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Effect of Preventive Program about Reproductive Tract Infections on Knowledge, Beliefs and Practices among Rural Women Based on Health Belief Model

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Abstract: **Reproductive tract infections among women have become a widespread growing health issue worldwide as a main reason for women's morbidity during reproductive period. They carry a high social and economic burden in the community leading to serious health problems not only for the woman, but also for the infant. Aim of the study: to evaluate the effect of preventive program about reproductive tract infections on knowledge, beliefs and practices among rural women based on health belief model. Subjects and method: Study design: A quasi experimental research design was used. Setting: This study was carried out at El-Santa Health Center, Gharbeya governorate which affiliated to the Ministry of Health on 170 rural women selected by convenience sampling. Those women were divided equally into two groups (study group and control group). The preventive program was conducted for the study group only. Tools: Two tools were used. Tool 1: Structured interview schedule consisted of four parts. Part I: Socio- demographic characteristics of the women. Part II: Health history of the women. Part III: Knowledge of the studied women regarding RTIs. Part IV: Self- reported practices of the studied women regarding prevention of RTIs. Tool II: Beliefs of the studied women regarding RTIs based on health belief model (HBM). Results: Total knowledge, practice and belief scores significantly improved immediately and three months post-program than pre-program for the study group. Meanwhile, the control group showed no significant improvement. There was significant positive correlation between the total knowledge, practice and belief scores pre and three months post program for both groups. Conclusion: The preventive program based on health belief model (HBM) was effective and improved the studied rural women's knowledge, beliefs and practices regarding RTIs. Recommendations: Community health nurses working in rural areas need to design preventive health programs based on HBM for women in order to change negative and false beliefs about prevention of RTIs and emphasizing its benefits for the women, infants, family and community.**

Keywords: **Reproductive tract infections, Health belief model.**

1. INTRODUCTION

Reproductive tract infections (RTIs) among women have become a widespread growing health issue worldwide. Reproductive tract infections are defined as group of diseases that threaten women's health, which occur due to invasion of any part of upper or lower reproductive tract by bacteria, viruses, fungi or protozoa causing serious consequences to women. RTIs may be endogenous, which occur due to overgrowth of organisms normally present in vagina. Infection also may be iatrogenic, which occur due to introducing organisms into reproductive tract during medical procedures in the reproductive tract with unsterilized instrument or sexually transmitted which occur due to invasion of microorganisms during sexual contact with infected partner [(1-3)].

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Reproductive tract infections are a main reason for women's morbidity during reproductive period. They carry a high social and economic burden in the community leading to serious health problems not only for the woman, but also for the infant. RTIs can produce ectopic pregnancy, pre-term labor / low birth weight, chronic pelvic inflammatory disease, abortion, still birth, congenital infection to fetus, cervical or genital cancer and other long term consequences such as infertility and toxic shock syndrome [(4)].

Globally, RTIs have become a challenging health concern for women. According to WHO (2016), approximately 357 million new cases of syphilis, gonorrhea, chlamydia and trichomoniasis occur each year worldwide. According to WHO (2017), reproductive illnesses account for over 30% of total burden of diseases and disabilities among women. It was also estimated that every day, 1 million cases of RTIs occur [(5, 6)].

In Egypt, data regarding RTIs are scarce as it depends on seeking medical care by women who feel ashamed of reporting such diseases which may be sexually transmitted. According to the Egyptian demographic health survey (EDHS) (2014), more than one third of married women between 15- 49 years reported that they had abnormal vaginal discharge, genital ulcers, vaginal infections and STIs in the past 12 months. Prevalence was higher in rural areas than in urban ones (33% and 30.2% respectively) [(7)].

Moreover, a cross sectional study was done to assess frequency of vaginal infections in Upper Egypt among women attending Women Health Hospital, Assuit University, Egypt (2016), showed that 60.8% of women were diagnosed as vulvo-vaginal candidiasis, 37.1% with bacterial vaginosis and 2.1% with trichomoniasis. Another study conducted at 17 faculties at Mansoura University in Egypt (2017), about awareness of women employees regarding vaginal discharge showed that more than two thirds (69.8%) of the women employees complained of abnormal vaginal discharge before the study time while the incidence of abnormal vaginal discharge at the time of the study was 23.4% [(8, 9)].

Poor personal hygiene, using contraceptive intra-uterine device (IUD), poor socio-economic status, diabetes, obesity, pregnancy, extra-marital sexual relations or having multiple partners and non-use of condom are significant contributors to high prevalence of reproductive tract infections especially among rural women. RTIs may be asymptomatic for some women, while others exhibit symptoms like itching, pain, abnormal vaginal discharge, dyspareunia, burning feeling with urination or genital ulceration and warts in viral infections [(10)].

Rural women have greater chance for getting RTIs related to several factors including traditional beliefs and lack of resources. Traditional beliefs can prevent rural women from following preventive measures especially related to sexual complaints and issues as they become ashamed to seek treatment for RTIs [(11)].

