

Effect of Self-Care Practice Health Educational Program for Patients on Urinary Tract Infection Recurrence

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Abstract

Background: Urinary tract infection is an infection that affects any part of the urinary system. Lack of knowledge and unhealthy behaviors are predisposing factors of recurrent UTI. **The study aimed** to evaluate the effect of a self-care practice health educational program for patients on urinary tract infection recurrence. **Subjects and method:** Design: Quasi-experimental research design was used in this study. **Setting:** The study was conducted in the urology department and the urology outpatient clinic at Tanta University Hospitals. **Subjects:** A convenience sampling of 80 adult patients was divided into two equal control and study groups. **Tools:** Four tools were used in the study. **Tool (I):** Structured interview schedule includes two parts, patients' socio-demographic data and patients' clinical data. **Tool (II):** Patients' knowledge assessment questionnaire. **Tool (III):** Urinary tract infection assessment tool consists of three-part; risk assessment urinary tract infection recurrence, urinary tract infection manifestation checklist, and laboratory investigations. **Tool (IV):** Self-Care practice assessment tool. **Results:** Statistically significant improvements in the total scores of knowledge and self-care practices post-program intervention were found in the study group compared with pre-intervention. The recurrence rate decreased for patients in the study group compared with the control group during follow-up. **Conclusion:** The educational program was effective for improving knowledge, self-care practices related to urinary tract infection which lead to a decrease in the recurrence rate. **Recommendation:** Implementation of a continuous educational program for patient self-care practice and preventive behaviors regarding UTI in different geographical areas.

Key Words: Urinary tract infection, recurrence, educational program, self-care practice.

Introduction

Urinary tract infection (UTI) is an infection that affects any part of the urinary system caused by the abnormal growth of pathogens ⁽¹⁾. UTI causes significant morbidity, affecting both sexes of all ages however, females are significantly more affected than males ⁽²⁾. UTI is the second most common type of infection, accounting for nearly 25% of all infections ⁽³⁾. About 152 million people developed UTI globally each year with an annual incidence of 12.6% in women and 3% in men ^(4, 5). Nevertheless, it is difficult to accurately assess the incidence of UTI in Egypt, because it is not a reportable disease. About 40% of patients who visit out-patient urology clinics at Tanta University hospitals are complaining of UTI symptoms ⁽⁶⁾.

Recurrent urinary tract infections are common, approximately 25% will develop recurrent infections within 6 months. Recurrent UTIs are defined as at least two documented UTI episodes within 6 months or three episodes within 12 months. The recurrences may be relapses or reinfections ^(7,8). *Escherichia coli* are the most pathogen, responsible for more than 80% of community-acquired UTIs and about 50% of hospital-acquired UTI. In addition *Klebsiella*, *Enterobacter*, *Proteus*, *Pseudomonas*, *Enterococcus*,

Staphylococcus, and others can also cause UTI ⁽⁹⁾. UTI is classified by its location in the urinary system to lower or upper UTI, the presence of underlying diseases and anatomical or functional abnormalities of the urinary tract as uncomplicated UTI or complicated UTI, and the presence or absence of symptoms as asymptomatic or symptomatic ⁽¹⁰⁾. Risk factors for urinary tract infections are alterations to the host's natural defense mechanisms, anatomical and physiological factors, age and sex, obstruction, instrumentation, and behavioral factors ⁽¹¹⁾.

The most common complications of UTI are urolithiasis, stricture, *Clostridium difficile* colitis, renal failure, and sepsis. The diagnosis of UTI depends on clinical symptoms and a positive urine culture, the lower urinary tract symptoms are dysuria, frequency, urgency, hematuria, and suprapubic pain, while pyelonephritis is associated with fever, chills, and flank pain. Proper diagnosis and early treatment of urinary tract infection are crucial to prevent infection recurrence and its complications. ^(12,13).

About 25% of all antibiotic prescriptions are for UTIs and antibiotic resistance is a rising problem worldwide so, the world health organization has issued about prevention of infection before happening

and the urgent need for antimicrobial-sparing strategies to infectious diseases. In this regard, patients with recurrent UTIs are counseled about behavioral approaches before antimicrobial prevention strategies (14-17).

Management of UTIs involves pharmacologic therapy and patient education about the disease, how to deal with the symptoms, and prevent its recurrence. Since UTIs can be reduced with proper hygiene practices and healthy behaviors and prevalence of UTI can be a strong driver for self-care promotion. So providing health education for preventing UTIs is crucial to changing self-care patterns and reducing UTI. On the other hand, people need guidance and training for changing their health behaviors, and these positive changes in behavior can be met by health education (18-21).

Patient education is one of the most important roles for nurses in the health care setting. Nurses teach patients about self-care practices to ensure continuity of care. Implementing educational programs about self-care practices showed positive effects in the prevention of diseases and promotion of health (22). Self-care practices refer to activities and attitudes that individuals perform on their behalf in maintaining life, health, and well-being (23). UTI-related self-care practices include;

practicing careful personal hygiene, increasing fluid intake, urinating regularly, and following the therapeutic regimen (18). Since the most predisposing factors for recurrence are behavioral risk factors. Therefore, we can reduce UTI recurrence by educating the patients about UTI and empower them for healthy behaviors (24). Hence there is an urgent need to conduct a study about self-care practice health educational program related to urinary tract infection recurrence.

