

Application of an Epidemiological Triangle Model on Prevalent Sexually Transmitted Diseases among Married Women

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Abstract

Sexually transmitted diseases are globally recognized as significant health burdens. **The aim** of this study was to evaluate the application of an epidemiological triangle model on prevalent sexually transmitted diseases among married women. **Research design:** A quasi experimental design was utilized in this study. **Setting:** This study was conducted at the Obstetrics & Gynecology Outpatient Clinics in Benha University Hospital and Benha Teaching Hospital in Benha City. **The sample:** Simple random sample of 25% of all women attended to previously mentioned settings which included 150 women. **Tools:** **A structured interviewing questionnaire which includes fourth parts:- a):** demographic characteristics **b):** Medical history of the studied women's regarding obstetric history and present complain **c):** knowledge about prevalent sexually transmitted disease (chlamydia, gonorrhoea, syphilis and trichomoniasis) according to an epidemiological triangle model **d):** women's reported practices for prevalent sexually transmitted disease (chlamydia, gonorrhoea, syphilis and trichomoniasis) according to an epidemiological triangle model. **Results:** 18.0% of the studied women had good total knowledge pre implementation compared with 72.7% post implementation of epidemiological model, and 31.3% of the studied women had satisfactory total practices pre implementation compared with 81.3% post implementation of epidemiological model. also the result proved that there are no significant correlations between total knowledge scores and total practices scores pre implementation of epidemiological triangle model and there are positive statistically correlations between total knowledge scores and total practices scores post implementation of epidemiological triangle model among the studied women. **Conclusion:** The epidemiological triangle model succeeded to improve knowledge and practices of the studied women regarding sexually transmitted diseases. **Recommendations:** Provide continuous educational program to women in Outpatient Obstetrics Clinics to increase knowledge about prevention of sexually transmitted diseases.

Key words: Epidemiological Triangle Model, Prevalent Sexually Transmitted Diseases, Married Women.

1. Introduction

Sexually Transmitted Diseases (STDs) pose serious risks to public health for people of all ages, particularly in low- and middle-income nations and especially for women. Even for the four manageable STDs, the epidemic of STDs is a growing worldwide challenge, and the prevalence and incidence of STDs are still high (chlamydia, gonorrhoea, trichomoniasis, and syphilis), with more than one million new infections being detected each day globally. The majority of new STD cases each year are among women between the ages of 15 and 24, who also have the highest STD prevalence rates [1][2].

Women are more prone to infections. Due to the vaginal mucosa is thin, sensitive, and easily penetrated by infectious agents, the female urogenital anatomy may be more exposed and susceptible to STDs than the male urogenital anatomy. Additionally, the vagina's wet environment makes it a perfect place for bacteria to flourish [3].

Each person has the potential to contract these illnesses multiple times throughout lifetime because they do not produce immunity. Multiple sexual partners, beginning sexual activity at a young age, poverty, smoking, low knowledge, low literacy, depression, hazardous sexual behaviour, and a history of other STDs are risk factors for STDs. One of the key factors contributing to the spread of these diseases is

unfavourable attitudes and ignorance. Misuse of recreational drugs and alcohol, which impairs judgement, as well as unsafe sexual encounters and sharing of contaminated needles or syringes, are other risk factors [4][5].

In general, STDs have adverse effects on social, psychological, and physical aspects of daily life. Pelvic inflammatory diseases, ectopic pregnancy, infertility and persistent pelvic pain are some of the complication of STDs. Adults untreated syphilis develops cardiovascular and neurological disorders. Premature birth, newborn encephalitis, ocular infections, pneumonia, and fetal or neonatal death are among risks associated with STDs during pregnancy. The risk of acquiring and transmitting HIV is further increased by chlamydia, gonorrhoea, syphilis, and trichomoniasis [6] [7].

Guidelines on STDs prevention and care are being developed by WHO in phases. These guidelines will include suggestions for primary prevention, management of asymptomatic STDs, updated treatment recommendations for specific STDs, partner management, monitoring and evaluation, and delivery of services, syphilis screening and treatment for pregnant women, and management of [8].

Epidemiology is the study of the incidence of disease and its causes in different populations. Designing and evaluating strategies for preventing

illness as well as acting as a guide for the care of individuals whose disease already has manifested. The epidemiological triangle model is a crucial tool for developing and implementing such preventive interventions as well as a model of illness causation. The epidemiological triangle model's main objectives are to better understand how a disease spreads, identify the factors that led to disease transmission, and provide guidance for choosing an efficient disease control strategy [9] [10].

