Effect of An Educational Intervention on Pregnant Women's Knowledge and Self-Care Practices Regarding Urinary Tract Infection

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Received July 31, 2020, accepted August 20, 2020
doi: 10.47104/ebnrojs3.v2i4.197

ABSTRACT

Contents: The most prevalent type of infection during pregnancy is urinary tract infections (UTIs). It affects up to ten percent of pregnant women and may cause serious adverse pregnancy outcomes for both mother and fetus.
Aim: The research aimed to evaluate the effect of an educational intervention on pregnant women's knowledge and self-care practices regarding urinary tract infection.
Methods: A quasi-experimental (pre/post-test) design was adopted to fulfill this study's aim. The study was conducted at the Obstetrics and Gynaecological outpatient clinic in Benha university hospital on a purposive sample of 68 pregnant women among those attending the setting mentioned above. Two key instruments were used to collect data: A structured interviewing questionnaire, self-care practices checklist.
***Results*:** revealed a highly statistically significant difference in pregnant women's knowledge and self-care practices related to urinary tract infection at post-intervention compared to their pre-intervention phase (p-values < 0.001). A highly significant positive correlation was illustrated between studied women's total knowledge and total practice scores at pre (p=0.04) and post-intervention (p=0.000) phases.
***Conclusion*:** The study concluded that the research hypothesis is supported, and pregnant women exhibited better knowledge and self-care practices regarding (UTI) during pregnancy after implementing an educational intervention than before. The study recommended that knowledge and self-care concepts regarding UTI through antenatal screening programs in early pregnancy should be empowered as an essential part of all women's health care levels and strategies.

Keywords: Educational intervention, pregnant women, knowledge, self-care practices, urinary tract infection

1. Introduction

Pregnancy is a critical time for women. There is an increased risk that pregnant women will develop urinary tract infections (UTIs) *(Dean & Kendall, 2014)*. The hormonal changes that occur during pregnancy further increase the risk for both pregnancy and non-pregnancy related infections due to the physiological immune suppression associated with the action of human chorionic gonadotropin and prolactin *(Nwambo et al., 2016).*

UTIs are the most prevalent form of infection in the urinary tract and often go hand in hand since pregnancy occurs. UTIs account for up to 10% of pregnant women. They are also known, after anemia, as the second most common pregnancy disorder. More than 50% of women suffer at least one UTI incidence during their lifetime *(Nwambo et al., 2016).*

UTI is one of the most prevalent health problems worldwide during pregnancy, especially in developing counties. In a recent review, the global prevalence of UTIs in pregnancy ranged from 3 to 35% across five continents, with preterm birth rates >10% *(Gilbert et al., 2013).* There are three distinct clinical forms of UTI related to pregnancy: Asymptomatic bacteriuria (ASB), cystitis, and pyelonephritis, which are the cause of approximately 5% of hospital admissions of such patients *(Szweda & Jóźwik, 2016).*

Pregnant women are more vulnerable to infection of the urinary tract (UTI) than other women. Pregnancy-related adaptive changes in the urinary tract predispose to UTIs' development *(Tamalli et al., 2013).* The functional urinary tract abnormalities and gestational diabetes can also increase susceptibility to UTIs during pregnancy *(Totsika et al. 2012).* Bacteria in the vagina or around the urethra (entrance to the urinary tract) can also cause UTI. They enter the urethra and then travel to the bladder and kidneys *(Szweda & Jóźwik, 2016).*

Urinary tract infections during pregnancy are categorized as either symptomatic or asymptomatic. Symptomatic urinary tract infections are divided into lower tract (acute cystitis) or upper tract (acute pyelonephritis) infections. Asymptomatic bacteria are defined as the persistent presence of bacteria within the urinary tract of women with no symptoms *(Perry et al., 2014).*

During normal pregnancy, the pressure of the gravid uterus on the ureter, causing stasis of urine flow attributed to hormonal changes that may increase the risk of UTI *(Amala & Nwokah, 2015).* The changes in urine chemical composition with elevated glucose and amino acids levels facilitate bacterial growth during pregnancy *(Ranjan et al., 2018).*

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Urinary tract infection stills a leading cause of significant distress to individuals and is associated with high healthcare and social costs. Particularly for women, it is a serious health problem as up to a third of all women experience urinary tract infection at some stage in their lives *(Bergamin & Kiosoglous., 2017).* Although often asymptomatic, the association of urinary tract infection with pregnancy could progress to symptomatic bacteriuria with fatal obstetric consequences such as pyelonephritis, low birth weights, and very high mortality rates *(Oladeinde et al., 2015).*

