Effect of Health Education Program on Knowledge, Genital Hygiene Behaviors and Marital Quality of Life among Pregnant Adolescents with Bacterial Vaginosis

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Abstract

Background: Bacterial vaginosis (BV) is the most frequent vaginal infection affecting women of reproductive age (15-41 years) worldwide. It is associated with significant adverse healthcare outcomes, especially during pregnancy. **Aim:** of this study was to evaluate effect of health education program on knowledge, genital hygiene behaviors and marital quality of life among adolescent pregnant women with bacterial vaginosis. **Design:** A quasi-experimental pretest and post-test one-groups (pre/posttest) design was used. **Setting:** The study was conducted at the Obstetrics and Gynecology Outpatient Clinic at Fayoum University Hospital. **Sample:** A purposive sample of (70) pregnant adolescents and taken from the above-mentioned setting. **Three tools** of data collection were used**;** 1) Pre structured self-administrated questionnaire. It includes socio-demographic data, Obstetrics data, History of vaginal infection and knowledge assessment.2) Genital hygiene behaviors inventory (GHBI):to assess genital hygiene behavior.3) Marital Quality of life Scale (MQLS): to assess quality of marital life. **Results:** Less than three quarters of pregnant adolescents had deficit in essential knowledge regarding bacterial vaginosis, more than quarter had unsatisfactory genital hygiene behaviors and more than one fifth had poor marital quality in the pretest. Meanwhile, there were a significant positive correlation between the total score of genital hygiene behaviors and total score of knowledge as well as, total score of marital quality ($P<0.001$). **Conclusions:** Applying the health education program has a significant effect on improving knowledge, genital hygiene behavior, and marital quality regarding bacterial vaginosis. **Recommendation:** Implementing screening for all pregnant women during antenatal follow-up for bacterial vaginosis for early detection and to prevent adverse outcomes for mothers and the fetus.

Keywords: Pregnant adolescents, Genital hygiene behaviors, Marital quality of life, Health education program, Bacterial vaginosis.

Introduction:

Bacterial vaginosis (BV) is a common cause of abnormal vaginal discharge that happens when there is too much of certain bacteria in the vagina. It is in women of childbearing and reproductive age and affects 10-30% of adolescent pregnant women globally **(CDC, 2022).** The vagina naturally contains "good" bacteria of the Lactobacillus species, which play a key role in maintaining balance and host defense against pathogens by producing several substances that inhibit the growth of deleterious microorganisms and a few "bad" bacteria called anaerobes. Normally, there's a careful balance between lactobacilli and anaerobes. When that balance is disrupted, however, anaerobes can increase in number and cause BV **(Jayaram et al., 2020).**

Lactobacillus species are thought to inhibit the growth of pathogenic bacteria by generating hydrogen peroxide and other antimicrobials and by maintaining a highly acidic environment (lower pH through lactic acid), which can disrupt bacterial cell membranes and stimulate host immunity **(Peebles et al., 2021).**

Symptoms of bacterial vaginosis include an abnormal vaginal discharge that has a strong fish smell, particularly after sex, a change to the color and consistency of discharge, such as becoming white or gray, thin and watery, burning during urination, and vaginal itching.

50% of women infected with bacterial vaginosis do not know the symptoms, and it's common to recur, usually within a few months **(Daher et al., 2022).** Estimated that 1 million pregnant adolescents get BV each year. During pregnancy, the baby is at increased risk for premature birth and low birthweight (CDC**, 2022).**

WHO (2020) defines adolescence as the period between the ages of 10 and 21 years. Pregnancy can occur with sexual intercourse after the start of ovulation. Pregnant adolescent women are defined as any pregnant woman between the age of 10–21 years. According to **Temmerman, 2017.** It's estimated that 21 million girls aged 15 to 21 years and 2 million girls younger than 15 years become pregnant every year. About 16 million of these girls give birth each year, mostly (90%) in low-income countries, and recurrent bacterial vaginosis is associated with a significant adverse effect on self-confidence, sexual relations, and quality of life.

Pregnant Adolescents are a complex issue that may be liable to health problems, including adverse outcomes during pregnancy and childbirth, as being underweight, which can cause serious health problems for the baby, including difficulty breathing and liability to infections. Addressing these problems requires a comprehensive approach that includes a sex education program, access to healthcare, and support of teenage mothers, which leads to improving the lives of young women and their families **(Salam et al ., 2016).**

According to **Daher et al. (2022)**: Understanding bacterial vaginosis and proper genital hygiene practices is crucial for the health of pregnant adolescents. A lack of knowledge and improper hygiene practices can lead to genital infections and a low quality of marital life, which are significant contributors to public health problems that most pregnant adolescents may experience at least once in their lives.

Epidemiological studies about bacterial vaginosis have been associated with a range of adverse gynecologic and obstetric outcomes, including early miscarriage and recurrent pregnancy loss, pregnancy loss before 22 weeks, pelvic inflammatory disease, post abortion sepsis, postpartum endometritis, preterm birth and low birth weight (**Cohen et al., 2020).** Bacterial vaginosis in early pregnancy (second trimester) conveys a greater risk for complications than infection with bacterial vaginosis in late pregnancy. Based on increased risk, in the second trimester, the treatment can eradicate bacterial vaginosis in pregnancy, but the overall risk of preterm birth (PTB) is not significantly reduced **(Faruqui, 2018).**

Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases. **"WHO, 2020**. Regular bathing, using breathable underwear, having safe sex, and maintaining good menstrual hygiene are all examples of good hygiene habits that can lower the risk of infections, diseases, and major problems while also enhancing the quality of a marriage. Maintaining proper genital and sexual hygiene has advantages beyond physical health. It's also excellent for mental and psychological well-being **(Umami et al., 2022).**

Marital quality of life refers to the married couple's subjective evaluation of their marriage relationship, and it is widely used to measure adequate communication, happiness, and a high degree of satisfaction. Many factors affect marital quality, e.g., age, length of marriage, and early marriage. With age, marital quality improves. Longer marital duration was associated with lower divorce rates. Early marriage without preparation or support often increases health risks and lowers relationship quality (**Nurhayati et al., (2019).**

Health education program is a formal form of interaction between nurses and pregnant adolescents to improve their health and prevent health problems, before they cause other complications and an adverse pregnancy outcome. Health guidelines are essential for pregnant adolescent women for the promotion of marital quality and sexual relations **(Violet et al., 2022).**

Nurses play a variety of roles in outpatient clinics. Nurses must communicate clearly and accurately with pregnant adolescents to explain symptom management and other measures to relieve and treat symptoms. The nurse also plays an educational role by teaching pregnant

adolescents how to prevent vaginosis. Health educational program provides evidence-based practices in hygiene and the use of probiotics to treat vaginosis **(Sousa et al., 2016).**

Significant of the study:

Pregnant adolescents increase the risk of developing bacterial vaginosis (BV) due to hormonal changes that occur during pregnancy, as well as the risk of premature birth and low birth weight for the baby. One million women in the world suffer from urogenital infections, such as urinary tract infection and bacterial vaginosis, and 75% of them have had previous experience with genital infections. The prevalence of bacterial vaginosis is 8%–75% **(Karadeniz et al.,2019).** In Egypt, according to **Kamel et al. (2019)** reported that of 400 women had abnormal vaginal discharge, 40.9% had vulvovaginal candidiasis, 10.2% had bacterial vaginosis, 6% had trichomonas vaginalis, 17.1% had an intermediate stage between the normal vaginal flora and bacterial vaginosis and 2.1% women were suffering from coinfection. But despite official statistics on vaginal infections, there is no research on their effect on pregnant adolescents. Moreover, In Egypt, **Abbas et al. (2016)** reported that among a sample of 3894 female patients from Upper Egypt, approximately 8.24% suffered from vaginal infections, of whom 75.2% suffered from bacterial vaginosis.