The epidemiological triangle model has three corners: Agent or microbe that causes STDs ("what" of the Triangle), host or organism harboring STDs ("who" of the Triangle) and the environment or those external factors that cause or allow STDs transmission ("where" of the Triangle). The epidemiological triangle model enables women to identify STDs causative agent, STDs-prone individuals, and environmental factors that influence disease occurrence. This enables women to pinpoint the sexually healthy behaviors that aid in STD prevention [11].

According to the epidemiological triangle model, community health nurses play a crucial role in helping women prevent and control STDs by promoting "safer sex" or sexual abstinence, trying to encourage testing and counseling for women who have a history of exposure to STDs or who are in high-risk groups, and providing referrals for follow-up for women who test positive for an STD. In order to priorities prevention of STDs over treatment, community health nurses assist women in modifying destructive behaviors (relating to personal hygiene, safe sex, and commitment to treatment) [12]

Significance of the study:

Sexually transmitted diseases impact the health and well-being of individuals and create a financial burden for both individuals and society at large. WHO has been performing global estimation for four curable STDs approximately every five years since 1995. The latest report published in June 2019 estimated about 380 million new cases of curable STIs in year 2016, with the WHO Region of the Americas having the highest incidence rate for syphilis and chlamydia among both men and women, while the WHO African region had the highest incidence rate for gonorrhoea and trichomoniasis in both men and women. According to WHO, the estimated incident cases of the most common STDs 127.2 million chlamydia; 86.9 million gonorrhoea; 156.0 million trichomoniasis; 6.3 million syphilis.

In developing countries, the prevalence and incidence of STDs are high, making up the second highest cause of healthy life lost in women aged

14 to 45 years, after maternal morbidity and mortality. Moreover, STDs constitute a substantial health and economic burden, especially for developing countries already strained with other emerging health problems. STDs prevalence in Egypt is up to 3.0% among 15-49 years married females.

Aim of the study:

The study aimed to evaluate the application of an epidemiological triangle model on prevalent sexually transmitted diseases among married women.

Research hypothesis

Application of an epidemiological triangle model for married women have prevalent sexually transmitted disease will improve their knowledge and practices regarding sexual transmitted diseases.

2. Subject and methods

Research design:-

This study was conducted using a quasi-experimental research design.

Setting:-

The Obstetrics and Gynecology Outpatient Clinics at Benha University Hospital and Benha Teaching Hospital in Benha City served as the site of this study.

Type of sample:-

Simple random sample of 25% of all women attended to previously mentioned settings which includes 100 women from 400 women attended to Benha University Hospital Outpatient Clinic at the last year (2020) and 50 women from 200 women attended to Teaching Hospital Outpatient Clinic at the last year, so the total sample included 150 women, they chosen according to certain criteria:

- Diagnosed with sexually transmitted disease (chlamydia, gonorrhoea, syphilis and trichomoniasis).
- Aged 18-45 years.
- Free from chronic and other obstetric disease.

Tools of data collection:

The researcher created a structured interviewing questionnaire, which was written in simple, familiar Arabic language and include 4 parts:-

The first part: concerned with demographic characteristics of women as (age, education level, occupation, residence and family type).

The second part: - concerned with medical history of the studied women, which cover 2 parts:-

A: concerned with obstetric history of studied women 7 questions as (age at marriage/ years, pervious abortion, regularity of menstrual cycle, amount of blood during menstruation, method of contraception, gravid and Para).

B: concerned with present complain of studied women 11 questions as ((abnormal vaginal discharge, itching in genital area, swelling in genital area, pain during

intercourse, severe pain during menstruation, lower abdominal pain, pain during urination, sores or blisters on genital area, vaginal bleeding, recurring STDs and husband suffers from STDS).

The third part: Was concerned with women knowledge about prevalent sexually transmitted disease, chlamydia, gonorrhoea, syphilis and trichomoniasis (pre / post-test) according to an epidemiological triangle model which adapted from [13]. It include 6 questions about agent of sexually transmitted diseases, 4 questions about agent of chlamydia trachomatis, 4 questions about agent of gonorrhoea, 6 questions about agent of syphilis, 5 questions about agent of trichomonas, 9 questions about host of sexually transmitted diseases and 9 questions about environment of sexually transmitted diseases.