Urinary tract infections should be treated effectively with the appropriate therapy by improving pregnant women's knowledge and healthy lifestyle activities (self-care practices) to prevent complications such as premature labor. These include an understanding of genitourinary tract physiology, reasons for genitourinary infection, complications, and proper health habits. Good personal hygiene, drinking plenty of water that flushes out the bacteria from the urinary tract, completely emptying the bladder as soon as the urge is felt or at least once in three hours, helps to keep bacteria down, and also wearing cotton underwear which does not trap moisture and proper hygiene *(Lawani et al., 2015).*

Proper health habits (self-care) referred to the development and use of personal health habits and coping strategies to improve their health, avoid or mitigate disease, and preserve well-being. Such practices are generally carried out without clinical assistance. However, it can be detrimental if founded on inaccurate understanding or harmful behaviors, considering the great value of self-care activities for health maintenance *(Kamgang et al., 2016).*

Alternatively, women should learn how to manage this problem during pregnancy and cope with their changes *(Tehran et al., 2014).* The nature of the health condition and the degree and form of impairment, including its effects on everyday activities, are the best determinants of whether a person uses self-care methods or requires assistance from a specialist. If the woman does not apply self-care measures correctly, it may negatively affect urinary tract infection, such as ascending infection and inflammation *(Hassan, 2015).*

The nurse is a key person to educate the women to meet the self-care needs, request, facilitate, and increase their self-care abilities to perform self-care activities. Women's treatment now receives full nurse evaluation, preparation, rehabilitation, education, counseling, and assistance. Nurse encourages relaxation, provides sufficient hydration, teaches patients, and provides women with the expertise to recognize early signs and symptoms of urinary tract infection to encourage prevention, early detection, and treatment of possible infection*s (Ahmed & Khresheh 2016).*

2. Significance of the Study

Urinary tract infection (UTI) during pregnancy is associated with increased maternal-fetal morbidity and mortality rates. UTI is widespread, and one of the most prevalent health problems worldwide during pregnancy, causing burdens to families and communities, so preventive strategies are essential for combating *(Goldman & Rexrode 2013)*. In a recent review, the global prevalence of UTIs in pregnancy ranged from 3 to 35% across five continents, with preterm birth rates >10% (Gilbert et al., 2013). In Egypt, UTIs prevalence during pregnancy ranges between 22 and 35% *(UMMC, 2011).* There are three distinct clinical forms of UTI related to pregnancy: Asymptomatic bacteriuria (ASB), cystitis, and pyelonephritis, which are the cause of approximately 5% of hospital admissions of such patients (Szweda & Jóźwik, 2016). In this context, the current study has one central goal of providing remarkable evidence of an educational intervention program's positive effect on pregnant women's knowledge and self-care practices regarding urinary tract infection.

3. Aim of the study

The present study aimed to evaluate the effect of an educational intervention on pregnant women's knowledge and self-care practices regarding urinary tract infection.

3.1. Research hypothesis

Pregnant women who received educational intervention will exhibit better knowledge and self-care practices regarding (UTI) during pregnancy than before applying for the educational program.

4. Subjects & Methods

4.1. Research design

A quasi-experimental design (pre/post-test design), a single group was used to fulfill this study's aim. Quasi-experimental research is research that resembles experimental research but is not true experimental research. Although the independent variable is manipulated, conditions, or terms of conditions are not randomly allocated to participants *(Cook & Campbell, 1979).*

4.2. Research setting

The study was conducted at Obstetrics and Gynecological outpatient clinic in Benha University Hospital. This setting was mainly chosen because a large number of pregnant women attended antenatal care clinics and visited the clinic for follow up.

4.3. Subjects

A purposive sample of 68 pregnant women with urinary tract infection who attended the setting mentioned above was recruited at the present study according to the following inclusion criteria: All pregnant women who complained of (UTI) and the second and third trimester of pregnancy. Also, those who were free from any medical and obstetrical complications.

Sample size based on women's incidence of complaint from (UTI) during pregnancy flow rate at the previous study year in the predetermined hospital (134) women. The sample size was calculated using the present formula.

$$n = \frac{\mathrm{N}}{1 + \mathrm{N(e)2}}$$

Where:
N= total population number (134).
n= sample size=68
e= margin error (0.05)

4.4. Tools of the study

Data were collected through two main tools.

