	Do you know that UTI can have bad effects on pregnancy and can sometimes lead to loss of early pregnancy?	64	16.8
9.	Do you know that sometimes UTI can exist in your body without causing any symptoms?	90	23.7
10.	Do you know that if UTI is treated timely, it is treatable?	179	47.1
11.	Do you know what urine culture test is?	121	31.8
12.	Do you know that uncontrolled blood sugar is related to increased tendency of developing UTI?	182	47.9

Table 3: Frequency and percentage of attitude regarding UTI among diabetic females. (n=380)

Sr.#	Statement	(n)	(%)
1.	Did you ever suffer from UTI?	313	82.4
2.	Do you know that if you develop any symptoms of UTI, you should seek early medical advice and a urine test?	302	79.5
3.	Do you know that in case you suffer from UTI, you should drink plenty of water?	319	83.9
4.	Do you know that if you get UTI, you should complete the course of medication to get recovered?	281	73.9

Table 4: Frequency and percentage of practices regarding UTI among diabetic females. (n=380)

S.#	Statement	(n)	(%)
1.	Did you ever suffer from UTI?	313	82.4
2.	When you had UTI did you consult a doctor?	292	76.8
3.	Did you complete the duration and course of medication?	246	64.7
4.	After completing treatment did you get your urine test repeated?	151	39.7
5.	Did you get your urine culture done?	175	46.1
6.	Did you drink plenty of water during UTI?	290	76.3
7.	Did you take your diabetic medications regularly during UTI?	300	78.9
	What type of hygienic product do you use during menstrual cycle		
A	Homemade cotton Pad	55	14.5
B	commercial Sanitary Pads	112	29.5
C	Cloth Piece	29	7.6
D	Post-Menopausal	184	48.4
8.	Do you wash your hands with soap after using toilet?	6	1.6

Self-monitoring of blood glucose by diabetic patients has a pivotal role in the management of diabetes. It was observed that most of our patients were aware of their last random blood sugar levels which shows that they are monitoring their blood

sugar levels. Only 5.8% of patients had a Random blood glucose of less than 200 which indicates that 94.2% of our subjects had an inadequate glycemic control. We couldn't include the last HbA1c levels due to many limitations. It has been observed that

uncontrolled blood sugar is directly related to repeated events of UTI.¹³ In our study almost 48% females knew that uncontrolled blood sugar can lead to increased risk of developing UTI.

Table 5: Association of age and education level towards knowledge attitude and practices.

Variables	N	%	p-value
Age			
Knowledge			.846
20-40	137	36	
41-60	209	55	
61-80	34	9	
Total	380	100	
Attitude			.000
20-40	137	36	
41-60	209	55	
61-80	34	9	
Total	380	100	
Practices			.000
20-40	137	36	
41-60	209	55	
61-80	34	9	
Total	380	100	
Education Level			
Knowledge			.094
Uneducated	172	45.3	
Primary	72	18.9	
Matric	82	21.1	
Higher Education	56	14.7	
Total	380	100	
Attitude			.000
Uneducated	172	45.3	
Primary	72	18.9	
Matric	82	21.1	
Higher Education	56	14.7	
Total	380	100	
Practices			.002
Uneducated	172	45.3	
Primary	72	18.9	
Matric	82	21.1	
Higher Education	56	14.7	
Total	380	100	

The problem of delayed diagnosis of UTI is fairly common. It results in both overtreatment and undertreatment. Serious complications like pyelonephritis or even urosepsis might result from a UTI that has not been properly diagnosed. Additionally, delirium brought on by UTIs might increase mortality and morbidity in older patients.¹⁶ We observed that most of the Pakistani females had knowledge that if UTI is treated in time, it is a treatable illness and will not lead to complications. But we need to improve our primary care for timely diagnosis and management according to the international guidelines. Our results show that most of the diabetic females have a positive attitude regarding management of UTI. Most of them knew that what steps should be taken if they develop symptoms of UTI. 83% women knew that they

should drink plenty of water if they develop UTI and it's a better preventive measure and 79.5% female usually seek early medical advice and urine test if they suffer from UTI.

There is growing evidence in the literature that increasing antibiotic resistance is an issue on a worldwide scale. The pattern of resistance varies from hospital to community, large hospital to small hospital, state to state, and even vary from country to country. Emergence of resistance to antibiotics shows the importance of using evidence-based strategies for treatment.¹⁷ For UTI cases in Pakistan antibiotic treatment is often started empirically without conducting necessary lab workups or educating the patients about disease prevention. Appropriate antibiotic use in patients with UTI reduces length of hospital stay and therefore favors patient outcomes and healthcare costs. Hence, it becomes important to regularly monitor the resistance or susceptibility patterns of uropathogen, so that the guidelines for empirical antibiotic therapy can be improved to include antibiotics with low resistance and reduce therapeutic failures.^{17,18} Discontinuing antibiotics before completing the full course of treatment is another cause of antibiotic resistance. In this study 73.9% females knew that they should complete the course of medication for getting recovered if they suffer from UTI. Traditional urine culture is commonly regarded as the gold standard for detection and identification of pathogens. However, evidence has been accumulating to support use of molecular methods such as PCR. With antimicrobial resistance becoming both more common and complex, effective treatment of UTIs is even more dependent on the accurate identification of pathogens.¹⁹

