RESEARCH ARTICLE

IMPACT OF INTERVENTION PROGRAM ON NON PREGNANT WOMEN'S KNOWLEDGE AND GENITAL HYGIENE PRACTICES REGARDING BACTERIAL VAGINOSIS

[1, 2]*Eman elsayed Mohammed elsabagh

[1]Assistant Professor of Obstetrics and Gynecology Nursing, Faculty of Nursing, Zagazig University, Egypt
[2]Associate professor Maternal and Newborn Health Nursing, Maternity and childhood department, Nursing College Taibah University Madina, KSA

ARTICLE INFO	ABSTRACT
	Bacterial vaginosis (BV) is an ecological disorder of the vaginal microbiota that affects millions of women annually, and is associated with numerous adverse health outcomes. **The study aims:** To evaluate the effect of intervention program on non Pregnant women's knowledge and genital hygiene practices regarding bacterial vaginosis. **Research design:** A quasi- experimental design was used in this study which conducted in Obstetrics and Gynecology clinic, at Zagazig University Hospital. Sample The study subject included 80 non pregnant women and diagnosed as bacterial vaginosis. both clinically and microbiologically. **Tools** of the study consist of three tools, the first tool was women assessment sheet, the second tool was questionnaire sheet for assessment of women` knowledge and practices, while the third tools was intervention program. **Results:** The study has revealed that statistically significant improvement in women' knowledge and genital hygiene practices regarding bacterial vaginosis were noticed at the post test. The study finding concluded that the present study had revealed low level of knowledge and practice about bacterial vaginosis among non pregnant women. The study also clearly pointed out the impact of health education in improving their knowledge and positive behavioral changes in individual, menstrual and coital hygiene habits. **The main study recommendations**: The study recommended that further education intervention for non pregnant women with bacterial vaginosis and careful follow up from medical and nursing team to decrease the complications of genital infections.

INTRODUCTION

Bacterial vaginosis (BV) is the most common cause of vaginal discharge in women of childbearing age, accounting for 40 to 50% of cases (Ebrahimi *et al.,* 2015). It can also be referred to as a condition whereby there is a microbial imbalance, in which a decrease in resident vaginal Lactobacilli, associated with the growth of anaerobic polymicrobial flora. Most women affected with bacterial vaginosis harbor Gardnerella vaginalis, other associated microbial population include Bacteriodes, Mycoplasma hominis and Mobiluncus (Gupta *et al.,* 2013). The mechanism by which the floral imbalance occurs and the roles of sexual activity in the pathogenesis of BV are not clear but formation of an epithelial biofilm containing G. vaginalis appears to play an important role (Swidsinski *et al.,* 2005). Hydrogen-peroxide producing Lactobacilli appear to be important in preventing overgrowth of the anaerobes normally present in the vaginal flora.

*Corresponding author: [1, 2]*Eman elsayed Mohammed elsabagh
[1]Assistant Professor of Obstetrics and Gynecology Nursing, Faculty of Nursing, Zagazig University, Egypt
[2]Associate professor Maternal and Newborn Health Nursing, Maternity and childhood department, Nursing College Taibah University Madina, KSA

With the decrease in the population of Lactobacilli, pH rises and massive growth of vaginal anaerobes occurs. These anaerobes produce large amounts of proteolytic carboxylase enzymes, which break down vaginal peptides into a variety of amines that are volatile, malodorous, and associated with increased vaginal transudation and squamous epithelial cell exfoliation, resulting in the typical clinical features observed in patients with BV. The rise in pH also facilitates adherence of G. vaginalis to the exfoliating epithelial cells (Lamont *et al.,* 2011). Bacterial vaginosis (BV) is a polymicrobial syndrome with acquisition of several fastidious bacteria, concurrent with a decrease of lactobacilli, the dominant constituents in normal vaginal flora (Ling *et al.,* 2010). It is a condition characterized by replacement of vaginal lactobacilli with predominantly anaerobic micro-organisms such as Gardnerella vaginalis, Prevotella, Peptostreptococcus and Bacteroides spp((Livengood , 2009). Although BV is often asymptomatic, it still is, along with vulvovaginal candidiasis, the most common cause of vaginitis, and hence among the commonest reasons for women to seek medical help (Taj *et al.,* 2012). The prevalence of BV varies widely among populations, with estimates ranging from 5 – 55 % of women (Sherrard *et al.,* 2011). Although bacterial vaginosis is not considered a STD,

but has been associated with increase susceptibility to some other STD as a sexually related disease (Oyewole *et al.,* 2010) in which the frequency of intercourse plays a critical role. Other risk factors include low socioeconomic status, douching, antibiotic treatment for another condition, young age of coitarche, acquisition of a new sex partner and a recent history of multiple sex partners (Fethers *et al.,* 2008 and Verstraelen *et al.,* 2010). Other factors known to increase the risk of BV include sexual activities, vaginal hygiene practices, HIV infection, marital status, black race and sexually transmitted infections including Herpes simplex type 2 (Bukusi *et al.,* 2006; Hassan *et al.,* 2007; Fethers *et al.,* 2012; Chepes *et al.,* 2008; Haggerty *et al.,* 2009). Approximately 50-75% of women with BV show no symptoms (Schwebke and Desmond 2007). Those with symptoms often note an unpleasant "fishy" vaginal odour and a yellow or off-white vaginal discharge that is more noticeable after sexual intercourse (Hedges *et al.,* 2006). Bacterial vaginosis usually does not cause significant irritation of the vulva. If undiagnosed or untreated, it might interfere with the woman reproductive health, being commonly associated with infertility, obstetric conditions such as pelvic inflammatory disease (PID), and premature rupture of membranes (PROM) (Syed *et al.,* 2004).

