

The Effect of Supportive Nursing Instructions on Recurrence of Vulvovaginal Candidiasis Infection during Pregnancy

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Abstract Pregnant women are more vulnerable to VVC than healthy women with chronic recurrent candidiasis [1]. Supportive nursing instruction help pregnant women in improving their health by adopting preventive measures that help in reducing the incidence and avoid complication from VVC [2,3]. The aim of this quasi-experimental study was to examine the effect of supportive nursing instructions on recurrence of vulvovaginal candidiasis infection during pregnancy. A total of 100 pregnant women diagnosed as having vulvovaginal candidiasis infection who attend antenatal unit at El-Manial maternity hospital in Cairo, Egypt, were recruited for this study. The required data was collected through Semi-structured Interview questionnaire, pre-posttest questionnaire and VVC Follow-up Sheet. Results indicated that the age of the sample range was 18-45 year with a mean of 26.38 ± 6.56 years old, 64% living in urban area, 74% of the sample was negative smokers, 70% of the sample was housewife & 48% of the sample had primary education. The results also revealed that a highly statistically significant difference between mean knowledge score regarding VVC during pregnancy in pretest and posttest ($p < 0.0001$) and a highly statistically significant difference between level of knowledge regarding VVC during pregnancy in pre and posttest as ($p < 0.0001$). Also, there was an observed relieve in majority of the symptoms of VVC infection after four weeks follow-up. In relation to recurrence of vulvovaginal candidiasis symptoms during pregnancy, the results revealed that most of cases did not develop recurrent episode of VVC attack during pregnancy through follow-up till term while minority of cases developed recurrent episode especially in third trimester of pregnancy.

Keywords: *supportive nursing instruction, recurrence of VVC during pregnancy*

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1. Introduction

Vulvovaginal candidiasis is caused by overgrowth of Candida yeast species, most often *Candida albicans*. Candida species colonizes the vagina in at least 20 % of all women. This rises to 30 % during pregnancy. Vulvovaginal candidiasis (VVC) is one common type of vaginal infection among pregnant women throughout the world particularly in hot, subtropical climate. Annually in the United States there are approximately 13 million cases of vulvovaginal candidiasis (VVC), resulting in 10 million gynecologic offices visits per year [4,5].

Furthermore, a cross –sectional study was conducted at Jilala municipal hospital in Tanzania, studying the prevalence and risk factor of VVC among 50 pregnant women documented that; 38.1 % were pregnant women with curdy white discharge, 14.7% with genital ulcer, 58.6% with genital pruritus [6]. In Egypt a study of 50 married women from Cairo; has indicated that, the overall prevalence of reproductive tract infection was 93.6%;

80.1% of them had recurrent vaginal infection 84.9% had candida albicana, 11.3% bacterial vaginosis and 3.9% had trichomonas vaginalis [7].

VVC may be associated with symptoms and signs such as severe itching, erythema, vaginal soreness, pruritis, pain, irritation, a curd-like vaginal discharge, unpleasant odor and dyspareunia, and/or with dysuria and burning at micturition. Colonization of the vagina by Candida is common - 20 to 30% of women are asymptotically colonized, although colonization is not considered clinically relevant in the absence of symptoms [8,9].

Several risk factors can be associated with the increased role of colonization of vagina by Candida species in women which includes compromised immune system, obesity, diabetes, prolonged use of broad spectrum antibiotic or corticosteroids, HIV/AIDS, ageing, pregnancy, use of high level of estrogens and oral contraceptives pills (OCPs), intrauterine contraceptive device (IUCDs), tight clothing, use of vaginal douches, poor personal hygiene, use of diaphragms, condoms, frequent sexual intercourse, poor dietary habits, and diet with high starch & glucose content [10]. In addition, any physiological changes that affect the

beneficial bacteria in the vagina would alter the acidity of the vagina reducing its pH to 5.0-6.5 by enhancing the establishment of pathogenic organisms such as *Candida* [11]. On the other hands about 5-10% healthy women apparently suffer from recurrent vaginal candidiasis without any predisposing factors [1].

Pregnant women are more vulnerable to VVC than healthy women with chronic recurrent candidiasis [1]. The increased estrogen level during pregnancy leads to the production of more glycogen in the vagina which allows for the proliferation of yeast cells on the wall of the vagina [12]. It has been estimated that up to 30% of pregnant women worldwide may have VVC [13].

