# Assessing the Significance of Pre-and Post-Health Education on the Changes of Knowledge Levels and Self-Efficacy in Pregnant Women with Urinary Tract Infections

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**Abstract**
Background: Urinary tract infections (UTIs) among pregnant women are common, particularly in developing countries like Saudi Arabia. In addition, UTI poses several adverse outcomes for mother and fetus. Aim of the study: This study examines change in self-efficacy and knowledge among UTI pregnant women following three months of health education. Setting: Quasi-experiment study was conducted at Prince Sultan Military Medical in Riyadh. Sample: The recruited sample included 77 pregnant women (39 case group and 38-control group) with UTI. Data was collected through interview. Tool: A structured questionnaire was used, and results were statistically analyzed using IBM SPSS (Statistical Package for Social Sciences). Results: Knowledge score, following the intervention, improved (fair, 61.54% and good, 35.90%). Self-efficacy also improved from 61.54% before intervention to 76.92% after the intervention. Education level was found to be highly correlated with health education (p-value 0.0037). Conclusion: Education programs and monitoring should be held for improved knowledge levels and self-efficacy in pregnant women. Recommendations: Clearly written management protocol, should be developed and used in clinical practice.
Keywords: Health Education, Knowledge Level, Saudi Arabia, Self-Efficacy, Urinary Tract Infections.

## 1. Introduction

Urinary tract infection (UTI) is the proliferation of microbial pathogens in the urinary tract and a major cause of morbidity and health expenditure globally (Navarro et al., 2019). According to the World Health Organization (2018), UTI causes one million hospitalizations across the world. Tolulope & Deborah (2015) reported that UTI affects twenty percent of pregnant women and is the prime cause of obstetrical ward admission. Such as in Hamdan et al. (2011) study, positive UTI was reported among pregnant women for Khartoum North Hospital in Sudan. Similarly, a US study from 2007 to 2012 showed that 4.9 percent of the pregnant women in the emergency department had positive UTI (Baer et al., 2019).

Matuszkiewicz-Rowińska, Małyszko, and Wieliczko (2015) demonstrated two types of UTI; asymptomatic or symptomatic with the presence of 13 and 17.9 percent in pregnant women, respectively. The prevalence of asymptomatic UTI adversely affects the health of pregnant women, causing various complications, while also affecting the health of the fetus. The complications observed include low birth weight, premature birth, and perinatal death (Matuszkiewicz-Rowińska, Małyszko, & Wieliczko, 2015). Boye et al. (2012) reported that UTI occurrence in pregnant women is due to several physiologic and anatomic changes. Most studies confirm that UTI risk among women is because of the short urethra, vagina to anus proximity, and lack of ability to empty the bladder (Bukola et al., 2016; John, Mboto, & Agbo, 2016). The vagina to anus proximity can lead to fecal coliforms transfer, resulting in UTI (Navarro et al., 2019). *Escherichia coli*

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is identified as the primary vaginal colonizer, primary vaginal microflora among pregnant and non-pregnant women.

National Institute for Health and Care Excellence (2018) advised that to prevent the occurrence of UTI among women, particularly pregnant, there is a need to modify various perinatal and health-specific behavior. However, the complexity of the behavioral change among women is rarely acknowledged following before, after, as well as during pregnancy. Olander et al. (2018) highlight that modifying or maintaining women's health behavior can be ensured through midwives or nurses who help in the behavioral change of pregnant women. However, the engagement of the pregnant women in the health behavior for reducing UTI risk is a scarcely explored area, particularly in Saudi Arabia.

Even though various researches have explored the UTI medical aspect in Saudi Arabia (Alsohaim et al., 2019; Faidah et al., 2015; Quadri et al., 2019), none has explored the change in pregnant women health behavioral change or either their self-efficacy. Majorly, previous researches were concentrated on the antibiotic resistance concerning *Escherichia coli* (Alsohaim et al., 2019; Quadri et al., 2019).

### Significance of the study:

Given the increasing pregnancy-related complications of UTI, the present study assumes that health intervention is likely to assist in reducing its prevalence in pregnancy-related UTI cases. This is because health education program promotes self-care, which reduces mortality and morbidity while increasing quality of life and decreasing health-related cost. The knowledge, self-efficacy as well as health behavior of the pregnant women is likely to prevent UTI among women. Analysis of the self-efficacy among pregnant women also adds to the study's significance, as it has only been studied for breastfeeding in Saudi Arabia (Khresheh & Ahmed, 2018). The study, therefore, examines the change in self-efficacy, and knowledge among pregnant women with UTI following three months of health education.