Marrazzo *et al.,* (2012) and Verstraelen *et al.,* (2010) reported that the aetiology of bacterial vaginosis has been under debate. It is uncertain whether bacterial vaginosis should be classifed as a sexually transmitted condition or is an example of abnormal microbial colonisation. Until this is resolved preventive action against bacterial vaginosis is difficult to initiate. The public health importance of bacterial vaginosis remains ambiguous, as it is uncertain whether bacterial vaginosis is the cause of substantial reproductive morbidity, particularly preterm birth and upper genital tract infection, or is simply an offensive vaginal discharge. Early recognition of vaginal infections, initiating appropriate treatment and taking necessary precautions are essential in protecting and improving women's health. Genital hygiene has a key role in preventing genital infections (Sahin *et al.,* 2013).

Nurses play a critical part in identifying vaginal discharges-an important finding that may assist in preventing situations which lead to gynecologic infections-as well as in ensuring that the patients comply with the recommended analyses and treatments and in finding out wrong hygiene habits and determining the correct practices. As part of their educative and counseling positions, nurses carry responsibilities regarding reproductive health of the youth within the scope of preventive medicine. They are the healthcare professionals who can undertake the role of a health educator and mentor through proper approaches in identifying and resolving gynecologic problems, where such issues are considered strictly private. Within the context of reproductive health services, nurses are typically expected to have knowledge on the causes of vaginal discharge and other infections and on the methods of preventing and managing such conditions and teaching these to women. Education provided to women, particularly adolescents, by nurses and by trainers who have relevant experience and knowledge may ensure proper hygiene practices (Reid and Bruce, 2003). These study focus on the impact of intervention program on non pregnant women's knowledge and genital hygiene practices regarding bacterial vaginosis.

Aims of the study

The aim of this study was to evaluate the effect of intervention program on non pregnant women's knowledge and genital hygiene practices regarding bacterial vaginosis.

Research hypothesis

It was hypothesized that the intervention program will improve the knowledge and genital hygiene practices regarding bacterial vaginosis among non pregnant women.

MATERIAL AND METHODS

Study design and setting

A quasi-experimental design was used in the present study. The study was conducted in the Obstetric and Gynecological clinic in Zagazig University Hospital, Sharkia, Governorate, Egypt.

Study sample

The sample consisted of 80 non pregnant women who attended to Obstetric and Gynecological clinic and diagnosed as Bacterial vaginosis. Both clinically and microbiologically. The duration of data collection was one year starting from April 2015 to March 2016. The non pregnant women were selected according to the following criteria:-

Inclusion criteria

- Age 18-45 years
- Non pregnant women
- Women without other genital tract infection
- Positive culture with bacterial vaginitis.

Excluded criteria

- Women who were menstruating, or having vaginal bleeding
- pregnant women or using any vaginal suppository drug
- Women had received antibiotics in the past four weeks
- Women who immunocompromised, postmenopausal, posthysterctomy, or post pelvic radiotherapy

Tools of the study

The data collection tools for this study were composed of three tools; these included women assessment sheet as well as questionnaire sheet for women practices and performance as well as intervention program.

Tool I: (women assessment sheet): It was consisted of three parts:

First part: women assessment sheet it was included information about their socio-demographic characteristics (such as age, education, occupation, Marital status, family income, and residence)

Second part: was developed to assess of symptoms of bacterial vaginosis such as vaginal discharge, vaginal malodor, increase malodor after intercourse, Vaginal itching, Vaginal irritation, and dyspareunia.

Third part: past history sheet such as age of menarche, Menses within last 14 days, prior STD history, age of first sexual intercourse< 20 years, sexual intercourse ≤ 1 time/week, last sexual intercourse < 48 hours, current antibiotic use, current IUD use, and use of vaginal douching

Tool (2) questionnaire sheet for assessment of women` knowledge and practices it was consisted of two parts

First part: Interview questionnaire sheet for assessment women` knowledge throughout intervention program included 8 questions and divided to three maim parts:

- Definition of bacterial vaginosis, causes, risk factors, signs and symptoms of bacterial vaginosis, diagnosis of bacterial vaginosis
- complications of bacterial vaginosis
- Management and prevention of bacterial vaginosis.

Questions were scored as follows 1 marks for correct answer and 0 mark for wrong or no answer. Summation of all questions including knowledge (8 marks).

- The total score of each aspect equal 60% or more than → adequate or satisfactory knowledge and practice
- The total score of each aspect less than 60% → inadequate e or unsatisfactory knowledge and practice

Second Part was developed to assess of women practices and performance throughout intervention program included 20 questions and divided to three maim parts:

- Menstrual Hygiene (4 questions).
- Individual vaginal hygiene (13 questions).
- Coital hygiene (3 questions).

The scoring system for women practices and performance consisted of given two points for the done step, while zero for the step not done. The higher scores indicated a higher level of practices. Those score classified as:

- Unsatisfactory (< 60 %)
- Satisfactory (60 %)

Tool 3: Intervention program:

The intervention program applied in this study includes 10 sessions through 12 weeks:

The educational program consists of vaginitis definition, cause, risk factors, methods of detection and treatment, complications and the importance of controlling were presented for the women with vaginitis. After women diagnosed with bacterial vaginosis according to clinical manifestation and culture test. Give women intervention program which the curriculum includes a 45-minute individual training session. The women were also provided educational pamphlets. The site was the training class in Obstetric and Gynecological clinic in Zagazig University Hospital. 10 women after classes, post-test questionnaires was completed by the researcher for women. According to unwillingness of some women to participate in the post-test, finally 80 of them filled out the questionnaires completely.