The increased risk of VVC in pregnancy is likely caused by pregnancy-related factors, such as decreased immunologic alterations, increased estrogen levels, and increased vaginal mucosal glycogen production. Increased estrogen facilitates adherence of yeast to vaginal mucosal epithelial cells. In addition, estrogen promotes hyphal formation and enzyme elaboration, such as secreted aspartyl proteinases and phospholipases. These virulence factors further enhance colonization [14]. In essence, from the second trimester of pregnancy until delivery, there is an anti-inflammatory state. Hence, the immunologic changes and differential release of cytokines during pregnancy yields a weaker local genital tract response to *Candida* and increased frequency of colonization [15].

Vulvovaginal candidiasis is an important cause of morbidity in pregnancy which can cause abortion, candida chorio-amnionitis, premature rupture of membranes, subsequent preterm delivery, emotional stress and suppression of immune system and poor pregnancy outcome (25-40% of pregnancies). Intra-amniotic *Candida* infection may also cause systemic congenital infection, cerebral candidiasis, or fetal demise. In addition, there is some evidence that eradication of *Candida* in pregnancy may reduce the risk of preterm birth [16]. In a prospective, randomized study in which pregnant women <20 weeks of gestation with singleton pregnancies, there was a higher spontaneous preterm birth rate in women with untreated asymptomatic candidiasis compared to those without candidiasis (6.25 versus 2.99 %) [17].

In addition, the increased risk of ascending infection, oral thrush may be present at birth, and yellow-white papules may be observed on the umbilical cord. Occasionally, term babies with congenital candidiasis have systemic manifestations, such as pneumonia or clinical evidence of sepsis [18].

The nurse role plays important role through delivering important health educational topics to the pregnant women as, diet, personal hygiene, increasing immunity, and way of administration of medication as well as limit recurrence of those infection and preventive subsequent complication. The nurse should perform careful assessment of common signs, symptoms of vaginal candidiasis, and presence of risk factors such as improper hygiene. Health professional caring for pregnant women should find out symptoms of vaginal candidiasis and they can give them knowledge and then aware about VVC, that may help them in improving their health by adopting preventive measures that help in reducing the incidence and avoid complication from VVC [2,3].

1.1. Significance of Study

Although, the problem may seems small because women think their symptoms are normal occurrence or are reluctant to seek medical advice but for the sufferer it is the immense physical and psychological problem that may require instant attention, which is lacking in the most of the hospitals and clinics. In Egypt, very few studies have been implicated in role of nurse during treatment of VVC and prevention or recurrence through nursing instruction and follow up.

The need for the study arises from the facts gathered from the few research studies focused on this area of health related issues. The present study was focused to disseminate health instruction regarding VVC treatment and prevention of recurrence among pregnant women which may be helpful for the prevention from re-infection, stillbirth, abortion and sterility to the women.

1.2. Aim of the Study

The aim of the current study was to examine the effect of supportive nursing instructions on recurrence of vulvovaginal candidiasis infection during pregnancy.

1.3. Hypothesis

To achieve the aim of the current study the following research hypotheses were formulated:

H1. Pregnant women with vulvovaginal candidiasis who received the supportive nursing instructions, their symptoms of VVC will decrease than before.

H2. Pregnant women who receive supportive nursing instructions regarding vulvovaginal candidiasis will show higher scores in posttest than in their pretest.

H3. Pregnant women with vulvovaginal candidiasis who received the supportive nursing instructions will prevent the episodes of recurrent VVC during pregnancy

2. Operational Definition

Supportive nursing instructions: in this research means the nursing instruction given to pregnant women with vulvovaginal candidiasis to support them to reach maximum level of alleviation of symptoms and prevent recurrent of this infection.

3. Subjects and Methods

Research design and setting: One group pre-posttest quasi experimental design was adopted in the current study, which was carried out in the antenatal outpatient clinic at El-Manial maternity hospital in Cairo, Egypt. It is a university affiliated hospital providing free health care to maternity as well as gynecological clients and family planning services. Being a large university hospital in a metropolitan city, it attracts clients from all over Egypt, including Upper and Lower Egypt areas especially complicated cases.

Subjects: A purposeful sample of (100) pregnant women, attending antenatal unit were recruited for the study according to the following inclusion criteria: diagnosed as having vulvovaginal candidiasis infection, their gestational age before 20 weeks, and can read & write. Patients who had chronic diabetes or gestational diabetes and who had any other type of genital infection, complication of current pregnancy as rupture membrane will be excluded. Also pregnant women who refused to participate in the study were excluded or mothers attended a previous similar training.

Tools for data collection: three tools were constructed by the researcher after reviewing related literature: Semi-structured Interview questionnaire, Pre-posttest questionnaire and follow-up questionnaire.