Aim of the Study

This study aimed to evaluate the effect of a health education program on knowledge, genital hygiene behaviors, and marital quality of life among pregnant adolescents with bacterial vaginosis. Through:

1- Assessing the knowledge of pregnant adolescents regarding bacterial vaginosis.
2- Assessing the genital hygiene behaviors of pregnant adolescents regarding bacterial vaginosis.
3- Assessing the marital quality of life of pregnant adolescents affected by bacterial vaginosis.
4- Developing and implementing the health education program for pregnant adolescents.
5- Evaluating the effect of health education program on the knowledge, genital hygiene behaviors, and marital quality of life among pregnant adolescents with bacterial vaginosis.

Hypothesis:-

1- Pregnant adolescent who will receive a health education program on bacterial vaginosis will improve their knowledge compared to before the implementation of the health education program.
2- The health education program will positively affect the pregnant adolescent's genital health behaviors and marital quality of life compared to before the implementation of the health education program.

Subjects and Methods

Research design: A quasi-experimental (one-group pre & post) design was utilized to achieve the aim of the study. A quasi-experimental design is used to evaluate the effects of an intervention or to establish a cause-and-effect relationship between independent(educational program) and dependent variables (knowledge, genital hygiene, and marital quality of life) **(Maciejewski, 2018).**

Setting: The current study was conducted at the Obstetrics and Gynecology Outpatient Clinic at Fayoum University Hospital. This location was chosen because it offers excellent free gynecology services to women. The clinic is also open on all days of the week, resulting in a high rate of female attendance. It also serves residents of Fayoum Governorate and neighboring governorates in the Lower Egypt region.

Sampling: Purposive sampling of 70 pregnant adolescents who visited outpatient's clinics and have met the inclusion criteria within seven months of the previous setting during the data collection period.

Inclusion criteria; Pregnant adolescents in the first and second trimester were taken while attending the antenatal clinic, The pregnant adolescents were diagnosed with bacterial vaginosis by obstetricians, and their age was 18 to 21 years old (late adolescent stage).

Exclusion Criteria: Pregnant adolescents disagree to participate in data collection.

Tools of the Study: Three tools were used in the present study.

Tool I: Pre structured self-administered questionnaire was designed by the researchers after reviewing the related literature and research studies **(Abbe & Mitchell, 2023)**; in simple Arabic language to collect the following data. It included four parts

Part (1): It included demographics data of pregnant adolescents as (age, education, occupation, income, type of family, and residence.

Part (2): Obstetrics data as (gestational age, gravity, and abortion).

Part (3): History of bacterial vaginosis infection (signs and symptoms of bacterial vaginosis, duration of infection, use medication and source of knowledge related BV).

Part (4): pregnant adolescents' knowledge (10 questions were close ended) (pre-posttest format) regarding bacterial vaginosis: It was developed by the researchers. To assess (definition, causes, risk factor, symptoms, bacterial vaginosis contagious, bacterial vaginosis a sexually transmitted disease, treatment by Probiotics food, the foods rich in probiotics, and complication for pregnant women and their fetus).

The scoring system: 10 questions were used to test pregnant adolescents about bacterial vaginosis with a total of 20 points, a correct complete answer was scored (2) and a correct incomplete answer was scored (1), while the wrong answer was given (0), according to the pregnant adolescents' answers, the total knowledge score was good (adequate) knowledge if the score was between 16 and 20 (representing>75%), average (moderate) knowledge if the score was between 10 and 15 (representing 50 -75%) and poor (inadequate) knowledge if the score was between 1 and 9 (representing <50%).

Tool II: Genital hygiene behaviors inventory (GHBI): It was adopted from **Ege and Eryılmaz (2006),** and translated by researcher to assess pregnant adolescents' self-care practices. It consists of 27 items. The inventory is single-dimensional and includes 24 positive and 3 negative items. Each item includes the alternative answer "never", "sometimes", "frequently", and "always". For the items with positive statements, the answer "never" receives "1" point, and the other answers "2", "3", and "4" points, respectively. For the items with negative statements (17,26 and 27) the classification was done in the reverse way. Scoring system: The GHBI total score ranges from 27 to 108 points. The pregnant adolescents' hygiene was considered satisfactory: if the percent score was ≥ 60%, while was considered unsatisfactory if the percent score was less than 60%. Higher scores mean better adoption of genital hygiene behaviors.

Tool III: Marital Quality Scale (MQS): The scale was developed by **Shah A., (1995),** which has 50 items, self-report scale which assesses marital quality of life. The scale had 28 positively worded items (1,4,8,9,10,11, 12,13,16,17,21,25,26,27,28,29,30,31,36,37, 38,39, 42, 43,46,47,48,49,50). Usually got a score of 1, sometimes a score of 2, rarely a score of 3, and never a score of 4. The reverse scoring was followed for 22 negatively worded items (2,3,5,6,7,14,15,18,19,20,22,23,24,32,33,34 ,35,40,41,44,45).

Scoring system: Total marital quality score ranges between 50-200. Higher score indicates poor quality of marital life. Overall range of marital quality further divided into three classes, viz: Good (Total score ranges between 50-100), average (Total score ranges between 101-150) and poor (Total score ranges between 151-200).

Procedures:

Validity and Reliability:

The tools will review for appropriateness, completeness, and legibility by five expert's professors; three experts from the Community Health Nursing Department, two professors from the Maternal Health Nursing Department. Modifications were made according to the panel judgment to ensure sentence clarity and content appropriateness. The Cronbach's α test

was used to assess the reliability of the knowledge questions, which was 0.90, the reliability of the practice genital hygiene behaviors was 0.89 and marital quality behaviors was 0.92.

Ethical consideration

Official permissions to conduct the proposed study were obtained from the Scientific Research and Ethical Committee, Faculty of Nursing, Modern University for Technology and Information (MTI). It was approved by the number of (67/2023). All pregnant adolescents were informed about the importance and aim of this study. All pregnant adolescent women were informed that their participation is voluntary, their rights to withdraw at any time, and the confidentiality of the information obtained. Also, pregnant adolescents were informed that the collected data would be used only for the purpose of the present study, as well as for their benefit. After obtaining a written consent from pregnant women the researcher started to collect data through the following.