4.4.1. A Structured Interviewing Questionnaire

Researchers developed it to gather necessary data after reviewing relevant literature *(Foxman, 2014)*. It was written in the Arabic language and consisted of three parts:
The first part was concerned with women's socio-demographic data. It includes six questions (age, level of education, residence, occupation, family type, and perceived income).
The second part was embraced the women's obstetrical history. It consisted of ten questions such as number of gestations, gestational age, number of deliveries, number of abortions, type of previous delivery, previous use of the contraceptive method, attending antenatal class, the reason for attending antenatal class, previous history of UTIs in the previous pregnancy, and frequency of current UTI, besides their source of information.
The third part comprised women's knowledge regarding urinary tract infection. It was adapted from *Emiru et al. (2013)*. It included 14 questions in the form of closed-end questions (Signs & symptoms, causes, risk factors, and complications).
Scoring system

Each question was assigned a score of (two) given when the answer was correct. A score of (one) was given when the answer was incorrect. The total score was calculated by summation of the scores of knowledge items. The total score ranged from 1-28. The total incorrect score ranged between 1-14, and the total correct ranged between 15-28. The total knowledge score was then represented as follows:

- Poor <50% of total knowledge.
- Average 50-75 of total knowledge.
- Good >70% of total knowledge.

4.4.2. Self-Care Practices Checklist

It was adopted from *Amiri et al. (2009).* It included 15 items to assess self-care practices such as abdominal massage, the use of the antiseptic solution in water for perineal care, change clothes (underwear), cold compression on the bladder, and personal hygiene.
Scoring system

Each item was scored as (1) for not done and (2) for done. Then summing up the items' scores in each practice, and the overall scores gave practice score. The mean and standard deviation was calculated. As well as women total practice score was classified as the following:

- Low practice < 50% of total practice.
- Moderate practice 50-75% of total practice.
- High practice > 70% of total practice.

4.5. Procedures

The study was executed according to the following steps:

Administrative approval: This study was conducted after the approval of the Faculty of Nursing Ethical Committee, Benha University. The official authorization to collect the requisite data and enforce the program was obtained from the hospital authorities in the identified setting.

Pilot study: A pilot study was performed on 10% of the total sample (seven women) to assess the study instruments' clarity and applicability and estimate the time necessary to complete the questionnaires and the feasibility of the research process. Women involved in the pilot study were included in the study as no modification was done.

Validity: The research instruments were sent to a jury of five field experts in obstetrics and gynecology nursing to test the content validity.

Reliability: Test-retest of the tools on the same sample of pregnant women on two occasions and then compare them. The Cronbach's coefficient alpha of the knowledge questionnaire was 0.853, and the practice checklist's internal consistency of practice was 0.82.

Ethical Considerations: Before data collection and after describing the research's intent, approvals for women were obtained. As the completed questionnaires were given a code number, anonymity was guaranteed (not by names). The women have been told that the questionnaires will be used and discarded only for the study at the end of the study. The study maneuvers do not entail any harmful effects on participation. The participant women were informed of having the right to withdraw at any time without giving any reason.

Fieldwork: The following phases were adopted to fulfill the aim of the study. Interviewing and assessing the women's learning needs and their readiness to learn, design, implement, and evaluate the program. After receiving the hospital authorities' approval in the identified setting to collect the necessary data and implement the program, these phases were started to carry out by the researchers from the beginning of May 2019 and completed at the end of October 2019, covering six months. Three days a week, the researchers visited the previously described setting (Saturday, Tuesday, Thursday), from 9.00 am to 12.00 pm.

Interviewing and initial assessment: This phase encompassed interviewing to collect socio-demographic characteristics, baseline data about women and their urinary tract infection knowledge. It was used two times (pre- post-test). The interviewing questionnaire (pre-test) was administered to each woman individually using the personal interview method and asked to respond to the interview questionnaire. It was produced in simple Arabic language, and answers were recorded immediately.

At the start of the interview, the researcher welcomed the woman and introduced herself to every woman involved, explained the study's purpose, and provided the woman with all information about the study (purpose, duration), and take their oral consent. The average time for

each woman to complete the interview was about (15-20 minutes). This period of pre-tests (knowledge and practice) took one month.

Planning: Based on the results obtained during the assessment process, the researchers produced the UTIs educational guidelines in a printed Arabic booklet. Learning needs were identified and classified into knowledge and self-care practices. Detected needs, requirements, and performance deficiencies were translated to the aim and objectives of educational guidelines. Objectives were categorized into general and specific objectives.

The general objective was to improve the knowledge and self-care practices related to urinary tract infections among pregnant women. The specific objectives were as the following: At the end of the educational intervention, the women should be able to:

- Define urinary tract infection.
- List causes of urinary tract infection during pregnancy.
- List complications of urinary tract infection during pregnancy.
- Adopt correct self-care practices regarding urinary tract infection during pregnancy.