HBM is one of the oldest and most widely used models that help people use free preventive programs for prevention and early detection of diseases. According to HBM, person's intention to perform a given preventative behavior is influenced by his belief regarding that disease. Based on HBM, improving knowledge of rural women regarding RTIs can improve their beliefs and eventually improve their practices. Community health nurse plays an important role in prevention and control of RTIs among women through increasing their knowledge about these infections to modify their beliefs and eventually improve their practice [(12- 14)]. Hence, the present study aimed to evaluate the effect of preventive program about reproductive tract infections on knowledge, beliefs and practices among rural women based on health belief model.

Research Hypothesis

Knowledge, beliefs and preventive practices among rural women about reproductive tract infections expected to be improved after implementation of a preventive program based on health belief model.

2. SUBJECTS AND METHOD

Study design: A quasi experimental research design was used.

This study was carried out at El-Santa Health Center, El-Gharbeya governorate which affiliated to the Ministry of Health and serves rural villages surrounding El-Santa city namely (Meet-Ellith, Ezbet El-khatib, Shobrablulah and Abo-Elgohor), as these four villages have no rural health unit.

Subjects: A convenience sample of 170 rural women attending the health center in El-Santa district for any service (antenatal care, family planning, baby follow-up or immunization) according to the schedule of work for the health center and who were willing to participate in the study, were included in this study. They were selected according to the following criteria:

- Age: 18-44 years.
- Married and sexually active women.

Subjects were divided into two groups equally (study and control group) each group included 85 women.

Tools: Two tools were used to collect the necessary data as follows:-

Tool 1: Structured interview sheet: It was developed by the researcher in Arabic language after reviewing of related literature [2, 3, 6, 11, 15, 16]. It encompassed the following four parts:-

Part I: - Socio- demographic characteristics of the women as age, educational level, occupation, number of family members, number of rooms and family monthly income.

Part II: - Health history of the women including medical, obstetric, gynecological and menstrual history as presence of chronic diseases as: diabetes mellitus, heart diseases and hypertension, age of marriage, use of contraceptive methods and type used and previous gynecological disorders or reproductive tract infections (RTIs).

Part III: - Knowledge of the studied women regarding RTIs: which consisted of seven questions that cover definition, types, risk factors, signs and symptoms, complications, treatment and prevention of reproductive tract infections.

Scoring system:

Knowledge score was calculated as follows: the complete correct answer was scored "two", the incomplete correct was scored "one" and don't know was scored "zero". The total knowledge score was 48. The higher scores reflected higher levels of knowledge about prevention of RTIs.

The total score was converted into a percent score. It was classified into:

- Poor knowledge: <50% (<24) of the total knowledge score.
- Fair knowledge: 50 - 65% (24-34) of the total knowledge score.
- Good knowledge: >65% (> 34) of the total knowledge score.

Part IV:- Self- reported practices of the studied women regarding prevention of RTIs[8, 11, 16]: which consisted of 18 questions covering women's self- reported practices as: methods of cleaning perineal area, direction of cleaning, drying it after cleaning, washing perineum before and after intercourse, using cotton underwear, changing underwear regularly and ways of cleaning underwear, frequency of conducting regular medical checkup by obstetric physician

Scoring system:

The score for each behavior was calculated as follow: done correctly was scored "one", done incorrectly or not done was scored "zero". Scores for all practices were summed up. The total practice score was 18. It was converted into a percent score and classified into:

- Satisfactory practice: >60% (> 12) of the total practice score.
- Unsatisfactory practice: ≤ 60% (≤ 12) of the total practice score.

Tool II: - Beliefs of the studied women regarding RTIs based on health belief model (HBM) [12, 17, 18, 19, 20]:

Health belief model was originally developed by four psychologists (Hochbaum, Leventhal, Kegeles and Rosenstock) in the 1950s as a way to examine the reasons that prevented people from using free programs which would detect or prevent diseases. It consisted of four main constructs including perceived susceptibility, perceived seriousness, perceived benefits and perceived barriers. In 1974, cues to action construct has been added to the model by Rosenstock and self-efficacy was added by Bandura in 1977.

An interview sheet was developed by the researcher based on the constructs of the health belief model to assess women's beliefs regarding reproductive tract infections related to:

a- Perceived susceptibility: This consisted of seven statements covering women's perception of her chances to get RTIs.

b- Perceived severity: This consisted of four statements that cover women's perception of complications which may occur if RTIs not cured.

c- Perceived benefits: This consisted of three statements that cover women's perception of the benefits that she will get from following the preventive measures of RTIs.

d- Perceived barriers: This consisted of nine statements that cover women's perception of the barriers that may hinder them from following preventive measures of RTIs.

e- Cues to action: This consisted of six statements that cover women's perception of the cues that encourage her to perform actions that prevent RTIs.

f- Self-efficacy: This consisted of nine statements illustrating women's perception of her efficacy to perform actions that prevent RTIs and change unhealthy behaviors.

Scoring system:

The statements were measured using a five-point Likert scale. Positive statements were given score of strongly agree (5), agree (4), neutral (3), disagree (2) and strongly disagree (1) with regard to each item. **Scores of negative statements** were inversed as follows: strongly disagree (5), disagree (4), neutral (3), agree (2) and strongly agree (1). The scores were summed up for each construct then for the six constructs.