Pilot Study:

A pilot study was conducted on 10% (7 pregnant adolescents) of the total sample to test the feasibility and applicability of the research process. The modifications were carried out to develop the final. Pregnant adolescents who were in the pilot were excluded from main sample.

Field Work:

The study included 70 pregnant adolescents with bacterial vaginosis. The researchers collected data over period of seven months, start from February to August 2023 at two days a week from 9 am to 2 pm. Average time for the completion of the questionnaire, the hygienic practice behavior and martial quality was (35-45 minutes).

The program was implemented after the beginning of the research acceptance until the end of the program implementation stage and sample collection.

- The official approval was obtained from the directors of the outpatient clinics affiliated to Fayoum University Hospital in Fayoum City to collect the necessary data after explaining the purpose of the study.
- At the beginning, demographic data were collected by researchers from pregnant adolescents about the obstetrics data, history and knowledge of bacterial vaginosis infection. The researchers used face-to-face interviews and help pregnant adolescents to answers and fill the tools.
- Before the educational program evaluate (knowledge, genital hygiene and marital quality) for identify the weak point in knowledge, practice genital hygiene and martial quality of life.
- Preparatory and assessment phase: Data collection tools were distributed to pregnant adolescents twice (pre-test to assess their knowledge, genital hygiene practice and martial quality before implementing the educational program. Post-test to evaluate pregnant adolescents' knowledge and hygiene practice and martial quality after implementing the educational program.

  The health educational program was designed based on analysis of the actual pregnant adolescents' needs in pretest.
- Program Implementation: A health education program was developed, where the sample was divided into ten groups, each group containing seven pregnant adolescents in the study setting. The program was implemented in five sessions, and each session took about 35-45 minutes. The first session served as a preliminary test during the evaluation phase; each session started with summary feedback about the previous session. The second, third, and fourth sessions were held over two weeks to implement the program, and the fifth sessions were held a month later to evaluate the program content for each group. The simplified booklet was used as a supportive material and given to pregnant adolescents in the Arabic language to cover all items regarding the knowledge, genital hygiene practice and marital quality to attract and motivate them, assist with home review, and support teaching.

- The second session, covered general knowledge about bacterial vaginosis

(definition, causes, risk factor, symptoms, bacterial vaginosis contagious, bacterial vaginosis a sexually transmitted disease, treatment by Probiotics food, the foods rich in probiotics, and complication for mother and baby).

- The third session addressed the practice of healthy genital hygiene behaviors, which include personal hygiene to maintain body cleanliness, toilet cleanliness, menstrual and vaginal cleanliness, and practicing good sexual hygiene to maintain vaginal cleanliness, as well as emphasizing the correction and prevention of unhealthy practices.
- The fourth session covered the following guidelines on marital quality of life, including close relationships, conflict resolution, and coping with marital difficulties. It also focused on emergency situations, such as health symptoms resulting from bacterial vaginosis, which can disrupt the quality and stability of marriage during the infection period. Therefore, this scale was discussed with each woman individually, which required greater effort. the interview took approximately 30-40 minutes for each group of pregnant adolescents to answer and fill out the questionnaire to assess the scale of genital hygiene practices and marital quality of life.

- Evaluation phase: Posttest was evaluated after one month (fifth session) from the implementation of the health education program, and an interview was conducted one month later with each group of pregnant adolescents. the post test for pregnant adolescents ‟ knowledge, hygiene behaviors and marital quality of life were done by the same format of the pre-test to assess the effect of the implemented health educational program.

Statistical analysis:

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 28 (SPSS Inc., Chicago, IL, USA). The descriptive analysis will be done using mean and standard deviation (SD) for continuous variables and percentage for qualitative variables and appropriate statistical significance tests was hired based on the type of the data. For the analysis, Chi-square (X2) test was used to compare the variables between the study phases. the significance level will be set at 5%; hence, $p< 0.05$ will be considered statistically significant.

Result:

Table (1) shows that the socio-demographic profile of the 70 pregnant adolescents with bacterial vaginosis revealed that 61.4% were aged 18 to <19 years with a mean age of 18.79±0.98 years. 52.8 % of pregnant adolescents had primary school, and 70.0% were housewives. However, 57.1% of them had insufficient income, 67.1% live with extended families, and 57.1% resided in rural areas.

Table (2) reveals that 67.1% pregnant adolescents were in their first trimester, while 32.9 % were in their second trimester. 75.7 % of woman were primigravida in her initial pregnancy, whereas 24.3% had one previous birth. Regarding abortion history, 74.3 % reported no previous abortions, while 25.7 % had experienced one abortion.

Table (3) Shows that 48.6% of the pregnant adolescents reported Thin and white vaginal discharge and 51.4 % of them reported thin and gray vaginal discharge, Meanwhile, (50.0%& 48.6%) of them reported fishy bad odor of vagina and burning during urination,61.4% experienced symptoms for less than one week, while 38.6% reported symptoms lasting one week or more, 65.7 % of them had used medication to manage their condition. Regarding the Source of knowledge related to BV, 31.4 %, 30.0 % & 38.6 % of them received it from family member, friends and health personnel respectively.

Table (4): illustrates the comparison of the pregnant adolescents according to their knowledge regarding bacterial vaginosis pre and post health education program implementation. It was found that 14.3% and 10.0 % reported complete answers about the definition and causes of bacterial vaginosis preprogram while 91.4 % and 88.6% of them reported correct and complete answers for the same items post program. Concerning symptoms and risk factors of bacterial vaginosis, 17.1% and 8.6 % of them reported

complete answers preprogram while, 91.4% and 92.8 % of them reported complete answers post program. In addition to contagious of bacterial vaginosis, BV. sexually transmitted disease, Probiotics food treats bacterial vaginosis and food rich by probiotic. less than one quarter (12.9%, 15.7%, 11.4% and 15.7) of them reported complete answers preprogram while, (97.1%,95.7 % ,94.3% and 95.7%) of them reported complete answers post program respectively. in relation to complication of bacterial vaginosis related to (mother and fetus), 8.6% and 14.3% of them reported complete answers preprogram Moreover, 92.8% and 91.4% of them reported complete answers preprogram with a highly significant difference in all knowledge items regarding bacterial vaginosis among pregnant adolescents before and after the educational program ($p < 0.001$).

Table (5): shows the comparison of pregnant adolescents' total knowledge about bacterial vaginosis pre- and post- health educational program. In this table, knowledge of 72.9% of pregnant adolescents had poor knowledge, average among 15.7%, and good among 11.4% preprogram implementation. As well, the percentage of good knowledge increased to 91.4% and poor knowledge decreased to 4.3%. (Mean = 3.15±1.44 & 17.85±2.37) respectively, with a paired t-test yielding a significant result ($t = 44.350$, $p < 0.001$). A statistically significant difference in their knowledge level post-program compared to their pre-intervention level regarding bacterial vaginosis (p 0.000).