Significance of the study

Urinary tract infections are serious health problems affecting millions of people each year with a high recurrence rate. These infections have a significant influence on various aspects of the patients' quality of life and are associated with a significant disease burden and cost to patients and healthcare organizations (25, 26). UTI has serious complications such as stones, stricture, sepsis, and renal failure (18). Despite the importance of self-care educational actions in health promotion and prevention of UTI recurrence, there are not enough studies about urinary tract infection self-care practice. So this study was conducted to evaluate the effect of a health education program about self-care practices on the reduction of urinary tract infection recurrence.

Aim of the study

Evaluate the effect of self-care practice health education program for the patient on urinary tract infection recurrence.

Research hypothesis:

Post-implementation of the health educational program, the patients in the study group are expected to have higher mean scores and positive effects of self-care practice related to the reduction of urinary tract infection recurrence.

Subjects and Method

Research design:

A quasi-experimental research design was used in the current study .

Setting:

Our study was conducted in the urology department, Tanta University hospitals. It is composed of an out-patient clinic and 22 inpatient wards including 72 beds.

Subjects:

A convenience sampling of eighty adult patients (80) was included in the study according to inclusion and exclusion criteria. The sample size was calculated based on the power analysis using Epi-Info software statistical package version 2003. The included patients were divided into two equal groups (40 patients in each group) as follow:

Group I (study group) who received routine hospital care and health education program

about UTI self-care practices implemented by the researcher.

Group II (control group) received routine hospital care only.

Inclusion criteria:

- Adult patients (21 -60 years old) either male or female.
- Newly admitted patients whatever the cause of admission and have not operated yet.
- Alert and able to communicate.

Exclusion criteria:

- Pregnancy.
- Patient with urinary catheterization.
- Patients with urological surgery.
- Diabetes mellitus.

Tools of Data Collection:

Tool I: Structured interview schedule

The interview schedule was developed by the researcher after review the recent related literature ^(14, 20, 21) to collect the personal data and data concerning urinary tract infection which consists of the following parts:

Part (1): Patient`s socio-demographic data includes: age, sex, marital status, level of education, residence, and occupation.

Part (2): Patient`s clinical data which includes: history that includes previous urinary tract infection, previous urinary operation, previous catheterization, previous hospitalization, and family history

of urinary tract infection, In addition to diagnosis, vital signs, the chief complaints, any infection other than the urinary system, the current medications, laboratory investigations, and family planning method for female patients.

Tool II: Patient`s knowledge assessment questionnaire:-

It was developed by the researcher after review the recent related literature^(14, 15, 27) to assess patients' knowledge regarding urinary tract infection. It includes (13) multiple choices questions about parts of the urinary tract, definition, causes, classifications, symptoms, and risk factors of urinary tract infection. Furthermore, practices that reduce UTI recurrence, measures that can relieve symptoms of UTI, complications of UTI, the commonly recommended treatment for UTI, and protocol of prescribed antibiotics for UTI. The patient needs to choose one or more correct answers for each question.

Scoring system:

The scoring system for knowledge was determined through:

- The correct and complete answer was scored (2)
- The correct and incomplete answer was scored (1)
- Don't know and wrong was scored(0)

The total scores for patients' knowledge were 26. It was calculated and classified as follows:

- Poor score was < 60% of the total score
- Fair score was from 60% to 75% of the total score
- Good score was > 75% of the total score

Tool III: Urinary tract infection assessment tool:

This tool was used to assess the risk factors and manifestations of UTI it consists of three parts:-

Part (1): Risk assessment urinary tract infection recurrence

This part was adapted from Lotfy⁽²⁸⁾ and modified by the researcher after reviewing the related literature to determine the risk factors for urinary tract infection recurrence. It was used once for each group and includes (26) close-ended questions about risk factors which were classified to **(a) non-modifiable risk factors** such as anatomical malformation, obstruction, immunosuppression, postmenopausal, and neurological condition. **(b) modifiable and behavioral risk factors** such as deferral of micturition, decreased fluids intake, excessive drinking of soda, tea, and coffee, hygienic practices after bowel habits and sexual activity, In addition to constipation, diarrhea, obesity, smoking, limited activity, contraceptive

methods especially using of diaphragms or spermicides, and antibiotics abuse.

Scoring system:

Each item was scored by one for "yes" and zero for "no".

Part (2):- Urinary tract infection manifestation checklist

This part was adapted from Gomaa N. ⁽²⁹⁾ and modified by the researcher to assess urinary tract infection manifestations. It includes close-ended questions about (a) General manifestations of urinary tract infection (10 items) such as frequency, urgency, dysuria, fever, chills, malaise, tachycardia, nausea& vomiting, urine incontinence, and urinary retention. Also, (b) Local manifestation (10 items) such as suprapubic pain, flank pain, urethral pain, perineal pain, purulent urethral discharge, urethral irritation, inflammation of the perineal area, and change in the character of urine as color, odor, or consistency.

Scoring system:

Each item was scored by one for "yes" and zero for "no".

Part 3: Laboratory investigations

Urine culture was performed to determine the type of micro-organism, and the colonies count, More than 10^3 CFUs per ml in the urine culture is indicated to infection ^(30,31).