Scoring system:

Women's knowledge was graded using the following system: 1 point for a complete and correct response, 0 for an incorrect response, and don't knowing.

A mean score was calculated by adding the item scores together and dividing the result by the number of items. The total knowledge score was rated as high if it exceeded 75% (32) points, average if it fell between 50% and 75% (32-21) points, and poor if it fell below 50% (21) points.

The fourth part: - Was concerned with women reported practices regarding prevalent sexually transmitted disease, chlamydia, gonorrhoea, syphilis and trichomoniasis) (pre / post-test) according to an epidemiological triangle model includes 14 statement about reported practices about personal hygiene according to an epidemiological triangle model related agent, 16 statement about reported practices about increasing resistance to disease by improving immunity and adhering to healthy diet and follow-up and compliance with treatment according to an epidemiological triangle model related host and 9 statement about reported practices regarding safe sex according to an epidemiological triangle model related environment.

Scoring system:

Women's reported practices were scored using the following formula: (1) score for done; (0) score for not done. A mean score was calculated by adding the item scores together and dividing the result by the number of statement.

Scores was considered satisfactory if the score of the total practices $\geq 60\%$ (≥ 23) point, while considered unsatisfactory if it is $< 60\%$ (< 23) point.

Pilot study:

The pilot study involved 10% (15) of the women at the two-month (January and February 2021). The interviewing questionnaire served as a pre-test sheet for the pilot research, which tested the tool's content, clarity, application, and simplicity. Each pre-test sheet took about 30-45 minutes to complete. The sample from the pilot study was incorporated into the overall sample without any changes.

Ethical considerations:

All ethical concerns were addressed; prior to the interview, informed consent was obtained from each woman, and they were given a brief explanation of the study's objectives. Women were also given the assurance that any information acquired would be kept private and used just for the investigation. The woman had the freedom to discontinue the study at any moment and without explanation.

Content validity of the tools:

Three faculty staff nurses with expertise in community health nursing examined the tools for readability, relevancy, comprehensiveness, and applicability and provided their feedback on their content validity.

Reliability of the tools:

The researcher used the tool's reliability to assess its internal consistency by giving the identical tools to the same people under similar circumstances on one or more occasions. The results of multiple tests were compared (test-re-test reliability). The reliability was determined using the Cronbach's Alpha coefficient test, which showed that each of the three instruments had a moderate to high level of reliability and contained reasonably homogenous items. Knowledge had an internal consistency score of 0.76, while practices had a score of 0.81.

Epidemiological Triangle Model development included four phases:

The Epidemiological Triangle Model was designed by the researcher based on the findings from the interviewing questionnaire and literature study. After the pre-test, it was put into practice immediately and applied by the researcher in four phases as follows: **(I) Assessment phase:** By gathering and analyzing baseline data from the completed instruments, this phase of the epidemiological triangle model evaluated the knowledge and practices of the investigated women. The researcher conducted the pre-test during this phase.

(II) Planning phase: The researcher established priority for the needs of the target population, identified the critical needs, and created goals and objectives.

(III) Implementation phase: The epidemiological triangle model was used to the women during this phase at the best time for them. From the beginning of March 2021 to the end of February 2022, data were gathered during a 12-month period. In the Obstetrics and Gynecology Outpatient Clinics at Benha University Hospital and Benha Teaching Hospital in Benha City, the researcher visited the obstetrics and gynaecology outpatient clinics at Benha University Hospital twice a week (on Saturdays and Tuesdays), as well as the teaching hospital on Sundays from 9:00 am to 12:00 noon each week. The sheet took an average of 30-45 minutes to complete, the average number interviewed at the Obstetrics & Gynecology Outpatient Clinics were 3-4 women/week (0-4 women/day) depending on the responses of the women.

The epidemiological triangle model was implemented by the researcher over the course of six sessions, totaling 3.5 hours (2 theoretical sessions and 4 practical sessions, each lasting 30 to 45 minutes, including breaks for discussion, and ending with a post-test.

First session: The researcher welcomed and introduced herself to the women at the start of the first session, and she gave them an overview of the intervention and its procedure, included meaning of sexually transmitted diseases, explain mode of transmission of sexually transmitted diseases, mention people high risk for sexually transmitted diseases, recognize factors contributing to the occurrence of sexually transmitted diseases, enumerate causes of sexually transmitted diseases (agent) and explain ways to prevent sexually transmitted disease.