Fig. (1) Illustrates that 72.9 % of the pregnant adolescents had poor total knowledge about bacterial vaginosis before health educational program and increased to 91.4 % after the program.

Table (6): Shows Comparison of pregnant adolescents regarding to their genital hygiene behavior pre- and post-educational program. In this table, as noticed about 90.0% of them were satisfied in the following items (use a condom, visit a doctor when experience pain or bleeding during sexual intercourse, wash hands after sexual intercourse, daily change underwear, wear cotton underwear, dry with toilet paper after cleaning my genital area with water, visit a doctor when I have itching in the genital area, wash hands after going to the bathroom, and wash hands after changing the pad and about 30.0% of them reduced unhealthy genital hygiene behavioral as wash the vaginal area from back to front, always use a piece of cloth and use a piece of cloth during the period post-educational program. Additionally, there are statistically significant differences in pregnant adolescents' genital hygiene behaviors post the educational program comparison to preprogram, whereas mean of them 'genital hygiene behavior in posttest improved than pretest (85.32±7.29& 73.64±5.97 respectively). with a paired t-test indicating a highly significant difference) $t = 10.371$, $p < 0.001$).

Table (7): Illustrates the comparison of pregnant adolescents' total genital hygiene behavior pre- and post-educational program. This table shows statistically significant difference in their genital hygiene behavior post-program compared to their practices level pre-program (P=0.000). Additionally, whereas mean of them 'genital hygiene behavior in posttest improved than pretest (96.74±5.12& 34.12±3.61respectively). with a paired t-test indicating a highly significant difference ($t = 83.630$, $p < 0.001$).

Fig. (2) Illustrates that 72.9 % of the pregnant adolescents had satisfactory total genital hygiene behavior regarding bacterial vaginosis before health educational program and increased to 92.9% after the program

Table (8): Reveals that 75.7% of pregnant adolescents reported improvement in marital quality in posttest compare to pretest 51.4%. With statistically significant ($X^2 = 9.561$, $p < 0.008$). Moreover, the mean score significantly increased from 114.37±9.61 before the intervention to 154.29±12.45 after, with a paired t-test indicating a highly significant difference between the two study phases ($t = 21.236$, $p < 0.001$).

Fig. 3 clarifies the percentage distribution of the pregnant adolescents according to their total marital quality of life score. It shows that 51.4 % of the pregnant adolescents had good marital quality of life score pre health educational program. While 75.7 % of them had good marital quality of life score post health educational program.

Table (9): Clarifies that there was a significant positive correlation between (total score of genital hygiene behavior and (total score of knowledge and total score of marital quality) pre ($r = 0.564$, $p < 0.001$& $r = 0.412$, $p < 0.001$ respectively) and strong high positive correlation in posttest ($r = 0.716$, $p < 0.001$& $r = 0.507$, $p < 0.001$ respectively).

Table (10): indicates that a highly statistically significant positive relation ($P \leq 0.001$) between total score of genital hygiene behavior and (age, level of education and job of pregnant adolescents), and income pre intervention. while there is statistically significant association between total genital hygienic behavior and all sociodemographic variables post intervention. Moreover, no significant differences between total genital hygiene behavior and pregnant adolescents' family type and residence pre intervention.

Table (1): Frequency and percentage distribution of Socio-demographic Characteristics of pregnant adolescents with bacterial vaginosis (n=70)

	N	%
Age groups		
18- <19	43	61.4
19 ≥21	27	38.6
Mean±SD	18.79±0.98	
Level of education		
Can't read or write	8	11.4
Primary School	37	52.8
Diploma school	25	35.8
Job		
Housewife	49	70.0
Employee	21	30.0
Income		
Sufficient	30	42.9
Insufficient	40	57.1
Types of Family		
Nuclear	23	32.9
Extended	47	67.1
Residence		
Rural	40	57.1
Urban	30	42.9

Table (2): Frequency and percentage distribution of Pregnant Adolescents regarding their obstetrics data (n=70)

	N	%
gestational age		
First trimester from conception to week 12	47	67.1
Second trimester from week 13 to week 27	23	32.9
Gravidity		
Primigravida	53	75.7
Multigravida	17	24.3
Number of abortions		
None	52	74.3
1	18	25.7

Table (3): Frequency and percentage distribution of Pregnant Adolescents regarding to History of Bacterial Vaginosis Infection (n=70)

	N	%
Signs		
Thin and white vaginal discharge	34	48.6
Thin and gray vaginal discharge	36	51.4
Symptoms		
Fishy bad odor	35	50.0
Vaginal itching	30	42.8
Burning during urination	34	48.6
Pain during intercourse (dyspareunia)	33	47.1
Duration of symptoms		
<one week	43	61.4
≥one week	27	38.6
Used medication		
Yes	46	65.7
No	24	34.3
Source of knowledge related BV		
Family member	22	31.4
Friends	21	30.0
Health personnel	27	38.6

*N.B. some Items not mutually exclusive

Table (4) Comparison of Pregnant adolescents' Knowledge between Pre and Post Health Education program toward abacterial vaginosis

Knowledge	Pre-education program						Post –education program						Chi-square	
	Complete		Incomplete		Incorrect		Complete		Incomplete		Incorrect			
	No	%	No	%	No	%	No	%	No	%	No	%	X2	P-value
Definition of bacterial vaginosis.	10	14.3	-	-	60	85.7	64	91.4	-	-	6	8.6	83.587	<0.001*
Causes of bacterial vaginosis.	7	10.0	10	14.3	53	75.7	62	88.6	5	7.1	3	4.3	90.150	<0.001*
Symptoms of bacterial vaginosis	12	17.1	7	10.0	51	72.9	64	91.4	2	2.9	4	5.7	78.520	<0.001*
Risk factor of bacterial vaginosis	6	8.6	12	17.1	52	74.3	65	92.8	3	4.3	2	2.9	100.724	<0.001*
Bacterial vaginosis is contagious	9	12.9	-	-	61	87.1	68	97.1	-	-	2	2.9	100.462	<0.001*
Bacterial vaginosis is sexually transmitted disease?	11	15.7	-	-	59	84.3	67	95.7	-	-	3	4.3	90.786	<0.001*
Using treatment with Probiotics food in bacterial vaginosis.	8	11.4	-	-	62	88.6	66	94.3	-	-	4	90.0	96.429	<0.001*
The foods rich in probiotics.	11	15.7	7	10.0	52	74.3	67	95.7	1	1.4	2	2.9	107.022	<0.001*
Complication of bacterial vaginosis for mother.	6	8.6	15	21.4	49	70.0	65	92.8	3	4.3	2	2.9	103.028	<0.001*
Complication of bacterial vaginosis for fetus.	10	14.3	13	18.6	47	67.1	64	91.4	2	2.9	4	5.7	83.727	<0.001*

**Highly significant at $p < 0.001$

Table (5): Comparison of Pregnant Adolescents regarding to their total knowledge about bacterial vaginosis pre and post educational program (n=70).

