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Assessment of the Prevalence of Urinary Tract Infection among Pregnant and Non-Pregnant Women in the Kingdom of Saudi Arabia

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Authors' contributions

This work was carried out in collaboration among all authors. Author MRM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors HHA, AIA and FHA managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Urinary tract infections (UTIs) are common in pregnant women mainly caused by *Escherichia coli* and should be treated correctly to prevent complications in both the mother and her child. Pregnancy is associated with physiological and functional urinary tract changes which promote ascending infections from the urethra. In this paper, we aimed to assess the prevalence of UTI in pregnant and non-pregnant women in the KSA and to measure their awareness about signs, symptoms and complications of this infection. It was conducted through a questionnaire, among pregnant and non-pregnant women online. It consists of 15 questions including socio-demographic and other questions such as time and number of infections, type of treatment, symptoms associated with the infection, weight of child during birth. Our results showed that about 46.3% of participating women had UTI, 5.6% of them were diabetic. About 66.8% of women become infected at age range from 20-39 years old. Also, 22.3% women had once UTI during pregnancy, 13.3%

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had twice and 21.7% had more than twice during pregnancy. The child's weight during birth from UT infected mother was low in 21.9%. Pregnant women who refuse to receive treatment will be suspected to many complications and their children. From these results we can conclude that high percentage (half of them) of participating women were infected in urinary tract and the most affected age between 20-39 years old and some of them with diabetes. So, we can recommend to introduce educational seminars to pregnant or non-pregnant women to be more awareness with UTIs, signs and symptoms and complications and how to protect themselves from infection.

Keywords: Urinary tract infection (UTI); pregnant women; treatment, antibiotics; Kingdom of Saudi Arabia.

1. INTRODUCTION

Risk of urinary tract infection (UTI) in women is higher than men and it spreads to kidney with pain, and lead to serious consequences [1]. There are several factors that can cause urinary tract infection such as age, female sex and marital status [2]. Adult females with age of 15-39 had UTIs [3]. UTIs are more common in patients with diabetes mellitus (DM) [4]. A study done in Hedi Chaker University Hospital, Sfax, Tunisia showed that DM had Prognosis for Recurrent UTI [5]. High percentage of the women visiting the emergency department with a UTI [6]. The prevalence has been recorded of UTI in pregnant women in Saudi Arabia was 20% [7]. The use of antibiotics for treatment of UTI was more effective and can decrease the pathogens of UTI. Moreover, lower rate of infection was recorded in Emirates and Iran [8]. Most of cases were asymptomatic in Sylhet, Bangladesh and about 9% of pregnant women with UTI [9]. High risk factors of UTIs are diabetic women who are postmenopausal [10], women with uncontrolled DM type 1 [11], and eating more salty and spicy foods [12,13]. Other risk factor is delaying of micturition for a long time (6 hours and more) will cause a problem of urinary tract. Emptying of the bladder and after urination after sexual intercourse helps to flush the bladder and decrease the risk of having a UTI [1,14]. Women with intended caesarean delivery were at high risk of UTI than women with intended vaginal delivery [15]. Treatment of pregnant women suffering from bacteriuria by antibiotic reduced the incidence of low birth weight [16], while untreated UTI's led to low birth weight [17]. There was a contrast relation between symptomatic response and lack of pain in UTI among individual with asymptomatic bacteriuria [18]. In patient who infected with UTI can accompany with change in frequency in urination, dysuria, urgency, presence or absence of vaginal discharge [19]. Also, the patient can come with any 2 of the symptomatic UTI to meet the clinical diagnostic criteria as fever, worsened urinary urgency, acute dysuria, suprapubic tenderness or costovertebral angle pain [20]. There are different ways to treat UTI such as drinking a lot of water can prevent UTIs, and eliminate the bacteria before causing infection [1]. Treatment of UTIs with antibiotics such as beta-lactams, nitrofurantoin, fosfomycin and trimethoprim-sulfamethoxazole are the preferred treatment to treat the pregnant women [19]. nitrofurantoin or cephalexin were used for prevention of UT re-infection in pregnant women [21]. High Number of Patient with UTI in Cameroon infected with Staphylococcus the main cause for prevalence of UTI [22]. The diagnosis of UTI by clinical criteria untrusted alone [23] and urine culture is important also, dipstick urinalysis can be used [19]. In outpatient with uncomplicated UTI urine culture may be not important while, it is necessary with patient who have recurrent UTI and for inpatient who develop UTI [24]. The aim of this study is to assess the prevalence of UTI among pregnant and non-pregnant women in the Kingdom of Saudi Arabia and measure their awareness about signs, symptoms and complications of this infection.