The intervention program applied in this study includes 10 sessions through 12 weeks:

- Knowledge about definition, causes, risk factors of bacterial vaginosis. 1-2 week
- Signs and symptoms of bacterial vaginosis, diagnosis of bacterial vaginosis. 3-4 week
- Complications of bacterial vaginosis. 5-6 week
- Management and route of medication. 7-8 week
- Prevention of bacterial vaginosis. 9-10 week
- Menstrual Hygiene.
- Individual vaginal hygiene.
- Coital hygiene.
- Revisions last 2 weeks

Method of data collection

- An official permission for conducting the study was obtained from administrative and responsible personnel after explaining the aim and nature of the study and submission of a formal letter from the Faculty of Nursing.
- Development of tool I and II after reviewing recent relevant literatures.
- Validity of tools were established for content validity by a panel of five expertise
- in this field who revised for clarity, relevance, applicability, comprehensiveness, and ease for implementation and according to their opinions, minor modifications were done accordingly.
- Meeting and discussion held between the researcher and non pregnant women to make them aware about aims and objectives of the research, as well as, to get better cooperation during the implementation phase of the research.
- An oral informed consent was taken from all the women prior to examination. All women were submitted to the following: Full history taking, General examination Obstetric examination and taking vaginal swab for bacterial vaginosis.
- After consent from all participants. Each participant was instructed to assume a lithotomy position. Then, pelvic examination was conducted for each participant. An unlubricated speculum was inserted into the vagina and vaginal secretion was evaluated for the appearance.
- High vaginal swabs (HVS) were collected from one hundred of non pregnant women with abnormal vaginal discharge within the age range of 18 to 45 years after informed consent.
- The samples were properly labeled and moved to the Research and Teaching Laboratory of the Department of Obstetrics, Gynecology, and Perinatology, Zagazig University, Ile-Ife, Nigeria after collection. Using a pH paper in the range of 4.0 to 6.5 and 10% potassium hydroxide (KOH), the pH and fishy odour of the vaginal samples were determined respectively
- Samples of vaginal secretion were obtained with two dry cotton-tipped swabs from the vaginal fornices. Vaginal pH was measured directly from one of the swabs, using an indicator paper (Merck, Germany: range 4.0-6.0), then this swab was mixed into two drops of 10% potassium hydroxide on a glass slide and tested for the fishy amine-like odor.

- Another swab was mixed into two drops of normal saline solution in a test tube, which was subsequently examined for the presence of clue cells and other vaginal infections such as trichomoniasis and candidiasis. A third swab was inserted into the endocervical canal to obtain cervical secretion,
- Then smeared on a glass slide for gram stains and examined microscopically for polymorphonuclear cells and intracellular gram-negative diplococci, characterized of Neisseria gonorrhoeae.
- Criteria for diagnosing BV: Nugent method was used to diagnose BV. A Nugent Score (NS) of 7-10 is classified as BV; 4-6 as intermediate flora and 0-3 as normal (Nugent *et al.,* 1991). The clinical criteria reported by (Amsel *et al.,* 1983) for diagnosing bacterial vaginosis were also evaluated: 1) Thin, homogeneous appearing vaginal discharge, 2) vaginal pH of greater than 4.5, 3) release of a fishy amine odor on addition of 10% potassium hydroxide or positive whiff test, and 4) presence of vaginal epithelium cells heavily coated with small bacilli (clue cells) on a saline wet mount. The presence of any three of the four Amsel criteria confirms BV.
- A pre-designed, pre-tested, structured questionnaire was administered to the women when to study their existing level of knowledge and practices regarding bacterial vaginosis when women taken treatment of bacterial vaginosis. The questionnaire included topics concerning vaginitis, management and complications of bacterial vaginosis, and women performance about menstrual, vaginal, and coital hygiene.
- After collection of the questionnaire, health education regarding "bacterial vaginosis" was imparted to the women through lectures with the help of audio-visual aids. This was followed by question-answer session to clarify their doubts. the total sample was classified into 8 groups each group ranged from 10 women, and each group obtained 2 sessions through 10 weeks, each session ranged from 45-60 minutes, first session include, pretest and information about bacterial vaginosis After three months, the same questionnaire was again administered to the women (post-test) to assess the impact of health education.
- The anonymity, privacy and confidentiality of women, voluntary participation and right to withdraw from the study at any time were emphasized.

Statistical analysis

Up on completion of data collection each sheet was manually scored. The back ground data sheet was coded and listed into numbers for calculation. Data were checked, entered and analyzed by using SPSS (version 14) soft ware computer packed (special package for social science). Data were express as number and percentage for categorical variables, range and mean ± stander deviation for continuous variables. Student t-test, Chi square (X2), Mann-Whitney test, Fisher test are used for comparison between quantitative and qualitative variables at P-value= <0.05 was considered statistically significant. Table (1) showed that the mean age of the women was 28.28+6.65years. Concerning women' level of education, it was noticed that more than half of women (58.7%) had primary and secondary education. According to Occupation, it was revealed that the two third of women (66.3%) had housewife. On the other hand, (95%) of them were currently

married. While (56.3%) of women hadn't enough income. Finally, according to residence, about (63.7%) of women come from rural area.