Total knowledge	Pre		Post		Tests	
	N	%	N	%	Test	P-value
Good	8	11.4	64	91.4	X^2=90.794	<0.001*
Average	11	15.7	3	4.3		
Poor	51	72.9	3	4.3		
Total mean±SD	3.15±1.44		17.85±2.37		*t*=44.350	<0.001*

*X^2= Chi-square, t= Paired t-test, High sig. <0.001**

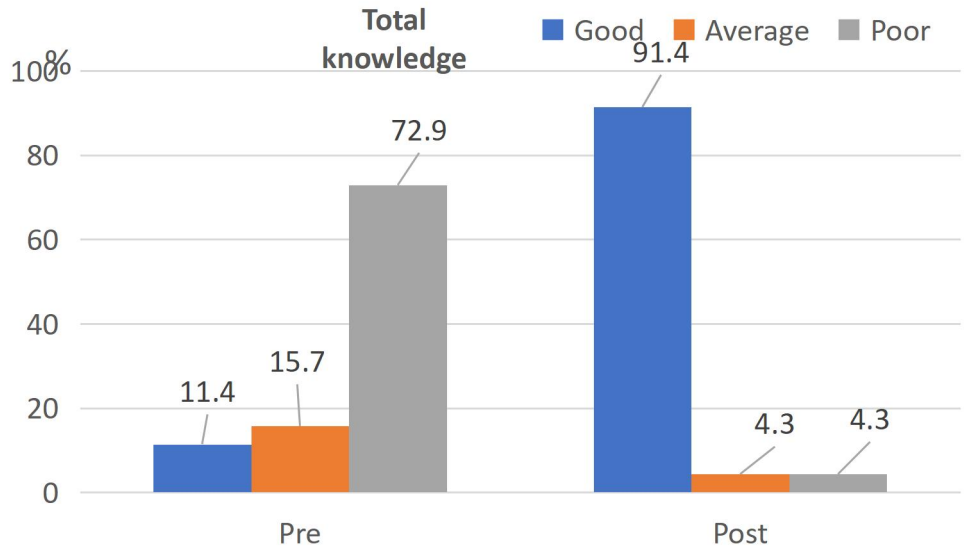

Fig. (1): Percentage distribution of the pregnant adolescents according to their total knowledge about bacterial vaginosis. (n = 70).

Table (6) Comparison of pregnant adolescents regarding to their Genital Hygiene Behavior pre and post educational program (n=70).

genital hygiene practice	Satisfactory pre		Satisfactory post		Chi-square	
	N	%	N	%	X^2	P-value
I participate in educational meetings conducted on issues regarding sexual health.	49	70.0	57	81.4	0.357	0.550
I follow the news published on written and visual media about sexual health.	53	75.7	59	84.3	10.861	<0.001*
I request my partner to use a condom when I experience malodorous discharge.	46	65.7	64	91.4	6.802	0.009*
I visit a doctor when I experience pain or bleeding during sexual intercourse	43	61.4	65	92.8	37.784	<0.001*
I wash my hands before sexual intercourse	43	61.4	58	82.9	5.594	0.018*
I wash my hands after sexual intercourse	47	67.1	63	90.0	5.201	0.023*
I wash my genital area before sexual intercourse	52	74.3	55	78.6	9.856	0.002*
I wash my genital area after sexual intercourse.	51	72.9	63	90.0	7.755	0.005*
I monitor the genital area carefully with regard to diseases symptoms.	27	38.6	62	88.6	7.241	0.007*
I obtain information from health personnel about genital area hygiene.	47	67.1	59	84.3	3.212	0.073
I visit a gynecologist regularly.	47	67.1	59	84.3	10.861	<0.001*
I care about genital area hygiene.	49	70.0	58	82.9	19.623	<0.001*
I daily change my underwear.	51	72.9	65	92.9	4.242	0.039*
I iron my underwear.	45	64.3	57	81.4	3.170	0.075
My underwear is made of cotton.	50	71.4	63	90.0	7.766	0.005*
I dry with toilet paper after cleaning my genital area with water	52	74.3	64	91.4	1.141	0.285
I visit a doctor when I experience malodorous discharge.	33	47.1	58	82.9	1.036	0.309
I visit a doctor when I have itching in the genital area.	47	67.1	63	90.0	0.578	0.447
I wash my hands before going to the bathroom	50	71.4	60	85.7	6.098	0.014*
I wash my hands after going to the bathroom.	53	75.7	65	92.9	6.438	0.011*
*I wash from the region where I have my bowel movement towards the area where I urinate in the toilet.	29	41.4	19	27.1	11.429	<0.001*
*I always use a piece of cloth.	27	38.6	21	30.0	1.141	0.285
I use hygienic pads during my period.	49	70.0	53	75.7	0.578	0.447
I take a shower during my period.	52	74.3	57	81.4	1.036	0.309
*I use a piece of cloth during my period.	32	45.7	18	25.7	6.098	0.014*
I wash my hands before changing my pad.	46	65.7	59	84.3	6.438	0.011*
I wash my hands after changing my pad.	48	68.6	64	91.4	11.429	<0.001*
Total mean±SD	73.64±5.97		85.32±7.29		*t*=10.371	<0.001*

Table (7): Comparison of pregnant Adolescents' Genital Hygiene Behavior pre and post educational program (n=70)

Total genital hygiene behavior	Pre		Post		Tests	
	N	%	N	%	Test	P-value
Satisfactory	51	72.9	65	92.9	X^2=62.976	<0.001*
Unsatisfactory	19	27.1	5	7.1		
Total mean± SD	34.12±3.61		96.74±5.12		*t=83.630*	<0.001*

*X^2= Chi-square, t= Paired t-test, High sig. <0.001**

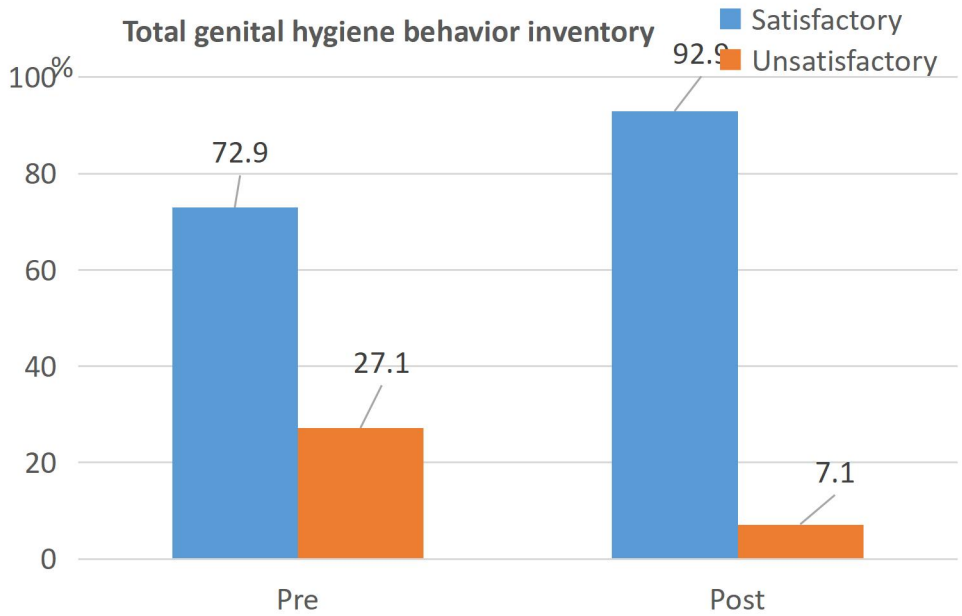

Fig. (2): Percentage distribution of the pregnant adolescents according to their total genital hygiene behavior score regarding bacterial vaginosis. (n = 70).

