

Effect of Educational Program About Self-care Practices on Preventing Occurrence of Vaginal Infection Among Gestational Diabetic Women

Nawal K. Abd Elkhalek¹ & Sahar F. Elsayed².

¹Lecturer of Obstetrics and Gynecological Nursing, Faculty of Nursing, South Valley University, Egypt.

²Assistant Professor of Obstetrics and Gynecological Nursing, Faculty of Nursing, South Valley University, Egypt.

Abstract

Background: gestational diabetic women are reported to be high risk for infections of the genital tract. Controlling vaginal infections rested on the nurse through educating women self-care practices. **Aim:** To assess the effect of educational program about self-care practices on prevention occurrence of vaginal infection among gestational diabetic women. **Methods:** Quasi experimental research design was used in this study. It was conducted at antenatal outpatient clinic of South Valley University's Hospital. Sample included 60 pregnant women with diabetes mellitus. Structured interview and self-care model was used and involved three parts. An educational program about care of genital system was carried out on pregnant women with gestational diabetes. **Results:** There is statistical significant difference between control and study groups regarding total self-care practices and occurrence of genital infection P-values are 0.001. **Conclusion:** There was a vital role to the educational program about self-care practices on preventing occurrence of vaginal infection among pregnant women. **Recommendations:** Planning and implementing educational program as a routine hospital care with providing a brochure about genital hygienic practices are important to reduce rate of vaginal infection among gestational diabetes women.

Keywords: Educational Program, Vaginal Infection & Gestational Diabetic Women.

Introduction

Diabetes mellitus continue to affect growing numbers of women in their childbearing years and increasing their risk of obstetric complications (Chu et al., 2017). Gestational diabetes mellitus (GDM) is a type of diabetes diagnosed during the 2nd or 3rd trimester of pregnancy and is clearly not overt diabetes (American Diabetes Association, 2018).

It is "widely accepted" that the incidence of infections is greater in diabetes mellitus patients. Increased recurrence of cervicovaginal infections is associated with a multitude of factors regarding the elevated glucose concentrations in the vaginal mucosa (Lukic et al., 2017) Nowakowska et al. reported that the risk of vaginal Candida colonization in pregnant women is more than four times higher in women with DM compared to non-diabetic women, also postulating an elevated risk in those with GDM (Nowakowska et al., 2015)

For screening and diagnosis of GDM, the International Association of Diabetes and Pregnancy Study Groups (IADPSG) recently in 2015, issued new criteria. According to the IADPSG recommendations, fasting plasma glucose should be measured in the first prenatal visit and women with fasting blood glucose (FBG) >7.0mmol/L will be diagnosed with overt DM and those with FBG>5.1mmol/L will be diagnosed with GDM. For women with FBG<5.1mmol/L, a 75-g

2-hour oral glucose tolerance test (OGTT) should be performed at 24 to 28 weeks (Pettker et al., 2017).

GDM is associated with increased risk of maternal complications such as spontaneous preterm birth, premature rupture of membrane (PROM), chorioamnionitis, traumatic complications of vaginal delivery, cesarean delivery, morbidity from operative delivery, preeclampsia, and risk of developing metabolic syndrome or DM (Sacks et al., 2015) & (Varner et al., 2017). GDM is also associated with poor metabolic control, higher body mass index, and impaired leukocyte function, some studies have suggested that GDM is associated with disturbances in the vaginal flora and vagina infections, but this is controversial. Infections caused by Candida are relatively well known to be associated with GDM, but much less is known about bacterial infections (Marschalek et al., 2016).

When managing vaginal infections the nurse takes the responsibility to modify the practices and to improve and prevent recurrence of vaginal infections. The prevention requires changing in self-care practices that put the women under the risk of infection, and the women should be taught about the most common symptoms and risk factors for vaginal infections (Baraia et al, 2016)

Self-care practices refer to activities and attitudes, which add to the upkeep of prosperity and personal

wellbeing and advance human improvement. As far as health maintenance, self-care is any action as a person with the expectation of enhancing or reestablishing wellbeing, or treating or anticipating sickness. Vaginal infection related self-care themes include: personal hygiene, perineal hygiene, sexual hygiene, and menstrual hygiene (Baraia et al., 2017).