Table 1. Distribution of study sample according to their socio-demographic characteristics

variables	No	%
Age		
18-24	29	36.3
25-34	35	43.3
35-45	16	20.0
Mean± SD	28.28+6.65	
Education		
Illiterate	16	20.0
Primary/preparatory	20	25.0
Secondary	27	33.7
University	17	21.3
Occupation		
Working	27	33.7
Housewife	53	66.3
Marital status		
Single	1	1.3
Currently Married	76	95.0
Divorced/separated/widowed	3	3.7
Family income		
Not enough	45	56.3
Enough	27	33.7
Enough and more	8	10.0
Residence		
Rural	51	63.7
urban	29	36.3

Table 2. Distribution of study sample according to their symptoms

variables	No	%
Symptoms		
No symptom	38	47.5
Increased discharge	35	43.3
Vaginal malodor	21	26.3
Increase malodor after intercourse	13	16.3
Vaginal itching	19	23.7
Vaginal irritation	6	7.5
Vaginal dyspareunia	11	13.7

Table 3. Distribution of study sample according to their history

variables	No	%
Age of menarche		
9-12	23	28.7
13-15	37	46.3
16-17	13	16.3
18-19	7	8.7
Menses within last 14 days	29	36.3
Prior STD history	1	1.3
age at first sexual intercourse < 20 years	54	67.5
> 2 Lifetime partners	13	16.3
> 2 partners in past 3 months	1	1.3
Sexual intercourse ≤ 1 time/week	31	38.7
Last sexual intercourse < 48 hours	16	20.0
Current antibiotic use	5	6.3
Current IUD use	43	53.7
Use of vaginal douching	23	28.7
Frequency > 1 time/week	17	21.3
-Douching inside vagina	9	11.3
-Recent use (< 48 hours)	11	13.7

The symptoms regarding bacterial vaginosis was shown in Table (2). Nearly half (47.5%) women reported that no symptoms, while, (43.3%) women complain of increased vaginal discharge, followed by vaginal malodor (26.3%), vaginal itching (23.7%), increase malodor after intercourse (16.3%), vaginal irritation (7.5%), and vaginal dyspareunia (13.7%).

Table 4. women's correct knowledge about definition, causes, risk factors, and signs and symptoms of bacterial vaginosis

Items	Pre (n=80)		Post (n=80)		Mc –Nemar test	p-value
	No	%	No	%		
The definition of bacterial vaginosis						
• natural balance of organisms in the vagina is changed ◉	5	6.3	48	60.0		
• no change in vagina	11	13.7	14	17.5		
• change in perinum	19	23.7	7	8.8	6.866	0.0001***
• I don't know	45	56.3	11	13.7		
The causes of bacterial vaginosis						
• Bacteria ◉	28	35.0	55	68.7		
• Virus	14	17.5	11	13.7		
• Parasitic	21	26.3	9	11.3	13.629	0.002**
• I don't know	17	21.2	5	6.3		
risk factors of bacterial vaginosis ◉ ◙						
• parity, contraception	26	32.5	35	43.7		
• antibiotics, douching	26	32.5	35	43.7		
• diabetes	26	32.5	35	43.7		
• Incomplete answer	18	22.5	28	35.0	9.309	
• I don't know	36	45.0	17	21.3		0.003**
signs and symptoms of bacterial vaginosis ◉ ◙						
• Thick, curdled whitish-yellow discharge	45	56.2	75	93.7		
• Odor, Itching, Burning	45	56.2	75	93.7		
• Pain or irritation with intercourse or urination	45	56.2	75	93.7		
• Incomplete answer	26	32.5	5	6.3	23.439	<0.0001***
• I don't know	9	11.3	0	0.0		
Overall score M ± SD	4.267±3.55		7.07±2.45		Paired t 4.762	0.000**

◙ More than one answer ◉ correct answer * statistically significant, ** highly statistically significant, *** extremely statistically significant

Table 5. women's correct knowledge about diagnosis, Complications, management, and prevention of bacterial vaginosis

Items	Pre (n=80)		Post (n=80)		Mc – Nemar test	p-value
	No	%	No	%		
Clinical diagnosis of bacterial vaginosis ◉ ◙						
• Check the color of the vaginal secretions	34	42.5	68	85.0		
• Check the Itching	34	42.5	68	85.0	14.729	
• Check the an unpleasant smell	34	42.5	68	85.0		
• Incomplete answer	27	33.8	0	0.0		<0.0001***
• I don't know	19	23.7	12	15.0		
complications of bacterial vaginosis ◉ ◙						
• increased risk of pelvic inflammatory disease	21	26.3	69	86.3		
• infertility, pelvic pain, and ectopic	21	26.3	69	86.3	11.341	
• sexually transmitted diseases	21	26.3	69	86.3		
• Incomplete answer	32	40.0	8	10.0		0.0021**
• I don't know	27	33.7	3	3.7		
Management of bacterial vaginosis ◉						
• antibacterial medications (Metronidazole)	24	30.0	66	82.5		
• anti virus	22	27.5	10	12.5	14.941	
• anti Parasitic	18	22.5	1	1.3		<0.000***
• I don't know	16	20.0	3	3.7		
Route of medication ◉						
• Both oral (tablets) and intravaginal (gels or creams)	28	35.0	60	75.0		
• Oral and injection	17	21.3	17	21.3	15.444	
• Intravaginal and Injection	21	26.3	3	3.7		0.0013**
• I don't know	14	17.5	0	0.0		
prevention of bacterial vaginosis ◉ ◙						
• Avoid douching, Wipe from front to back	22	27.5	54	67.5		
• Avoid perfumed soaps and feminine hygiene sprays	22	27.5	54	67.5	9.379	
• Avoid tight, hot clothing	22	27.5	54	67.5		
• Incomplete answer	23	28.7	12	15.0		<0.0001***
• I don't know	35	43.7	14	17.5		
Overall score M ± SD	28.74 ±17.41		44.84±13.32		Paired t 4.425	0.000**