2. SUBJECTS AND METHODS

2.1 Study Design

The research was carried out among pregnant and non-pregnant women in the Kingdom of Saudi Arabia through questionnaire distributed on Google Drive (online) starting from first of December 2020 for two months. the questionnaire consists of about 15 questions including socio-demographic and other questions such as times and type of infection, type of treatment, symptoms associated with this infection, weight of child during birth from UT infected mother.

2.2 Sample Collection and Statistical Analysis

This study was conducted among pregnant and non-pregnant women in the Kingdom of Saudi

Arabia through questionnaire on google Drive (online). All participants (984 women) were provided with clear information about the research paper in order to allow them to make voluntary decision about their participation. The participation was optional and not mandatory, so, filling the questionnaire was considered an agreement of participation. Statistical analysis was performed using SPSS version 22 (SPSS, Chicago, IL, USA). Frequencies and percentages were calculated using chi-square test for categorical variables.

3. RESULTS AND DISCUSSION

In this paper, the total number of Saudi women that participate in this study were 984. Most of participants from eastern region (67.3%), northern (12.5%) and southern (10%), KSA. About 57.6% of these women were married and 39.2% were unmarried. About 46.3% had UTI, 5.6% of them were diabetic. Other studies showed lower rates of prevalence of UTI among pregnant women (4.8% and 6.1%) were recorded in UAE and Iran, respectively [25,26]. While in Egypt the frequency of UTIs during pregnancy was high (32%). About 63% of them having moderate infection [27]. Community-associated UTI prevalence is 0.7% (as global epidemiological data) and the main risk factors are age and diabetes [28]. UTIs were more significant among women with an intermediate socio-economic score (37.9%) [27]. Other study found that among 589 women, 20% of them having symptomatic UTI, 83% were treated with antimicrobials. About 14% of women with type 1 diabetes and having UTI, 23% with type 2 diabetes developed a UTI [29].

According to the age of infection Table 1 showed that 66.8% of women become infected at age range from 20-39 years old and 24.5% of them become infected at age less than 20 years old (Fig. 1). Simple UTIs are common in adult women in all ages, with annual incidence of 15% and 10% in those aged 15-39 and 40-79 years, respectively [3]. About 34.7% of them eating lot of salty and spicy foods, while 41.7% did not eat salty or spicy foods, but 23.6% sometimes eat Egyptian journal of Health Care reported that more than 50% of the studied students preferred spicy foods and salty foods [30].

Our results found that 27.2% of women delay urination for a long time, while 29.4% did not delayed, but 43.5% sometimes delayed. Another study showed that incomplete voiding represents the primary risk factor for UTIs associated with urinary incontinence and prolapse [31]. Another study showed that pregnant woman suspected for increased risk for UTIs. Also, when the women were pregnant, holding their pee can further increase this risk [32].

Table 1. Percentages of women with UTI in Saudi Arabia and answered the following questions about the age of infection, number of UT infection, weight of child birth from UT infected mother. [Number of participants = 984 women]

Questions		Answers			
Women age during UTI.	Answer	< 20 YEAYS	20-39 YEAYS	40-60 YEAYS	>60 YEAYS
	%	24.5	66.8	8.7	0
Do you delay urination for a long time?	Answer	YES	NO	Sometimes	
	%	27.2	29.4	43.5	
Do you eat a lot of salty and Spicy foods?	Answer	YES	NO	Sometimes	
	%	34.7	23.6	41.7	
Numbers of UTI during pregnancy.	Answer	NO	Yes (once)	Yes (twice)	Yes (More than twice
	%	42.7	22.3	13.3	21.7
The child's weight during birth from UT infected mother.	Answer	Suitable weight	Low weight	Heavy weight	
	%	71.9	21.9	6.2	