Implementation (intervention): Women were divided into small groups (6-7 women/ session). Each group perceived the educational program contents using the teaching strategies and hand out. The total numbers of sessions were three sessions for each group. It was divided as follows: One session for the theoretical part and two practical parts. The total number of groups was (10 groups) and the total time for achieving the educational guideline was (3 hours) for each group under the study.

Explanation of the guidelines using a PowerPoint presentation, discussion, demonstration, and redemonstrations was also conducted during each session. A theoretical session was given to cover the general and specific objectives of guidelines, knowledge regarding the definition and causes, signs & symptoms of UTI, risk factors, UTI causes during pregnancy and UTI complications on mother and fetus. In (2) sessions to cover self-care practices regarding UTI during pregnancy, self-care practices sessions were carried out.

During each knowledge session, the researcher used simple, brief, and clear words. At the end of each session, the researcher summarized and emphasized the most important points included in each session. Before starting each session, pregnant women were asked the researcher to re-emphasize questions related to the issues discussed in the previous session to ensure that they remember the instruction given and reinforce the knowledge, missed or unclear points. The researcher offered small gifts as an incentive for the correct answers.

UTI educational guidelines booklet was given to each woman to grasp her attention, motivate her, review at home, and support knowledge and practice. Each woman was seen continuously by the researcher to be sure that the instructions were followed correctly. Correction, reinstruction, and re-demonstration were offered.

Evaluation phase: During this phase, the educational program's effect was evaluated by using the same format of tools used before the program implementation.

4.6. Data analysis

Data were verified before computerized entry and categorized, coded, computerized, tabulated using IBM SPSS (statistical package for social science) for that purpose. Descriptive statistics were applied as frequency and percentages. Using the chi-square test (x^2), qualitative variables were compared by the significance test. The correlation coefficient (r) was used to determine the relationship between the studied variables. The p-value is the degree of significance. When p-value ≤ 0.05, a significant level was considered, and when p-value ≤ 0.001, a highly significant was considered, while p-value >0.05 suggests non-significant results.

5. Results

Table 1 reveals that 58.8% of the studied women were in the age group of 20-<30 years old. 60.3% of them had secondary education. Also, 75.0% of them lived in an urban area, and 70.6% were working women, while 80.9% live in a nuclear family, and 82.4% had not enough income.

Table 2 reveals that 38.2% of the studied women were primigravida, and 55.9% were in the third trimester. Moreover, 41.1% of the studied women had 3-4 deliveries. Additionally, 88.2% had no abortion, and 60.5% of them had a previous normal delivery. Furthermore, 54.4% had previous use of contraceptive methods, and 50% use the IUD method.

Table 2 also reveals that 50% of studied women attended antenatal classes, and 86% attended antenatal classes to treat symptoms. Also, 60.3% had no previous UTI history with previous pregnancies, and 45.6% had one UTI recurrence.

Figure 1 shows that 35% had their information source from health workers, and 30% had their friends and family information.

Table 3 shows a highly statistically significant difference of studied women's knowledge related to urinary tract infection between the pre-and post-intervention phases ($p<0.001$).

Figure 2 represents the total knowledge score of studied women regarding urinary tract infection during pregnancy. Pregnant women had poor knowledge about UTI before educational intervention (55.9%), which became good knowledge after implementing educational intervention (79.4%).

Table 4 shows a highly statistically significant difference between studied women self-care practices related to urinary tract infection at pre and post-intervention phases ($p<0.001$).

Figure 3 represents the total self-care practice score of the studied sample regarding urinary tract infection during pregnancy. After the intervention, the self-care practice level modified from a low level of 80.8% before the intervention to a moderate level of 48.5%.

Table 5 shows the correlation between studied women's knowledge and practice scores at different phases of intervention. It was observed that there was a highly significant positive correlation between their knowledge and practice scores at pre-and post-intervention phase.

Table (1): Frequency and percentage distribution of the studied women socio-demographic characteristics.

Socio-demographic characteristics	No.	%
Age		
Less20	9	13.2
20-<30	40	58.8
30-<40	17	25.0
more 40	2	2.9
Mean ±SD	25.0±5.52	
Education level		
Basic education	13	19.1
Secondary	41	60.3
University	14	20.6
Residence		
Rural	17	25.0
Urban	51	75.0
Occupation		
Working	48	70.6
Not working	20	29.4
Family Type		
Nuclear	55	80.9
Extended	13	19.1
Perceived income		
Enough	12	17.6
Not enough	56	82.4

Table 2: Frequency and percentage distribution of studied women's obstetric history.