1. Semi-structured Interview questionnaire. It entailed 4 main sections.
 - a. Personal data. This section was concerned with data related to pregnant women's age, occupation, residence, educational level, habits as smoking and caffeine intake
 - b. Personal & family medical history. This section included (5) questions related to diabetes, hypertension, thyroid, allergy, and any congenital anomalies.
 - c. Obstetric history: it includes (14) questions such as; gravidity, parity, number of living children, number of abortion, date of last labor or abortion, as well as detailed history of last pregnancy as: history of gestational diabetes, history of any complication during last pregnancy, labor, and postpartum period: mode of previous delivery, reason for abortion, date of last menstrual period and calculated date of delivery.
 - d. Health habits. This section included (14) questions related to maintain dryness after toilet, use of soap during washing of the genital area, use of daily peri-pad, use of cotton underwear, changing wet underwear, use of external vaginal douche daily & during menses, changing peri-pad frequently during menses, changing underwear frequently during menses, wash of underwear carefully, taking ovulation induction for long period (>3 years), taking hormonal family planning for more than 3 years, over eating of carbohydrates and sugary food content, and eating of food containing elements for increasing immunity protection during pregnancy as olive oil, whale liver oil, garlic, and vitamin c.
2. Pre-posttest questionnaire. It include (13) questions related to factors that may increase severity and recurrence of VVC and factors that may help in relieving symptoms of VVC.

Scoring system: the correct answers were predetermined according to the literature. A score of (2) was given to the correct and complete answer; a score of (1) for correct but incomplete answer; and a score of (0) for the wrong or no answer. The total score was computed by summing up the number of correct answers for all questions. The total knowledge score calculated by (13) questions \times 2= 26 score, then the total scores were classified into three levels: poor (<50%); acceptable (50%to<75%); and high (\geq 75%).

3. VVC Follow-up Sheet. It include data related to follow-up symptoms of vulvovaginal candidiasis, it include (4) items as vaginal itching, dyspareunia and characteristics & odor of vaginal discharge,

3.1. Validity and Reliability

The tools were thoroughly reviewed by three experts in maternal & newborn health nursing for content validation. As per their opinions, no modifications were required. Reliability of the tools was performed to confirm its consistency. The reliability coefficients' alpha between questions was 0.83.

3.2. Pilot Study

A pilot study was carried out on 10 mothers representing 10% of the total sample to test study tools in terms of their clarity, applicability and time required to fill. Since no modifications were done, these mothers were included in the sample.

3.3. Procedures

Upon obtaining official permission from director of El-Manial maternity hospital, data were collected through five phases: Preparation, Recruitment; Assessment, Implementation, and Follow-up& evaluation.

1. **Preparation phase.** During this phase an official permission was taken from the hospital administrators. Extensive review of related literature has been done for construction of data collection tools and for designing the teaching brochure. The brochure was constructed in a clear Arabic language and covered knowledge related to signs & symptoms of VVC and healthy habits to follow to alleviate symptoms and prevent recurrence of infection. As well as it include pictures to clarify the written information.
2. **Recruitment phase.** The researcher met the pregnant women in the waiting room of the antenatal outpatient clinic to explain the purpose and nature as well as to obtain the informed written consent of the study from those who agreed to participate and met the selection criteria.
3. **Assessment phase.** After recruitment, each pregnant woman was interviewed individually where semi-structured interview questionnaire and pretest questionnaire were completed. The questions were asked in Arabic and the woman's responses were recorded by the researcher. The time taken to complete the tools was about 30 minutes, and the needed time to complete this phase was 30 days.
4. **Implementation phase.** After completion of the assessment phase each women received one small session of nursing instruction about definition, symptoms, risk factors and how woman can help in treating and preventing recurrence of vulvovaginal candidiasis. Brochure was used as teaching aid to help in clarifying information presented in this session. During and after the teaching session the researcher encouraged active participation of the

pregnant woman through asking questions and receiving feedback. This session was conducted in the waiting room of the antenatal outpatient clinic immediately after completion of the assessment phase. The time taken to complete this phase was about 25 minutes.

5. **Follow up and evaluation phase.** Follow-up of VVC symptoms conducted after 4 weeks from the implementation phase to assess if the symptoms of VVC were relieved or not using follow-up questionnaire. And posttest assessment was performed to assess level of knowledge using pre/posttest questionnaire. Each pregnant woman was followed up individually in the waiting room of the antenatal outpatient clinic. The questionnaires were filled by the researcher. The time taken to complete this phase was about 20 minutes. Also, follow-up and evaluation of recurrence of VVC infection carried out four weeks apart after first follow-up until pregnant women reach 36 weeks of gestation through antenatal appointment visits using follow-up questionnaire, if the pregnant woman developed recurrent VVC infection symptoms, she will asked to take swabs of the vaginal discharge from the anterior fornix or lateral vaginal wall and send for microscopy for a fungal culture, to confirm recurrence and for culture and sensitivity.