According to the results of practices regarding UTI among diabetic females it was observed that most of our patients consult a doctor in routine when they develop the symptoms of UTI and complete the course of prescribed medications. Some of the patients get their urine test repeated after completion of medications. Timely recovery of UTI in a diabetic patient depends upon the glycemic control. In our study most of the patients were using their diabetic medications regularly during UTI. The benefit of increased fluid intake for prevention of UTI is thought to be from dilution and flushing of bacteriuria, thereby reducing attachment of bacteria to uroepithelial cells and reducing their nutrients for growth. Most of our patients practiced increased fluid intake when they developed UTI.

If we discuss about the use of hygiene products during UTI most females use homemade cotton pads and commercial sanitary pads during menstruation. Few ladies use a household cloth

piece which can lead to increased risk of pelvic infections. Many studies conducted in Africa, South East Asia, and the Middle East show extensive usage of unhygienic absorbents and insufficient washing and drying of reused absorbents. Even cleaning a piece of fabric with soap and unclean water. Very little sanitary pad use has been observed in studies conducted in Africa, India, and other nations.²⁰ Hand washing is the primary and well-known precaution for avoiding infections. It's alarming that only 1.6 % of our female diabetic patients are used to wash their hands with soap after using toilet.

The improvement of patient's knowledge, attitudes, and behaviors toward common diseases has a pivotal role in health education. Through health education initiatives and raising public awareness, we can enhance the understanding of our diabetic females about UTI. Literature search has shown the benefits of health education in disease prevention and complications. A study carried out in Mashhad (Iran) demonstrated the beneficial effects of health education on improving physical activity in diabetic women.²¹ A study carried out in China revealed that nutritional education enhances the knowledge and practices regarding dietary intake and blood glucose control in patients with type 2 diabetes.²² Finland conducted a global study that examined how health education affected individuals with osteoporosis regarding their knowledge and attitudes about their disease. Education was found to be useful in increasing dietary preventative practices for osteoporosis, according to this study.²³ In an American study on asthma health education, it was discovered that education about self-care practices among asthmatic students had a significant impact on their disease progress and symptoms.²⁴

The main strength of this study is its sample size. No study of this size investigating women's attitudes towards and experiences with UTIs in the Pakistan had been performed before. Results provide a unique insight into the factors influencing women's knowledge about the symptoms and management of UTI as well as a look into women's practices with urinary symptoms. One of the main limitations of this study is that it is based on participants' memory, resulting in a substantial risk of recall bias, for the frequency and diagnosis of UTIs per participant as well as the treatment that they received. It is also difficult to differentiate between urinary symptoms and actual UTIs in our data, since respondents might not have completely understood the difference between the two.

Urinary tract infection is a common infection among diabetic females in Pakistan. Our study

concluded that most of the educated women had adequate knowledge regarding UTI and they also had positive attitude towards the symptoms and management of UTI. Females of child bearing age have limited knowledge about adverse effects of UTI on pregnancy. The Hygienic practices of females for preventing UTI are not appropriate.

Acknowledgement

Authors wish to thanks the department of Medicine of South East Hospital and Research Center, Islamabad for their support in data collection.

Conflict of interest: None declared.

References

1. Czajkowski K, Broś-Konopielko M, Teliga-Czajkowska J. Urinary tract infection in women. *Prz Menopauzalny* 2021; 20(1): 40-7.
2. Foxman B. Urinary tract infection syndromes: occurrence, recurrence, bacteriology, risk factors, and disease burden. *Infect Dis Clin North Am* 2014; 28: 1.
3. Geerlings SE. Clinical presentations and epidemiology of urinary tract infections. *Microbiol Spectr* 2016; 4(5).
4. Raheela M, Siddiqui KM, Recurrent urinary tract infections in females *J Pak Med Assoc* 2010; 60 (1): 55-9.
5. Bonkat G, Bartoletti R, Bruyère F, Cai T, Geerlings SE, Köves B, et al. EAU guidelines on urological infections. *European Association of Urology*; 2022. (Accessed on 15th September 2023) Available from URL: <https://d56bochluxqnz.cloudfront.net/documents/full-guideline/EAU-Guidelines-on-Urological-Infections-2022.pdf>
6. Anger J, Lee U, Ackerman AL, Chou R, Chughtai B, Clemens JQ, et al. Recurrent uncomplicated urinary tract infections in women: AUA/CUA/SUFU guideline. *J Urol* 2019; 202: 282-9.
7. Wilke T, Boettger B, Berg B, Groth A, Mueller S, Botteman M, et al. Epidemiology of urinary tractinfections in type2 diabetesmellitus patients: Ananalysis based on a large sample of 456,586 German T2DM patients. *J Diabetes Complications* 2015; 29: 1015-23.
8. Gebremariam G, Legese H, Woldu Y, Araya T, Hagos K, Wasihun AG. Bacteriological profile, risk factors and antimicrobial susceptibility patterns of symptomatic urinary tract infection among students of Mikelle University. *BMC Infect Dis* 2019; 19: 950.
9. Bellazreg F, Abid M, Lasfar NB, Hattab Z, Hachfi W, Letaief A . Diagnostic value of dipstick test in adult symptomatic urinary tract infections: results of a cross-sectional Tunisian study. *Pan Afr Med J* 2019; 33: 131.