Table 2. Percentages of women with UTI in Saudi Arabia and answered the following questions about the severity of infection, how they diagnosed, symptoms of infection and treatment [Number of participants = 984 women]

Questions		Answers						
Period of UTI.	Answer	Less than one week		One week to one month			More than one month	
	%	45.6		38.9			15.5	
The severity of the pain.	Answer	NO Pain	Mild		Moderate		Severe	
	%	6.4	20.8		44		28.8	
Method of diagnoses.	Answer	Examination by a doctor		Urine Analysis			Urine Culture	
	%	43.1		65.7			13.3	
The symptoms associated with UTI.	Answer	Persistent urge to urinate	Burn sensation	Discharges	Change in urine color	Pelvic Pain	Upper Back and side pain	No symptoms
	%	54.2	61.9	43.3	33.7	25.8	38.5	3.4
Type of UTI treatment during pregnancy.	Answer	Antibiotics	Drink lot of water		Special Effervescent salts treatment		Analgesics	
	%	51.8	20.8		76.3		19	
Name of antibiotic prescribed by the doctor for UTI.	Answer	Ampicillin	Amoxil	Augmentin		Nitrofurantoin	Bactrim	Others
	%	11.7	19.6	14.3		2.2	1.8	57.5

In the current research, 42.7% of women did not have UTI during pregnancy, while 22.3% had once, 13.3% had twice and 21.7% had more than twice during pregnancy (Table 1, Fig. 2). Other studies stated that 20% of females have UTI at least once during lifetime [33,34].

In our study, the period of infection of UT was long lasted < 1week in 45.6% of participant women, from 1week to 1month in 38.9%, and only lasted for >1 month in 15.5%. Similar study showed that the symptoms of UTI were recurrent in 61.90% of women and started from the beginning of the pregnancy by 28.6%. About 79% of them didn't seek for medical advices [35].

In this study, the child's weight during birth from UT infected mother was suitable in 71.9%, low weight in 21.9% and heavy weight in 6.2%. Other studies revealed that there was a much higher risk (up to 40%) of progression to pyelonephritis, and possibly increased risk of pre-eclampsia, premature birth and low neonatal birth weight [36-41].

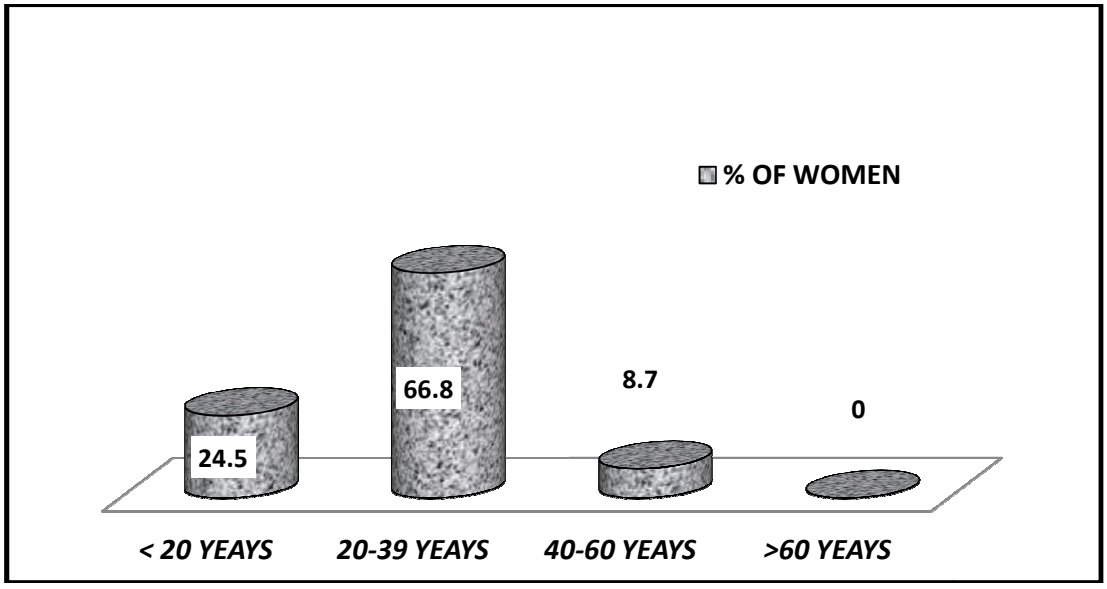

Fig. 1. Age of women during UT infection (%)