3.4. Ethical Considerations

Ethical approval was obtained from the research ethical committee of the Faculty of Nursing, Cairo University. Then official permission was granted from director of El-Manial maternity hospital in Cairo, Egypt, to facilitate data collection process. The researcher explained the aim of the study to the mothers and informed them that the information obtained will be confidential, their participation was in a voluntary base and they have the rights to refuse and/or withdraw at any time without providing a reason and without any effect on the mothers and their newborn routine care. A written Informed consent was taken from women to obtain their acceptance to participate in the research

3.5. Statistical Analysis

Data entry and statistical analysis were done using SPSS 20.0 statistical software package. Descriptive statistics included frequencies and percentages for qualitative variables, and means and standard deviations for quantitative variables, one's descriptive statistics and frequencies were run to examine normality and determine if any skewness or kurtosis occurred. Assessment of normality was made through histogram; 95% confident interval (CI). Parametric and non-parametric inferential statistics as (paired t-test, two related sample test, Chi-square test and correlation analysis) were used. For all of the statistical tests done, the threshold of significance was fixed at the 5% level (P-value). A p-value > 0.05 indicates non-significant results and a p-value <0.05 indicates a significant result. The smaller the p-value obtained, the more significant is the result.

4. Data Analysis and Finding

The aim of the current study was to examine the effect of supportive nursing instructions on recurrence of vulvovaginal candidiasis during pregnancy. Finding of this quasi experimental study will be presented in five main sections: description of the sample, effect of supportive nursing instruction on women's knowledge regarding vulvovaginal candidiasis, follow-up of vulvovaginal candidiasis symptoms, recurrence of vulvovaginal candidiasis symptoms, and relation among variables.

Section I: Description of the Sample: This section includes four main parts a) socio- demographic characteristics; b) family history; c) obstetric history; d) health habits; e) Vulvovaginal Candidiasis symptoms

A) Socio- demographic Characteristics: includes pregnant women's age, occupation, residence, educational level, habits as smoking and caffeine intake. The age of the sample range was 18-45 year with a mean of 26.38± 6.56 years old. In relation to level of education, 38% of the sample received secondary education, 10% of the sample can read and write, 48% of the sample had primary education, and 4% of the sample received baccalaureate education. Regarding mother's occupation, 30% of the sample were working while, 70% of the sample were housewife, 36% of the sample was living in rural area while, 64% living in urban area, 74% of the sample was negative smokers (Table 1).

Table 1. Distribution of the sample according to their socio-demographic characteristic:

Characteristics	Items	Freq. (n=100)	%
Educational level	Can read and write	10	10
	Primary education	48	48
	Secondary education	38	38
	Baccalaureate education	4	4
Residence	Urban areas	64	64
	Rural areas	36	36
Patient's occupation	Housewife	70	70
	Working	30	30
Mother smoking	Passive	74	74
	No	26	26

b) Family History

Regarding to family history, 30% of the sample had family history of diabetes mellitus, 30% had family history of hypertension, 14% had family history of congenital anomalies, 24% had family history of cardiac disease, 10% had family history of renal disease and 38 % with no history of family medical diseases (Table 2).

Table 2. Distribution of the sample according to their family history

Items	Freq. (n=100)	%
Diabetes mellitus	30	30
Hypertension	30	30
congenital anomalies	14	14
cardiac disease	24	24
renal disease	10	10
No history	38	38

*Numbers are not mutually exclusive, i.e. some women have more than one family history.

C) Obstetric history

Regarding obstetric history, the duration of marriage range was 4-300 months with a mean of 66 ± 6 months. In addition the current gestational age range was 13-19 weeks with mean 15 ± 2 week. And number of previous pregnancy (gravida) ranged 1-6 times with mean of 4 ± 1 times. There was 38% of the sample primigravida, and 62% was multigravida, with number of delivery ranged 1-5 times with mean of 3 ± 1 times. And the time of last delivery range was 2-60 months with mean of 29 ± 5 months. In addition, the number of living child range was 1-6 children with mean of 3 ± 1 child (Table 3).