10. Bouma M, Geerlings SE, Klinkhamer S, Knottnerus BJ, Platteel TN, Reuland EA, et al. Herziene NHG-Standaard Urineweginfecties. Huisarts Wet 2020; 63(5): 60.
11. Ahmed SS, Shariq A, Alsallloom AA, Babikir IH, Alhomoud BN. Uropathogens and their antimicrobial resistance patterns: Relationship with urinary tract infections.. *UrInt J Health Sci* 2019;2: 45-55.
12. Gajdács M, Dóczi I, Ábrók M, Lázár A, Burián K. Epidemiology of candiduria and Candida urinary tract infections in inpatients and outpatients: results from a 10-year retrospective survey. *Cent European J Urol* 2019; 72(2): 209-14.
13. Girma A, Aemiro A, Workineh D, Tamir D, Magnitude, Associated Risk Factors, and Trend Comparisons of Urinary Tract Infection among Pregnant Women and Diabetic Patients: A Systematic Review and Meta-Analysis. *J Pregnancy* 2023;8365867
14. Lee AC, Mullany LC, Koffi AK, Rafiqullah I, Khanam R, Folger LV. et al. Urinary tract infections in pregnancy in a rural population of Bangladesh: population-based prevalence, risk factors, etiology, and antibiotic resistance. *BMC Pregnancy Childbirth* 2020; 20(1): 1.
15. Nicolle LE, Bradley S, Colgan R, Rice JC, Schaeffer A, Hooton TM, et al. Infectious diseases society of America guidelines for the diagnosis and treatment of asymptomatic bacteriuria in adults. *Clin Infect Dis* 2005; 40(5): 643-54.
16. Chae JH, Miller BJ. Beyond urinary tract infections (UTIs) and delirium: a systematic review of UTIs and neuropsychiatric disorders. *J Psychiatr Pract* 2015; 21(6): 402-11.
17. Patel HB, Soni ST, Bhagyalaxmi A, Patel NM. Causative agents of urinary tract infections and their antimicrobial susceptibility patterns at a referral center in Western India: An audit to help clinicians prevent antibiotic misuse. *J Family Med Prim Care* 2019; 8(1): 154-9.
18. Goebel MC, Trautner BW, Grigoryan L. The five Ds of outpatient antibiotic stewardship for urinary tract infections. *Clin Microbiol Rev* 2021; 34: 3-20.
19. Wojno KJ, Baunoch D, Luke N, Opel M, Korman H, Kelly C, et al. Multiplex PCR Based Urinary Tract Infection (UTI) Analysis Compared to Traditional Urine Culture in Identifying Significant Pathogens in Symptomatic Patients. *Urology* 2020; 136: 119-26.
20. Baisley K, Chagalucha J, Weiss HA, Mugeye K, Everett D. Bacterial vaginosis in female facility workers in north-western Tanzania: prevalence and risk factors. *Sex Transm Infect* 2009; 85(5): 370-5
21. Mahdizadeh MS, Peymam N, Taghipour A, Esmaily H, Mahdizadeh SM. Effect of health education program on promoting physical activity among diabetic women in Mashhad, Iran: Applying Social Cognitive Theory. *J Res Health Sci*; 13(1): 90-7.
22. Wang H, Song Z, Ba Y, Zhu L, Wen Y. Nutritional and eating education improves knowledge and practice of patients with type 2 diabetes concerning dietary intake and blood glucose control in an outlying city of China. *Public Health Nutr* 2014; 17(10): 2351-8.
23. Laslett LL, Lynch J, Sullivan TR, McNEIL JD. Osteoporosis education improves osteoporosis knowledge and dietary calcium: Comparison of a 4 week and a one-session education course. *Int J Rheum Dis* 2011; 14(3): 239-47.
24. Kintner EK, Cook G, Marti CN, Allen A, Stoddard D, Harmon P. Effectiveness of a school and community-based academic asthma health education program on use of effective asthma self-care behaviors in older school-age students. *J Spec Pediatr Nurs* 2015; 20(1): 62-75.