Second session: Explored meaning of chlamydia, gonorrhoea, syphilis and trichomoniasis, list causes, signs and symptoms, complication and methods of treatment of chlamydia, gonorrhoea, syphilis and trichomoniasis infection.

Third sessions: Demonstrate personal hygiene.

Fourth sessions: Illustrate safe sex.

Fifth sessions: Construct healthy diet.

Six sessions: Demonstrate follow up and compliance for treatment.

(IV): Evaluation phase:

The Epidemiological Triangle Model's implementation was evaluated using a post-test questionnaire that had the same formats as the pre-test in order to compare the changes in patients' knowledge and practices.

Statistical analysis:

All data were sorted, tabulated, and statistically tested after collection. The Statistical

Package for Social Science (SPSS) version 21 was used to analyse the data, which included calculating frequencies and percentages, means and standard deviations, and testing statistical significance and associations using the Chi-square test (χ^2 and coefficient (r) to identify associations between the variables (P value).

Results

Table (1): Shows that; 47.3% of the studied women their age were 18 to 28 years with mean age was 28.65 ± 5.21 years and 65.3% of them had secondary education. Regarding occupation 60.0% of the studied women were housewife. 62.7% of the studied women were lived in rural areas and 67.3% of them lived in extended family.

Table (2): Shows that; 60.7% of the studied women married between 18-25 years old, 61.3% of them didn't have previous abortion. 64.7% of studied women had irregular menstruation and 55.3% of them had medium amount of blood during menstruation. 27.3% of the studied women used intrauterine device as contraceptive method.

Table (3): Shows that; 96.7%, 86.7% and 82.7% of the studied women had abnormal vaginal discharge, swelling in genital area and itching in genital area respectively and 79.3%, 76.0% and 74.0% of them had lower abdominal pain, pain during intercourse and recurring STDs respectively.

Figure (1): Illustrates that, while 57.3% of the studied women had poor total knowledge levels prior to the implementation of the epidemiological model, this percentage fell to 10.0% after the epidemiological model's implementation. In contrast, 18.0% of the women had good total knowledge levels prior to the implementation of the epidemiological model, increasing to 72.7% after the model's implementation.

Figure (2): Illustrates that 81.3% of the investigated women had satisfactory total practises levels after the epidemiological model's implementation, up from the pre-model percentage of 31.3%.

Table (4): demonstrates that, following the adoption of the epidemiological triangle model, there were positive statistical correlations between the total knowledge and total practice scores of the examined women ($P = > 0.05$). Prior to the installation of the epidemiological triangle model, there were no significant relationships between the study women's overall knowledge level and their overall practice score.

Table (1) Frequency distribution of the studied women regarding their demographic characteristics (n=150).

<i>Demographic characteristics</i>	No.	%
Age/years		
18-28	71	47.3
29-38	50	33.4
39-45	29	19.3
Mean \pm SD	28.65 \pm 5.21	
Education level		
Don't read and write	17	11.3
Basic education	14	9.3
Secondary education	98	65.3
University education and more	21	14.1
Occupation		
Working	60	40.0
Housewife	90	60.0
Residence		
Urban	56	37.3
Rural	94	62.7
Family type		
Single family	7	4.7
Nuclear family	42	28.0
Extended family	101	67.3

Table (2) Frequency distribution of the studied women regarding their obstetric history (n=150).

Items	No	%
Age at marriage/years		
18-25	91	60.7
26-33	36	24.0
34-41	23	15.3
Pervious abortion		
Yes	58	38.7
No	92	61.3
Regularity of menstrual cycle		
Regular	53	35.3
Irregular	97	64.7
Amount of blood during menstruation		
Low		
Medium	21	14.0
Much	83	55.3
	46	30.7
Method of contraception		
Tablets	23	15.3
Intrauterine device	41	27.3
Injections	31	20.7
Natural method as breastfeeding	22	14.7
Male condom	2	1.3
Female septum	2	1.3
External ejaculation	1	.7
Do not using	28	18.7
Gravid		
None	20	13.3
Once	53	33.3
Twice	53	37.3
Three or More	24	16.0
Para		
None	33	22.0
Once	49	32.7
Twice	54	36.0
Three or More	14	9.3

Table (3) Frequency distribution of the studied women regarding their present complain (n=150).