The score of perceived susceptibility was (7- 35), perceived severity (4-20), perceived benefits (3-15), perceived barriers (9-45), perceived cues to action (6-30) and perceived self-efficacy (9-45). The total score ranged between (38- 190). It was classified into:

- Positive beliefs ≥ 60% (≥ 114) of the total belief scores.
- Negative beliefs < 60% (< 114) of the total belief scores.

Method

1. **Obtaining approval:**

– Official permission to conduct the study was obtained from the Dean of the Faculty of Nursing to the director of El-Santa health center to conduct the study. Director of selected health center was informed about the purpose of the study to maintain his cooperation.

2. **Ethical considerations:-**

– Consent of the ethical committee of the Faculty of Nursing was obtained.

– Every woman was informed about the purpose, nature and benefits of the study at the beginning of the interview and that they had the right to withdraw from the study at any time.

– Informed consent was obtained from the study subjects.

– Nature of the study didn't cause any harm and/ or pain for the entire sample.

– Confidentiality and privacy regarding the collected data was put into consideration.

– The interview sheets were anonymous.

3. **Developing the study tools:**

– The study tools (tool I and II) were developed by the researcher based on literature review [2, 6, 11 12].

– The study tools were tested for face and content validity by a jury of five experts in the field of community health nursing and public health.

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4. **Conducting pilot study:**

– A pilot study was carried out on 10 women to test the tools for its clarity, applicability and reliability and to determine the length of time needed to collect the data from each woman. The necessary modifications were done (rephrasing a question in self -reported practices). These women were excluded from the study subjects.

– The reliability of the study tools was computed using Cronbach's Alpha test. It was found to be 0.922 that indicated high reliability of the study tools.

5. **Developing a preventive program:** this was done according to the following phases:

I) Assessment phase: in which the researcher used the pre designed study tools and interviewing each woman of both study and control groups individually in the predetermined setting to assess women's knowledge, beliefs and practices regarding prevention of RTIs as well as socio-demographic data about the study subjects as a pre intervention assessment.

II) Planning phase: the preventive program was planned according to women's educational needs determined through pre assessment and based on literature review, which included the following steps:-

a) **Setting the goal of the program:**

The goal of the program: was to enable the rural women to improve their knowledge, beliefs and practices regarding prevention of reproductive tract infections.

b) **Determining the teaching strategies:**

☒ **Teaching strategies:**

- Interactive lectures, group discussions and brain storming were used.

- The women were given an opportunity to exchange their experiences and opinions through story-telling to change their beliefs.

☒ **Teaching aids:**

- Power point presentation was used to present the content of the program in clear manner with illustrating pictures.

- Each woman in the study group was given a booklet prepared by the researcher.

c) **Preparing and organizing the content of the preventive program:** based on women's educational needs and related literature review. The content of the program was prepared and organized in 5 sessions (each session was 60 minutes) as follow:

1. **Session (1):** Program orientation and expectation:-

The aim of this session was to build a relationship with the subjects and to orient them about the importance of the program, its sessions and expectations from each session.

2. **Session (2):** An overview of the reproductive tract infections:-The aim of this session was to orient the studied women with the definition of reproductive tract infections, causative agents and its prevalence in Egypt and in worldwide.

3. **Session (3):** Types, causes and risk factors of RTIs:-

The aim of this session was helping the studied women to identify types, causes and factors predisposing to RTIs.

4. **Session (4):** Manifestations, complications and treatment of RTIs:

The aim of this session was to enable the studied women to differentiate between the signs and symptoms of RTIs and recognize complications of untreated RTIs and its treatment.

5. **Session (5):** Prevention of reproductive tract infections:

The aim of this session was to convince the studied women to follow the preventive measures for prevention of RTIs.

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III) Implementation phase:

– The program was totally carried out by the researcher to ensure providing complete, consistent and accurate knowledge about RTIs for the study group.

– The researcher met the women in the previously mentioned health center at antenatal care, family planning, well baby and immunization clinics throughout the week according to the work schedule of the center.

– The researcher began with introducing her-self and explaining the aim of the program and its importance to women attending the previous setting and obtained their consent. Then divided the women randomly into two equal groups. The first group was the study group, the second group was the control group.

– The first session was given to both groups, while other four sessions (2^{nd} – 5^{th}) were given only to the study group.

– The duration of each session was 60 minutes (total 300 minutes). Each session included (2-5) women according to number of women and work circumstances.

– Each session begun with a summary of the previous session and specific objectives of the present session.

– Booklets were distributed to each woman in the study group.

– The second group (control) hadn't given any information, it was used only to clarify and ensure the effectiveness of the program.

– After three months of the program, the researcher gave handouts and booklets for the control group to gain benefits.

– The total study duration (assessment, planning, implementation and evaluation phases) was about 10 months (from the first of March to the end of December 2017).

IV) Evaluation phase:

The aim of this phase was to evaluate the effectiveness of the preventive program on the women's knowledge, beliefs and practices regarding RTIs.

This evaluation was conducted to the studied subjects three times:

1- **First time (pre-test)**: before implementation of the preventive program (using tools I and II) for both study and control groups.

2- **Second time (Immediate post-test):** immediately after implementation of the preventive program using tool I (part III and part IV) and tool II for the study group only.