This study aims to achieve the following objectives:

1. To assess the level of knowledge and self-efficacy of pregnant women with urinary tract infection for both groups (control-case).
2. To assess the change in their knowledge level and change in, self-efficacy of pregnant women with urinary tract infection after three months of implementation of health education for both groups.
3. To find the correlation between social demographic data and level of knowledge regarding urinary tract infection for both case and control groups.

### Research hypothesis

1. Health education program improves the level of knowledge, and self-efficacy regarding the prevention of recurrent UTI.

### Theoretical Approach

Social Cognitive Theory, In quite simple words, self-efficacy could be defined as person's belief and self-trust in order to achieve or complete as certain goal or task in certain situation. While according to the Bandura (1999), to achieve a certain goal or task, one major element is person is self-sense in order to develop practical approach. The social cognitive theory and theory of self-efficacy are very much linked, as Bandura (2005) proposed that there are essential roles of social experience and observational learning in personality growth and development. While moving further with the theory of Bandura, the high level of self-efficacy produce better results and more orientation towards achievement of certain goals, which may be, more complicated as well.

## 2. Methodology

### Study Design

A quasi-experimental design is used for assessing self-efficacy behavior among pregnant women. This study was conducted at the outpatient antenatal–clinic, Prince Sultan Military Medical City, Riyadh, in Saudi Arabia. The study sample was 77 pregnant women with UTI who visited the outpatient antenatal clinical. The sample of the study was determined using the sample size formula (Yamane, 1967), which is as follow; $n = \frac{n}{1} + N + (e)^2$ with criteria as pregnant women with UTI (as per urine analysis and chemical assessment), aged from 18 years to 45 years old and in second trimester of pregnancy, 77 patients were divided into two groups; case group (39 pregnant women) and control group (38 pregnant women). The case group women were provided with health education, whereas control group participants were not.

**Tools of data collection:** The study Data were collected through the following: A valid and reliable Structured Interviewing Questionnaire (Cronbach's alpha is greater than 0.7) was used to gather necessary data after reviewing relevant literature (Tehrani & Nikpour, 2014). It was written in the Arabic language and consisted of three parts: Baseline characteristics were assessed in the first part, whereas, UTI knowledge (sign, symptoms, risk factors, diagnosis, treatment as well as prevention) assessment was held in the second part. The third part assessed the information concerning the self-efficacy evaluation of the patient. The questions of second and third parts were adapted from Tehrani & Nikpour's (2014) study, linked to the knowledge score (one for right and zero for wrong). In the second part, 8 questions were included; therefore, the maximum score for this assessment was eight. Based on the score, three categories were made; Good (66.7 percent to 100 percent), Fair (33.4 percent to 66.6 percent), and Poor (0 percent to 33.3 percent). Likewise, the third part of the questionnaire constitutes 6 items based on a 3-point Likert scale (2 yes, 1 sometimes and 0 no). The score for each item

is presented in percentage, where the overall score for the items ranged from 0 to 12. Based on the score, three categories were made; certain self-efficacy (66.7 percent to 100 percent), moderate certain self-efficacy (33.4 percent to 66.6 percent) and uncertain self-efficacy (0 percent to 33.3 percent).

### Procedure:

To achieve study objectives, there were following stages were set up:

The very 1st stage was to collect the socio-demographical information and baseline data of women's knowledge and information about urinary tract infection, by using interview-based assessment method. This assessment was done twice as first in pre-test phase and then in post-test phase. In pre-test a questionnaire was applied on each individual by using face to face interview and further participants were asked to fill the information form on the spot. As each of the women were welcomed and was provided initial and necessary information such as aims of the study in brief explanation manner. Researcher set the average time as 15-20 minutes for each of the women to complete the interview information. The 1st stage as pre-test was completed in 3 months. Among participants urinary tract infection (UTI) was diagnosed in 77 pregnant women. While these 77 women were distributed into 2 groups randomly as 39 pregnant women were in intervention group and 38 pregnant women in control group. So, 39 patients of pre-test intervention group were randomly assigned for 2 weeks as they finished their appointments with doctor from clinic 1 and 2. Similarly, 38 patients of pre-test control group were randomly assigned for 2 weeks as they finished their appointments with doctor from clinic 3 and 4. To address UTI gestation issues, patients in intervention group received intervention-based procedures across health teaching sessions. At the other hand, regular care was provided to the control group. While both groups received pre and post intervention based questionnaire. In antenatal clinic, researcher itself interviewed from each participant individually. The data collection was started after attaining permission from hospital administration. The duration of data collection and teaching sessions was remained for 6 moths i.e., from July-2022 till the end of December-2022. While it was set as 5 days in a week by utilizing the timing of 8:00 am until 2:00 pm.