Tool IV: Self –Care practices assessment tool

It was developed by the researcher after reviewing the related literature ^(20, 21, 27) to collect data related to patient's reported self-care practices that reduce UTI recurrence. It contained (31) items divided into seven domains as follow; 1- practicing careful personnel (9 items), 2- adequate fluid intake (4 items), 3- voiding frequently and regularly (3 items), 4 -nutritional practices (5 items), 5- exercises and daily activities (4 items), 6 - maintain normal body weight (2 items), and 7- following the therapeutic regimen (4 items).

Scoring system:

Each practice item was measured on a five Likert Scale ranging from (0) never, (1) seldom, (2) sometimes, (3) often, and (4) always. The scores of the items were summed up and the total score was divided by the number of the items, giving a mean score for each part. These scores were converted into a percent score.

The practice was considered:-

- Satisfactory $\geq 60\%$ of the total score.
- Unsatisfactory $< 60\%$ of the total score.

Ethical considerations:

- Official permission was obtained from the head of the urology department and the director of the Student Hospital at Tanta University after an explanation of the study's aim.
- Informed consent for participation was obtained from every patient after an

explanation of the study aim and the patients were informed that the study will not cause any harm or pain to them.

- Patients were assured about the confidentiality of data and anonymity as code number was used instead of names.
- The patients were told about their right to withdraw at any time of data collection.

Method of data collection:

1. The tools of the study were developed and modified after reviewing the related literature and translated into the Arabic language.
2. The tools were validated by five experts; three of them are assistant professors of medical surgical nursing and two assistant professors of the urology department at the Faculty of Medicine, Tanta University. Modifications were carried out accordingly.
3. The reliability of tools was tested using the Cronbach Alpha Coefficient test, Cronbach's Alpha for the sheet in total is 0.847
4. A pilot study was done for 10% of patients (n=8) after the experts' opinion and before starting the actual data collection to test the feasibility and applicability of the tools and to determine any obstacles that may be

encountered during the period of data collection, accordingly, needed modification was done. Those patients were excluded from the study.

5. Data were collected for 9 months from September 2019 till the end of May 2020.
6. The present study was conducted through four phases (Assessment, planning, implementation, and evaluation):

1 -Assessment phase:

Assessment of the patient baseline data using Tool I part (1) and part (2), Tool II to assess the patient's knowledge about UTI, Tool III part (1) to assess the risk factors of urinary tract infection recurrence, part (2) to assess urinary tract infection manifestations and part (3) to assess the growth of microorganism in the urine culture and the colony count. Tool IV was used to assess the patient's self-care practices related to the prevention of urinary tract infection. Those four tools were used for both study and control groups.

2 -Planning phase:

The educational program about urinary tract infections which aims to improve the patient's knowledge and self-care practices, that may lead to the reduction of urinary tract infection recurrence was designed by the researchers based on the

related literature^(8, 17, 20, 21), and the needs identified during the pre-test assessment while goals and expected outcome were regarded. PowerPoint and an illustrative structured booklet were prepared by the researcher and written in simple Arabic language contained colored pictures for attracting patients and to facilitate patients' understanding as a guide for the study group.

3 -Implementation phase:

An educational program for patients regarding urinary tract infection was developed and implemented by the researcher based on the patient's need, relevant literature, and, expected outcomes. Motivation and encouragement were used to enhance the patient's sharing in this study. The educational program sessions were implemented for 40 patients (the study group) divided into eight groups each group consists of five patients. To implement the educational program, various methods of teaching were used such as lecture, group discussion, demonstration, and re-demonstration, while the educational aids were videos, booklets, and power-point which prepared by the researcher based on literature review. The booklet about urinary tract infection was distributed to the patients, so they can use it as a home reference. The program was covered in five sessions, each

session lasts for 20-30 min for five consecutive days. The program included three theoretical sessions and two practice sessions for the study group about urinary tract infection

4 -Evaluation phase:

The effect of the educational program was assessed after the implementation of the educational sessions using tool II to assess the patient's knowledge about UTI for the study group immediately after the program implementation.

Both control and study groups were followed up using Tool III part (2) and (3) to assess urinary tract infection manifestations and urine culture after one month, three months, and six months after the program implementation. Tool IV was used one month after the implementation of the educational program for the study group to assess patients' self-care practices related to the prevention of urinary tract infection. Additionally, the outcomes of the program were compared between the study and control groups before and after the program.

Statistical analysis:

The collected data were organized, tabulated, and statistically analyzed using SPSS software statistical computer package version 26. For comparison between means of variables for two groups, an independent T-test was used. For comparison between means for

variables pre and post-intervention in a group, a paired-samples T-test was used. Pearson and Spearman's correlation

Results:

Table (1) illustrates the distribution of the patients according to their socio-demographic characteristics. It is found that slightly more than one-third (35%) of the control group were

in the age (50- 60) years while in the study group less than one-third (32.5%) are between (40-50) years. Also, less than two-thirds (65%, 62.5%) are males in the control and the study groups respectively and the majority of them (82.5%) are married. In addition, less than two-thirds (60%) of both groups live in rural areas. Also, it is found that slightly more than half (52.5%) of the control group are secondary educated and more than one-quarter (27.5%) of the study group are illiterate. Additionally, more than one-third (35%, 37.5%) of the control and the study group respectively are workers.

