The Relationship of Health literacy with Preventive Behaviors of Urinary Tract Infection in Pregnant Women

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ABSTRACT

Background and Objective: Urinary tract infection (UTI) is the most common medical complication in pregnant women and is associated with serious consequences for both the fetus and the mother. The role of health literacy in examining adherence to UTI prevention behaviors during pregnancy has not been fully studied and relevant studies report controversial results. This study aimed to investigate the relationship of health literacy with preventive behaviors of urinary tract infection in pregnant women.

Materials and Methods: This cross-sectional was conducted on 235 pregnant women in Mashhad, Iran. A multi-stage sampling design was used to select eligible participants, and valid and reliable questionnaires including the Test of Functional Health Literacy in Adults (TOFHLA) and research made-preventive behaviors recommendations for urinary tract infection the disease was implemented to collect data. Data were analyzed using SPSS version 22 and Spearman correlation, regression, Mann-Whitney and Kruskal Wallis tests. Significance level was considered lower than 0.05.

Results: The average health literacy in this survey was 56.10±16.23 and ranged from 30.24-89.45. In this study, 83.6% of pregnant women showed marginal or inadequate levels of health literacy. there is a statistically significant correlation (P=0.001, r=0.959) between health literacy and prevention behaviors. Health literacy significantly correlated (P=0.001) with all aspects of prevention behaviors toward urinary tract infection.

Conclusion: Health literacy could be considered as a stronger predictor of preventive behavior toward urinary tract infection. Focusing on designing and implementing educational programs to promote the health literacy skills of pregnant mothers could be very beneficial to facilitate a healthy lifestyle in this.

Paper Type: Research Article

Keywords: Health literacy, Health promotion, health education, Public health, Urinary Tract Infection.

Introduction

The last definition of personal Health literacy was updated in 2020 as follow "it is the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others" (1, 2). Lack of sufficient knowledge and skills in individuals reduces the motivation to adopt preventive behaviors. At the same time, one of the most effective factors in controlling and preventing infectious diseases is health literacy (3).

The World Health Organization has identified health literacy as one of the biggest determinants of health so that people with higher health literacy are more likely to take preventive behaviors. Health literacy skills are essential for individuals to gain knowledge about health issues, make the right health decisions, and benefit from health care services(4).

Several studies indicated that health literacy is a stronger predictor of health as compared to other factors such as education level, sex, age, employment status, income, culture, and race. Likewise, it was evidenced that health literacy has significant effect on increasing health behaviors and adoption of preventive behaviors (4). However, studies on the association between preventive behaviors and health literacy report controversial results (1, 2). While a study shows insignificant correlation between mammography and health literacy, other researches have reported that a inadequate HL are significantly related to the less preventive behaviors such as less involvement in mammography, screening tests (Pap smear, and colorectal cancers, prostate, and breast self-examination), and physical activity and smoking (5). These studies to some extend confirm the potential effect of health literacy on health and preventive behaviors(1, 2).

Pregnancy is a unique and natural physiological process in women's lives. However, the presence of diseases could complicate pregnancy with unwanted complications. Urinary tract infections occur at different ages and in both genders (6).

Due to the short urethra in women, the incidence is higher in women than men and during pregnancy, hormonal and anatomical changes including ureteral dilatation, progesterone-induced smooth muscle relaxation, enlarged mechanical compression of the uterus, and increased plasma volume, leads to decreased urinary concentration and increased bladder volume, cause stagnation of urine and urinary tract reflux (7). Moreover, Urine pH and osmolality, as well as glycosuria and aminoaciduria caused by pregnancy, further facilitate the growth of bacteria and urinary tract infections (7, 8).

Pregnant women are four times more likely to develop a urinary tract infection, and urinary tract infections may be symptomatic or asymptomatic (9, 10). Urinary tract infection is a major problem in the world and 20% of women get urinary tract infection at least once in their lifetime and the economic cost is more than 6 billion US dollars. The rate of infection is 41.92% in women and 11.73% in men. A study performed by Foxman et al., indicated that 11.3 million women in the United States have a urinary tract infection, and at least one pregnant woman in developing countries has a higher rate of urinary tract infections than their counterparts in developed countries(11, 12).