The 2nd stage of planning was completed by developing UTIs educational sessions by considering the obtained information in the assessment period. Through an extensive literature review, the educational sessions were developed. Such as Hassan (2015) and Nwambo et al. (2016) reported that execution of educational sessions were applied in individual teaching, which was consisted of 4 individuals daily. While it was consisted of 2 month long period with 30 sessions in total. As each session was lasted from 30 to 120 minutes. The session content was intended to cover definition of UTI, causes, symptoms, problems and complications associated with UTI, risk factors, management, prevention through healthcare procedures and nursing care of UTI signs and symptoms. Similarly, various teaching methods were adopted and used like printed guidelines and instruction, booklets, visual aid information such as Power Points, demonstration and individual discussion.

The 3rd stage as Evaluation Phase was conducted after completion of teaching sessions as 3 months right after that. While post-test was completed with intervention group by using the constant questionnaire and scale used in the teaching sessions, in order to check the knowledge and self-efficacy of participants. Researcher asked patients to remain in contact with researcher through cellphone in order to receive further guidelines or clarification. Control group received usual hospital care in routine. Moreover, the same said tool was applied in post-test after period of 3 months.

Pilot study: The study tools were pre-tested on a random sample of 10 % of women to check the clarity, applicability, any difficulties with their application, and to determine the time needed for completion of the tools. Modification of the tools was done according to the pilot study results. Subjects who shared in the pilot study were excluded from the study subjects. As regard, the teaching sessions were tested for its content validity by a panel of expert in medical and obstetric faculty member staff to ascertain its relevance and completeness and required modification was carried out accordingly. The reliability of the questionnaire was assessed by Cronbach's alpha coefficient, the value for UTI knowledge was found 0.81 and self-efficacy was 0.90. For face validity, the data collection tools were reviewed in details by the team including researcher, gynecologist, urology specialists, gynecological and obstetric nursing head for its applicability and comprehensiveness.

### Ethical Consideration

Prior to the study, the researcher obtained ethical approval from the Institutional Review Board (IRB) NO. 846. The researcher also communicated the anonymous and confidential handling of the data, whereas a written consent form was also attained. The participants were communicated their right to withdraw at any point in the study.

## 3. Data Analysis

IBM SPSS (Statistical Package for Social Sciences) Version 23.0 was used for analyzing the data. Percentage and frequencies were used for analyzing qualitative data, where mean and standard deviation for quantitative data. Chi-square $\chi 2$, t-test and two-way ANOVA were used for analyzing the group differences.

## 4. Results

| Table 1: Participants Demographic Details | | | | |
|---|---|---|---|---|
| Variables | Control Group | | Case Group | |
| | N (38) | % | N (39) | % |
| Age | | | | |
| 19-25 | 6 | 15.79 | 5 | 12.82 |
| 26-32 | 17 | 44.74 | 20 | 51.28 |
| 33-40 | 15 | 39.47 | 14 | 35.90 |
| Mean ± S. D. | 5.81 | | 4.55 | |
| Education Level | | | | |
| Elementary | 1 | 2.63 | 3 | 7.69 |
| Intermediate | 4 | 10.53 | 4 | 10.39 |
| Secondary | 14 | 36.81 | 12 | 33.77 |
| Diploma | 3 | 7.89 | 2 | 6.49 |
| University | 16 | 42.11 | 18 | 44.16 |
| Employment | | | | |
| Employee | 12 | 31.58 | 14 | 35.90 |
| Housewife | 26 | 68.42 | 25 | 64.10 |
| Family Income | | | | |
| < 3000 SAR | 1 | 2.63 | 4 | 10.26 |
| 3000- 8000 SAR | 15 | 39.47 | 18 | 46.15 |
| >8000 SAR | 22 | 57.89 | 17 | 43.59 |