Table (8): Comparison of pregnant adolescents regarding martial quality of life between pre and post educational program (n=70).

Total scale of martial quality	*Pre*		*Post*		*Tests*	
	N	*%*	*N*	*%*	*Test*	*P-value*
Good	*36*	*51.4*	*53*	*75.7*		
Average	*22*	*31.4*	*13*	*18.6*	*X^2=9.561*	*0.008**
Poor	*12*	*17.2*	*4*	*5.7*		
Total mean±SD	*114.37±9.61*		*154.29±12.45*		*t=21.236*	*<0.001**

*X^2= Chi-square, t= Paired t-test, High sig. <0.001**

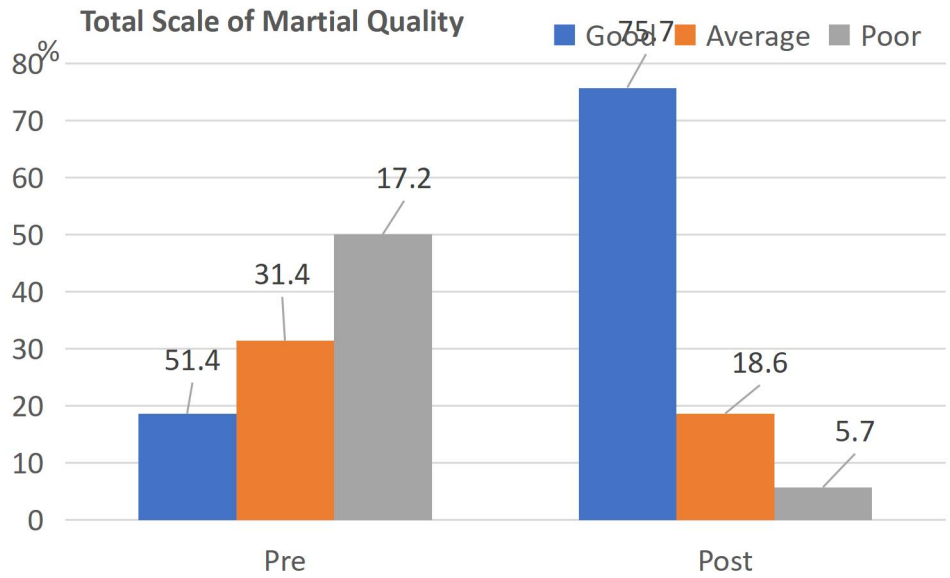

Fig (3): Percentage distribution of the pregnant adolescents according to their total marital quality of life. (n = 70)

Table (9): Correlation between total score of genital hygiene behavior and both total score knowledge and total score of marital quality of life among pregnant adolescents pre and post the health educational program. (n=70)

	Total score of genital hygiene behavior inventory			
	Pre		Post	
	r	P-value	r	P-value
Total score knowledge	0.564	<0.001*	0.716	<0.001*
Total score of martial quality	0.412	<0.001*	0.507	<0.001*

Table (10): Relationship Between genital hygiene behavior and Demographic Characteristics of pregnant adolescents pre and post educational program (n=70).

	Total Score of genital hygiene behavior							
	Pre		Tests		Post		Tests	
	Mean	SD	t/f	P-value	Mean	SD	t/f	P-value
Age								
18 - <19	67.02	7.17	3.735	<0.001*	84.19	10.35	3.585	<0.001*
19 or more	75.74	12.38			93.85	11.93		
Level of education								
Can't read or write	68.52	7.57	9.659	<0.001*	76.00	9.92	6.240	0.003*
Primary School	68.00	9.77			76.98	11.68		
Diploma	81.00	10.37			89.17	9.36		
Job								
Housewife	68.42	10.09	2.965	0.004*	85.60	11.38	3.038	0.003*
Employee	76.53	8.89			95.12	10.75		
Types of Family								
Nuclear	46.35	11.05	0.541	0.590	82.35	13.16	1.714	0.091
Extended	44.91	10.09			77.23	10.97		
Income								
Sufficient	49.47	11.76	3.017	0.004*	83.77	11.30	3.142	0.002*
Insufficient	42.33	8.04			75.28	11.10		
Residence								
Rural	43.33	8.67	1.447	0.153	75.50	11.87	2.134	0.036*
Urban	46.93	11.33			81.48	11.38		

*t= Paired t-test, f=ANOVA, significant <0.05**

Discussion:

Adolescent pregnancy has become an important health issue, and it is a global phenomenon in the Arab region, which has led to serious physical, social, economic, and sexual problems due to a lack of knowledge about correct methods of genital hygiene. Increasing knowledge about genital hygiene practices appears to be an important factor in preventing vaginal infections. Improving vaginal health in all these items will lead to maintaining marital quality **(Visacri et al 2023**). The present study aimed to evaluate effect of health education program on knowledge, genital hygiene behaviors, and marital quality among pregnant adolescents with bacterial vaginosis.

Concerning adolescent pregnant women socio-demographic characteristics. The results of the current study demonstrated that age ranged between 18 – ≥21 years old with a mean age of 18.79±0.98 years. This finding is supported, in Nepal, by **Yogi, (2020**), who studied " Factors Associated with Early Marriage in Rural Mid-Western Nepal" illustrated that, the mean age at first marriage was 18.4 years (SD=3.83) and the socio-demographic factors of the respondents like sex was found as major factors associated with early marriage. Moreover, this finding is supported, in Kenyan, by **Oluoch et al., (2023),** who studied "Longitudinal assessment of bacterial vaginosis prior to and during incident pregnancy: an observational study in Kenyan adolescent girls and young women" illustrated that, young women were recruited at age group from (14-20) years old. with mean age of studied students was 18.6 years old. Moreover, the finding of the current study is in agreement with study of **Roxby et al., (2023),** who studied " Low prevalence of bacterial vaginosis in Kenyan adolescent girls and rapid incidence after first sex" revealed that mean age of adolescent girls were 18.6 years (interquartile range, 16-21).