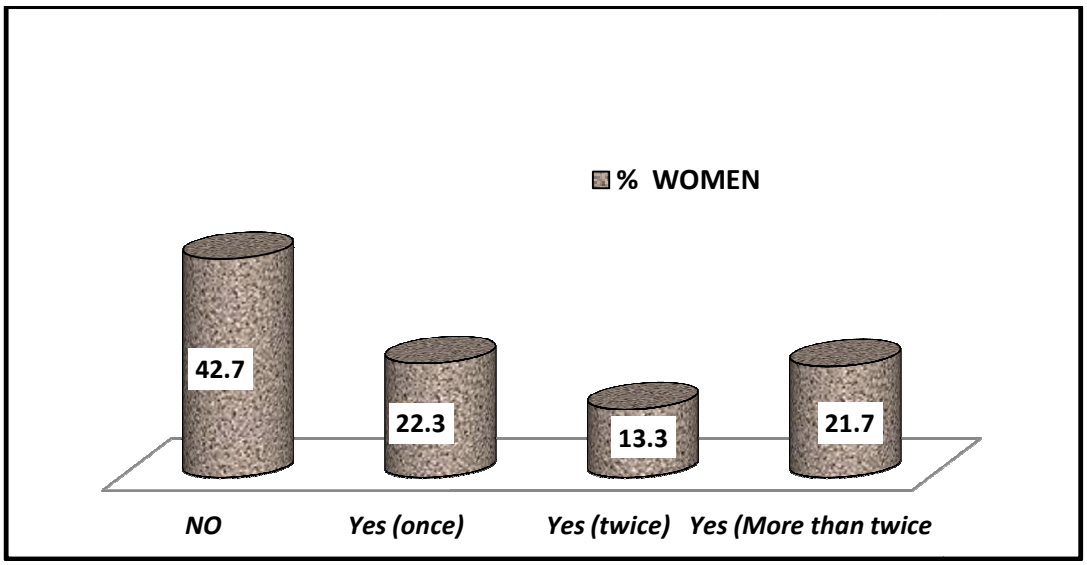

Fig. 2. % of women who answered the question about the number of UTIs during pregnancy