◙ More than one answer ◉ correct answer * statistically significant, ** highly statistically significant, *** extremely statistically significant

Tables (3) reveal the distribution of studied women according to their history, regarding the age of menarche, nearly half (46.3%) of women reported that they had their menarche from 13 to 15 years while the remaining 8.7% had their menstruation after their 18th birthday. As the reaction to the menstruation within last 14 days, more than one third of the women (36.3%) had menses within last 14 days, bout 1.3% had Prior STD history. Also 67.5% of women had their age at first sexual intercourse < 20 years. Also 38.7% of women had Sexual intercourse ≤ 1 time/week. Concerning Last sexual intercourse, only 20% of women had Last sexual intercourse < 48 hours. While 6.3% current used of antibiotic. More than half of women (53.7%) reported current IUD used. according to use of vaginal douching, 21.3% women had douching > 1 time/week , 11.3% used douching inside vagina, and 13.7% had recent use < 48 hours. Table (4) Describes the correct knowledge of women about definition, causes, risk factors, and signs and symptoms of bacterial vaginosis. The percentage of women able to correctly define bacterial vaginosis as natural balance of organisms in the vagina is changed jumped from 6.3% to 60% after the intervention program. This 10-folds increase was extremely statistically significant (p=0.0001). When asked to give the causes of bacterial vaginosis, only 35.0% of the women gave a correct answer, while 21.2% didn't know. After the intervention program, 43.7% could choose a correct answer, while the percentage of those who didn't know decreased to 3.7%. This difference was highly statistically significant (p=0.002). Knowledge about the risk factors of bacterial vaginosis improved from 32.5% to 43.7% after the intervention program and this increase was highly statistically significant (p=0.003). On the other hand, only 66.7% of the women correctly identified the signs and symptoms of bacterial vaginosis ,this percentage rose to 93.7% after the intervention program with statistically significant difference (p=0.0001). Finally, the mean and SD of the overall percentage of adequate knowledge related to bacterial vaginosis improved from 4.267±3.55 to 7.07±2.45, with a highly significant difference (p=0.000).

Table (5) describes the women's' knowledge about diagnosis, Complications, management, and prevention of bacterial vaginosis before and after the intervention program. The knowledge of women about the diagnosis of bacterial vaginosis improved from 56.2% to 93.7% after the intervention program with highly statistically significant. The percentage of women who will able to define new-onset of complications of bacterial vaginosis increased from 26.3% to 28.7%, this difference was statistically significant (p=0.0021). In addition, the percentage of women knowing the correct Management of bacterial vaginosis rose from 30% to 47.5%, after intervention program while the percentage of those who didn't know decreased from 20% to 6.2%, with a significant difference (p =0.000). On the other hand, 35% recognized the correct knowledge about Route of medication while 17.5% didn't know. These percentages changed to 46.3% and 3.7% respectively after the intervention program. Regarding the knowledge of women about the prevention of bacterial vaginosis improved from 27.5% to 67.5% after the intervention program with highly statistically significant. Finally, the overall mean increase in adequate knowledge improved from 28.74 ±17.41 to 44.84±13.32 after the intervention program, with an extremely statistically significant difference (p=0.000). Table (6) describes the improvement in the percentages of correct practices related to menstrual hygiene throughout the intervention program. The practice of bathing during menstruation period improved from 68.7 % to 78.7 % after the intervention program, with an extremely statistically significant difference (p<0.0001). Moreover, The practice of women related to never genital douching during menstruation period improved from 31.3% to 46.3%. The practice of using sanitary pad and pad change after each urination improved from 56.3% to 76.3% and from 46.3to 57.5 % respectively, with a significance difference (p= 0.026, 0.0001 respectively). Moreover, the practice of sexual abstinence during menstruation period improved from 81.3 to 90% after the intervention program, with a significant difference (p=0.001).

Table 6. Women's practice about menstrual hygiene throughout intervention program

Menstrual Hygiene criteria	Pre (n=80)		Post (n=80)		X2	P-value
	NO	%	NO	%		
1-Bathing during menstruation period						
Always	55	68.7	63	78.7		
Sometime	17	33.7	14	17.5	28.907	<0.001**
never	8	10.0	3	3.7		
2-Genital douching during menstruation period						
Always	34	42.5	37	46.3		
Sometime	21	26.3	26	32.5	12.506	0.026*
never	25	31.3	17	21.3		
3-Using sanitary pad						
Always	45	56.3	61	76.3		
Sometime	22	27.5	12	15.0	19.339	<0.0001***
never	13	16.3	7	8.7		
4-Pad change after each urination						
Always	37	46.3	46	57.5	12.104	
Sometime	16	20.0	21	26.3		0.0002***
never	27	33.3	13	16.3		
5-Sexual abstinence during menstruation period						
Always	65	81.3	72	90.0		
Sometime	15	18.7	8	10.0	49.102	<0.001**
never	0	0.0	0	0.0		
Mean ± S.D	1.03±1.51		1.76±2.02		Paired t 4.638	0.0001***
Total score	3.90±2.41		5.40±1.19		4.692	0.000**