Table (2) reveals that around half (52.5%), (47.5%) in the control and the study group respectively had a history of urinary stone and most patients (70%), (85%) in the control and the study group respectively had a previous UTI. Also, it is found that (40%), (47.5%) in the control and the study group respectively had a previous operation in the urinary tract. Moreover, it reveals

coefficients were used to assess the correlation between variables.

that (47.5%), (62.5%) of the control and the study group respectively had a previous hospitalization. Additionally, less than one-third (30%) of the studied patient in both groups had a family history of UTI.

Figure (1):This figure represents that the majority (95%, 90%) of the control group and the study group respectively have a poor level of the total level of knowledge before the educational program, while the total level of knowledge was improved to the good level in the majority (92.5%) of the study group post-program. .

Figure (2) illustrates that (22.5%) of the control group and (12.5%) of the study group their urine cultures were sterile (no growth) before the program while improved to (70%,75%,85%) in the study group at 1,3 and 6 months respectively after the program compared with the control group, it was (55%,65%, and 75%) post 1,3 and 6 months.

Figure (3) shows that there was no difference between control and study groups in all self-care practice domains pre-educational program. While there was an improvement in the mean scores of self-care practice domains in the study group post-educational program.

Figure (4) shows that the majority (92.5%, 95%) of the control group and the study group respectively have unsatisfied practices before the program implementation, while the majority (90%) of the study group their practices become satisfactory after program implementation.

Table (3) shows that there is a positive weak non-significant correlation between total knowledge level and total practice level for both control and study groups preprogram while there is a positive highly statistically significant correlation between total knowledge level and total practice level for the study group post-program ($r=0.646$, $p=0.000$).

Table (4) it is observed from this table that there is a positive weak non-significant correlation ($r=0.149$, $p= 0.359$ and $r=0.194$, $p= 0.231$) between the total knowledge score and the sterility of the urine for both control and study group respectively preprogram while, in the study group post-program there is a positive highly significant correlation as $r= 0.585$, $p=0.008$. Also, this table shows

the negative significant correlations between the total level of knowledge and frequency, urgency, dysuria, and flank pain for the study group post-program implementation where ($r= -0.291$, $p=0.026$, $r= -0.325$, $p=0.037$, $r= -0.345$, $p=0.014$ and $r=-0.413$, $p=0.034$) respectively.

Table (5) it is observed from this table that there is a positive weak non-significant correlation ($r=0.265$, $p= 0.098$ and $r=0.060$, $p= 0.714$) between the total practice score and the sterility of the urine for both control and study group respectively preprogram while, in the study group post-program there is a positive highly significant correlation as ($r= 0.745$, $p=0.001$). Also, this table shows the negative significant correlations between the total practice level and frequency, urgency, dysuria, and flank pain for the study group post-program implementation where ($r= -0.251$, $p=0.049$, $r= -0.645$, $p=0.013$, $r= -0.362$, $p=0.024$ and $r= -0.524$, $p=0.032$) respectively.

Table (1) : Distribution of the studied patients according to their socio-demographic characteristics.

Characteristics	The studied patients (n=80)				χ^2 P
	Control group (n=40)		Study group (n=40)		
	N	%	N	%	
Age (in years)					
▪ (21-< 30)	10	25.0	9	22.5	4.268 0.234
▪ (30-< 40)	10	25.0	10	25.0	
▪ (40-< 50)	6	15.0	13	32.5	
▪ (50-60)	14	35.0	8	20.0	
Gender					
▪ Male	26	65.0	25	62.5	FE 1.00
▪ Female	14	35.0	15	37.5	
Marital status					
▪ Married	33	82.5	33	82.5	1.077 0.584
▪ Single	6	15.0	7	17.5	
▪ Divorced	1	2.5	0	0.0	
Place of residence					
▪ Urban	16	40.0	16	40.0	FE 1.00
▪ Rural	24	60.0	24	60.0	
Educational level					
▪ Illiterate	13	32.5	11	27.5	5.01 0.085
▪ Read and write	4	10.0	10	25.0	
▪ Basic education	1	2.5	3	7.5	
▪ Secondary education	21	52.5	8	20.0	
▪ Higher education	1	2.5	8	20.0	
Occupation					
▪ Worker/Technician	14	35.0	15	37.5	6.735 0.081
▪ Employee	2	5.0	9	22.5	
▪ Housewife	13	32.5	10	25.0	
▪ Not work	11	27.5	6	15.0	

FE: Fisher' Exact test

Table (2): Percentage distribution of studied groups according to their past medical history

# Past medical history	The studied patients (n=80)				χ^2 P
	Control group (n=40)		Study group (n=40)		
	N	%	N	%	
1-Urinary stone	21	52.5	19	47.5	1.107 0.478
2-kidney disease	2	5.0	2	5.0	
3-Hypertension	9	22.5	4	10.0	
4-Previous urinary tract infection	28	70.0	34	85.0	
5-Previous urinary operation	16	40.0	19	47.5	
Site of the previous operation	(n=16)		(n=19)		
▪ Kidney	7	43.8	8	42.1	FE
▪ Ureter	9	56.2	11	57.9	1.00
6-Previous urinary catheterization	10	25.0	17	42.5	FE
7-Previous hospitalization	19	47.5	25	62.5	0.138
Duration of the previous hospitalization	(n=19)		(n=25)		
▪ Less than one week	18	94.7	22	88.0	FE
▪ More than one week	1	5.3	3	12.0	0.622
8-Family history of urinary tract infection	12	30.0	12	30.0	0.00 1.00

FE: Fisher's exact test # More than one answer was chosen.