Items	Yes		No	
	No	%	No	%
Abnormal vaginal discharge	145	96.7	5	3.3
Itching in genital area	124	82.7	26	17.3
Swelling in genital area	130	86.7	20	13.3
Pain during intercourse	114	76.0	36	24.0
Severe pain during menstruation	105	70.0	45	30.0
Lower abdominal pain	119	79.3	31	20.7
Pain during urination	109	72.7	41	27.3
Sores or blisters on genital area	45	30.0	105	70.0
Vaginal bleeding	41	27.3	109	72.7
Recurring STDs	111	74.0	39	26.0
Husband suffers from STDS	32	21.3	118	78.7

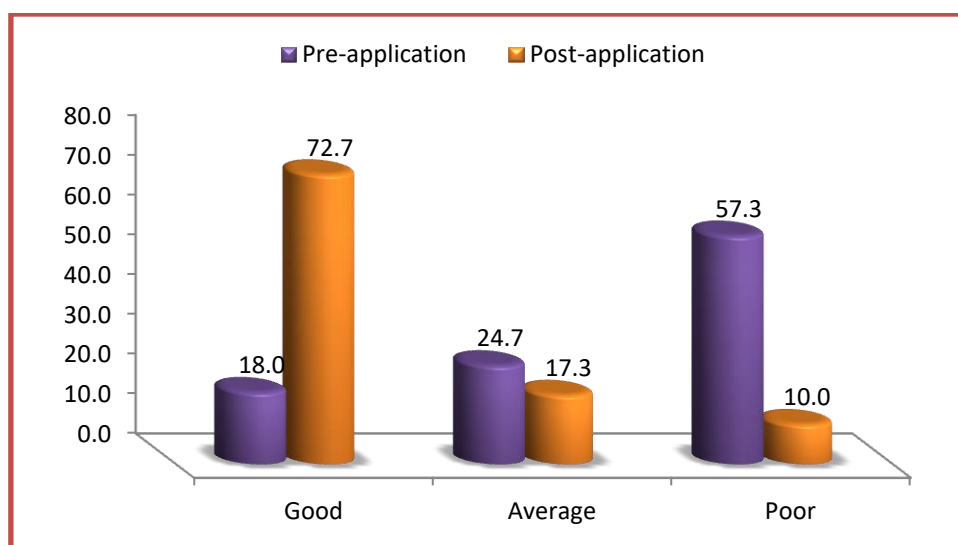


Fig. (1) Percentage distribution of the studied women regarding their total knowledge level pre and post implementation of epidemiological model for sexually transmitted diseases (n=150).

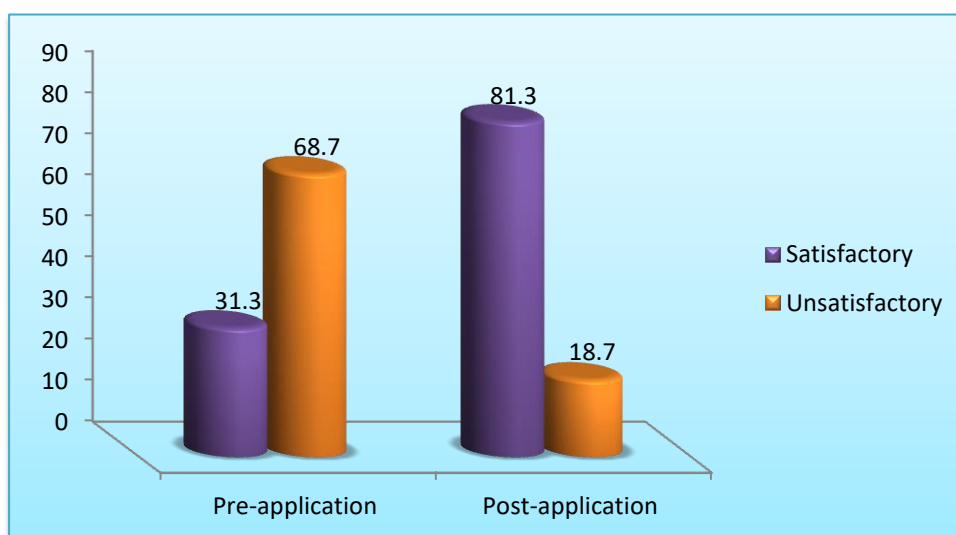


Fig. (2) Percentage distribution of the studied women regarding their total reported practices level according to an epidemiological triangle model regarding agent, host and environment (n=150).