◉ More than one answer ● correct answer * statistically significant, ** highly statistically significant, *** extremely statistically significant

Table 7. Women's practice about individual hygiene throughout intervention program

Individual vaginal hygiene criteria	Pre (n=80)		Post (n=80)		X2	P-value
	NO	%	NO	%		
1-Regular underwear changing						
Always	17	21.3	35	72.5		
Sometime	31	38.7	24	43.7	9.973	0.0031**
never	32	40.0	21	26.3		
2-Underwear washing with hot water						
Always	19	23.7	36	45.0		
Sometime	16	20.0	24	30.0	7.396	0.0021**
never	45	56.3	20	25.0		
3-sunlight drying of underwear						
Always	30	37.5	43	53.7	18.324	<0.000***
Sometime	38	47.5	28	35.0		
never	12	15.0	9	11.3		
4- use of loss underwear						
Always	27	33.7	34	42.5	17.459	<0.0001***
Sometime	40	50.0	25	31.2		
never	13	16.3	21	26.3		
5-Ironing underwear before use						
Always	17	21.3	39	48.7		
Sometime	11	13.7	19	23.7	6.220	<0.0001***
never	52	65.0	22	27.5		
6-driness of underwear during day						
Always	17	21.3	23	28.8		
Sometime	42	52.5	38	47.5	13.382	<0.0001***
never	21	26.3	19	23.7		
7-front to back douching and cleaning of genital area						
Always	55	68.7	67	83.7		
Sometime	20	25.0	11	13.7	34.095	<0.000***
never	5	6.3	2	2.5		
8-drying of genital area after douching						
Always	36	45.0	61	76.3		
Sometime	34	42.5	15	18.7	20.583	<0.0001***
never	10	12.5	4	5.0		
9-use of privet bathroom						
Always	54	67.5	66	82.5		
Sometime	26	32.5	14	17.5	33.278	<0.000***
never	0	0.0	0	0.0		
10-use of personal bathing equipment						
Always	35	43.7	72	90.0		
Sometime	43	53.8	8	10.0	25.207	<0.000***
never	2	2.5	0	0.0		
11-sanitation of bathroom before use						
Always	32	40.0	60	75.0		
Sometime	36	45.0	11	13.7	18.487	<0.0001***
never	12	15.0	9	11.3		
12-bathing in standing position						
Always	46	57.5	51	63.7		
Sometime	21	26.3	17	21.3	19.704	0.0105*
never	13	16.2	12	15.0		
13-sun drying of bathing equipment						
Always	39	48.7	48	60.0		
Sometime	23	28.8	18	22.5	15.638	0.0013**
never	18	22.5	14	17.5		
Mean ±SD	2.87±1.28		3.87±0.43		Paired t 0.500	0.000**
Total mean score	5.93±3.60		8.83±2.25		2.250	0.000**

◉ More than one answer ● correct answer * statistically significant, ** highly statistically significant, *** extremely statistically significant

Table 8. Women's practice about Coital hygiene throughout intervention program

Coital hygiene criteria	Pre (n=80)		Post (n=80)		X2	P-value
	NO	%	NO	%		
1-Genital douching before intercourse						
Always	31	38.7	23	28.7	13.705	
Sometime	28	35.0	39	48.8		0.0002*
never	21	26.3	18	22.5		
2-Urination after intercourse						
Always	48	60.0	53	66.3	20.103	<0.0001***
Sometime	19	23.7	17	21.2		
never	13	16.3	10	12.5		
3-Frequency of intercourse(less than 7 times a week)						
Always	58	72.5	62	77.5	33.489	
Sometime	15	18.8	12	15.0		0.0171*
never	7	8.7	6	7.5		
Mean ±SD	2.13±1.53		3.43±1.07		Paired t 7.208	0.000**
Total score	1.40±1.45		5.87±3.58		9.622	0.000**

◉ More than one answer ● correct answer * statistically significant, ** highly statistically significant, *** extremely statistically significant

The overall mean increase in adequate practice improved from 1.03±1.51 to 1.76±2.02 after the intervention program, with a significant difference (p=0.0001). The overall mean increase in adequate practice improved from 3.90±2.41to 5.40±1.19 after the intervention program, with a highly significant difference (p=0.000). Table (7) describes the improvement in the percentages of correct practices related to individual hygiene throughout intervention program. The practice of Regular underwear changing improved from 21.3% to 72.5% after the intervention program, with an extremely statistically significant difference (p<0.0001). Moreover, The practice of women related to sunlight drying of underwear and Ironing underwear before use improved from37.5% to 53.7% and from 21.3% to 48.7% respectively, , with a significance difference (p= <0.000, <0.0001respectively). The practice of cleaning of genital area from front to back douching, and drying of genital area after douching improved from 68.7% to 83.7% and 45.0% to 76.3% respectively, , with a significance difference (p= <0.000, <0.0001respectively). Moreover, the practice of bathing in standing position improved from 57.5% to 63.7% after the intervention program, with a significant difference (p=0.0105). The overall mean increase in adequate practice improved from 5.93±3.60 to 8.83±2.25 after the intervention program, with a highly significant difference (p=0.000). Table (8) describes the improvement in the percentages of correct practices related to genital douching before intercourse, before and after the intervention program. The proper practice of urination after intercourse, Frequency of intercourse(less than 7 times a week) improved from 60.0 to 66.3% and 77.2% to 77.5% respectively, with a significant difference of p=0.0002, 0.0001 and 0.0171 respectively). The overall mean increase in adequate practices improved from 1.40±1.45 to 5.87±3.58 after the intervention program, with an extremely significant difference (p=0.000).