In addition, 48.4% of the multigravida women had history of normal vaginal delivery and 51.6% had history of cesarean section delivery. Regarding pregnancy complications, 3.42% of the multi gravida women had a history of gestational diabetes, 12.9% had a history of abortion, 6.45% had history of pregnancy bleeding, 9.68% had history of infection rather than VVC, and 9.68% had history of severe anemia. In addition, 13.1% of the multi Para women had a history of complication during delivery and post-partum; 9.68% of them had a history of post-partum hemorrhage (PPH) and 3.42% of them had a history of stillbirth babies (Table 4).

Table 3. Distribution of the sample according to their obstetric history

Items	Mean	SD±
Duration of marriage	66	6months
Gestational age	15	2 week
Number of gravidity	4	1time
Number of parity	3	1time
Number of delivery	3	1 time
Number of living children	3	1 child
Time of last delivery or abortion	29	5 months

Table 4. Distribution of the sample according to their obstetric history (cont.)

Characteristics	Items	Freq.	%
Type of gravida (n=100)	Primi-gravida	38	38
	Multi-gravida	62	62
Type of last delivery (n=62)	Normal	30	48.4
	CS	32	51.6
Complication previous pregnancy (n=62)	Gestational diabetes	2	3.42
	Abortion	8	12.9
	Bleeding	4	6.45
	Infection rather than VVC	6	9.68
	Anemia	6	9.68
	No complication	36	57.87
Complication previous delivery (n=62)	PPH	6	9.68
	Stillbirth	2	3.42
	No complication	54	86.9

D) Health habits

Regarding pregnant woman's health habits, 82% of the sample maintain dryness after urination, 66% of the sample was using soap for washing of the genital area, 52% using daily protective pads, 68% wearing cotton under wears, 76% changing a wet under wears frequently, 64% using daily vaginal douching, 12% using vaginal douching during menstruation, 100% change pads regularly during menstruation, 80% change under wears regularly

during menstruation, 56% using soap and warm water during washing (Table 5).

Regarding intake of unnecessary antibiotics, 30% of the sample had used unnecessary antibiotics (without doctor prescription), 12% was using corticosteroid drugs for more than 3 years, 18% using oral contraceptive for more than 3 years, 74% had used excessive intake of carbohydrate and sugars daily, and 23% of the sample had used to take especial food to strength immunity (Table 5).

Table 5. Distribution of the sample according to their health habits

Item	yes		No	
	Freq.	%	Freq.	%
Maintain dryness after urination	82	82	18	18
Using soap for washing of the genital area	66	66	34	34
Using daily protective pads	52	52	48	48
Wearing cotton under wear	68	68	32	32
Changing wet under wear frequently	76	76	24	24
Using daily vaginal douching	64	64	36	36
Using vaginal douching during menses	12	12	88	88
Changing pads frequently during menses	100	100	0	00
Changing under wears during menses	80	80	20	20
Washing with soap and warm water	56	56	44	44
Use unnecessary antibiotics	30	30	70	70
use corticosteroid drugs> 3 years	12	12	88	88
Use oral contraceptive pills >3years	18	18	82	82
Eat excessive carbohydrate and sugar	74	74	26	26
Eat food to strengthen immunity	46	46	54	54

*Numbers are not mutually exclusive, i.e. some women have more than one habits.

E) Vulvovaginal candidiasis symptom

Regarding symptoms of vulvovaginal candidiasis, 96% of sample had vaginal itching, 82% had burning during sexual intercourse (dyspareunia), 60% had a cheesy white discharge, 46% had offensive odor of vaginal discharge. And 42% of the sample had recurrent vulvovaginal candidiasis infection with time range was 1-6 months with mean of 3.5 ± 0.5 months (Table 6).

Table 6. Distribution of the sample according to their vulvovaginal candidiasis symptoms

Item	Freq.	%
Itching	96	96
Dyspareunia	82	82
Cheesy white vaginal discharge	60	60
Offensive vaginal discharge	46	46
recurrent vulvovaginal candidiasis infection	42	42

*Numbers are not mutually exclusive, i.e. some women have more than one symptom.

Section II: Effect of supportive nursing instruction on women's knowledge regarding vulvovaginal candidiasis

Table 7 showed that, the majority of the pregnant women had incorrect knowledge related to factors help in relieving the symptoms and the factors that increase severity and recurrence of VVC infection in pretest except for poor cleaning, use of warm water during vaginal douche, using soap for wash and avoid internal vaginal douching (88%, 66%, 62%, 66% respectively) had correct and complete knowledge. At the posttest, there were

statistically significant improvements in all answers; the vast majority percentage of pregnant women (100%) had correct and complete answers. In total the mean score

of knowledge regarding VVC in pre instruction was 16.6 ± 4.18 out of 26, compared to 25.01 ± 0.91 four weeks post instruction.