Obstetric history	No.	%
Number of gestations		
Primigravida	26	38.2
Two	17	25.0
Three	13	19.1
More than three	12	17.6
Gestational age		
2nd trimester	30	44.1
3rd trimester	38	55.9
Number of deliveries		
Primipara	25	36.8
1-2 times	14	20.5
3-4 times	28	41.1
more than 4	1	1.4
Number of abortions		
Not yet	60	88.2
1-2 times	5	7.4
3-4 times	3	4.4
Type of previous delivery (n=43)		
CS	15	34.9
Normal delivery	26	60.5
Assisted delivery	2	4.6
Previous Use of contraception		
Yes	37	54.4
No	31	45.6
If yes		
Hormonal	11	29.7
IUD	19	51.3
Other	7	19

Table 2: Frequency and percentage distribution of studied women's obstetric history (continue).

Obstetric history	No.	%
Attending antenatal classes		
Yes	50	73.5
No	18	26.5
Reason for Attending antenatal classes		
Seeking medical advice to treat symptoms	43	86
Just for follow up visits only	7	14
Previous history of UTI with previous pregnancies		
Yes	27	39.7
No	41	60.3
Frequency of UTI		
Once	31	45.6
Recurrent	26	38.2
Continuous	11	16.2

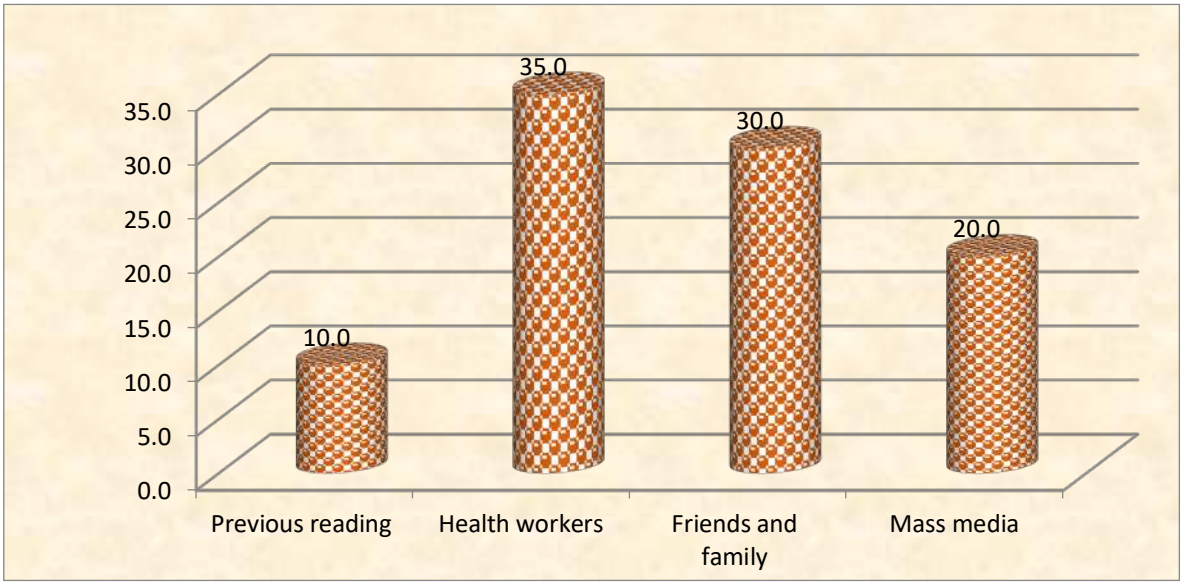

Figure (1): Percentage distribution of studied women's source of information.

Table (3): Comparison of the studied women's knowledge regarding urinary tract infection pre- and post-educational intervention.

knowledge	Pre-intervention				Post-intervention				X^2	p-value
	Correct		Incorrect		Correct		Incorrect			
	No.	%	No.	%	No.	%	No.	%		
Signs and symptoms	15	22.1	53	77.9	63	92.6	5	7.4	69.2	0.000
Causes	9	13.2	59	86.8	61	89.7	7	10.3	79.5	0.000
Risk factors	11	16.2	57	83.8	59	86.8	9	13.2	67.8	0.000
Complications	15	22.1	53	77.9	57	83.8	11	16.2	52.0	0.000