DISCUSSION

Bacterial vaginosis is a common clinical condition in women of reproductive age. It represents a unique and complex change in the flora of the vagina, which is characterized by a reduction in the prevalence and the numbers of lactobacilli and an increase in the concentration of Gardnerella vaginalis and resident anaerobic bacteria (Li *et al.,* 2010). The vaginal infections are an important women's health problem associated with negative impacts on sexual and family lives and has a tendency of increasing prevalence worldwide. They are currently among the foremost causes that lead women to seek medical attention at obstetrics and gynecology polyclinics Workowski and Berman (2010). Therefore, the aim of this study was to evaluate the effect of intervention program on non pregnant women's knowledge and genital hygiene practices regarding bacterial vaginosis. The present study revealed that the mean age of women was 28.28+6.65years, and nearly half of women were within the age group of 26-35 Yrs. Concerning the level of education and job status the present study revealed that more than half of women have primary and secondary education and the two third of women had housewife. On the other hand, the majority of them were currently married. Similar study conducted by Thulkar, *et al.,* (2010) who reported that vaginal infections commonly occur in women of reproductive age i.e between 25-30 years. Also Akhter *et al.,* (2010), who observed that the majority of the women were within the age group of 26-35 Yrs (45.5 %) followed by 15 to 25 Yrs (41 %). These results were supported by Hemalatha *et al.,* (2013) reported that the mean age (in years) and body mass

index (BMI in kg/m2) of the subjects were 28.8 and 22.2, respectively. A proportion of 33.3 percent women was illiterate and 17.8 percent had primary education. Illiterate women and women with only primary education had parity more than two compared to women with higher education (P<0.05). On the same line Bhalla *et al.,* (2007) highlighted that the majority of the women in this investigation were >30 yr of age (143, 63.3%), were married (226, 95.3%), and were not working (208, 87.7%). Most of them were illiterate (131, 55.2%), and non smokers (198, 93%).

The findings of the present study showed that more than half of women have not enough income and more than two third of women come from rural area. The present results agreed with, Bhalla *et al.,* (2007) reported that the total of 260 women invited to participate, 237 (91.1%) were enrolled for the study. Of these, 122 (51.4%) belonged to urban slum, while 60 (25.3%) and 55 (23.25%) subjects belonged to urban middle class and rural communities, respectively. In the same line with the current results Sahin *et al.,* (2013) confirmed that genital infections were significantly less common among the women whose families had good levels of income (p<0.05). Moreover, Bhalla *et al.,* (2007) found that women with good monthly income had higher mean scores from the genital hygiene. This also was asserted by Dan *et al.,* (2002) who stressed that more common vaginal infections among women with poorer socioeconomic status. Better income makes it easier to meet hygiene requirements and helps women to conveniently utilize healthcare institutions should they experience any problems with their health.

The current study revealed that the symptoms regarding bacterial vaginosis. Nearly half of women reported that no symptoms, while, (43.3%) women complain of increased vaginal discharge, followed by vaginal malodor (26.3%), vaginal itching (23.7%), increase malodor after intercourse (16.3%), vaginal irritation (7.5%), and vaginal dyspareunia (13.7%). Result was similar to Allsworth and Peipert (2007) who suggests that the more than half of all BV cases feature a chief complaint of vaginal discharge. These results were supported by Hemalatha *et al.,* (2013) shown that the vaginal discharge was the symptom in 84.8 percent of the subjects with BV and 85.3 percent with no BV. Foul smell was the symptom in 43.5 percent of the subjects with BV. Women with BV were more likely to have foul smell as symptom (P<0.002) compared to normal subjects. On the same line Wiset *et al.,* (2004) who emphasized that the most common complaint of either groups was increased vaginal discharge, whereas vaginal malodor and increase malodor after intercourse were significantly associated with bacterial vaginosis. Moreover, as previous studies by RCOG, (2001) reported that the correspondingly, only 27.4% and 19.7% of women diagnosed as having BV, presented with these symptoms, respectively. Women with BV might report any vaginal symptoms and nearly up to 50% of those were asymptomatic. Therefore, the authors suggest that women considered to be at high risk of having BV should be targeted, either asymptomatic or atypical presentations.

In the present study, nearly half of women reported that they had their menarche from 13to 15 years while the remaining 8.7% had their menstruation after their 18th birthday. As the reaction to the menstruation within last 14 days, more than one third of the women had menses within last 14 days, bout 1.3% had Prior STD history. Also 67.5% of women had their age at first sexual intercourse < 20 years. Also 38.7% of women had