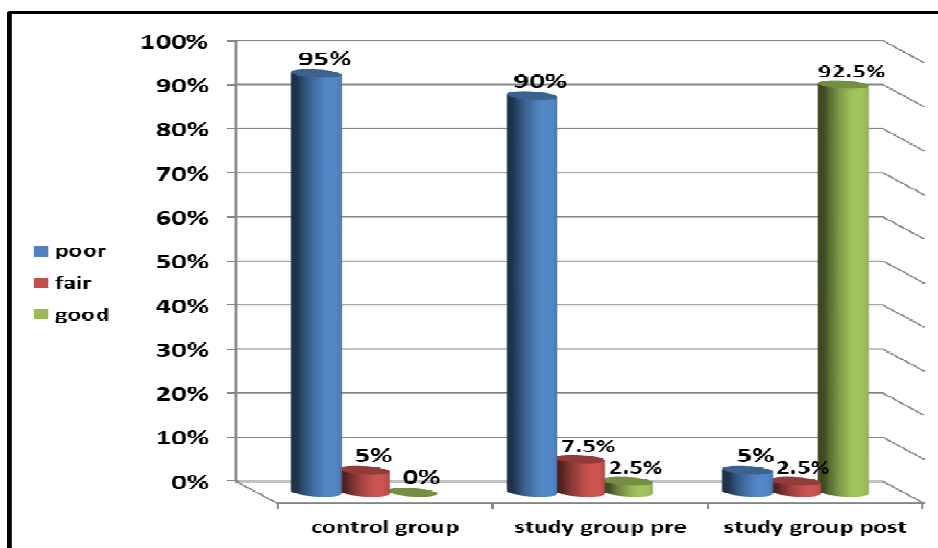


Figure (1): Distribution of the studied groups according to their total knowledge level about urinary tract infection pre and post-educational program.

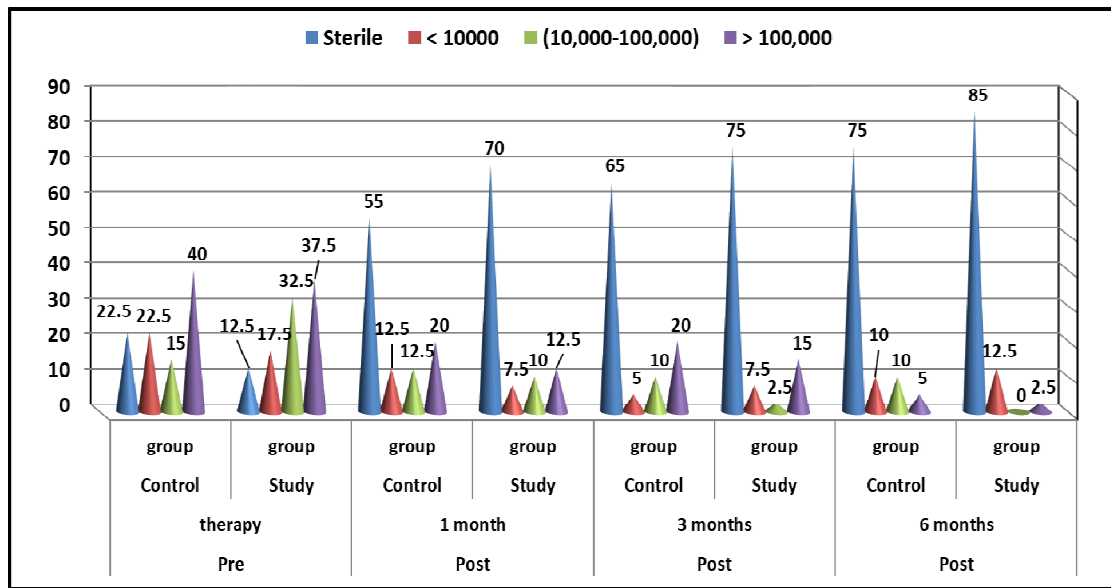


Figure (2) percentage of both control and study group according to their urine culture results during periods of the study.