The notion that self-care is a major mainstay of health, and social consideration implies it is a vital part of a modern human services framework administered by bureaucracy and legislation. Concern has been raised by world health organization (WHO, 2015).

About whether vaginal, sexual or menstrual self-practices could have harmful effects such as increasing the susceptibility to sexually transmitted infection (STI) or reproductive tract infection (RTI). They recommend that more evidence is needed to confirm a correlation between an increased risk of RTI and Gestational diabetes and vaginal practices, but they are modifiable through health education and prevention messages by the maternity nurses (WHO, 2015).

Vulvovaginal conditions are treated on an outpatient basis, unless the patient has other medical problems, and women may express embarrassment, guilt, or anger and may be concerned that the infection may be serious (causing infertility) or that it may have been acquired from a sex partner. In these points patient teaching, tact, and reassurance are important aspects of nursing care (Abdelnaem, et al., 2019).

Significance of the study

Vulvovaginitis is common among diabetic patients. Patients with diabetes, especially those with poorly controlled glycaemia, are risk to have genital mycotic infections. The main cause of vulvovaginal infections in diabetic women is *C. albicans*. Genetics, pregnancy, estrogen have been identified as the main risk factors for vaginitis in diabetic patients (Kalra & Kalra, 2017).

DM increased risk for infection as it associated with reduced response of neutrophil function, T cells, and disorders of humoral immunity (Tinelli, 2018) Also a study performed to compare occurrence of vaginal infections in gestational diabetic women, and found that vulvovaginal candidiasis was higher in gestational diabetic women compared with healthy pregnant women (22.6% vs 9.7%; $P < 0.001$) (La Vignera et al., 2019) Pregnant women with diabetes have a high risk of *Candida* infection because the elevated sugar level in the blood provides food for yeast and encourages *Candida* overgrowth (Sopian et al., 2016) Also Nowakowska et al. 2015 reported that risk of vaginal infection in pregnant women is more than four times higher in women with DM compared to non-diabetic women.

Also Epidemiological studies have reported that pregnant women exposed to bacterial and fungal infections are at higher risk of maternal and neonatal complications (Lukic et al., 2017), so the researcher interested to identify effect of educational program on prevention occurrence of vaginal infection among pregnant women with gestational diabetes.

Aim of the study

This study aimed to

Assess the effect of educational program about self-care practices on preventing occurrence of vaginal infection among gestational diabetic women.

Research hypothesis:

Women who attended an educational program about self-care practices on preventing occurrence of vaginal infection exhibits less vaginal infection than those who don't attend.

Patients & Methods

Patients and methods were showed into four designs technical, operational, administrative, and statistical design.

Technical Design

Which included research design, setting, sample and tools of data collection.

Research Design:

A quasi-experimental (control and study) design was used in this study.

Setting

The study was implemented at antenatal outpatient clinics of South Valley University's Hospital, Qena governorate. It serves Qena governorate only. Antenatal outpatient clinics included two rooms, one for interviewing the pregnant women and taking history that have a sector for physical examination and the other room for ultrasound examination.

Sample

A total of 60 pregnant women with gestational diabetes involved in the study that divided into two equal groups control (30 pregnant women received routine hospital care) and study (30 pregnant women received educational program about self-care practices). The sample calculated using the following equation.

$$\text{Sample size } n = \frac{[\text{DEFF} * N * p(1-p)]}{[(d^2/Z^2)_{1-\alpha/2} * (N-1) + p * (1-p)]}$$

DEFF (Design effect) = 1

N (population) = 120

p (Hypothesized %) = 10% +/- 5

d (tolerated margin of error) = 0.05

Z (level of confidence) = 1.96

α (Alpha) = 0.05

$$n = \frac{[1 * 120 * 10\% +/- 5 (1 - 10\% +/- 5) / [(0.05)^2 / (1.96)^2 - 0.05 * (120 - 1) + 10\% +/- 5 (1 - 10\% +/- 5)]}$$

n = 60 pregnant women with gestational diabetes

Inclusion criteria

- Pregnant woman diagnosed with gestational diabetes

- Between 24-28 weeks' gestation
- No presence of vaginal infection
- Single fetus

Tools of the study

A structured interview questionnaire was designed by the researchers and included three parts.