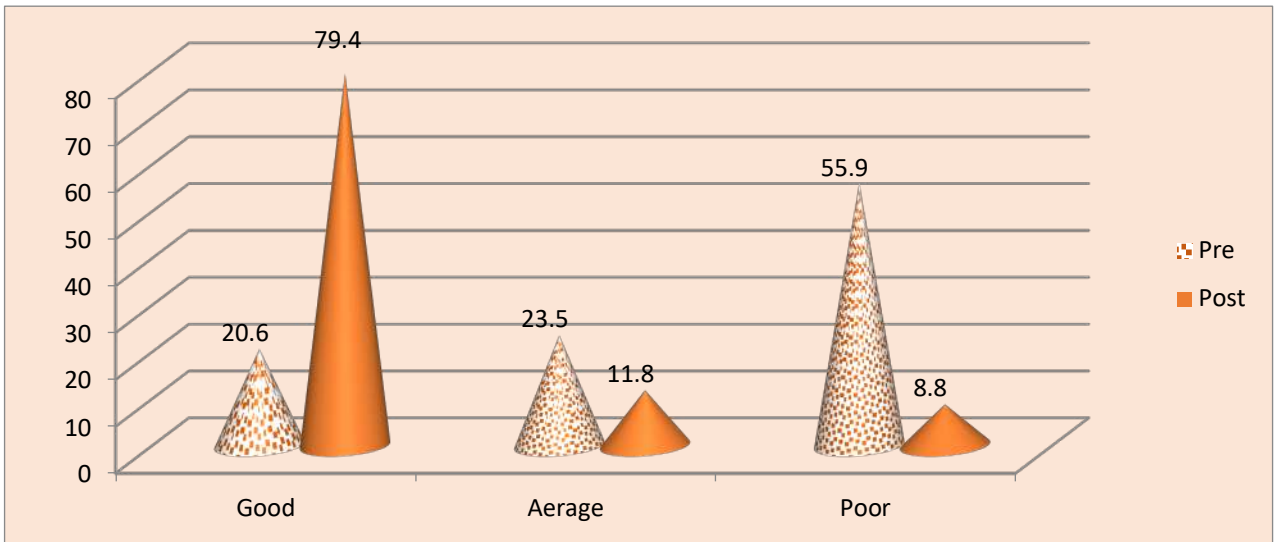

Figure (2): Percentage distribution of studied women regarding their total knowledge score.

Table (4): Comparison of the studied women regarding self-care practices of UTI symptoms before and after the educational intervention.

Self-care practices	Pre intervention				Post intervention				X^2	p-value
	Yes		No		Yes		No			
	No.	%	No.	%	No.	%	No.	%		
Use the gel for pain in intercourse	12	17.6	56	82.4	27	39.7	41	60.3	8.08	0.004
Massage in an abdomen	0	0.00	68	100.0	36	52.9	32	47.1	48.9	0.000
Use of antiseptic solution in water for perineal care	20	29.4	48	70.6	64	94.1	4	5.9	60.2	0.000
Change clothes (underwear)	32	47.1	36	52.9	60	88.2	8	11.8	27.9	0.000
Cold compression on bladder	68	100.0	0	0.00	23	33.8	45	66.2	67.2	0.000
Vulval and vaginal washing with watermelon	9	13.2	59	86.8	2	2.9	66	97.1	4.84	0.02
Personal hygiene	23	33.8	45	66.2	16	23.5	52	76.5	1.76	0.18
Practicing exercises	14	20.6	54	79.4	47	69.1	21	30.9	32.3	0.000
Intake of self-medications	12	17.6	56	82.4	7	10.3	61	89.7	1.52	0.21
Sitz bath in saltwater	23	33.8	45	66.2	64	94.1	4	5.9	53.6	0.000
Application of lemon juice to the urethra and perineal area	21	30.9	47	69.1	6	8.8	62	91.2	10.3	0.001
Vulval and vaginal douching by warm water with aspirin	4	5.9	64	94.1	6	8.8	62	91.2	0.43	0.51
Sitz bath in water with chamomile	8	11.8	60	88.2	64	94.1	4	5.9	92.5	0.000
Sitz bath in tea	9	13.2	59	86.8	50	73.5	18	26.5	50.3	0.000
Application of spermicidal creams & suppositories -Increase periods of rest	10	14.7	58	85.3	50	73.5	18	26.5	47.7	0.000