Previous findings have indicated that urinary tract infections in pregnant women begin at six weeks of gestation and peak at 22 to 24 weeks, and women with a history of urinary tract infections are at increased risk of urinary tract infections during pregnancy(13).

Maternal urinary tract infection during pregnancy is one of the causes of preterm birth,

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which the World Health Organization report on preterm delivery shows that one million babies die every year due to preterm delivery. Complications of preterm birth may have lifelong effects on both mother and baby. For instance, premature babies often have lung problems, diabetes, heart disease, mental retardation, hearing loss, and vision impairment, learning disabilities, and behavioral problems, and cerebral palsy. Urinary tract infection also causes postpartum endometritis, sepsis, and ultimately maternal shock. Pregnant women with urinary tract infections are 1.22 times more likely to develop preeclampsia than pregnant women without urinary tract infections (14-16).

Given that antibiotics are critical in eradicating urinary tract infections, the development of antimicrobial resistance due to their use is a global health threat. The choice of safe antibiotics during pregnancy is limited due to teratogenic potential, and there is an association between antibiotic use and an increased risk of miscarriage and birth defects(17).

The overall prevalence of urinary tract infections in pregnancy in Iran is 13%. Several studies have indicated that urinary tract infection is highly prevalent in our country (18). Several studies to report the importance of UTI prevention behaviors (such as sexual activity, how to dress, eating habits, urinary habits, and cleanliness) and individual's knowledge are main factors in control and prevention of UTI diseases because these factors help individual can successfully perform the preventive behaviors needed to produce the positive outcome. Although, various studies show that the awareness of women in the field of urinary tract infection prevention is favorable, the prevalence of infections in pregnant women is increasing (14-16). Therefore, it seems that raising the awareness alone cannot lead to the prevention and control of urinary tract infections,

which indicates the need to use other factors affecting UTI prevention behavior (12). While health literacy is thought to influence women's health during pregnancy, yet no survey has been performed on the relationship between health literacy and UTI- prevention behaviors in pregnant women. To date, there are no researches have evaluated such relationships (2, 19).

Considering the effects of urinary tract infection on maternal and fetal health and the role of health literacy in promoting health behaviors, the present study aimed to investigate the relationship of health literacy with preventive behaviors of urinary tract infection in pregnant women.

Materials and Methods
Sample Population and Study Procedures
This descriptive study was performed from October 2020 to December 2020. on 235 pregnant mothers in Mashhad. In this study, a multi-stage sampling method was used to examine pregnant women in Mashhad, so that out of six health centers in Mashhad, three centers were selected by simple random as the main cluster. Following that, two comprehensive health service centers from each of the above health centers were selected by simple randomness (6 comprehensive health service centers in total were reviewed). Samples within the comprehensive health service centers were selected by available sampling and finally, 238 pregnant women were chosen.

The conditions for inclusion in this study are as follows: Women who are during the first pregnancy, no urinary tract infection at the time of inclusion in the study, gestational age 12-18, personal satisfaction, literacy, age range 20-45 years, no hospitalization in the past three months, no antibiotics or immunosuppressive drugs, no diabetes, no kidney disease, and high blood pressure. In this study, participants who did not

want to participate in the study and did not fully answer the questions of the questionnaire and also did not want to continue to participate in the study were excluded from the study and all women completed the consent form. Sample size was calculated using the following formula:

$$n = \frac{Z^2_{1-\alpha/2}\sigma^2}{d^2}$$

Where n is the sample size, α shows the first-type error, Z is the table-based normal distribution index, σ represents the small variable variance, and d shows the accuracy of quantitative variable estimation. To determine the sample size, based on the study of Javaheri Tehrani et al. (3)entitled Investigating the effect of education based on health belief model on preventive behaviors of urinary tract infections in women with the first type error equal to 0.05 and z equal to 96.3 and variance equal to 7.38 and accuracy d=0.99, the sample size was calculated to be 214, which was finally estimated to be 238 people with a 10% drop in sample size. The questionnaires were given to the mothers by the questioner (health expert or midwife).