3- Third time (Follow up): three months after implementation of the preventive program using tool I (part III and part IV) and tool II for both study and control groups.

6- Statistical analysis:

The collected data were organized, tabulated and statistically analyzed using Statistical Package for Social Sciences (SPSS) version 23. For numerical data, the range, mean and standard deviation were calculated. For comparison between two means, t-test was used. Differences between more than two means were tested by (F) repeated measures analysis of variance. For categorical variables, the number and percentage were calculated and differences between subcategories were tested by Chi- square (X^2). When Chi- square was not appropriate, Wilcoxon test and Monte Carle exact test were used. Correlation between variables was evaluated using Pearson's correlation coefficient. The level of significance was adopted at $p < 0.05$.

3. RESULTS

Table I shows the distribution of the studied groups in relation to their socio- demographic characteristics. It revealed that, the age of the study group ranged from 19- 40 years, with a mean of 29.02± 5.922 years, while it ranged from 19- 42 years, with a mean of 29.68±6.35 years for the control group. Slightly more than half of both the study and control groups (57.6% and 55.3% respectively) their age ranged between 25- 35 years.

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Regarding the studied women's education and occupation, the table also showed that, 56.5% of the study group had secondary education compared to 41.2% of the control group. Meanwhile, 24.7% and 34.1% of the study and control groups respectively had university education or more. The majority of the studied women in both study and control groups were house wives (82.4% and 81.2% respectively). The crowding index for the majority of both the study and control groups (88.2% and 89.4% respectively) was ≤ 2. As regard the family monthly income, it was enough for 74.1% and 62.3% of the study and control groups respectively. There was no significant difference between study and control groups in relation to any of their socio- demographic characteristics (p>0.05).

Table (I): Distribution of the studied groups in relation to their socio- demographic characteristics.

Variables	The studied women (n=170)				χ^2 P
	Study group (n=85)		Control group(n=85)		
	n	%	n	%	
Age/years					10.638
18 < 25	22	25.9	22	25.9	0.987
25- 35	49	57.6	47	55.3	
> 35 years	14	16.5	16	18.8	
Range					
Mean ± SD	(19 - 40) 29.02± 5.922		(19- 42) 29.68±6.35		
Educational level					4.175
Illiterate & read and write	5	5.9	8	9.4	0.243
Elementary	11	12.9	13	15.3	
Secondary	48	56.5	35	41.2	
University or more	21	24.7	29	34.1	
Occupation					
Housewives	70	82.4	69	81.2	0.039
Work	15	17.6	16	18.8	0.843
Husband's education					2.71
Illiterate & read and write	9	10.6	10	11.8	0.438
Elementary	17	20	19	22.4	
Secondary	42	49.4	32	37.6	
University or more	17	20	24	28.2	
Crowding index (CI)	75	88.2	76	89.4	
≤2	10	11.8	9	10.6	5.99
>2					0.967
Family monthly income					
Enough	63	74.1	53	62.3	2.773
Not enough	18	21.2	27	31.8	0.25
Enough and save	4	4.7	5	5.9	

***significant at p<0.05**

Table II represents the distribution of the studied groups in relation to their obstetrical and gynecological history. It revealed that most of the study and control groups (76.5% and 84.7% respectively) suffered from gynecological problems previously. RTIs was the most prevalent gynecological problem among the study and control groups (92.3% and 97.2% respectively), followed by menstrual irregularity (18.5% and 19.4% respectively), then vaginal bleeding (13.8% and 9.7% respectively). Of those who suffered from RTIs, 76.1% and 71.4% respectively suffered from it more than once. The interval between infections was 1- 6 months for 43.5% of the study group and for 38% of the control group.

Concerning women's action in response to occurrence of infection, the same table revealed that, 68.3%, 62.8% of the study and control groups respectively went to doctor, pharmacist or health center for treatment. Meanwhile, 23.3%, 20% of both groups respectively used vaginal cleansers herself.

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Table (II): Distribution of the studied groups in relation to their gynecological history.

Gynecological history	The studied women (n=170)					
	Study group (n=85)		Control group(n=85)		χ^2	P
	n	%	n	%		
Suffered from gynecological problems previously	65	76.5	72	84.7	1.843	0.175
****Type of gynecological problem**						
RTIs	n=65		n=72		3.269	0.071
Menstrual irregularity					1.82 MCET	0.67
Vaginal bleeding					MCET	0.4
Ovarian cyst					MCET	0.613
Uterine fibroids	60	92.3	70	97.2		0.498
	12	18.5	14	19.4		
	9	13.8	7	9.7		
	6	9.2	6	8.3		
	1	1.5	2	2.7		
Frequency of RTIs infection	n= 60		n= 70		3.725	0.155
1 time	14	23.3	20	28.6		
>1 time	46	76.7	50	71.4		
Intervals between infections	n= 46		n= 50		2.540	0.468
< 1 month						
1- 6 months						
> 6 months	15	32.6	15	32.6		
	20	43.5	20	43.5		
	11	23.9	11	23.9		

MCET= Monte Carlo exact test ** More than one answer was allowed *significant at p<0.05

Table III shows the distribution of studied groups in relation to their total knowledge score throughout the study period. It revealed that the majority of the study and control groups (92.9%, 85.3% respectively) had poor knowledge score before implementation of the intervention, while the majority of the study group had good knowledge score immediately and three months after intervention (91.7% and 82.3% respectively). Regarding the control group, there was no significant improvement in their knowledge score pre and three months after intervention.