Figure (1) Knowledge Comparison Before and After Health Education for Case Group

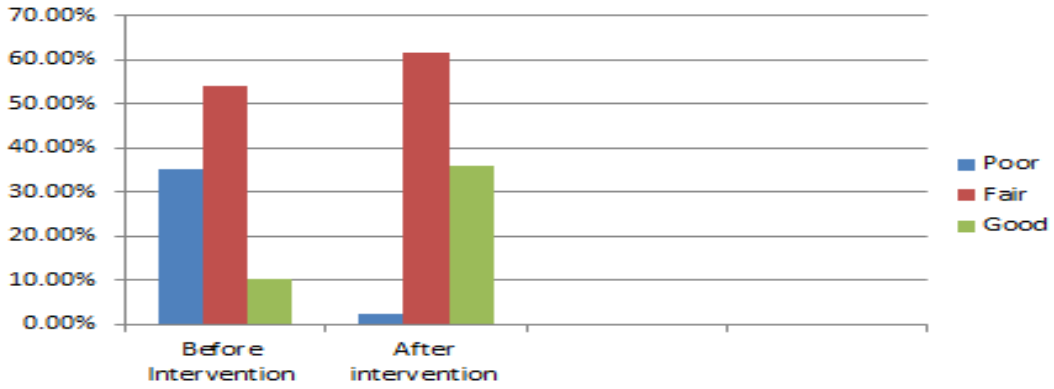


Figure (2)Knowledge Comparison Before and After Health Education for Control Group

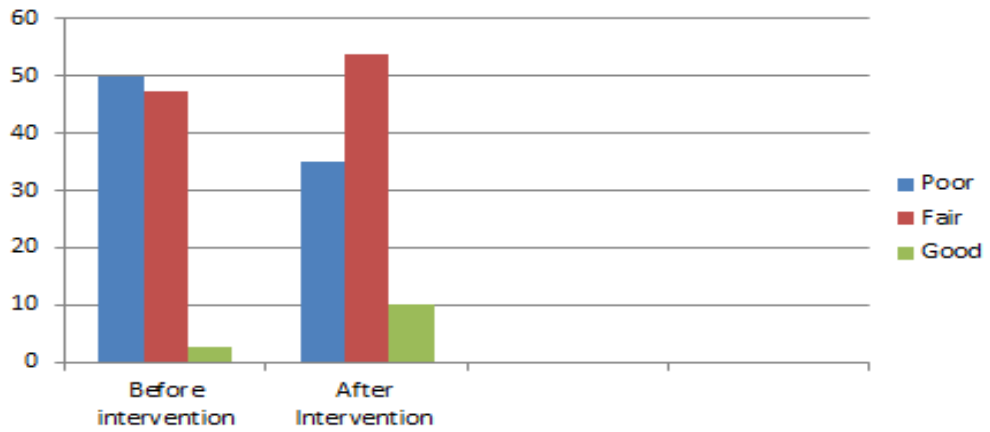

Figure (3)Self-Efficacy Score Comparison among UTI study Women Before and after Intervention

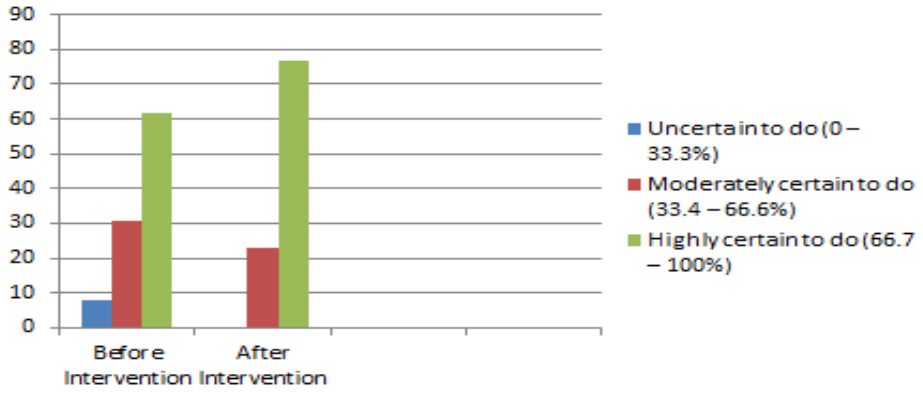


Figure (4)Self-Efficacy Score Comparison among UTI Control Women Before and after Intervention