Table 7. Distribution of the pregnant women according to their knowledge about vulvovaginal candidiasis

Items	Pretest		Post test		Chi-square	
	Freq.	%	Freq.	%	X ²	P
Factors that increase severity and recurrence of infection						
1. Poor cleaning						
• Correct and complete	88	88	100	100	12.8	<0.001
• Incorrect	12	12	00	00		
2. Douching						
• Correct and complete	20	20	100	100	133	<0.001
• Incorrect	80	80	00	00		
3. Antibiotics						
• Correct and complete	26	26	100	100	117	<0.001
• Incorrect	74	74	00	00		
4. Contraceptive pills						
• Correct and complete	10	10	100	100	164	<0.001
• Incorrect	90	90	00	00		
5. Pregnancy						
• Correct and complete	24	24	50	100	123	<0.001
• Incorrect	76	76	00	00		
6. stress						
• Correct and complete	4	4	100	100	185	<0.001
• Incorrect	96	96	00	00		
Factors help in relieving the symptoms						
1. Use of Warm water during vaginal douche						
• Correct and complete	66	66	98	98	34.7	<0.001
• Incorrect	34	34	2	2		
2. Using soap for wash						
• Correct and complete	62	62	100	100	46.9	<0.001
• Incorrect	38	38	00	00		
3. Change wet underwear						
• Correct and complete	46	46	100	100	74.0	<0.001
• Incorrect	54	54	00	00		
4. Avoid internal vaginal douching						
• Correct and complete	66	66	100	100	41.0	<0.001
• Incorrect	34	34	00	00		
5. Follow balanced diet						
• Correct and complete	42	42	96	96	68.2	<0.001
• Incorrect	58	58	4	4.0		
6. wear cotton underwear						
• Correct and complete	34	34	100	100	98.5	<0.001
• Correct and incomplete	20	20	00	00		
• Incorrect	46	46	00	00		
7. change underwear frequently						
• Correct and complete	12	12	100	100	157	<0.001
• Incorrect	88	88	00	00		
Mean± SD	16.6±4.18		25.01±0.91			

Concerning level of knowledge regarding VVC, pre-instruction only 40% of the pregnant women have a high level of knowledge, this percentage was increased to 94% four weeks post instructions (Table 8).

Table 8. Distribution of the pregnant women according to their level of knowledge regarding vulvovaginal candidiasis

Level of Knowledge	Pre-instruction (n=100)		Post-instruction (n=100)	
	Freq.	%	Freq.	%
poor	58	58	6	6
acceptable	2	2	00	00
High	40	40	94	94

Table 9 revealed that, there was a highly statistically significant difference between mean knowledge score regarding VVC during pregnancy in pretest and posttest ($p < 0.0001$).

Table 9. Comparison between mean knowledge score regarding VVC during pregnancy in pre and posttest

Comparison	Differences		Paired t- test	
	Mean	±SD	t	p
Pretest	16.6	4.18	19.6591	<0.0001
Posttest	25.01	0.91		

Results revealed that a highly statistically significant difference between level of knowledge regarding VVC during pregnancy in pre and posttest as ($p < 0.0001$).

Table 10. Comparison between level of knowledge regarding VVC during pregnancy pre & posttest

Level of knowledge	Poor		Acceptable		High		Two related sample test	
	Freq.	%	Freq.	%	Freq.	%	Z	p
Pretest	58	58	2	2	40	40	7.225	<0.0001
Posttest	6	6	0	00	94	94		

Section III. Follow-up of vulvovaginal candidiasis symptoms

Four weeks after instructions and after baseline assessment, the follow-up of VVC symptoms revealed that, 4% of the sample had minimal vaginal itching, 2% of the sample had dyspareunia, no cheesy white vaginal discharge, and also no offensive odor (Table 11).

Table 11. Distribution of the sample according to follow-up of VVC symptoms

Item	Freq.	%
Itching	4	4
Dyspareunia	2	2
Cheesy white vaginal discharge	0	00
Offensive vaginal discharge	0	00

Section IV: Recurrence of vulvovaginal candidiasis symptoms

Follow-up of VVC every four weeks during pregnancy till completion of 36 weeks revealed that, in 1st 4 weeks follow-up, two cases developed recurrence of VVC, in 2nd follow-up only one case developed recurrence, in 3rd

follow-up three cases developed recurrence, and in 4th four weeks follow-up five cases developed recurrence of VVC (Table 12).