Tools

In this study, TOFHLA health literacy questionnaires and a researcher-made questionnaire of preventive behaviors were used for urinary tract infections.

Test of Functional Health Literacy in Adults

The Functional Health Literacy Questionnaire (TOFHLA, Test of functional health literacy in adults) was used to assess the health literacy of the subjects. The questionnaire is one of the most important and valid health literacy questionnaires are worldwide and the validity and reliability of this questionnaire have been confirmed in several studies, such as the study by Raeisi et al., in which reliability was confirmed for the computing section (0.79) and the reading section (0.88), and

its content validity ratio (CVR) was higher than 0.56, and its content validity index (CVI; 79.0) was also confirmed (20-22). The questionnaire consists of two sections, which are calculation and reading comprehension. The calculation section assesses a person's ability to understand and act based on the recommendations given to him by physicians and health educators who needed calculations, and the person's score in this section was calculated within the range of 0-50. In the reading comprehension section, participants' ability to read and understand the three texts under the headings of preparation for upper gastrointestinal imaging, patient rights and responsibilities in insurance policy forms, and standard hospital consent forms were assessed. The individual's score was calculated within the range of 0-50. Out of the total scores of these two sections, the total score of health literacy, which is a number between 0 and 100, was calculated. Finally, the subjects' functional health literacy score was divided into three levels: insufficient (0-59), borderline (60-74), and sufficient (75-100) (23).

Researcher-made Questionnaire on Preventive Behaviors of Urinary Tract Infection and Demographic Information

We used the self-efficacy theory framework to design the questionnaire, which was prepared based on study sources and records related to the prevention and control of urinary tract infections in women (24-26). During the preparation of the questionnaire, the necessary consultations were obtained from gynecologists and health professionals. The questionnaire includes demographic information and five areas of urinary tract infection prevention behaviors with 25 questions, including four items about dressing, six items about eating habits, two items about urination, seven items about cleanliness, and six items about sexual behavior habits.

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In this tool, each question is set based on the Likert scale from the range of never (score 0) to always (score 4). To check the content validity, after forming a panel of experts including 10-12 people, and obtaining their opinions, CVI and CVR indices were calculated. The average CVR and CVI for this questionnaire are equal to 0.94 and 0.94, which was acceptable in the present study. In this study, the Test-retest method was used to evaluate the reliability in such a way that the questionnaire was distributed twice and with an interval of two weeks among 20 pregnant mothers, and Cronbach's alpha was estimated to be 0.72 and based on this, reliability was established.

Questionnaires were completed in health centers by mothers as well as virtually using press lines and interviews. All eligible women were informed of the purpose of the study and their characteristics (age, employment status, income status, education level, and weight and height) were recorded. After obtaining informed consent, participants completed a questionnaire on urinary tract infection prevention behaviors, TOFLHA health literacy, and Scherer self-efficacy.

Statistical Analysis

The data were analyzed using SPSS software version 18. Central indices and dispersion and frequency distribution tables were used to describe and correlation tests and independent t-test were used to analyze the data. The normal distribution of A P-value of less than 0.05 was considered significant in all the statistical analyses.

Ethical Considerations

The study protocol was approved by the Ethics Committee of Mashhad University of Medical Sciences (code: IR.MUMS.REC.1398.268) after obtaining the required permit for the research. The participants provided written informed consent and were assured of confident

Results

According to Table 1, the participants were aged 18-42 years with the mean age of 26.77±5.281 years and mean gestational age was 20.75±6.948 weeks. The mean body mass index (BMI) was 26.95±3.99. In terms of education, 57.1% have non-university education.