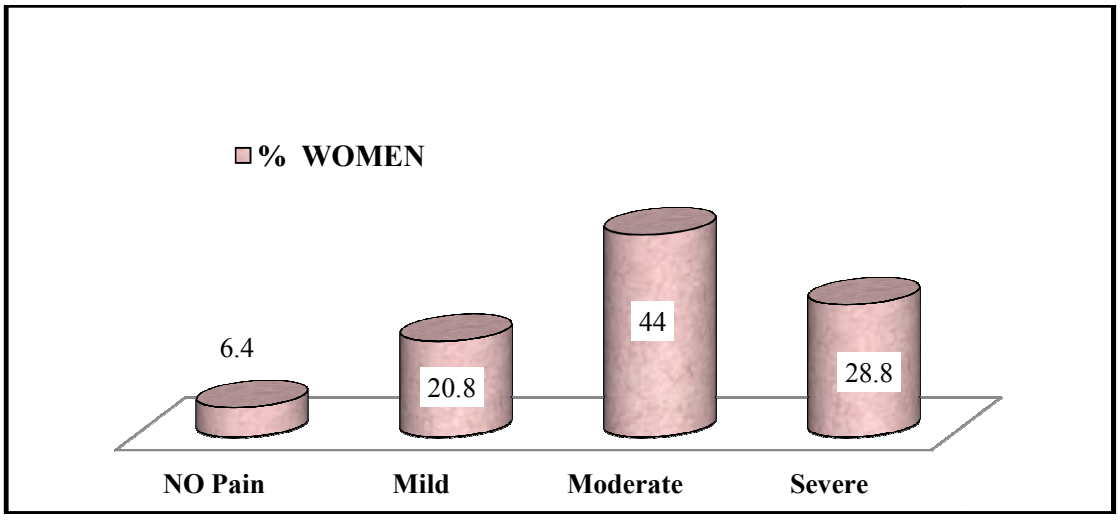

Fig. 3. % of women who answered the question about the severity of pain during UTI

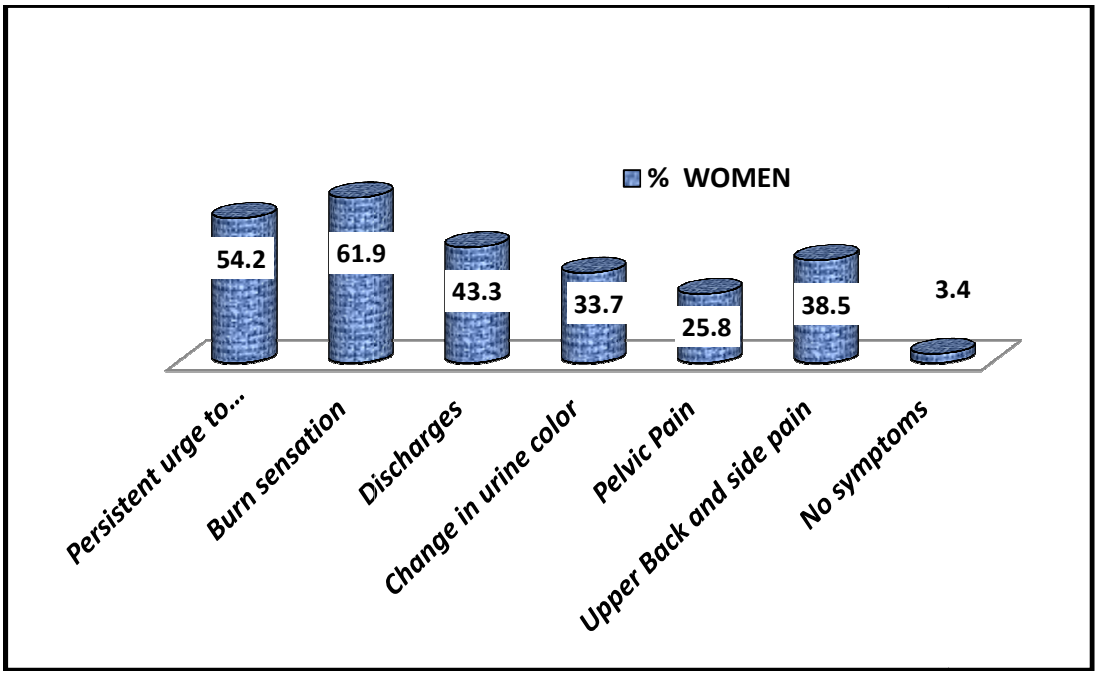

Fig. 4. % of women who answered the question about the symptoms associated with the infection

Table 2 showed that women felt with severe pain due to UTI (28.8%), moderate (44%), mild (20.8%) while only 6.4% with no pain (Fig. 3). Similar study done by Haider (2010) reported that about 47% of women reported urinary complaints [42]. Another study carried out in Netherlands found that 35% of pregnant women having UTI symptoms [43]. The most important risk factors associated with UTI are low level of personal hygiene, positive history of diabetes mellitus, anemia, and past history of UTI [27]. Also, Table 2 showed that the symptoms accompanied UTI were varied, 61.9% had burn sensation, 54.2% had persistent and frequent urge to urination, 43.3% had discharges, 38.5% had upper back pain and sides, 33.7% had pelvic pain, while 3.4% with no pain (Fig. 4). Similar study done by Hassan et al. (2015) reported that