Moreover, the table illustrated that there was significant increase in the total mean score of knowledge for the study group throughout the study period, as the mean score was 7.29±9.31 before the program and became 44.48±5.93 and 38.95± 6.73 immediately and three months post program respectively. On the other hand, there was no significant difference in the total mean score of knowledge of the control group pre and three months post program (6.91±8.88 and 6.96±8.96 respectively).

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Table (III): Distribution of studied groups in relation to their total knowledge score throughout the study period.

Knowledge score	The studied women (n=170)											Z P
	Study group (n=85)						χ^2 P	Control group (n=85)				
	Pre-test		Immediate Post-test		3 months Post-test			Pre		3 months Posttest		
	n	%	n	%	n	%		n	%	n	%	
Poor Fair Good	79 5 1	92.9 5.9 1.2	1 6 78	1.2 7.1 91.7	3 12 70	3.6 14.1 82.3	162.88 0.001*	81 3 1	85.33.5 1.2	80 4 1	94.1 4.7 1.2	1.155 0.248
Range Mean ± SD	(0-43) 7.29±9.31		(16- 48) 44.48±5.93		(12-48) 38.95± 6.73		F P 683.92 0.001*	(0- 41) 6.91±8.88		(0- 41) 6.96±8.96		t-test P 1.216 0.227

***significant at p<0.05**

Table IV demonstrates the distribution of the studied groups according to their total self-reported practice score throughout the study. It showed that before intervention implementation, 70.6% and 84.7% of the study group and control groups respectively reported unsatisfactory total score of practice. The total score became satisfactory for all the study group immediately and three months after intervention. The difference was statistically significant (p= 0.001).

In addition, the total mean of reported practice score of the study group increased from 10.04±2.45 pre- program to 16.44±1.26 immediately post and 17.33±0.864 three month post the program, with statistically significant difference between them (P=0.001). Regarding control group, there was no significant difference in total mean reported practice score pre and three months post the program (p>0.05).

Table (V): Distribution of the studied groups according to their total self-reported practice score throughout the study phases.

Total practice score	The studied women (n=170)											Z P
	Study group (n=85)						χ^2 P	Control group (n=85)				
	Pre-test		Immediate Post-test		3 months Posttest			Pre-test		3 months Posttest		
	n	%	n	%	n	%		n	%	n	%	
Unsatisfactory practice Satisfactory practice	60 25	70.6 29.4	0 85	0 100	0 85	0 100	155.32 0.001*	72 13	84.7 15.3	73 12	85.9 14.1	0.905 0.366
Range Mean ± SD	(4- 17) 10.04±2.45		(12-18) 16.44±1.26		(15-18) 17.33±0.864		F P 410.87 0.001*	(3- 16) 9.06±2.64		(3-16) 9.09±2.60		t P 0.904 0.369

***significant at p<0.05**

Table V shows the distribution of the studied groups according to their total scores of health belief model (HBM) constructs throughout the study period. The table illustrated that the study group showed a statistically significant improvement in their total positive scores of all HBM constructs (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy) throughout the study phases (p= 0.001). No significant difference was observed for the control group (p>0.05).

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Table (V): Distribution of the studied groups according to their total scores of health belief model (HBM) constructs throughout the study period.

Belief item about RTIs	The studied women (n=170)											
	Study group (n=85)						χ^2 P	Control group (n=85)				Z P
	Pretest		Immediate post-test		3 months post-test			pretest		3 months post-test		
	n	%	n	%	n	%		n	%	n	%	
Perceived susceptibility												
- Negative beliefs	61	71.8	20	23.5	3	3.5	147.48	64	75.3	64	75.3	1.857
- Positive beliefs	24	28.2	65	76.5	82	96.5	0.001*	21	24.7	21	24.7	0.063
Perceived severity												
- Negative beliefs	57	67.1	9	10.6	0	0	150.02	60	70.6	61	71.8	1.857
- Positive beliefs	28	32.9	76	89.4	85	100	0.001*	25	29.4	24	28.2	0.063
Perceived benefits												
- Negative beliefs	19	22.4	0	0	0	0		17	20	17	20	
- Positive beliefs	66	77.6	85	100	85	100	134.39	68	80	68	80	1.604
							0.001*					0.109
Perceived barriers												
- Negative beliefs	73	85.9	2	2.4	4	4.7	146.32	76	89.4	76	89.4	0
- Positive beliefs	12	14.1	83	97.6	81	95.3	0.001*	9	10.6	9	10.6	1
Perceived cues to action												
- Negative beliefs	29	34.1	7	8.3	4	4.7	123.12	23	27.1	23	27.1	1.342
- Positive beliefs	56	65.9	78	91.7	81	95.3	0.001*	62	72.9	62	72.9	0.18
Perceived self-efficacy												
- Negative beliefs	39	45.9	7	8.3	5	5.9	128.86	43	50.6	43	50.6	1.342
- Positive beliefs	46	54.1	78	91.7	80	94.1	0.001*	42	49.4	42	49.4	0.18

Table VI shows the distribution of the studied groups in relation to their total belief scores throughout the study period. It was clear that pre- program, 31.8% and 29.4% of both the study and control groups respectively had positive beliefs. Immediately and three months post the educational intervention, the majority of the study group (91.8% and 95.3% respectively) showed significant increase in their positive beliefs (p=0.001). Contrarily, there was non-significant difference in the total belief score for the control group where only 28.2% of them had positive beliefs three months post the intervention (p=0.162).