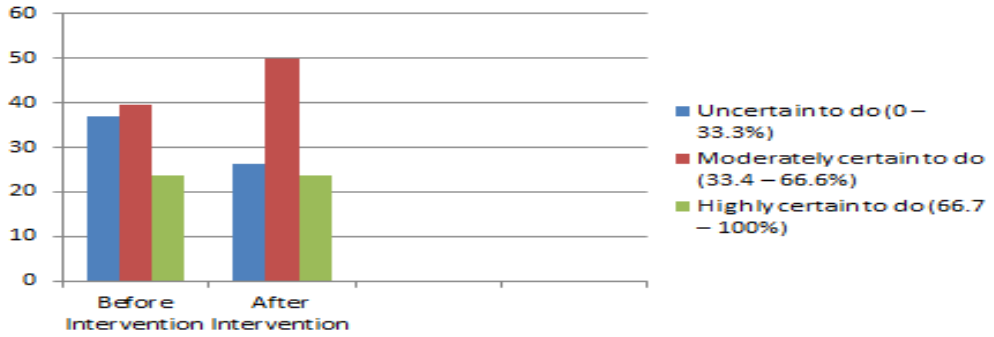


Table 2: Correlation between Knowledge Level and Socio-demographic Characteristics of the UTI Sampled Women after Intervention

| Items | Knowledge Level | | | | | | X2 | Contingency Coefficient |
|---|---|---|---|---|---|---|---|---|
| | Poor | | Fair | | Good | | | |
| | No. | % | No. | % | No. | % | | |
| Age | | | | | | | 1.202 | 0.175 Weak association |
| 19 - 25 | 0 | 0.00 | 3 | 12.50 | 2 | 12.29 | P = 0.272 | |
| 26 - 32 | 0 | 0.00 | 12 | 50.00 | 8 | 57.14 | | |
| 33 - 40 | 1 | 100 | 9 | 37.50 | 4 | 28.57 | | |
| Education Level | | | | | | | 8.445* | 0.421 Very Strong association |
| Elementary | 1 | 100 | 2 | 8.33 | 0 | 0.00 | P = 0.003 | |
| Intermediate | 0 | 0.00 | 2 | 8.33 | 2 | 14.29 | | |
| Secondary | 0 | 0.00 | 7 | 29.17 | 5 | 35.71 | | |
| Diploma | 0 | 0.00 | 1 | 4.17 | 1 | 7.14 | | |
| University | 0 | 0.00 | 12 | 50.00 | 6 | 42.86 | | |
| Employment Status | | | | | | | 0.158 | 0.063 Very weak association |
| Employee | 1 | 100 | 8 | 33.33 | 5 | 35.71 | P= 0.69 | |
| Housewife | 0 | 0.00 | 16 | 66.67 | 9 | 64.29 | | |
| Family Income | | | | | | | 1.569* | 0.1967 Weak association |
| < 3000 Saudi R. | 0 | 0.00 | 2 | 8.33 | 2 | 14.29 | P = 0.21 | |
| 3000 – 8000 Saudi R. | 1 | 100 | 12 | 50.00 | 5 | 46.15 | | |
| > 8000 Saudi R. | 0 | 0.00 | 10 | 41.67 | 7 | 43.59 | | |
| *Significant when p value < 0.05 | | | | | | | | |

Table (1) depicts the demographic details of the participants. It is found that the majority of the participants were aged between 26 to 32 years in both control group (44.74%) and case group (51.28%). Similarly, the educational status of the women showed that the majority were university

graduates, i.e., 42.11% in the control group and 44.16% in the case group. Also, most of the women were employed, i.e., 68.42% in the control group and 64.10% in the case group. Whereas, the income status of the participants differs, i.e., income of most of the control group participants were >8000 SAR, whereas the majority of the case group participants (46.15%) had income range from 3000- 8000 SAR.

The knowledge score of the patients before education is presented in Figure 1. Based on results, it is found that for control group most of the women had poor to fair (50%) and fair to good score (47.37%). Similar were the case group results, where majority scores ranged from poor to fair (35.09%) and fair to good score (53.85%). In addition, no statistical significance was found between the two groups.

From Figure 2 , The knowledge score after the application of the intervention ranged from poor to fair (35.09%) and (53.85%), among the control group women, whereas, it ranged from fair to good among the case group women, i.e., 61.54% and 35.09%. The p-value also denotes the substantial difference between the two cases (p-value 0.00017).

The self-efficacy score between the two groups is presented in **Figure 3**. It shows that before the intervention, control group women scores were uncertain and moderately certain, i.e., 36.84% and 39.47%. Whereas for the case group, UTI diagnosed women, majority had scores from moderate to high, i.e., 30.77% and 61.54%. The achieved p-value denotes the substantial difference between the two variables.

**Figure 4** showed that after intervention, the self-efficacy score among the control group patients ranged between uncertain (26.32%) to moderate (50.00%), whereas, for the case group, these ranged from moderate to high, such as 23.08% and 76.92%, respectively. The achieved p-value showed a significant statistical difference between the two groups, i.e., p-value 0.04.