Table (4) Statistically correlation between the studied women total knowledge scores and their total practices scores pre and post implementation of epidemiological model

Items	Total knowledge scores			
	Pre implementation of epidemiological model		Post implementation of epidemiological model	
	R	p-value	R	p-value
Total practices scores	.144	.079	.894	.011*

3. Discussion

Globally, it is acknowledged that STDs pose a serious health burden. They have been associated with severe side effects such as infertility, neurological decline, severe immunodeficiency, and chronic hepatitis with its potentially fatal sequel. Although there is a known knowledge gap about STDs and corresponding behaviors, STDs are largely preventable, mostly treatable, and occasionally curable. The success of positive results also depends on advances in preventative medicine and public awareness [14].

Regarding to demographic characteristics of the studied women, this study showed that; approximately less than half of the studied women were aged from 18 to 28 years with mean age 28.65 ± 5.21 years, almost two third of the studied women were secondary education, three fifth of them was housewife, more than three fifth of the studied women were rural resident and more than two third of them lived in extended family.

The current study found that three-fifths of the studied women married between the ages of 18 and 25 with regard to their obstetric history. This result was consistent with [15]. Who found that 57% of the women they looked at got married between the ages of 18 and 27. This may be because women who engage in early sexual activity have a higher chance of developing STDs.

The results of this study showed that; more than three fifth of the studied women didn't have previous abortion. This finding agreed with [16] who reported that 70.9% didn't have abortion.

Regarding the present complains of the studied women; the current study revealed that; the most of the studied women had abnormal vaginal discharge. This outcome was in line with [17]. Who reported that the most commonly reported symptom was vaginal discharge (91.3%). However, this results conflicts with [18] who reported that vaginal discharge (62.5%) was most common symptom. This finding might be due to STDs causes change in characteristic of vaginal discharge as increase in amount and change in color and odor.

Regarding total knowledge level pre and post implementation of epidemiological model for sexually transmitted diseases, the current study revealed that;

less than one fifth of the studied women had good knowledge level pre implementation of epidemiological model then improved to slightly less than three quarters post implementation of epidemiological model. This finding agreed with [19], who stated that significant group differences were found at different times (pre and post mobile-based educational program) in STD knowledge. In the same line this study finding agreed with [20], who showed that there significant improvement of the women total knowledge level from the pre-intervention to in the post-test ($p = 0.001$). This might be connected to the epidemiological triangle model, which assists in increasing women's education and encourage a clear understanding of STDs.

Regarding total reported practices pre and post implementation of epidemiological triangle model regarding agent, host and environment, the current study revealed that; less than third of the studied women had satisfactory total practices pre implementation of epidemiological model and improved to majority of them had satisfactory total practices post implementation of epidemiological model. This finding supported with [21], who showed that there were highly significant improvement in women's practice regarding personal hygiene, hand washing, perineum care, safer sex and compliance to treatment, pre and post nursing intervention program. This might be due to uses of epidemiological triangle model which help to simplify the information given to the women and encourage him to apply this information into practices to prevent recurrences of STDs symptoms.

Concerning correlation between total knowledge scores and total practices scores pre and post implementation of an epidemiological model, the present study revealed that there were positive statistically correlations between the studied women total knowledge scores and total practices scores pre and post implementation of epidemiological triangle model ($P = > 0.05$). This finding agreed with [21], who reported that there were positive relation between women's practices and their selected knowledge related triangle epidemiological model ($P < 0.001$). This finding might be due to attributed to the fact that the knowledge was the baseline of the practices and affect positively on their practices and when the knowledge increase

about women health, the women practice should be changed to better than before.

4. Conclusion

The epidemiological triangle model succeeded to improve knowledge, practices of the studied women. Regarding total knowledge level of the studied women pre and post implementation of epidemiological model for sexually transmitted diseases, less than one fifth of the studied women had good total knowledge level pre implementation of epidemiological model then increased to more than two third post implementation of epidemiological model, regarding total reported practices level of the studied women according to an epidemiological triangle model less than third of the studied women had satisfactory total practices pre implementation of epidemiological model and improved to majority of them had satisfactory total practices post implementation of epidemiological model.

5. Recommendations

1- Provide continuous educational program to women in Outpatient Obstetrics Clinics about sexually transmitted diseases to increase knowledge about prevention.

2-Encourage premarital screening to reduce risk of sexually transmitted diseases.

Further study:

1-Involving spouses in the study to promote healthy sexual behavior in married women.

2-Provision web-site for women who attend to outpatient clinics to continuously learn about sexually transmitted diseases.

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