Part one: included personal data of gestational diabetic women as (age, education, occupation, and residence). **Part two:** involved obstetrics data (previous and current) as gravidity, parity, abortion, stillbirth, previous pregnancy complications, mode of previous delivery, and weeks of gestation. **Part three:** Self-care model included 15 items (practical actions designed by Infectious Diseases Society of America) directed to pregnant women with gestational diabetes to assess their implementation or not as precautions to prevent vaginal infection (Pappas et al., 2015).

Practice scoring system

Each practice was scored as (1) for done action and (0) for not done action. While the total practices score was calculated as the following: <70% was unsatisfactory and if 70% and more was satisfactory.

Supportive materials

It was prepared by the researcher based on literature review. It planned in a form of brochure with using a simple and clear Arabic language that contained practices regarding genital care supported with photo to act as a guide for them at home and support their information.

Tools validity and reliability

The face and content validity of the study tools was assessed by a jury consisted of experts in the maternity and gynecological nursing department of faculty of nursing, South Valley University for comprehensiveness, accuracy, and clarity in language. Study tools were tested for its internal consistency by Cronbach's Alpha. It was 0.810 for the questionnaire.

Operational design

It was presented in two phases pilot study and field work.

Pilot study

Pilot study was involved (10%) according to inclusion of the sample size (6 cases) of pregnant women with gestational diabetes to evaluate clarity and efficiency of the study's tool.

Field work

Data collection took about ten months started from the beginning of May 2019, and completed by the end March 2020. It was implemented in three phases, pre intervention, intervention and post intervention:

Phase 1 (Pre intervention phase) for the control and the study groups

The researcher attended at South Valley University (antenatal outpatient clinics) three days per week from 9am to 1pm. The researcher interviewed with each pregnant woman diagnosed with gestational

diabetes individually, introduced herself then explained the aim of the study and ensures their cooperation. Then oral consent from participants was obtained. The researcher chose an envelope to determine the group that the pregnant woman (control or study). The researcher started to fill the structure interview questionnaire from the pregnant woman to assess personal characteristics, and current and past obstetric data. It took about 20 to 25 minutes.

Phase 1 (Intervention phase)

A) For the control group

The pregnant woman received routine antenatal hospital care during her pregnancy till labor.

B) For the study group

The researcher met with all pregnant gestational diabetic women involved in the study group in each day at the end of the day in a separate room (studying room that found beside outpatient clinic). The women's number in each educational session ranged from 1 – 2 pregnant women. The total number of groups was 18 groups. The researcher explained to pregnant women practices regarding methods to care for genital areas, and precautions that they should be done to prevent occurrence of vaginal infection that involved general practices as Cut nails frequently, perineal hygiene as use daily perineal pad and sexual hygiene as genital care before and after intercourse. This implemented in a lecture form supported by pictures and videos that took a time from 40-60 minutes. The researcher gave pregnant woman the content of lecture in a brochure to be a guide to her till labor.

Phase 3: Post intervention phase (follow up) for the control and the study groups:

After one week of first meeting with pregnant women. The researcher ask the pregnant women about actions or precautions and checked if done or not and fill the third part of the tool based on her talk. Then the researcher followed up pregnant women with gestational diabetes every two weeks through telephone till labor to identify appearance of any signs & symptoms of vaginal infection and if any, the pregnant woman asked to come to the outpatient clinics and genital infection ensured after diagnosed by obstetrician.

Administrative design

This study was carried out under the approval of faculty of nursing's Ethical committee, South Valley University, also an official permission was obtained from the director of South Valley University Hospital, informed consent was taken from each woman involved in the study, confidentiality was assured. The woman was freely to withdraw from the study at any stage.

Statistical design

The collected data were organized, categorized, coded, tabulated and analyzed using the Statistical Package for social sciences (SPSS). Data were presented and tables and charts using numbers,

percentages, means, and standard deviation. Correlation between variables (Pearson correlation) and chi-square test was used statistical significance was considered at P-value ≤ 0.05 .