Table (VI): Distribution of the studied groups in relation to their total belief scores throughout the study period.

Total belief score	The studied women (n=170)											
	Study group (n=85)						χ^2 P	Control group (n=85)				Z P
	Pretest		Immediate post-test		3 months post-test			pretest		3 months post-test		
	n	%		%	n	%		n	%	n	%	
Negative beliefs	58	68.2	7	8.2	4	4.7	157 0.001*	60	70.6	61	71.8	
Positive beliefs	27	31.8	78	91.8	81	95.3		25	29.4	24	28.2	1.399 0.162

Table VII shows correlation between total score of knowledge, practice and health beliefs about RTIs of the studied groups pre and 3 months post the program The table illustrated that, there was significant positive correlation between the total knowledge, practice and belief scores pre and three months post program for both the study and control groups ($p<0.05$). This means that increased practice score was associated with increased knowledge score and positive beliefs.

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Table (VII): Correlation between total score of knowledge, practice and health beliefs about RTIs of the studied groups pre and 3 months post program.

Variables	Study group (n=85)				Control group (n=85)			
	Pre- intervention		3 months post-intervention		Pre- intervention		3 months post-intervention	
	knowledge score	Practice score	knowledge score	Practice score	knowledge score	Practice score	knowledge score	Practice score
	r P	r P	r P	r P	r P	r P	r P	r P
Total Practice score	0.244 0.024*	-	0.275 0.011*	-	0.434 0.001*	-	0.44 0.001*	-
Total belief score	0.36 0.001*	0.207 0.057*	0.371 0.001*	0.386 0.001*	0.402 0.001*	0.422 0.001*	0.391 0.001*	0.413 0.001*

***Correlation is significant at the 0.05 level.**

Table VIII shows correlation between total score of knowledge, practices and health beliefs of the study group and their socio-demographic characteristics pre and three months post- program. The table revealed that, there was a significant positive correlation between age, educational level, occupation and total knowledge score among the study group pre and three months post- program ($p<0.05$). This means that knowledge score increased for older, working and educated women. Meanwhile, total practice and total belief scores of the study group was not influenced by their socio-demographic characteristics throughout the study phases. However, a statistically significant positive correlation was found only between total practice score and educational level before the program.

Table (VIII): Correlation between total score of knowledge, practices and health beliefs of the study group and their socio-demographic characteristics pre and three months post- program.

Variables	Study group (n=85)					
	Total knowledge score		Total practice score		Total belief score	
	Pre-test	3 months Post-test	Pre-test	3 months Post-test	Pre-test	3 months Post-test
	r P	r P	r P	r P	r P	r P
Age	0.132 0.229	0.046 0.678	-0.053 0.628	-0.067 0.545	0.093 0.397	0.056 0.613
Educational level	0.253 0.01*	0.268 0.013*	0.346 0.001*	0.175 0.109	0.088 0.425	-0.079 0.470
Occupation	0.425 0.001*	0.303 0.005*	0.069 0.529	0.0182 0.096	0.155 0.158	0.081 0.459
Crowding index (CI)	-0.130 0.237	0.083 0.452	0.084 0.444	-0.017 0.875	-0.087 0.431	-0.151 0.168
Family monthly income	0.242 0.026*	0.220 0.043*	0.052 0.639	0.035 0.747	0.089 0.417	0.031 0.778

*** Correlation is significant at the 0.05 level.**

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4. DISCUSSION

Reproductive tract infections (RTIs) contribute significantly to the burden of reproductive morbidity in developing countries. Large proportion of women, especially rural women, generally suffers morbidity silently and became reluctant to seek care. This is because they are restricted with traditional beliefs which may prevent them from following healthy preventive measures and can challenge application of these measures. Health belief model (HBM) is one of the models used to promote preventive behaviors through improving person's beliefs regarding the health problem. It assumed that improving beliefs is a basic stone to improve practice of people [19, 21- 23]. Thus, the aim of this study was to evaluate the effect of preventive program about reproductive tract infections on knowledge, beliefs and practices among rural women based on health belief model.

Generally, the present study revealed that, the preventive program that based on HBM was effective in improving rural women's knowledge, beliefs and practices regarding RTIs. The majority of the study and control groups before implementation of the program reported poor knowledge, unsatisfactory practice and negative belief scores. Meanwhile, after implementation of the program, a statistically significant improvement in the total knowledge, practice and belief scores was observed for the study group rather than the control group. This is in line with the results of the Egyptian studies conducted by **Abd El Aziz et al., (2016)** and **Soliman et al., (2018),** who found that application of HBM was effective in improving knowledge and practice of the studied participants regarding urogenital infections and obesity respectively [20, 24].