pregnant women complained from signs and symptoms of UTI such as pain during urination (92.9%), feeling of urgency when urinate (88.1%), pain and cramps in lower abdominal (supra pubic area) (80.9%), and burning sensation during urination (95.2%) [35]. Another study in KSA recorded that UTI in pregnant women was 20%; (12%) of them with symptomatic UTI and 8% were asymptomatic [7]. Other study showed that women with UTI, the most common symptom was abnormal voiding pattern seen in 40.3%, followed by irritative manifestation in 38.4%, urinary incontinence 17.1% and voiding difficulties in 4.3% of women [42]. In Table 2, 43.1% were diagnosed by physician, 65.7% by urine analysis and 26.4% by urine culture (Fig. 5), in contrast, only 4.3% of women with UTI was diagnosed by urine culture [42]. Microscopic urinalysis or dipstick urinalysis were used as a screening test for UTI, while bacteriuria is more specific and sensitive even in older women and during pregnancy [19].

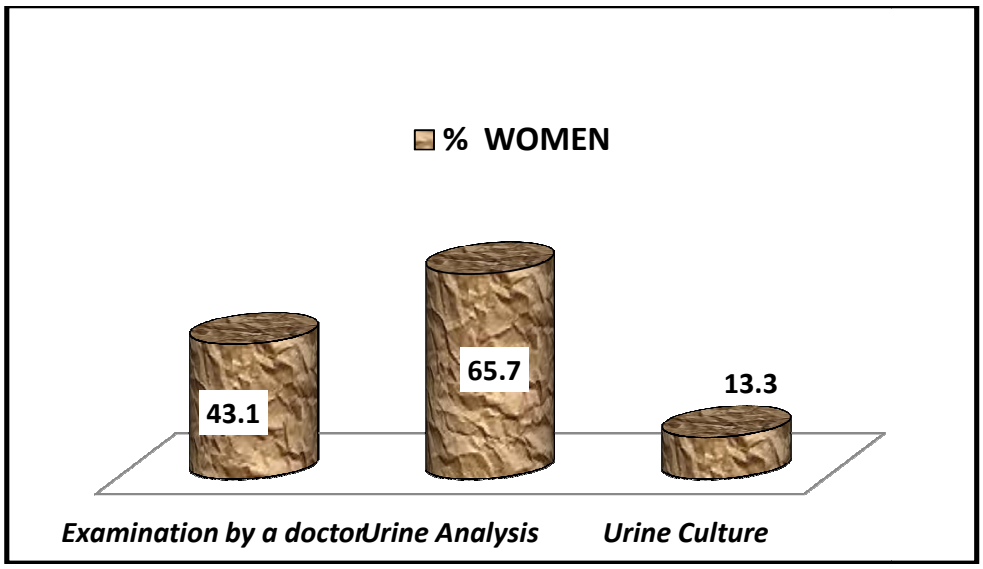

Fig. 5. % of women who answered the question about the method of diagnosis

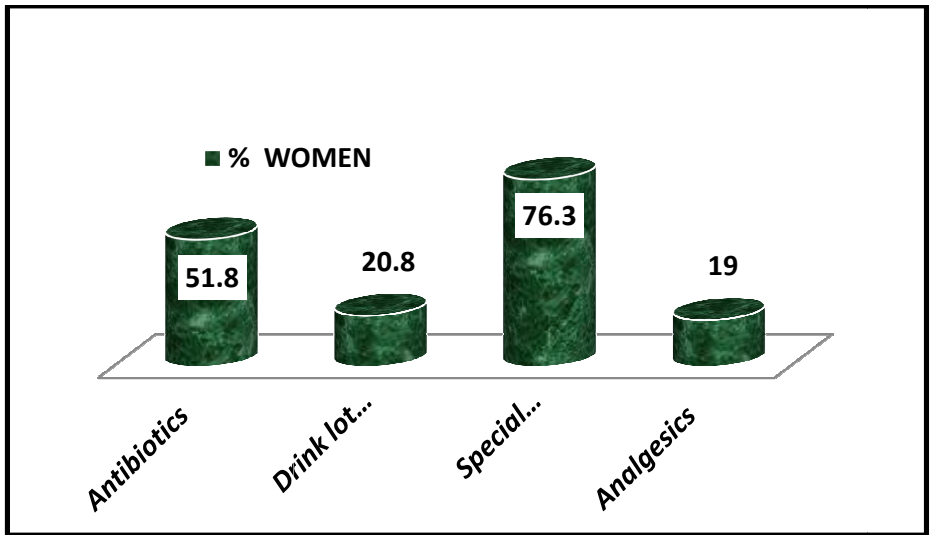

Fig. 6. % of women who answered the question about the method of treatments that used for UTI during pregnancy

Pregnant women who had UTI were treated with antibiotics (51.8%), drink lot of water (76.3%), using effervescent (20.8%) and analgesics (19%) (Table 2, Fig. 6). Another research among pregnant women reported that they performed self-care measures to relieve their UTI symptoms before the intervention such as 69% changed their underwear, 74% applied cold compression on bladder, 76% making vulval and vaginal washing with watermelon and frequent drink coffee & tea by 79%. Also reported that 71% of women sitz bath in water with chamomile, 76% bath in salt water, 62% applied lemon juice to urethra and pernial area and about 59% of women have taken self-prescribed medications [35]. Other study revealed that drinking enough quantity of water can be option to prevent UTI because it causes frequently urination, and this can eliminate the bacteria before causing infection to the urinary tract [1].