Results

Table (1): Distribution of studied pregnant women according to personal data in control and study groups (N=60 —→30 for each group).

Personal data	Control group (30)		Study group (30)		P-value
	No	%	No	%	
Age group					
Less than 25 year	6	20.0	9	30.0	0.061
25 - less than 35 year	19	63.3	14	46.7	
35 year or more	5	16.7	7	23.3	
Mean \pmSD(range/years)	26.23 \pm 4.23(21-39)		28.56 \pm 5.41(20-38)		
level of education					
Illiterate and Read and write	8	26.7	9	30.0	0.445
Basic education	6	20.0	4	13.3	
Secondary	10	33.3	9	30.0	
University	6	20.0	8	26.7	
Occupation					
Employed	12	40.0	10	33.3	0.326
House wife	18	60.0	20	66.7	
Address					
Urban	21	70.0	18	60.0	0.138
Rural	9	30.0	12	40.0	
Family history of DM					
Yes	21	70.0	23	76.7	0.285
No	9	30.0	7	23.3	
Total	30	100.0	30	100.0	

Table (2): Distribution of studied pregnant women according to obstetric history in control and study groups (N=60 —→30 for each group).

Obstetric history	Control group (30)		Study group (30)		P-value
	No	%	No	%	
Gravidity					
Primigravida	8	26.7	11	36.7	0.129
Multigravida	22	73.3	19	63.3	
Parity					
Nulliparous	10	33.3	12	40.0	0.350
Primipara	5	16.7	4	13.3	
Multipara	15	50.0	14	46.7	
Abortion					
Yes	7	23.3	8	26.7	0.579
No	23	76.7	22	73.3	
Still birth					
Yes	1	3.3	2	6.7	0.271
No	29	96.7	28	93.3	
Total	30	100.0	30	100.0	
Previous pregnancy					
Normal	4	18.2	3	15.8	0.767
Complicated	19	81.8	16	84.2	
Total	22	100.0	19	100.0	
The previous labor					
Normal	5	25.0	6	33.3	0.280
Complicated as fetal distress or obstructed labor	15	75.0	12	66.7	
Total	20	100.0	18	100.0	

Table (3): Distribution of studied pregnant women according to current obstetric data in control and study groups (N= 60 → 30 for each group).

Current obstetric data	Control group (30)		Study group (30)		P-value
	No	%	No	%	
Weeks of gestation at time of included to the study					
24 – less than 26 weeks	7	23.3	9	30.0	0.285
26-28 weeks	23	76.7	21	70.0	
Complications occurred through pregnancy					
Yes	25	83.3	19	63.3	0.001**
No	5	16.7	11	36.7	
Total	30	100.0	30	100.0	
Type of complication					
Macrosomic fetus	4	16.0	6	31.6	0.019**
Hypertention	5	20.0	2	10.5	
PROM	2	8.0	3	15.8	
Polyhydrominos	4	16.0	3	15.8	
Preterm labor	4	16.0	2	10.5	
Mix problem	6	24.0	3	15.8	
Total	25	100.0	19	100.0	

(**) Highly statistical significant difference $P < 0.01$

Table (4): Self-care practices among gestational diabetes women in control and study group.