Table 1: Subject social-demographic characteristics

Variable's characteristics (n= 235)	Variation	Value
Age, years, mean ± SD	Range: 18-42	26.77±5.281
BMI d, kg/m2, mean ± SD	Range: 18.07-39.23	26.95±3.99
Gestational age, (weeks), mean ± SD	Range: 6-31	20.75±6.948
Women's Employment Status. n (%)	Housewife	177(74.4)
	Employed	61(25.6)
Women's Education level, n (%)	Diploma/under diploma	136(57.1)
	Higher education	102(42.9)
Spouse's education level, n (%)	Diploma/under diploma	140(58.8)
	Higher education	98(41.2)
Spouse's Employment Status, n (%)	Employee	63(26.5)
	Freelance	110(46.2)
	Worker	50(21.0)
	Unemployed	15(6.3)
Family Income, n (%)	Low	114(47.9)
	Moderate	124(52.1)
History of pre-pregnancy UTI, n (%)	Yes	68(28.6)
	No	170(71.4)

±: Showing mean score (standard deviation); n: number of eligible participants; d BMI was classified as underweight (<18.5 kg/m2), normal (18.5–24.9), overweight (25–29.9) and obese (>30)

According to the information in Table 2, the level of clothing, nutrition, urination, sexual and health behaviors were 69.51±11.55, 67.26±11.31, 70.74±18.36, 74.17±13.03, and 73.87±14.63,

respectively. In this study, 83.6% of pregnant women showed marginal (30%) or inadequate (53.6%) levels of health literacy and adequate for only 16.4% of participants (table 2).

Our finding showed that there isn't any significant relationship (P>0.05) between health literacy and social demographic characteristics such as women's education (P=0.075), spouse education (p=0.22), income (p=0.70), vomiting in pregnancy (p=0.60), and history of pre-pregnancy urinary tract infection (p=0.63). Based on the information in Table 3, there is a statistically significant correlation (P=0.001, r=0.959) between health literacy and UTI prevention behaviors. Likewise, health literacy significantly correlated (P=0.001) with all aspects of UTI prevention behaviors.

Table 2: Average of urinary tract infection prevention behaviors and health literacy skills in pregnant women

Total Health literacy, mean ± SD	Range: 30.24-89.45	56.10±16.23
Health literacy skills, n (%)	Inadequate	53.6 (128)
	Marginal	30(71)
	Adequate	16.4(39)
UTI Prevention behaviors, mean ± SD	Range: 50-94	71.39±8.58
Clothing habits, mean ± SD	Range: 37.5-100	69.51±11.55
Nutrition, mean ± SD	Range: 41.67-95.83	67.26±11.31
Urination, mean ± SD	Range: 25-100	70.74±18.36
Health behaviors, mean ± SD	Range: 46.43-100	74.17±13.03
Sexual behavior, mean ± SD	Range: 25-100	73.87±14.63

±: Showing mean score (standard deviation); n: number of eligible participants;

Table 3. Relationship of health literacy skills with quantitative variables and UTI prevention behaviors

Variables (n= 238)	Health literacy		Numerical ability		Reading comprehension	
	R	p-value	R	p-value	R	p-value
Age	-0.057	0.385	0.034	0.12	0.023	0.23
Gestational age	-0.043	0.506	0.034	0.37	0.013	0.13
BMI	0.068	0.294	0.012	0.094	0.046	0.201
UTI Prevention behaviors	0.959	0.001	0.834	0.001	0.910	0.001
Clothing habits	0.667	0.001	0.603	0.001	0.423	0.001
Nutrition	0.469	0.001	0.374	0.001	0.401	0.001
Urination	0.371	0.001	0.417	0.001	0.287	0.001
Health behaviors	0.578	0.001	0.601	0.001	0.512	0.001
Sexual behavior	0.615	0.001	0.639	0.001	0.489	0.001

P-value shows whether the correlation coefficient is significant or not; R-value shows the level of correlation between variables

Discussion

This study aimed to investigate the relationship of health literacy with preventive behaviors of urinary tract infection (UTI) in pregnant women referring to health centers in Mashhad. Due to the prevalence of urinary tract infections worldwide, especially in pregnant women, it is considered one of the most important public health concerns, so it is necessary to use preventive behaviors for urinary tract infections during pregnancy due to the complications of mother and fetus. Foreign and domestic studies have demonstrated that non-pharmacological interventions and promotion of preventive behaviors for urinary tract infections are paramount given the absence of drug resistance, reduction of drug side-effects on the fetus, and reduction of high treatment costs (7, 27).