Sexual intercourse ≤ 1 time/week. Concerning Last sexual intercourse, only 20% of women had Last sexual intercourse < 48 hours. While 6.3% current used of antibiotic. More than half of women reported current IUD used. According to use of vaginal douching, 21.3% women had douching > 1 time/week, 11.3% used douching inside vagina, and 13.7% had recent use < 48 hours. The present results agreed with Wiset *et al.,* (2004) who noticed that 0.9% reported a prior history of sexually transmitted diseases and 0.6% had had more than 2 sexual partners in the past 3 months. Nearly 90% had only a single sexual partner through their lifetime and about 60% reported having 1 or less sexual intercourse per week. Another study conducted by Verstraelen *et al.,* (2010) who reported that BV may be considered a sexually enhanced disease, with frequency of intercourse being a critical factor. This goes in line with Madhivanan *et al.,* (2008) who clarified that no significant association was demonstrated between bacterial vaginosis and days since last menstrual period, days since last sexual intercourse and prior history of sexual transmitted diseases. Although not statistically significant, bacterial vaginosis tended to be more prevalent among women with a lower age at first intercourse, higher numbers of lifetime partners, higher frequency of sexual intercourse, current smokers, and less prevalence among women with current antibiotic use. However, bacterial vaginosis was significantly more prevalent among women who used douching inside the vagina than those who never douched [OR = 3.98 (95% CI 1.85-8.33), p < 0.01], and significantly more prevalent among women using IUD than non-IUD users [OR = 1.84 (95%CI 1.22-2.79), p<0.01]. There was no significant association between BV and IUD use. Moreover , Joesoef *et al.,* (2001) who emphasized that an increase risk of BV in IUD users, with the explanation that IUD might change the vaginal flora in favor of the growth of bacteria associated with BV and should be screened prior to IUD insertion. Also Gallo *et al.,* (2011) who observed that 94% of the BV positive cases were using vaginal douches which confirms that vaginal douches represent a risk factor of BV acquisition. Previous observational studies by Mangot-Bertrand *et al.,* (2013) suggested a strong association between vaginal douching and bacterial vaginosis. Moreover, Pourmarzi *et al.,* (2014) demonstrated that douching at least once per month, recent douching within 7 days and douching for symptoms or hygiene was associated with BV.

As regards the correct knowledge of women about definition, causes, risk factors, and signs and symptoms of bacterial vaginosis before and after the intervention program. The overall percentage of adequate knowledge related to bacterial vaginosis improved after the intervention program with a highly significant difference. This goes in line with Majlesi *et al.,* (2005) who clarified that the effect of health education on knowledge, attitude and performance of women of reproductive age with fungal vaginitis demonstrated that the education has an increasing effect on knowledge. Since the purpose of this study was at a low level in terms of education and social status and it was hard for them to gather and present, training was conducted individually in the clinic and this caused increasing in women level of knowledge. This disagreement with Soudabeh *et al.,* (2015) who mentioned that the knowledge scores between the intervention and control groups compared to each other toward vaginitis had no significant difference before and after training and after intervention, the scores of intervention group became more than control group and the difference became significant. Also Bahram *et al.,* (2009) who addressed that a significant

correlation between BV and educational status, which in comparison to other similar studies, it was evident that the lack of education has been found to be significantly associated. According to findings of the current study the improvement in the percentages of correct practices related to menstrual hygiene, Individual vaginal hygiene and coital hygiene after the intervention program. Also The overall mean increase in adequate practice improved after the intervention program, with a highly significant difference. This result coincided with Guaschino and Benvenuti, (2008) who stressed that the menstrual, personal and coital hygiene were the hygiene-related variables. There was a significant correlation between individual and menstrual hygiene and prevalence of BV, whereas other findings showed no significant correlation in this regard. Similar study conducted by Bahram *et al.,* (2009) who showed a significant correlation between BV menstrual status and individual vaginal hygiene (P<0.01 and P<0.001 respectively). In contrast, no significant correlation was observed between BV and coital hygiene. On the same line Soudabeh *et al.,* (2015) found that after education, it was the performance showed a significant increase compared to its previous status in intervention group, while in control group, this difference was not statistically significant. Moreover Amini *et al.,* (2013) who evaluated the impact of health education in the first and second level of prevention of infection by vaginal herpes and showed significant increase after the intervention compared to its previous status in relation to health care by women. Also Adhikari et al. (2007) reported that girls did not perform adequate menstrual hygiene. Poor menstrual hygiene practices present a risk factor for genital tract infections as well as urinary tract infections, and health education on this topic is of great significance. The overall percentages of correct practices related to genital douching before intercourse, low before the intervention program and increase after the intervention program. The proper practice of urination after intercourse, Frequency of intercourse (less than 7 times a week) improved with a significant difference. The overall mean increase in adequate practices improved after the intervention program, with an extremely significant difference. This agreement with Pourmarzi *et al.,* (2014) who addressed that vaginal douching that has been shown by other studies as an independent risk factor of BV, depends on several factors such as frequency of douching, recentness, reasons for douching, preparations of solutions and douching patterns (vulva or inside the vagina.

Conclusion

Based on the results of this study, it suggests that educational strategies need to be put in place to support women from different cultures to understand genital infection as a serious condition. The present study had revealed low level of knowledge and practice of non pregnant women regarding bacterial vaginosis. The intervention program that was given induced positive behavioral changes in individual, menstrual and coital hygiene habits. Reflected by statistical significant difference in level of practice among non pregnant women between pre and post the intervention program. Statistical significant difference in level of women' knowledge throughout intervention program.

Recommendations

- Current health education throughout mass media for teaching healthy life style for bacterial vaginosis, and

potential for reducing bacterial vaginosis complications and improving the quality of life of non pregnant women with the disease.

- Replication of the current study on a long probability sample is recommended to achieve generalization and wider utilization of the designed program.
- Establishing a training programs are required on genital hygiene, which is a crucial aspect of women's health. More comprehensive studies are needed to reveal any relationships between genital hygiene and genital infections.
- Further researches are needed to assess long term effects of such program.

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