Table 12. Distribution of the sample according to recurrence of VVC

Time of recurrence	Freq.	%
1 st 4weeks follow-up (n=100)	2	2
2 nd 4weeks follow-up (n=100)	1	1
3 rd 4weeks follow-up (n=95)*	3	3.16
4 th 4weeks follow-up (n=80)**	5	6.25

*N.B: Five cases in 3rd follow-up were delivered so total number decreased to 95

**N.B: Fifteen cases in 4th follow-up were delivered so total number decreased to 80

Section V: Relation among variables

Using correlation analysis results indicated that there was a significant correlation between family history of diabetes, maintain dryness after urination and using soap for washing of the genital area and recurrence of VVC infection during pregnancy ($r = 0.296, 0.433$ & 0.378 respectively) ($p = 0.037, 0.002$ & 0.007 respectively). On the other hand, there was no significant relation between mother age, mother smoking habits, mother address, duration of marriage and recurrence of VVC during pregnancy ($r = 0.032, 0.216, 0.028$ & 0.000 respectively) ($p = 0.826, 0.133, 0.848$ & 0.998 respectively). Also, there was no significant relation between using daily protective pads, wearing cotton under wear, changing wet under wear frequently, using vaginal douching, using vaginal douching during menses and recurrence of VVC infection during pregnancy ($r = 0.058, 0.078, 0.117, 0.206$ & 0.114 respectively) ($p = 0.691, 0.589, 0.419, 0.152$ & 0.431 respectively). In addition, there was no statistically significant relation between changing pads frequently during menses, changing under wears during menses, washing with soap and warm water, use unnecessary antibiotics, use corticosteroid drugs more than 3 years, use oral contraceptive pills more than 3years, eat excessive carbohydrate and sugar, eat food to strengthen immunity and recurrence of VVC infection during pregnancy ($r = 0.069, 0.173, 0.174, 0.212, 0.141, 0.106, 0.240$ & 0.095 respectively) ($p = 0.633, 0.228, 0.227, 0.140, 0.330, 0.465, 0.093$ & 0.510 respectively).

5. Discussion

In this research the researcher attempted to examine the effect of supportive nursing instructions on recurrence of vulvovaginal candidiasis infection during pregnancy. The findings of this research study were approved the research hypotheses which are 1. Pregnant women with vulvovaginal candidiasis who received the supportive nursing instructions, their symptoms of VVC will decrease than before, 2. Pregnant women who received supportive nursing instructions regarding vulvovaginal candidiasis will show higher scores in posttest than in their pretest and 3. Pregnant women with vulvovaginal candidiasis who received the supportive nursing instructions will prevent the episodes of recurrent VVC during pregnancy. Findings of this research study found that there was an observed relieve in

majority of the symptoms of VVC infection after four weeks follow-up. The results revealed highly statistically significant difference was found in relation to impact of the supportive nursing instructions on mean knowledge score regarding VVC during pregnancy in pretest and posttest. These findings might be related to pregnant women's commitment to the received nursing instruction with the prescribed medical therapy and the full explanation of the nursing instructions from the researcher that consequently relieve the VVC symptoms and increase pregnant women's knowledge score in their posttest.

These finding matched with Aubynac & Tagoeab [19] who studied Prevalence of vaginal infections and associated lifestyles of students in the university of Cape Coast, Ghana and concluded that education on lifestyle modifications will go a long way in reducing the prevalence of VVC infection. In addition, Jombo, Akpera, Hembra and Eyong [20], who studied the symptomatic vulvovaginal candidiasis: knowledge, perceptions and treatment modalities among pregnant women of an urban settlement in West Africa, revealed that pregnant women should be properly counseled and health educated on the need for prompt and adequate treatment of vulvovaginal candidiasis.

In relation to recurrence of vulvovaginal candidiasis symptoms during pregnancy, the results revealed that most of cases did not develop recurrent episode of VVC attack during pregnancy through follow-up till term while minority of cases developed recurrent episode especially in third trimester of pregnancy. These findings might be related to pregnant women's commitment to the received nursing instruction. These findings are at the same line with Fardiazar, Ronaci, Torab & Goldust [21] who found that statistically significant difference between mean numbers of recurrences during three trimesters of pregnancy as follow, mean of recurrence number was 0.17 ± 0.48 during the first trimester, mean of recurrence number was 0.92 ± 0.76 during the second trimester and mean of recurrence number was 2.16 ± 0.63 during the third trimester. In addition, these findings are matched with Ekpenyong, Inyang-etoh, Ettebong, Akpan, Ibu & Daniel [22] who studied the recurrent vulvovaginal candidiasis among young women in south eastern Nigeria: the role of lifestyle and health-care practices and found that a significant association between certain lifestyle habits and aberrant health-care practices and incident recurrent VVC among young women in south eastern Nigeria. This association has underscored the need for the introduction of preventive programs aimed at educating young women about the risk factors that could precipitate recurrent VVC.