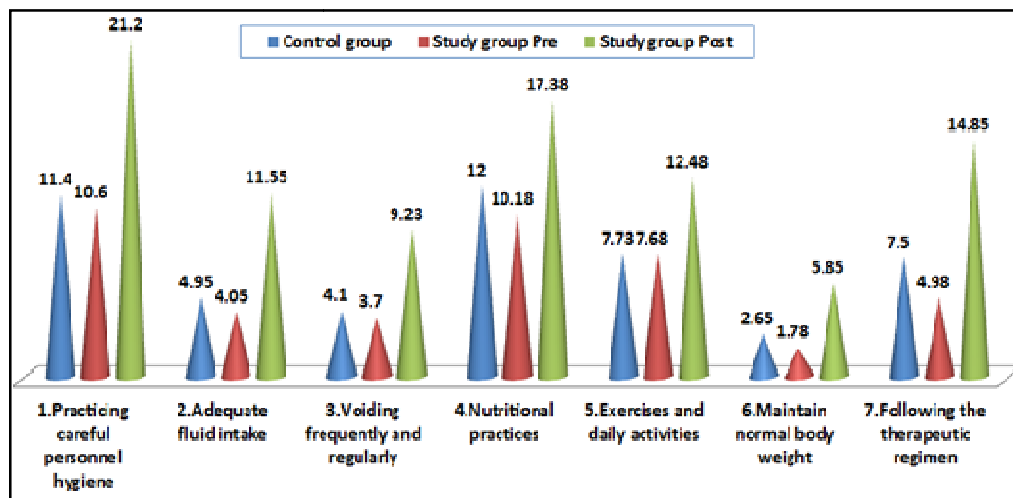


Figure (3): total mean scores of self-care practice domains among the studied groups pre and post-educational program.

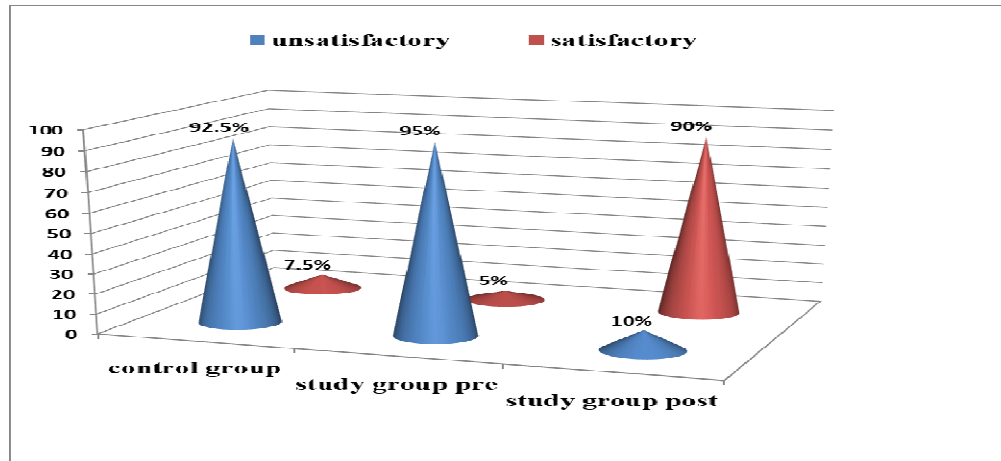


Figure (4): Percentage distribution of the studied groups according to their total self-care practice level pre and post-educational program.

Table (3): Correlation and relationship between total Knowledge level of the studied patients and their total practice level pre and post-educational program.

Total Knowledge Level	Total practice level											
	Control group (n=40)				Study group (n=40)							
	Unsatisfactory (n=37)		Satisfactory (n=3)		Pre (n=38)				Post (n=4)			
	N	%	N	%	N	%	N	%	N	%	N	%
▪ Poor	37	92.5	1	2.5	36	90.0	0	0.0	2	5.0	0	0.0
▪ Fair	0	0.0	2	5.0	2	5.0	1	2.5	1	2.5	0	0.0
▪ Good	0	0.0	0	0.0	0	0.0	1	2.5	1	2.5	36	97.5
χ^2, P	-				-				FE, 0.025*			
r , P	0.213 , 0.187				0.073 , 0.655				0.646 , 0.000**			

r: Pearson correlation coefficient
* Significant at level P<0.05.

FE: Fisher' Exact test
** Highly significant at level P<0.01

Table (4): Correlation between the total knowledge score and the colony count/ml & infection manifestation among the studied groups pre and post the educational program.

	The studied patients (n=80) Total knowledge score					
	Control group (n=40)		Study group (n=40)			
			Pre		Post	
	R	P	r	P	r	P
Colony (count/ml) Sterile	0.149	0.359	0.194	0.231	0.585	0.008**
Urinary tract infection manifestation						
1. Frequency	0.080	0.626	-0.106	0.514	-0.291	0.026*
2. Urgency	-0.165	0.309	0.048	0.769	-0.325	0.037*
3. Dysuria	0.059	0.719	-0.251	0.119	-0.345	0.014*
4. Flank pain	0.052	0.751	-0.011	0.944	-0.413	0.034*

r: Spearman's correlation coefficient

* Significant at level $P < 0.05$.

** Highly significant at level $P < 0.01$

Table (5): Correlation between the total practice score and the colony count/ml & infection manifestation among the studied groups pre and post the educational program.

	The studied patients (n=80) Total practice score					
	Control group (n=40)		Study group (n=40)			
			Pre		Post	
	r	P	r	P	r	P
Colony (count/ml) Sterility	0.265	0.098	0.060	0.714	0.745	0.001**
Urinary tract infection manifestation						
1. Frequency	0.278	0.082	-0.114	0.484	-0.251	0.049*
2. Urgency	-0.192	0.235	0.255	0.112	-0.645	0.013*
3. Dysuria	-0.033	0.842	-0.159	0.326	-0.362	0.024*
4. Flank pain	-0.163	0.218	-0.112	0.098	-0.524	0.032*

r: Spearman's correlation coefficient

* Significant at level $P < 0.05$.