However, the results of the current study demonstrates that more than half of women had primary school, around three quarters of adolescent pregnant women were housewives, more than half of them had insufficient income, and more than two third of pregnant adolescents had extended family. Consistent with these findings, **Calik et al., (2019),** who studied " Genital Hygiene Behaviors of Women and Their Effect on Vaginal Infections" found that more than half of the women had primary school, less than three quarters were unemployed, more than half of them had insufficient income and more than two third of women had extended family.

The results of the current study shows that more than half of them were from rural area. Consistent with these findings, **Osman et al., (2023),** who studied " Evaluating Pregnant Women's Knowledge Regarding Genital Tract Infections" found that more than two third of pregnant women were from rural area. This result is in disagreement with that of the study reported by **Li et al., (2014),** who studied " Risk factors for bacterial vaginosis: results from a cross-sectional study having a sample of 53,652 women " in China, reported that women with a higher level of education were less likely to have BV. One possible reason is that the higher the level of education a woman achieves, the more related knowledge and higher scores of reproductive tract infection (RTIs) related knowledge she will obtain, and the more opportunities she will encounter to prevent BV. In addition, women with a higher level of education were more likely to see a doctor after suffering from the symptoms of RTIs

Considering pregnant adolescents regarding obstetric history, the results of the current study shows that more than two third of them were in first trimester. The findings of the present study are in the line with the study conducted by **Osman et al., (2023),** who revealed that, more than two third of pregnant women were in first trimester.

In current study shows that more than three quarters of pregnant adolescents were primigravida in her initial pregnancy. The findings of the current study are supported by **Pete et al., (2019),** who studied " A cross-sectional descriptive study among antenatal care attendees" in Cameroon, who found that approximately 76% of pregnant women many likely primigravida. The current study found that less than three quarters of adolescent pregnant women did not have previous

abortion, these finding agreement with **Calik et al., (2019),** who found that around three quarters of women did not have a spontaneous abortion.

Regarding distribution of the studied pregnant adolescents according to their symptoms of bacterial vaginosis, the present study finds that less than half of them complained from thin and white vaginal discharge, itching, burning during urination and pain during intercourse, and half of them reported fishy bad odor of vagina. According to **Obubu & Chukwu (2019),** bacterial vaginosis often causes unusual vaginal discharge which they described as whitish, watery, and with a strong rotten fish smell, particularly after sexual intercourse, The findings of the current study are in agreement with **Osman et al., (2023),** who revealed that, less than half of them had white discharge, irritation, itching, dyspareunia and more than half of pregnant women had bad odor. However, the finding of the current study is in contrast with the study conducted by **Calik et al., (2019),** who revealed that more than half of them had pains, one third of them had burning sensation and an odor problem.

The results of the current study shows that more than one third reported symptoms lasting one week or more. This result is in agreement with **Calik et al., (2019),** who reported that more than one-third of them lasted for 6 months or over. On the other hand, the results of the current study shows that two third of them had used medication to manage their condition and one third of them received information about bacterial vaginosis from family member. This result is in agreement with **Osman et al., (2023),** who showed that less than two thirds of pregnant women treated from genital tract infection and one third of pregnant women had information about genital tract infection from the experience of family, relatives and neighbors. The result of current study shows that more than one third of adolescent pregnant women had knowledge from health personal. Moreover, in partial agreement with these findings, **Sinan et al. (2020),** who studied " Genital Hygiene Behaviors Among Married Women and the Outcomes of Counseling Practices" in Ankara. who found that married women had received prior information on genital hygiene; the main source of information (35.6%) was medical personnel. Given the sensitivity and specificity of genital hygiene practices, the health team must play a role in providing information to pregnant adolescents, which is rarely discussed in the media or among friends. According to the finding by **Prusty and Unisa, (2013),** who studied "RTIs and treatment-seeking behavior among married female adolescents in India" who found that, treatment-seeking behavior among female adolescents is poor.

Regarding knowledge of pregnant adolescents about bacterial vaginosis. The current study finds that pregnant adolescents had poor knowledge regarding bacterial vaginosis during pregnancy. less than three quarter of them had poor knowledge such as definition, causes, symptoms, risk factors, contagious of bacterial vaginosis, BV. sexually transmitted disease, Probiotics food treats bacterial vaginosis, food rich by probiotic, and complication of bacterial vaginosis (mother and fetus) related to bacterial vaginosis preprogram. From the researcher's point of view, this result may be due to the young age of the study sample and the fact that vaginal infections are a sensitive issue for women, especially since more than half of the sample came from the rural areas surrounding the city. However, awareness of this issue must be increased to prevent recurrence. The previous findings were in the same line with research conducted by **Varghese et al., (2017),** " Knowledge, attitude and practices of women towards vaginal discharge" who found that half of the women express the concept cause and symptoms of vaginal discharge as a normal process. Also, the present study disagrees with **Obubu and Chukwu (2019),** who reported that about two third of women had correct knowledge about definition, causes, and sign and symptoms of bacterial vaginosis. In addition, this study findings were in consistent with **Osman et al., (2023),** who revealed that more than one quarter of them had good knowledge regarding genital tract infection. From the researcher's point of view, this result may be due the nature of living in rural areas with traditional beliefs that affect their awareness and education about genital tract infections. Moreover, the results were supported by **Chen, et al., (2022)** who

studied " Probiotics are a good choice for the treatment of bacterial vaginosis: a meta-analysis of randomized controlled trial " in China and reported that probiotics may play a role in the treatment of BV. Compared with the efficacy of probiotics and antibiotics in the treatment of BV, there was no significant difference in the cure rate between the two groups.

Regarding total knowledge about bacterial diagnosis. The current study reveals that about less than three quarters of the pregnant adolescents had lack of knowledge about bacterial vaginosis before the intervention. Since an adolescent pregnant woman is young and the changes that occur as a result of a bacterial vaginosis are considered normal and merely symptoms that do not require treatment due to a lack of information about bacterial vaginosis. When the symptoms persist, they begin to ask about treatment. Each pregnant adolescents needs to know about treatment of bacterial vaginosis to prevent complication of fetus. Moreover, the findings of the current study are in line with finding of the study conducted by **Osman et al.**, **(2023),** who found that, more than two third of pregnant women had lack of knowledge during assessment period.

After applying the educational program for current study, there were a highly significant improvement between the pre and post-test mean scores. This result explained by **Sayed et al., (2022),** who studied " Effect of Urogenital Infection Educational Program on Women Knowledge and Practices " who found that there was a significant improvement in total knowledge about Urogenital infection in post-test as compared to pretest assessment. 94% of them had good knowledge at the post educational program.

Regarding the genital hygiene behavior. The results of the current study shows that the majority of pregnant adolescents use condom during malodorous discharge, visiting a doctor for pain or bleeding during intercourse, use a condom, wash hands after sexual intercourse, daily change underwear, wear cotton underwear, dry with toilet paper after cleaning my genital area with water, visit a doctor when I have itching in the genital area, wash hands after going to the bathroom, and wash hands after changing the pad. The majority of them had improvement in all previous items. The previous findings were in the same line with research conducted by **Varghese, et al., (2017),** who found that majority of women showed positive attitude towards observance of good genital hygiene, use of condom, visiting a doctor and avoidance of sexual relationship with infected persons as the best preventive measures to curtail this problem. Moreover, the results were supported by **Li, X.-D., et al., (2014),** who found that some hygienic behaviors were risk factors for BV, such as higher frequency of washing genitals before having sex with husband and changing underwear.