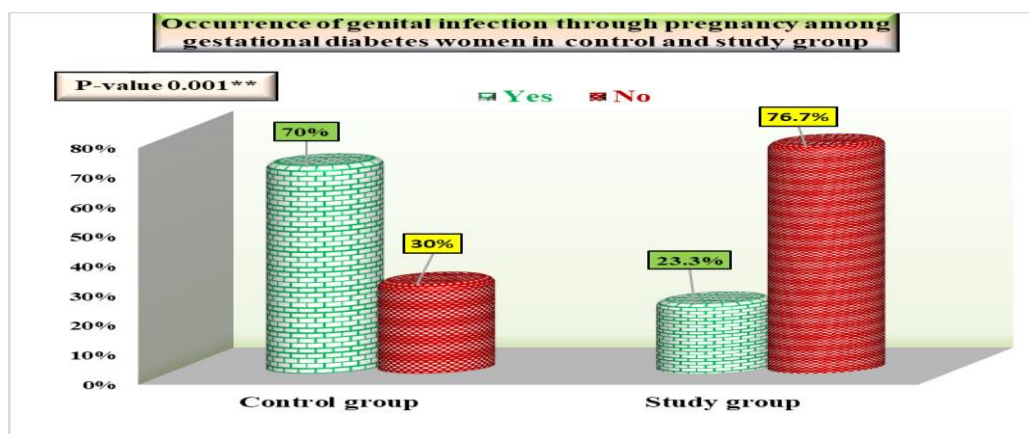
Genital care practices	Control group (30)				Study group (30)				P. value
	Done		Not done		Done		Not done		
	No	%	No	%	No	%	No	%	
General practices									
Cut nails frequently	15	50.0	15	50.0	28	93.3	2	6.7	0.001**
Use public water cycle	13	43.3	17	56.7	25	83.3	5	16.7	0.020*
Washing hands before and after using the toilet	17	56.7	13	43.3	30	100.0	0	0.0	0.001**
Drying after using toilet	8	26.7	22	73.3	28	93.3	2	6.7	0.001**
Perineal hygiene									
External washing of the genital area	24	80.0	6	20.0	30	100.0	0	0.0	0.002**
Cleaning genital area with hands	18	60.0	12	40.0	29	96.7	1	3.3	0.001**
Direction of cleaning the genital area from front to back	6	20.0	24	80.0	27	90.0	3	10.0	0.001**
Use daily perineal pad	5	16.7	25	83.3	27	90.0	3	10.0	0.001**
Changing underwear daily	9	30.0	21	70.0	28	93.3	2	6.7	0.001**
Use cotton underwear	12	40.0	18	60.0	26	86.7	4	13.3	0.001**
Boil under wear and pads	3	10.0	27	90.0	29	96.7	1	3.3	0.001**
Hang under wear in sun rays	13	43.3	17	56.7	30	100.0	0	0.0	0.001**
Sexual hygiene									
Genital care before and after intercourse	6	20.0	24	80.0	30	100.0	0	0.0	0.001**

(**) Highly statistical significant difference $P < 0.01$



(**) Highly statistical significant difference $P < 0.01$

Figure (1): Total self-care practices of pregnancy gestational diabetes women in control and study group regarding care of genital organ:



(**) Highly statistical significant difference $P < 0.01$

Figure (2): Occurrence of genital infection through pregnancy among gestational diabetes women in control and study group.

Table (5): Relationship between total practices of pregnancy gestational diabetes women and personal data:

Personal data	Total practices				Total N (%)	P-value
	Satisfactory (38)		Unsatisfactory (22)			
	No	%	No	%		
Age group						
Less than 25 year	10	66.7	5	33.3	15(100.0)	0.033*
25 - less than 53 year	19	57.6	14	42.4	33(100.0)	
35 year or more	9	75.0	3	25.0	12 (100.0)	
level of education						
Illiterate and Read and write	6	35.3	11	64.7	17(100.0)	0.001**
Basic education	6	60.0	4	40.0	10(100.0)	
Secondary	14	73.7	5	26.3	19(100.0)	
University	12	85.7	2	14.3	14(100.0)	
Occupation						
Employed	15	68.2	7	31.8	22(100.0)	0.256
House wife	23	60.5	15	39.5	38(100.0)	
Address						
Urban	31	79.5	8	20.5	39(100.0)	0.001**
Rural	7	33.3	14	66.7	21(100.0)	
Total	38	100.0	22	100.0	60(100.0)	

(**) Highly statistical significant difference $P < 0.01$

(*) Statistical significant difference $P < 0.05$

Table (6): Relationship between total self-care practices of pregnancy gestational diabetes women and occurrence of genital infection:

	Total practices				Total N (%)	P-value
	Satisfactory (38)		Unsatisfactory (22)			
	No	%	No	%		
Occurrence of genital infection						
Yes	9	32.1	19	67.9	28 (100.0)	0.001**
No	29	90.6	3	9.4	32 (100.0)	
Total	38	100.0	22	100.0	60(100.0)	

Table (1): Demonstrates personal data of pregnant women with gestational diabetes in control and study group and reports that 63.3% of studied pregnant women in control group and 46.7% in study group have an age group between 25-<35 years with a mean \pm SD of 26.23 \pm 4.23 and 28.56 \pm 5.41 respectively, about 33.3% of them in control group and 30% in study group have a secondary level of education. Regarding occupation 60% in control group and 66.7% in study group are housewives, 70% and 60% in control and study group respectively lived in urban areas, about 70% of them in control group and 76.7% in study group have a family history of DM, with no statistical significant between control and study groups.