Results indicated that there was no statistically significant relation between mother age and recurrence of VVC during pregnancy. Coincidentally, an epidemiological study described an increased Candida vaginitis in women at reproductive age rather than those at menopause [23] The reason for VVC being more common in young women may lie in the fact that they are easy to suffer from some physiological and tissue changes, caused by reproductive hormones, which happen in women during this stage of life, increase susceptibility to Candida infection.

Results indicated that there was a significant correlation between family history of diabetes and recurrence of VVC

during pregnancy, on the other hand, there was no significant correlation between eat excessive carbohydrate and sugar and recurrence of VVC during pregnancy. Nyirjesy, Zhao, Ways, & Usiskin, [24] who evaluating vulvovaginal symptoms and Candida colonization in women with type 2 diabetes mellitus treated with canagliflozin, a sodium glucose co-transporter 2 inhibitor, have showed that diabetes mellitus, especially uncontrolled diabetes mellitus, was conducive to the occurrence of VVC explored that frequently drinking sweet drinks and frequently eating sweet foods could augment the susceptibility to VVC, occasionally or never drinking sweet drinks and occasionally or never eating sweet foods showed a protective effect. This may contribute to the fact that increased glucose concentrations in vaginal secretions could promote the adherence of Candida to epithelial cells and further stimulate its development.

Results indicated that there was a significant correlation between maintain dryness after urination and using soap for washing of the genital area and recurrence of VVC infection during pregnancy, while, using daily protective pads, wearing cotton under wear, changing wet under wear frequently had no significant relation with recurrence of VVC infection during pregnancy. This finding in congruent with a recent study found that risk factors for VVC involved synthetic underclothing, frequently wearing tight pants, and healthy vaginal care [25] Another study showed that type of underwear (cotton/synthetic) was statistically associated with the presence of recurrent VVC, this probably is attributed to the fact that wearing tight clothes seems to foster friction and maceration, thereby increasing the local acidity and therefore the fungal infection [26].

Results indicated that there was no statistically significant relation between using vaginal douching; using vaginal douching during menses, changing pads frequently during menses, changing under wears during menses, washing with soap and warm water and recurrence of VVC infection during pregnancy. This results in contrast with Na, Weiping, Enfeng, Chan, Zhaozhao, & Honghui [27] who studied the risk factors for candida infection of the genital tract in the tropics and showed that frequent intra-vaginal douching was an adverse factor of women with VVC, the reason may lie in that intra-vaginal practices could cause damage to vaginal and rectal tissues and disrupt the vaginal flora as well. Moreover, intra-vaginal douching may disturb the balance of vaginal micro-ecosystem, lead to the decline of vaginal homeostasis, encourage the growth of yeasts, and further cause VVC.

Results indicated that there was no statistically significant relation between use unnecessary antibiotics and use corticosteroid drugs more than 3 years with and recurrence of VVC infection during pregnancy. On the contrary, Jaeger, Plantinga, Joosten, Kullberg and Netea, [28] concluded that VVC is a common occurrence after systemic or vaginal antibiotic drug treatment or corticosteroid. These agents not only trigger VVC, but can also increase vaginal colonization, these drugs, either systemically or locally, suppress lactobacilli flora, candidal organisms are then free to grow, adhere and germinate.

Results indicated that there was no statistically significant relation between use oral contraceptive pills

more than 3years and recurrence of VVC during pregnancy. On the contrary, An increased candidal colonization has been shown in several studies in patients using oral contraceptives containing a high estrogen dose, which cause an increased glycogen load in epithelium, and in turn, is a nutritional source for candida growth and germination, increase estrogen promotes fungal adhesion and germination; as a consequence, fungi are more capable to penetrate vaginal wall [6].

6. Conclusion

The current study results concluded that pregnant women who received the supportive nursing instruction had higher total mean score of knowledge than before regarding the VVC care and prevention of recurrence. The follow-up of VVC symptoms revealed that, majority of the sample had relieved their symptoms after instructions and follow-up. Regarding recurrence of VVC symptoms, the results revealed that most of the cases did not develop recurrent episodes during pregnancy till term.

7. Recommendations

Based on the research findings, the following was recommended:

1. Increase awareness among families and health care providers about importance of healthy behavior
2. Supportive nursing instruction should be an essential part of candidiasis treatment.
3. All nurses in obstetric outpatient clinic should be informed with the vital health information about VVC.

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