According to WHO, RTIs have become the most noticeable diseases in most countries worldwide, but prevalence is high in developing countries including Egypt particularly rural areas [21]. In this context, the current study revealed that RTIs was the most prevalent gynecological health problem among the majority of the study and control groups (table II). This may be because the majority of both study and control groups their age ranged between 18 - 35 years (table I). During this age most of women pass through menstruation, pregnancy, abortion and delivery. All these are factors that increase risk for RTIs. Also, using contraceptives by most of women in both groups, especially IUDs which was used by most of them may be another reason for high prevalence of RTIs.

This is consistent with **Akl et al., (2011),** who evaluated perceived reproductive morbidity and treatment seeking behavior among married women at Siwa Oasis, Egypt, and found that high proportion of participants reported having at least one gynecological health problem, the most commonly reported gynecological problem was symptoms of lower RTIs, as reported by more than half of the studied women [25]. Similarly, **Rahman et al., (2012),** who assessed reproductive tract infections associated with vaginal discharge among public health clinic attendees in Bangladesh, documented high prevalence rate of RTIs (53%) [26]**.** Also, **Philib et al., (2015),** who assessed the prevalence of the most common RTIs among women attending family Planning clinics in Montazah- Alexandria, reported that 78.7% of the studied women suffered from RTIs and most of them were using family planning methods. The researchers related this to the use of family planning method (IUDs) [7].

Contrarily, two other studies, one conducted by **Ramesh et al., (2018),** in Kottayam, India and another study by **Shrestha et al., (2015),** at Kathamandu University hospital, Nepal, revealed low prevalence of RTIs that only 11.8% and 1.6% of participants of both studies respectively suffered from RTIs [27, 28]. The differences in both studies may be due to setting differences as **Ramesh et al., (2018)** study was conducted in urban setting and **Shrestha et al., (2015)** study was conducted in hospital, while the current study was conducted in rural area.

Concerning women's action in response to occurrence of infection, this study revealed that about two thirds of the study and control groups went to doctor, pharmacist or health center for treatment (table II). This relatively high percentage of seeking medical treatment could be attributed to that about three quarters or more of the studied groups had either secondary or university education as well as family monthly income was enough for most of women in the current study. This is similar to the results from the study conducted by **Hedge et al., (2013),** about RTIs among women in a peri-urban privileged area in Bangalore, India, who found that most of the studied women who suffered from RTIs sought some form of treatment [29].

In contrast, findings of the study conducted by **Elahee et al., (2013),** to assess RTIs among women in slums of Khulna city in Bangladesh, and demonstrated that most of the studied women didn't seek any treatment for RTIs symptoms from any health care provider. This difference may be attributed to that subjects were from slum area as well as the absolute

poverty in which about half of the populations live in Bangladesh, which leads people to migrate inside and outside the country to earn money and don't seek medical treatment [30].

Recurrence of RTIs is considered a public health issue that occurs when infection is ignored and worsens its consequences. The present study indicated that, nearly three quarters of the study and control groups had recurrent infections (table II). This high percentage of recurrent infection indicated the poor knowledge about hygienic and preventive measures among both groups before program. This is supported by **Abbas et al., (2016),** who reported that recurrence rate was high for both bacterial vaginosis and candidiasis [8].

One of the main aims of health education is knowledge improvement as it is the first step for belief and behavior modification. That's why many studies incorporated knowledge in their intervention programs [31]. In this study, women's knowledge about RTIs was assessed throughout the study period. The results of the current study revealed that, there was significant improvement of total knowledge score for the study group as, before the program implementation, the majority of the study and control groups had poor total knowledge score. Whereas three months after intervention, the majority of the study group had significantly good knowledge score but the control group showed no significant difference (table III). The improvement of knowledge post program in the present study may be related to the effect of the conducted program as well as the ability of the studied subjects to gain knowledge easily, where only small percentage of the study group were illiterates.

This is supported by the findings of **Shelke and Vidyapeeth (2016),** and **Ahmed and Omar (2017),** who illustrated that, in pretest, most of the women in experimental group had poor knowledge regarding reproductive tract infections. Meanwhile, in posttest, the majority of them had good knowledge score. Also, they found no significant difference was observed for the control group [32, 33].

The growing incidence of RTIs, as well as the dangerous consequences that they can lead to, highlight the urgent need for appropriate and effective interventions. However, they are easily preventable through following simple preventive measures and safe health practices. These measures include perineal hygiene, menstrual hygiene, hygiene of underwear, safe sexual practices and regular medical checkup [34]. As regard the total practice score, the current study showed that, before program implementation, the most of the study and control groups reported unsatisfactory practice score. Immediately and three months after program, total score of reported practice became satisfactory for all the study group, with a statistically significant improvement in the total mean score of reported practice. Contrarily, it was not changed for the control group (table IV). This also reflects the effectiveness of conducted educational program.