** Highly significant at level $P < 0.01$

Discussion

Urinary tract infection is one of the most prevalent infectious diseases worldwide affecting people of all ages. Urinary tract infection is an important health concern

World wide and its treatment has recently become extremely difficult due to antimicrobial resistance⁽³²⁾. People must know about the definition, risk factors, signs & symptoms and, preventive measures of UTI. If people have adequate knowledge, they can use their knowledge to prevent UTI.

Over the years, the concepts of self-care have been greatly studied. Because of this finding, self-care is important in improving health outcomes, improving the quality of life, and reducing the cost of health care⁽³³⁾. Therefore, the present study was conducted to evaluate the effect of self-care practice health educational program for patients on urinary tract infection recurrence.

Regarding socio-demographic data of the studied groups, the results of the present study found that about one-third of the patients in both the control and the study groups were (50-60) and (40-50) years old respectively. This may be attributed to low immunity or complicated factors such as enlarged prostate in males

which is common at this age and menopause in females. This finding is in harmony with **Gomaa, (2013)**⁽²⁹⁾ who stated that more than one-third of the patients in both control and study groups were (41-50) years old

Concerning sex the current study revealed that about two-thirds of both groups were male this is maybe due to males are more likely to visit the hospital more than females or females are embarrassed to seek medical care related to genitourinary in our culture. This finding was in line with **El Lawindi et al., (2015)**⁽³⁴⁾ and, **John et al., (2016)**⁽³⁵⁾ who reported that males constituting slightly less than two-thirds of total cases.

Also, it was cleared from this study that most of the control and the study groups were married and about two-thirds of them live in a rural area, these findings were inconsistent with the study of **Monalisa et al., (2017)**⁽³⁶⁾ they found three-quarters of the subjects were rural habitats and more than three-quarters were married. Moreover, concerning the level of education, it was found that about half of the study patients were secondary and high education. In line with our finding **Hassanine et al., (2018)**⁽³⁷⁾ found that around half of the study and control groups were intermediate and high education.

Regarding the past medical history, it was found that around half of the studied patients in the control and the study group had a history of urinary stones. This is consistent with the study of **Schwaderer and Wolfe, (2017)** ⁽³⁸⁾ who stated that bacteria and urinary stone disease are clinically associated as the urinary stone is a predisposing factor for recurrent urinary tract infection and vice versa. Also, this finding is supported by the study of **Khan et al., (2015)** ⁽³⁹⁾ who found that less than two-thirds of patients with a previous or current history of urolithiasis, were diagnosed with UTI.

Related to previous UTI, it was revealed that most of the patients of the control group and the study group had previous UTI. This finding may be due to the most of our participants had complicating factors as urinary stones, stricture, and enlarged prostate. these findings agree with **Minejima et al., (2019)** ⁽⁴⁰⁾ who stated that more than half of patients had a history of previous UTI, while in **Changizi et al., (2014)** ⁽⁴¹⁾ was slightly less than a quarter and in **Arunachalam et al., (2017)** ⁽⁴²⁾ was one-third, Also, it was found that more than one-third of the control group and slightly less than half of the study group had the previous operation in the urinary tract this may be attributed to that most of the patients in both groups have recurrent

stone and stents have been placed. Additionally, it was found that more than half of the patients in the control group and one-third in the study group had the previous hospitalization this may be due to they had complicating factors and previous urinary operations. Our finding was consistent with **Gomaa, (2013)** ⁽²⁹⁾.

The present study findings revealed that there were serious deficiencies in patient's knowledge regarding all the items related to UTI such as definitions, types, causes, predisposing factors, manifestations, complications, preventive measures, and treatment as the majority of the control and the study groups had poor knowledge before the educational program. This is maybe due to our patients didn't receive any previous information or educational sessions about UTI. These findings were in agreement with a study in Egypt conducted by **Mohamed H et al., (2019)** ⁽⁴³⁾ who revealed that most of the adolescent students had poor knowledge regarding UTI. Another study in Filipino by **Navarro et al., (2019)** ⁽⁴⁴⁾ concluded that the majority of the respondents had unsatisfactory knowledge of UTI. The studies of **Khanal et al., (2014)** ⁽⁴⁵⁾ and **El Lawindi et al., (2015)** ⁽³⁴⁾ also support our findings.

On the contrary, the study conducted by **Changizi et al., (2014)** ⁽⁴⁶⁾ have shown that

less than three-quarters of the participants had good knowledge and the findings of the study conducted by **Mangai et al., (2019)**⁽⁴⁷⁾ revealed that the majority of the respondents had good knowledge about urinary tract infection. This is attributed to they received information about urinary tract infections by health care staff and by mass media, in addition to the high educational level of their participants.

Moreover, according to the present study findings, there was a statistically significant difference between pre and post the educational program in the study group's knowledge regarding all items. As the majority of the study group their total level of knowledge improved from poor level to good level. This significant improvement may be attributed to the content of the program which presented in a simple manner using audiovisual aids and the distribution of an illustrative booklet to the study group participants. On the other hand, most of the patients were keen to learn about their body parts and know about the disease.