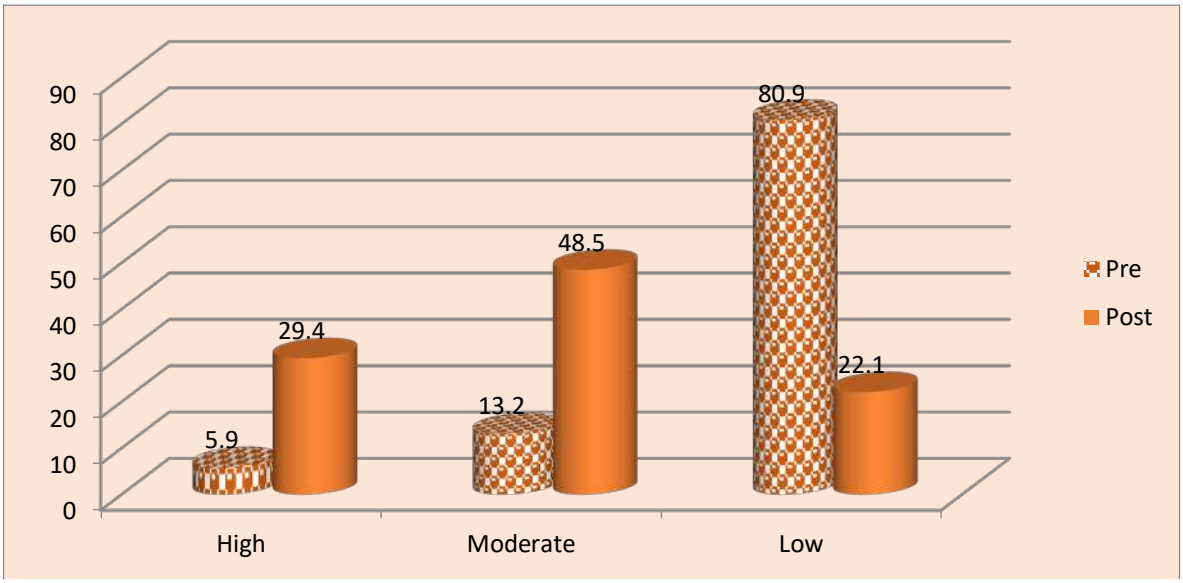

Figure (3): Percentage distribution of studied women's total self-care practice score.

Table (5): Correlation between total knowledge and total self-care practices of the studied women at pre and post-intervention phases:

	Total knowledge			
	Pre		post	
	r	p-value	r	p-value
Total self-care practice	0.43	0.04	0.71	0.000

6. Discussion

Urinary tract infection is one of the most prevalent disorders during pregnancy. Several physiological and hormonal changes occur, which increase the incidence of infection among pregnant women. It can be symptomatic or asymptomatic *(Ahmed & Khresheh, 2016)*. It is the most common complication of pregnancy. It occurs in around 5 to 10% of all pregnancies *(Jalali et al., 2014)*. Educating pregnant women about urinary tract infections and preventive measures helps to prevent the development of a complication. This study aimed to evaluate the effect of an educational intervention on pregnant women's knowledge and self-care practices regarding urinary tract infection.

The aim of the present study was achieved through the present study findings. The pregnant women's knowledge and self-care practices regarding urinary tract infection were statistically improved post-intervention compared to their preintervention level, supporting the research's current hypothesis.

The present study discloses that more than half of the sample were in the age group of 20-<30 years old, and the highest percentage of them had secondary education (near two-thirds). This finding might be due to our cultural tradition of early marriage. These results agree with a study by *Ahmed and Khresheh (2016)*, who stated that half of the sample ages' were from 20-<30 years old with a mean age of 29.8±9.89 and more than half of them had secondary education.

Additionally, these results agree with *Jalali et al. (2014),* who reported that about half the sample was between the age group of 22-25 years, and the mean age was 23.5 years. On the other hand, these results contrast with *Al-Kotb et al. (2016)*, as urinary tract infections have been reported to be more frequent in older women and of lower socioeconomic status. From the researcher's perspective, this difference may be due to different geographical locations and populations included in the study.

Regarding the residence and occupation, the present study reveals that three-quarters of the sample lived in urban areas. Also, near three-quarters were working. This finding may be due to most samples living in urban areas, which encourages them to work. This result is inconsistent with *Tehrani et al. (2014)*. They reported that more than half of women live in urban areas and were working women. On the other hand, these results disagreed with *Ahmed and Khresheh (2016)*, who stated that about three-quarters of the women's sample were from rural areas, and more than half were housewives.

The present study indicates that more than three quarters were living in a nuclear family, and also more than three quarters perceived they had not enough income from the researcher's point of view. These results may be due to the studied sample living in urban areas, and the extended family was present in the rural area. These results agree with *Duarte et al. (2008).* They reported that half of the sample did not receive enough income. This result also goes hand in hand with *Ahmed and Khresheh (2016*), who represented in his study that most of the sample live in nuclear families.