This is in harmony with the results of **Aburshaid et al., (2017),** who illustrated that in the pre-intervention phase, only (28.2%) have satisfactory total practices score, while in the post- intervention phase (94.9%) were more likely to have satisfactory total practices score [35]. **El- Mowafy et al., (2014),** also studied the effect of health education program on knowledge and practices about menstrual hygiene among adolescent girls at orphanage home, Port Said, and found that, there was highly statistically significant difference in total mean practice score of the studied sample after implementation of educational program [36].

Health behavior is a kind of a social behavior. Thus, it affects and gets affected by various socio-cultural parameters. Health belief model is based on the idea that changing the health belief is of significant importance for behavior change [37]. The present study showed that, there was significant improvement in the total positive belief scores of each construct of HBM among the study group. In contrary, there were no significant differences among the control one regarding all constructs of HBM (table V). This agrees with **Aligol et al., (2014),** in Tehran, who demonstrated that total scores of all constructs of HBM toward brucellosis infection were significantly increased among case group after the intervention, while there were no significant differences between the scores of the control group [38].

The current study revealed that the study group showed significant increase in the total positive belief score three months post intervention than before intervention. Meanwhile, there was no significant difference for the control group (table VI). This improvement may be due to the improvement of knowledge among the study group. Similarly, **Yossif et al., (2014),** found a highly statistically significant improvement of total belief score among intervention group two months after self-learning package but the control group showed no significant difference [19]. Moreover, **Abd El Aziz et al., (2016),** reported that there was a highly significant improvement in total belief scores within the intervention group two months after intervention, with no change for the control group [20].

Health belief model assumed that improving knowledge of the persons about a health problem can improve their beliefs regarding it and eventually improve their expected behaviors regarding its prevention [20]. This was approved by the results of the present study that, improved total knowledge score was associated with improved total practice and belief scores three months post program for the study group. Also poor knowledge score was associated with poor practice and belief scores before the program for both groups (table VII). Same findings were obtained by **Rahimi et al., (2016),** who studied predictors of preventive behaviors of UTIs based on HBM among women in Zahedan, Iran and **Mohamady et al., (2017),** who found that there was a statistically significant positive correlation between total knowledge, practice and belief scores about UTIs in both groups before and two months after intervention [39, 40]. They explained this by the applicability and effectiveness of HBM based programs to improve knowledge, beliefs and practice among their participants.

In the present study, it was observed that both means of total practice and belief scores were higher during three months post-test than immediate post-test. However, there was slight decrease in the mean of total knowledge score three months posttest than immediate post-test (tables III, IV and VI). These findings are similar to findings from the study conducted by **Ahmed and Khresheh (2016),** about the impact of instructional program about prevention of UTI recurrence on the level of knowledge and self-care behaviors among women with UTI in Saudi Arabia, who illustrated that the mean of total knowledge score of all items about UTI was significantly improved immediately and three months after implementation of the program, while it was higher immediately than three months post [41]. This may be attributed to that knowledge can be forgotten over time, but the presence of retained knowledge and improved health beliefs helped women practice correctly. Also, **Jeihooni et al., (2017)**, found that total mean scores of all constructs of HBM were higher during post-test II (four months after program) than immediate post-test [42]. This emphasize the effectiveness of HBM based educational program in improving women's beliefs regarding RTIs and its preventive measures which in turn resulted in improvement of their practice.

The findings of the present study revealed that, total belief score of the study group wasn't influenced by any of socio-demographic characteristics throughout the study phases (table VIII). This can be attributed to the fact that beliefs and traditions are shared by people having common characteristics and living within the same context. Thus, from the researcher's point of view, living in a rural residence can be the main indicator that influences their beliefs. This is in line with **Jahanbin et al., (2015)**, who found no significant relation between socio-demographic characteristics and total belief score. However, only significant relation was found with education [43]. They related its association with education to the effect of education in improving their knowledge which in turn improved their beliefs.

Eventually, RTIs can lead to devastating health consequences, when left untreated. However, they can be easily prevented through conducting health education programs about its definition, risk factors, causes, manifestations, consequences, treatment, and preventive measures. Even though, health education is very important, traditions and negative beliefs in rural culture may influence women's adherence to educated preventive measures. Thus, HBM can be used to modify these beliefs and practices. In this context, the present study revealed that, application of health belief model in conducted health education program was highly effective in improving women's knowledge and beliefs about RTIs for the study group which in turn resulted in improving their reported practice regarding preventive measures. This directs the light toward the role of community health nurse in using HBM to improve adherence to preventive measures.

5. CONCLUSION & RECOMMENDATIONS

Based on the findings of the present study, it can be concluded that the educational preventive program based on health belief model (HBM) was effective and improved the studied rural women's knowledge, beliefs and practices regarding RTIs. Thus, the current study recommended that,

1. Community health nurses working in rural areas need to design educational programs for women in order to change negative and false beliefs about RTIs and sexual health emphasizing its impact on women, infants, family and the community and enhancing preventive measures of RTIs.

2. Community health nurse has to assume her role as an advocate for provision and availability of adequate and efficient reproductive health services for all women in rural areas to overcome barriers as cost, unavailability of services and poor relationship.

3. HBM has proved its efficiency in improving women's beliefs and practices regarding RTIs. Thus, further research should be done in a large scale in different settings for improving adherence to preventive measures for other serious health problems.

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