Additionally, this finding is consistent with a study conducted in Saudi Arabia by **Ahmed and Khresheh, (2016)**⁽⁴⁸⁾ who concluded that the majority of the studied women had a good level of knowledge related to UTI immediately after the educational program. Also, this finding

was supported by the study conducted by **Kharadi, (2019)**⁽⁴⁹⁾ who stated that all the respondents had adequate knowledge post-program implementation. Such finding agreed with a study conducted in Zagazig City, Egypt by **Nofal et al., (2019)**⁽⁵⁰⁾ who reported that there was a significant improvement in the knowledge about UTI after the educational program.

Regarding the result of the urine culture, our findings revealed that less than one-quarter of the control group and one-eighth of the study group had no growth of microorganisms in their urine culture before the educational program which increased in both groups during the period of follow-up post the educational program. Moreover, there were significant differences between the control and the study groups after one, three and, six months. This could be due to the positive effect of the educational program on the behavior and attitude of the study group in addition to following the therapeutic regimen while the control group receiving medicine only. Consequently, the recurrence rate decreased in the study group comparing with the control group. The current findings were in the same line with **Nofal et al., (2019)**⁽⁵⁰⁾ who found that about 10% of samples were sterile and **El-Ghareeb, (2018)**⁽⁵¹⁾ who found that (20%) of urine sample were negative. While in

the study conducted at Menoufia University Hospitals, Egypt by **Elraghy et al., (2016)**⁽⁹⁾ who reported that no growth was reported in two-thirds of the urine cultures. These disparities may be due to the intake of antibiotics.

The present findings revealed that the majority of the control and the study groups had unsatisfied **total self-care practices levels** before implementation of the educational program. Meanwhile, most of the study group their total self-care practices level improved to a satisfactory level one month post-program. This is promising that education can improve hygienic practices and the patients are willing to adhere to healthcare personal advice. So this improvement in the practices is related to an improvement in the knowledge which is the result of the educational program for the study group. These findings agree with the study of **Heydari et al., (2019)**⁽⁵²⁾ who stated that intervention and control groups showed no difference with each other before intervention ($p>0.05$). Nevertheless, after the intervention, mean scores in all aspects of behavior in the intervention group were significantly improved ($p<0.05$). Furthermore, a previous study conducted in Egypt by **Shaheen et al., (2016)**⁽⁵³⁾ showed that unsatisfactory personal

hygiene had a significant role in developing UTI.

Concerning the correlation and relationship between the total Knowledge level of the studied patients and their total practice's level, the finding of the present study showed that there was a positive non-significant correlation between total knowledge level and total practice level for both control and study groups preprogram while there was a positive highly statistically significant correlation between the total knowledge level and total practice level for the study group post-program. This may be because when knowledge increase, practices tend to be healthier. Similar to these findings **Mahmoud et al., (2019)**⁽⁵⁴⁾ reported that there was a positive correlation between pre and post-intervention among study group knowledge and self-care practices with statistical significance at p values of ≤ 0.001 post-intervention. Also, supported by **Mohamed et al. (2019)**⁽⁵⁵⁾ who stated that there was a strong statistically significant positive correlation between knowledge and practices.

Regarding the correlation between the total knowledge score with the urine culture result and infection manifestation. The study showed that there was a positive highly significant correlation between the total knowledge score and the sterility of

the urine for the study group post-program as the urine sterility was increasing with the knowledge improvement. On the other hand, there were negative significant correlations between the total level of knowledge and manifestations of UTI such as frequency, urgency, dysuria, and flank pain for the study group post educational program implementation as improving knowledge lead to decreasing the manifestation of UTI. We can conclude from this, by increasing knowledge the urinary tract infection can be reduced.

Concerning the correlation between the total practices score and the urine culture result and infection manifestation. The study showed that there was a positive highly significant correlation between the total practice score and the sterility of the urine for the study group post-program as the urine sterility was increasing with the improvement of the practice. On the other hand, there were negative significant correlations between the total level of practices and the manifestation of UTI such as frequency, urgency, dysuria, and flank pain for the study group post-educational program implementation as improving practices decreasing the manifestation of UTI. We can conclude from this, by enhanced healthy practices the urinary tract infection can be reduced.

Finally, this study emphasized that there was a lack of patient knowledge regarding urinary tract infection and unsatisfactory self-care practices related to reducing the recurrence of UTI before the educational program while after program implementation their knowledge and the practices significantly improved. Hence, the recurrence rate decreased and the symptoms of UTI relieved. Therefore, the need to raise awareness regarding UTIs and to expand services for prevention and periodic screening for high-risk groups is crucial.

Conclusion

According to study results and the research hypothesis, a significant improvement in the total level of knowledge and self-care practices for the study group was observed after the program implementation. Also, the frequency of UTI manifestations and the growth of micro-organisms in the urine culture for the study group decreased throughout the study comparing with the control group.

Recommendations

1. Implementing continuous self-care practice health education programs regarding urinary tract infection in outpatient clinics and the urology departments.

2. A brochure about urinary tract infection self-care practices should be distributed to high-risk patients in the urology departments.
3. Periodic screening and follow-up for high-risk groups.
4. Further research on a larger probability sample is recommended to achieve the generalized capability and wider employment of self-care practices.

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