The study reveals that most women were multipara and multigravida and near two-fifth of them had a previous history of UTI in their previous pregnancies. These results are in the same line with *Vazquez and Abalos (2011)*, who reported that multiparty has an increased risk factor of developing bacteriuria among pregnant. Moreover, these findings agree with *Onuoha and Fatokun (2014).* They reported that UTI and multiparty reproductive history were risk factors for UTI in these women due to trauma to the pelvic floor during labor, weakening the supportive structures. On the other hand, *Emiru et al. (2013)* found that UTI is more common in primigravida. Additionally**,** *Dimetry et al. (2007)* reported discordant findings regarding increased UTI association with multigravidas, gestational age, and those who have more than one child. They related the results to the age, recurrent exposure to stasis of urine, or former infections history.

Regarding the type of previous deliveries, the present finding reveals that nearly two-thirds of the sample had a previous history of a normal delivery. Moreover, the present study findings represented that most of the sample attending antenatal classes to seek medical advice for treating UTI symptoms. Also, more than one-third of women obtain their health information from health workers. These may require that maternity nurses who provide care for pregnant women must conduct more educational programs regarding pregnancy and pregnant women's needs and be knowledgeable regarding UTI.

On investigating pregnant women's knowledge about UTI, the present study findings reveal that more than three-quarters of the sample had incorrect information regarding urinary tract infection (signs and symptoms, causes, risk factors, and complications). These findings are expected because most of the studied sample had secondary education and did not receive any educational session regarding UTI.

The result of the current study was in the same line as *Duarte et al. (2008)*. They revealed that more than two-thirds of women had no information about urinary tract infections. These findings are also supported by *Salvatore et al. (2013)*, who mentioned lacking knowledge about physiological changes during pregnancy among pregnant women, and pregnant women are at high risk of infection of the urinary tract. Such findings also indicate that nurses who look after pregnant women need a good understanding of pregnancy, changes, and discomfort. UTI symptoms with pregnancy end to cause the woman's discomfort and become frustrated, so the nurse should be professional with strong teaching skills to offer sound guidance on steps to avoid or alleviate UTI discomfort and help improve pregnant women's overall health well-being.

Meanwhile, the study reveals that nearly two-thirds of the sample got a poor level of total knowledge at the pre-intervention phase, and they displayed a good level of knowledge after intervention among more than three-fourths of them. These findings were in the same line as *Ahmed and Khresheh (2016*). They stated that significant improvements were revealed in women's total knowledge scores (from poor or weak score levels to good levels) regarding the studied items concerning urinary tract infection.

Concerning self-care practices regarding signs and symptoms of urinary tract infection, the present study shows a highly statistically significant difference between self-care practices related to urinary tract infection at pre- and after implementing the educational intervention for women regarding healthy performance self-care practices. These findings are supported by *Grigoryan et al. (2014)*. They said that because they relax stressed, tired muscles and make women feel fresh, hot showers can be therapeutic. Furthermore**,** *Yossif and Sayed (2014)* found that pelvic floor exercise and bladder retraining may be given to women with annoying lower urinary tract symptoms throughout pregnancy to minimize UTI risk.

The present study's findings revealed a statistically positive correlation between total knowledge and self-practices score before and after the intervention. This result may be due to the improvement of knowledge owing to improved practice. These findings are in congruence with *Grigoryan et al. (2014).* They clarified a positive, highly statistically significant correlation between total knowledge and total practice scores and total knowledge and total intention to practice healthy behavior. Additionally, *Yossif and EL Sayed (2014)* stated that most people require a certain degree of knowledge to practice competently. There is also the assumption that this level of knowledge is directly related to practicing safe and effective care. These findings are supporting the current research hypothesis.

Therefore, this research found that there was a lack of women's knowledge of UTI during pregnancy. They have also lacked the concept of self-care practice as well as basic health practices. However, it is essential to increase understanding of UTIs and improve prevention and recovery programs for pregnant women and health education to learn about self-care practices during pregnancy.

7. Conclusion

In the light of study findings, it was concluded that the research hypothesis was supported, and pregnant women exhibited better knowledge and self-care practices regarding (UTI) after application of an educational intervention program.

8. Recommendations

Based on the results of the present study, the following recommendations were suggested to be implemented:

- The self-care concept should be empowered as an essential part of women's health care levels and strategies.
- Increase women's awareness regarding physiological changes during pregnancy, warning signs of pregnancy complications, especially infections, through educational classes for pregnant women.
- Further research is needed concerning factors and barriers associated with the utilization of healthy self-

care practices throughout women's reproductive years and the management of various gynecological problems.

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