Our study showed that the most used antibiotic was Amoxil (19.6%), followed by Augmentin (14.3%), Ampicillin (11.7%), Nitrofurantoin (2.2%), Bactrim (1.8%), while 57.5% using other things. Other study found that the most effective antibiotics for treatment of UTI are amoxicillin, cefoxitin, celtaxidime, norfloxacin, penicillin and fusidic acid, also they can decrease the pathogens of UTI [8]. About 90% of *Escherichia coli* causing UTI is still susceptible to nitrofurantoin, a relatively inexpensive and safe drug. However, less than 25% of physicians used it for treatment of cystitis. Cephalosporins were most commonly used in hospital practice for the treatment of UTI. Amoxycillin was being used widely to treat UTI in pregnancy in spite of high prevalence of resistance [44]. The lowest observed resistance was for fosfomycin that range from 0-2.9% and for nitrofurantoin from 0-4.4% [28]. Pregnant women who at risk of recurrent UTI should prevent reinfection with nitrofurantoin or cephalexin [21]. Nitrofurantoin, fosfomycin, and trimethoprim-sulfamethoxazole (Bactrim) are the first-line treatments for UTI. For appropriate treatments of UTI in pregnant women, beta-lactams, fosfomycin, nitrofurantoin and trimethoprim-sulfamethoxazole. [19]. Another study done in 2017 showed that resistance was most common to amoxicillin (38%), trimethoprim/sulfamethoxazole (18.1%), ciprofloxacin and cefotaxime was lower (1.9%), nitrofurantoin (0.4) and no resistance observed to fosfomycin [45]. The misuse of antibiotics such as β-lactams, trimethoprim, nitrofurantoin and quinolones in the routine therapy of UTIs resulted in increased resistance rate of to these antibiotics. So, developing of vaccine against uro-pathogenic *Escherichia coli* is very important to reduce the economic costs [46].

4. CONCLUSION

From these results we can conclude that high percentage of participating women in Saudi Arabia with UTIs, the most affected age between 20-39 years old and some of them with diabetes. So, they have shortage in knowledge about UTIs and they are in need for educational seminars.

5. RECOMMENDATION

We can recommend that an educational seminar should be given to pregnant and non-pregnant women to increase their awareness about signs and symptoms of UTI to facilitate early detection and prevent future infection, also, give them sufficient knowledge about women self-care needs, physiological changes due to pregnancy. We advised all pregnant women to be screened for bacteriuria with urine culture and should be treated with specific antibiotic if they become infected.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

This study has been reviewed and approved by the research Ethical Committee (REC) at the University of Hail with letter number Nr.20455/5/42 dated 16/04/1442H.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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