In the present study, the mean of urinary tract infection prevention behaviors in pregnant women was 71.39±8.58. In the study of Taghdisi and Sadeghinejad, the performance of pregnant women in the field of behaviors preventing infection was moderate and was consistent with the present study (1, 28), But in Javaheri Tehrani study, the mean score of behavior was (54.20) and it was lower than the present study(3). This could be due to differences in research samples. In the Javaheri Tehrani study, women with urinary tract infections referred to the laboratory were examined who may have become infected due to inappropriate behavior and due to the development and spread of education in health centers and the expansion of the use of media, especially cyberspace, in recent years, awareness of behaviors to prevent urinary tract infections has increased (3, 29).

Findings of this study showed that pregnant women under study using tight pants with inappropriate materials, excessive use of carbonated beverages, tea, coffee and low consumption of sour drinks, as well as delayed bladder emptying and poor health behaviors. This result was consistent with previous studies showing that poor health behaviors such as urinary retention and unhealthy diet are the main dangerous UTI behaviors in women (30, 31). In the study of Shaili et al. (32), the incorrect method of washing the genital area, the use of clothes with inappropriate materials were risk factors for urinary tract infections.

The results of the present study showed a significant correlation between urinary tract infection prevention behaviors and health literacy. Numerous studies show that health literacy affects women's preventive behaviors and reproductive health behaviors (33, 34), and there are significant correlations between health literacy, health-promoting behaviors (35). Several studies indicated that health literacy skills has potential effect on adaptation of preventive behaviors toward type of disease because health literacy, same as awareness and knowledge and attitude is a main cognitive determinates and even somehow complement individual's knowledge and attitude. Likewise, health literacy critical effect in improving individual's attitude towards their health and promoting people's responsibility to maintain their health (1, 2). This effect sometimes occurs in the term of decision, acquiring and obtaining health and medical information, and understanding as well as sometimes in the dimension of processing and interpretation. Therefore, in this way, health literacy could affect preventive behaviors. It was evidence that health literacy is the main factors to adopt of preventive behaviors via promoting the perception, understanding, and assessment of the benefit of health and preventive behaviors (36, 37). This can be due to the awareness of people with high health literacy, preventive

behaviors and the need to perform them and their higher sensitivity and concern in terms of health.

We can conclude that although more researches have reported the significant relationship between preventive behaviors and health literacy, but confirm of this relationship is unlikely for population with the inadequate level of health literacy (36, 38). Therefore, designing and planning intervention-based health literacy concepts to promote its skills in communities lead to repair and establish the strong relationship between health literacy and preventive behaviors toward types of disease such UTI (1, 2).

One of the limitations of the present study was using a self-report tool, which might have led to issues such as recall problems and distortion. Also, our findings were obtained from a cross-sectional study, and in a longitudinal study, the causal correlation between them could be better understood. Working with pregnant women was difficult due to their special mental state due to the length of the questionnaire.

Conclusion

According to the results, the majority of participants in this study had moderate level of preventive behaviors toward the urinary tract infections during their pregnancy. Likewise, the significant relationship of health literacy with urinary tract infections preventive behavior is noteworthy among pregnant women. Health literacy skills are considered as significant predictor to improve preventive behaviors toward urinary tract infections. The need for large-scale education and various tools in pregnant women to improve health literacy is felt more than ever. Therefore, although it is necessary to teach the required subjects and give awareness in pregnancy, but what is important is the level of understanding, comprehension

and ability to use this information in necessary and dangerous cases. Given the threat of urinary tract infections to the mother and fetus during pregnancy and the adverse effects on the warm hearth of the family, this important issue can be considered as one of the health priorities of society. Therefore, it is necessary to make comprehensive efforts to increase maternal health literacy.

Conflict of interest: There is no conflict of interest to declare

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