The results of the current study shows that about one third of pregnant adolescents reported reduced unhealthy genital hygiene behavioral as wash the vaginal area from back to front, always use a piece of cloth and use a piece of cloth during the period. The previous findings were in the same line with research conducted by **Torondel et al., (2018),** who studied " Association between unhygienic menstrual management practices and prevalence of lower reproductive tract infections: a hospital-based cross-sectional study in Odisha" in India who reported that Married women who used unsanitary pads, changed pads only when they were full, and washed themselves less frequently during menstruation were more likely to develop bacterial vaginosis. However, the finding of the current study is in contrast with the study conducted by **Baraia, et al., (2014),** who studied "Health behaviors for vaginal infection among married women in Ismaila city" in Egypt who reported that only 17% had satisfactory health behavior and the majority of married women had unsatisfactory level of health behavior as personal hygiene, vaginal hygiene, sexual hygiene, menstrual hygiene and toilet hygiene. From view of researcher, the sample was large, the age of sample 18-44 and Ismailia is considered a rural rather than an urban area, and its residents share similar characteristics. Cairo, on the other hand, is regarded as an urban area, and its residents come from diverse backgrounds, including both urban and rural areas, and thus have

different characteristics as does the impact of the educational program on changing their knowledge and behaviors.

Regarding total genital hygiene behavior. The results of the current study shows that pregnant adolescents reporting satisfactory behavior increased after the program compare with pre -program rates, with total mean 34.12±3.61 preprogram and 96.74±5.12 post program. From the researcher's point of view, after the program, the percentage of women practicing correct practices increased due to their increased awareness of the importance of these practices in preventing infection. Correspondingly, the study by **Sinan, et al., (2020),** who studied " Assessment of the effectiveness of genital infection awareness training provided to women based on the IMB model." in Turkish reported that the mean score of GHBI pre and post program was found 72.6± 2.4 & 94.7 ± 2.6, ($P < 0.001$). if there were inadequate genital hygiene behaviors, it was main causes of vaginal infection. This result is in partial agreement with **Calik et al., (2019),** who reported that the 70.27 ± 10.05. mean GHBI score of the women was found without any program.

Regarding to marital quality of life. The results of the current study shows that more than three quarters of pregnant adolescents reporting improvement in marital quality post program compare to more than half of them preprogram. Moreover, the mean score significantly increased before the program to after the program. From the researcher's point of view, the quality of marital life is a difficult topic to discuss among women because of the privacy it entails. Therefore, it was difficult at first for a woman to talk about her privacy without fear. After reassurance, it became easy to discuss and guide for improving marital quality. In line with these findings, **Henriksen, et al., (2015),** who studied " Relationship Satisfaction Reduces the Risk of Maternal Infectious Diseases in Pregnancy: The Norwegian Mother and Child Cohort Study" in Norway who showed that more than half of the participant had no marital satisfaction because not practicing healthy sexual relations during vaginal infections, vaginal infections were significantly associated with relationship satisfaction during pregnancy due to the immune system's weak ability to fight infections, which in turn leads to lower levels of relationship satisfaction. The results support our hypothesis that the health education program had a positive impact on improving knowledge, reproductive hygiene behavior, and marital quality of life among pregnant adolescents regarding bacterial vaginosis. However, the finding of the current study is in contrast with the study conducted by **Iwao, & Saito, (2012),** who studied " Factors related to marital adjustment in couples during pregnancy" showed that 73.3% of pregnant women had a favorable marital relationship during pregnancy without effect of any factors. according to **Raziyeh et al., (2018),** who studied **"**Marital satisfaction and its associated factors at reproductive age women referred to health centers**"** reported that more than two third of pregnant women had marital satisfaction. This difference could be attributed to the variation in sample size and its selection criteria.

Regarding the correlation between total genital hygiene behavior and (total knowledge and marital quality scores). The current study found that there was a strong high significant positive correlation between (total genital hygiene behavior and total knowledge. The study findings were in agreement with by **Osman et al., (2023),** reported that. there was a highly statistically significant relation between women total GHBI score level with total knowledge about genital tract infections.

Additionally, the current study finds strong high significant positive correlation between total score of genital hygiene behavior and marital quality of life scores. From the view of a researcher, A good marital relationship provides emotional support for spouses to continue beneficial health practices, including proper genital hygiene and sexual health. The previous findings were in the same line with **Henriksen, et al., (2015),** who found that there was significant positive relation between marital quality scores and vaginal infection.

Regarding the relationship between total score of genital hygiene behavior(GHBI) level of pregnant adolescents and socio-demographic characteristics, the current study findings revealed that a highly positive statistically

significant relation between women total GHBI level of pregnant adolescents with age, educational level, job, income and residence in post health educational program. This may be due to the younger age of pregnant adolescents, lower illiteracy rates, different educational levels of pregnant adolescents, as well as different income and residence levels, all of which can affect genital hygiene practices. Therefore, the implementation of the genital hygiene behavior health education program was effective in improving knowledge of GHBI practices that led to improved marital quality of life for pregnant adolescents regarding bacterial vaginosis. These results are consistent with a study conducted by **Uzun et al., (2022),** who studied " Evaluation of the genital hygiene behavior and related factors of women aged 15-49" in Turkey**,** reported that a significant positive correlation was found between the genital hygiene behavior inventory score and education status and income status. Furthermore, the finding of the present study is in agreement with **Calik et al., (2019),** who reported that There were statistically significant differences in genital hygiene behaviors between the women in terms of the women's age, education, profession, and income ($p<0.05$).

Conclusion:

The current study concluded that applying the health education program has a significant effect on improving knowledge, genital hygiene behavior, and marital quality regarding bacterial vaginosis in the post program compared with the preprogram.

Recommendation:

- Implementing screening for all pregnant women during antenatal follow-up for bacterial vaginosis for early detection and to prevent adverse outcomes for mothers and the fetus.
- Implementing an educational session for young pregnant adolescents about instruction to prevent vaginal infection, especially bacterial vaginosis and its consequences on pregnancy and the fetus.
- Make a campaign to raise awareness among young pregnant adolescents about vaginal infections and their prevention measures for the prevention of vaginosis recurrence.
- Design a booklet about the genital hygiene behavior and its relation to marital quality for distribution during premarital care.
- Replication of the current study on a larger sample in other settings to confirm and generalize results.

Limitations of the research

- The research topic is sensitive because it affects genital hygiene and the marital quality.

- The obstetrics and gynecology outpatient clinic are a crowded place because some family members and children come with the pregnant women, which requires more time and effort to conduct sessions.

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Conflict of Interest

The author declares no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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