Table (2): Illustrates obstetric history of pregnant women with gestational diabetes in control and study group and shows that 73.3% & 50% of them in control group and 63.3% & 46.7 in study group are multigravida and multipara respectively. About 23.3% & 3.3% in control group and 26.7% & 6.7 in study group have a history of abortion and still birth respectively, 81.8% & 75.0% in control group and 84.2% & 66.7 in study group have a history of complications in previous pregnancy and labor respectively, with no statistical significant difference between control and study groups.

Table (3): Clarifies current obstetric data of gestational diabetic women in control and study group and finds that 76.7%, 83.3% & 24% of them in control group and 70%, 63.3% & 15.8% in study group have a weeks of gestation from 26-28, have complications during their pregnancy, and have a mix problem during current pregnancy, with statistical significant difference between both groups regarding current problem and type of problem, P- values are 0.001 and 0.019 respectively.

Table (4): Reveals self-care practices among gestational diabetic women in control and study group and illustrates that there is statistical significant difference between both groups regarding general, perineal and sexual care practices.

Figure (1): Demonstrates that there is statistical significant difference between control and study groups regarding total practices of genital care P-values is 0.001.

Figure (2): Shows that there is statistical significant difference between control and study groups regarding occurrence of genital infection P-values is 0.001.

Table (5): Reveals that there is relation between total self-care practices and age groups, educational level, and living areas, p-value are 0.033, 0.001 and 0.001 respectively. And there is no relation between total self-care practices and occupation P- values is 0.256.

Table (6): Displays that there is relation between total self-care practices and occurrence of genital infection among gestational diabetic women P-values is 0.001.

Discussion

It is reported that at least 75% of women have a history of genital infection worldwide. Incorrect self-care practices of women and deterioration in physiological characteristics of sensitive female genital organs increase the risk of exposure to infection (**Sahin et al., 2016**).

Concerning total self-care practices of diabetic pregnant woman (who involved in the study), current study reports that more than one third and the great majority of studied women have a satisfactory self-care practices in control and study group respectively with statistical significant difference between both groups, p- value 0.001.

On the same line (**Kaplan & Peksoy, 2020**) who applied their study in Turkey to identify the effect of training program based on information motivation behavioral (IMB) skills to women regarding genital infection practices, and found that only one third of studied women in control group and the majority of them in experimental group had a proper hygienic practices, with statistical significant difference between both groups, p- value 0.001. This reflects the need of pregnant women to be supported by educational and training programs to enhance their performance regarding self-care practices.

As regard self-care practices items, present study shows that there was statistical difference between control and study group regarding general, perineal and sexual hygienic practices.

Similar to previous study (**Baraia et al., 2017**) who implemented their study in Ismailia City, Egypt to assess the effect of self-care practices program for

women diagnosed with vaginitis on their response to the protocol of management, and reported that there is statistical difference between control and study group regarding general, perineal, menstrual and sexual hygienic practices p- value 0.001 for all. Also (Hamed, 2015) who carried out their study in Egypt to identify the effect of genital hygienic practices on the occurrence of vaginal infection, and revealed that there was statistical difference between control and case group regarding general, menstrual and coital hygienic practices.

And (Nofal et al., 2020) who conducted their study at Zagazig City, Egypt to evaluate effect of prevention program on knowledge and practices regarding prevention of urinary tract infection among female adolescents, and illustrated that there was significant improvement in performing hygienic practices after implementation of program regarding care of genital area p- value 0.001.