**Table 2** shows the correlation between knowledge level and socio-demographic characteristics to the UTO sampled women after the intervention. The correlation was found to be high for the education level only, i.e., p-value 0.0037. However, the correlation between employment and family income was found to be insignificant (p-value 0.6904 and 0.2103, respectively).

## 5. Discussion

UTI occurrence poses significant consequences for pregnant women. UTI is viewed as a risk factor leading to adverse outcomes such as adverse prenatal outcomes, premature birth, infant low birth weight, as well as perinatal death. The study examined the change in the self-efficacy and knowledge level among pregnant women following a health intervention program. The educational intervention was conducted using a quasi-experiment design, which showed that the study participants, despite having increased income and education level, had frequent episodes of UTI. This is different from the findings of the previous studies, which found that low-income level was highly correlated to the UTI occurrence among pregnant women (Emiru et al., 2013; Derese et al., 2016; Ogba, Eno & Eyo, 2016). This might be due to Vitamin D deficiency in the body, as it is needed for the development of the skeleton of the fetal, and is required for innate immunity. This highlights that pregnant women should be instructed to consume food that is rich in vitamin D as well as medicinal herbs, which help reduce the UTI infection.

The findings after the intervention showed that the knowledge of the case group improved compared to the control group. The knowledge score of the case group in the study, in contrast to the control group improved by 21.37 percent following the three months intervention. This improvement might be due to increased awareness as well as knowledge of pregnant women, which helps in altering their practices and care. These findings are corroborated by the previous studies, which have concluded similar results (Minassian et al., 2013; Navarro et al., 2019). This further emphasizes that programs should be initiated for improving UTI awareness, which aids in UTI prevention and treatment, promoting improved self-care during pregnancy. The findings further highlight the validity of the developed hypothesis, where health education program was found to improve the level of knowledge, and self-efficacy regarding the prevention of recurrent UTI.

The intervention results showed that the self-efficacy of the study group improved following the intervention. This is depicted from the achieved scores of the case group, which were high post-intervention. Jalali et al. (2014) study corroborates these findings stating that health intervention improves the participants' self-efficacy. These findings depict that Saudi participants need to improve the basic education concerning UTI for prompting pregnant women to follow preventive practices. It emphasizes the healthcare workers as well as Saudi culture as a whole to be considerate to the deliverance of the sexual education to the women.

The findings recommend that to prevent UTI occurrence among pregnant women, screening tests (concerning urine dipstick, culture, and microscopy) should be promoted. These can be conducted in different settings such as hospitals, primary care centers and community healthcare centers. This is important, as an untreated UTI is likely to develop into pyelonephritis, causing prenatal and maternal complications, fetal mortality, thrombocytopenia, and pregnancy-induced hypertension, and transient renal sufficiency, low birth weight of infants, anemia, and pre-eclampsia. Similarly, healthcare workers should improve pregnant women's awareness concerning UTI, modifications in lifestyle, increased consumption of fluid, sexual education, good nutation, and genital area care. Different educational programs and individual teaching sessions should be

held for improved care. These can be conducted at different levels of nursing schools, and make part of their educational curriculum.

The findings of this study are, however, limited, given its small sample size. For improving the generalizability, similar objectives can be replicated with a large study sample. In addition, the study was only conducted at a single institute, i.e., Prince Sultan Military Medical City in Riyadh, which further limits its generalizability across different regions. Therefore, future studies may evaluate the health education intervention effect on self-efficacy and UTI knowledge across different regions. Similarly, UTI causes and drug use can be examined along with the implementation of different interventions and their comparison. Future studies on the highlighted areas can help improve and expand the study area.

## 6. Conclusion and Recommendations

Recognized as a common bacterial infection, Urinary tract infection is frequently observed among pregnant women at different age levels. This quasi experiment-based study showed that health interventions and education substantially contribute to the improved understanding of pregnant women concerning their care and prevention from UTI. It showed that increased education and income were related to UTI reoccurrence among Saudi patients. This study concludes that health education is in direct relationship to self-efficacy, knowledge, and health behavior among pregnant women with UTI. It further recommends instigation of accessible UTI related health intervention, which helps women modify their practices, required for culminating UTI occurrence prospects. Education programs should be launched at different nursing education levels along with general awareness programs (particularly for sexual education) for reducing UTI occurrence. It also suggests screening at initial as well as different levels, to help prevent the occurrence of UTI among Saudi patients.

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### Conflict of interest

The author declares no conflict of interest.

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