On the other hand, (Kaplan & Peksoy, 2020), demonstrated that there was no significant difference between pre and posttest regarding changing a sanitary pad during menstruation as a menstrual hygienic practice p value 0.070, clean perineal area from front to back and exposed underwear to sun light as a perineal hygienic practices p value 0.625 and 0.250 respectively. This difference may be back to dissimilarity in the selecting design and the chosen sample as well as the women characteristics.

Regarding occurrence of genital infection through pregnancy among studied women, actual study clarifies that more than two thirds in control group and more than one fifth in study group have genital tract infection through pregnancy with statistical significant difference between control and study group p value 0.001.

Concurrent with previous results (Hamaad et al., 2019) who implemented their study in Riyadh, Saudi Arabia to identify the prevalence of vaginal infection in diabetic pregnant women and normal pregnant women, and showed that diabetic pregnant women had a higher percent of vaginal infection than normal pregnant women with statistical significant difference between them.

Also (Nelson et al., 2013) who applied their study in Kenya to assess prevalence of vaginal candidiasis and occurrence of Candida species in pregnant women attending the antenatal clinic, and found that there was statistical significant difference in the occurrence of vaginal candidiasis in pregnant women. This show the importance of educational program on self-care practices and its importance in reducing the occurrence of vaginal infections.

When referring to relationship between total self-care practices and personal data, existing study shows that there is relationship between total self-care practices and age, education, and residence p- value are 0.033, 0.001, and 0.001 respectively, but

there is no relationship between total self-care practices and occupation p- value is 0.256.

Agreed with previous results (Özlem et al., 2019), who applied their study in Ankara to assess genital hygienic behaviors of married women and the counseling provided to them, and reported that there was relation between genital hygienic behaviors and age and education level p- value were 0.006 and 0.025 respectively.

In congruent with previous results (Prasanthi et al., 2017), who carried out their study in Sri Lanka to assess knowledge and experience of childbearing women and lived in estate communities regarding vaginal discharge, and represented that there was no relation between genital hygienic practices and age and education level p- value were 0.664 and 0.546 respectively. This disagreement back to difference in personal characteristics and setting between both studies.

Concerning relationship between total self-care practices and occurrence of genital infection among gestational diabetic women, present study demonstrates that there is relationship between total self-care practices and occurrence of genital infection p- value is 0.001.

On the same line, (Baraia et al., 2017) & (Nofal et al., 2020) who reported that women who followed self-care practices had a higher cure percent than other not follow it, which indicates the importance of self-care practices in improving and recurrent vaginal infection. Regarding personal and obstetric data of studied women, current study finds that there is no statistical significant difference between control and study group regarding age, education, occupation, residence, gravidity parity and abortion.

(Kaplan & Peksoy, 2020) agreed with previous results, and showed that no statistical significant difference between control and experimental group regarding age, education and occupation.

Conclusion: There was a vital role to the educational program about self-care practices on preventing occurrence of vaginal infection among gestational diabetic women.

Recommendations

- Planning and implementing educational program as a routine hospital care about genital hygienic practices must be done to avoid harmful behaviors and reducing the rate of vaginal infection.
- Training programs should be conducted for nurses to train them in counseling women about the genital hygienic practices.
- A brochure about vaginal infection and hygienic self-care practices should be disseminated to pregnant women.
- Encourage early screening and treatment of vaginal infection.

- Further studies and more interventions must be explored to improve women health and avoid genital tract infection

Acknowledgement

The researchers would like to express their thanks to all pregnant women who included in the study.

References

- **Abdelnaem S., Ali, Hamido, S., & Mohamed, H., (2019):** Effect of self-care guidelines on knowledge and quality of life among faculty of nursing students with vaginal infection. *Obstetrics & Gynecology International Journal*, 10(1). <https://doi.org/10.15406/ogij.2019.10.00408>
- **American Diabetes Association (2018):** Classification and diagnosis of diabetes: standards of medical care in diabetes. *Diabetes Care* 2018; 41(Supp.): S13–27.
- **Baraia, Z., Abdallah, I., & Nour, S., (2017):** Impact of Educational Program about Self-care Practices on the Reliving of Vaginal Infection among High Risk Women in Ismailia City. *IOSR Journal of Nursing and Health Science*, 06(03), 73–78. <https://doi.org/10.9790/1959-0603077378>
- **Baraia Z., Shalaby & H., Imam (2016):** Health Behaviors for Vaginal Infection among Married Women in Ismailia City, master diss, Suez Canal University.
- **Chu S., Calla Ghan W., Kim S., Schmid C., lau J., England L., & Dietz P., (2017):** Maternal obesity and risk of gestational diabetes mellitus. *Diabetes Care*; 30: 2070–2076
- **Pettker E., & Zuckerwise L., (2017):** Screening for gestational diabetes mellitus: are the criteria proposed by the international association of the Diabetes and Pregnancy Study Groups cost-effective? *Diabetes Care*, 35:529–35
- **Hamaad, W., Alenizi, A., & El-tahtawi, N., (2019):** Prevalence of Vaginal Infections among Diabetic and Non-Diabetic Saudi Pregnant Women. 48–53.
- **Hamed, A., (2015):** The Impact of Genital Hygiene Practices on the Occurrence of Vaginal Infection and the Development of a Nursing Fact Sheet as Prevention Massage for Vulnerable Women. 4(6), 55–64. <https://doi.org/10.9790/1959-04655564>
- **Kalra B., & Kalra S., (2017):** Vulvovaginitis and diabetes. *Journal of the Pakistan Medical Association* 67(1): 143–145.
- **Kaplan, S., & Peksoy, S., (2020):** Assessment of the effectiveness of genital infection awareness training provided to women based on the IMB model. *March*. <https://doi.org/10.4103/njcp.njcp>
- **La Vignera, S., Condorelli, R., Cannarella, R., Giaccone, F., Mongioi', L., Cimino, L., Defeudis, G., Mazzilli, R., & Calogero, A., (2019):** Urogenital infections in patients with diabetes mellitus: Beyond the conventional aspects. *International Journal of Immunopathology and Pharmacology*, 33, 1–6. <https://doi.org/10.1177/2058738419866582>
- **Lukic, A., Napoli, A., Santino, I., Bianchi, P., Nobili, F., Ciampittiello, G., Nardone, M., Santomauro, M., Di Properzio, M., & Caserta, D., (2017):** Cervicovaginal bacteria and fungi in pregnant diabetic and non-diabetic women a multicenter observational cohort. *European Review for Medical and Pharmacological Sciences*, 21(10), 2303–2315.
- **Marschalek, J., Farr, A., Kiss, H., Haggmann, M., Göbl, C., Trofaiher, M., Kueronya, V., & Petricevic, L., (2016):** Risk of vaginal infections at early gestation in patients with diabetic conditions during pregnancy: A retrospective cohort study. *Journal.Pone.0155182*, 11(5), 1–10. <https://doi.org/10.1371/journal.pone.0155182>
- **Nowakowska, D., Kurnatowska, A., Stray-Pedersen, B., & Wilczynski, J., (2015):** Prevalence of fungi in the vagina, rectum and oral cavity in pregnant diabetic women: Relation to gestational age and symptoms. *Acta Obstetricia et Gynecologica Scandinavica*, 83(3), 251–256. <https://doi.org/10.1111/j.0001-6349.2004.0361.x>
- **Nelson, M., Wanjiru, W., & Margaret, M., (2013):** Prevalence of Vaginal Candidiasis and Determination of the Occurrence of Candida Species in Pregnant Women Attending the Antenatal Clinic of Thika District Hospital, Kenya. *January*. <https://doi.org/10.4236/ojmm.2013.34040>
- **Nofal, A., Hammad, N., Abdallah, A., Magdy, H., & Microbiology, M., (2020):** Impact of Educational Program on The Level of Knowledge and Self-Care Behaviors towards Genitourinary Tract Infection among Female Adolescent Students In Zagazig City. 38(3), 86–93.
- **Özlem, S., Çamözü, E., & Tosun, B., (2019):** Genital Hygiene Behaviors Among Married Women and the Outcomes of Counseling Practices. *Hemşirelikte Araştırma Geliştirme Derneği-HEMAR-G Yayın Organıdır*, 21(1–2), 12–22.
- **Pappas, P., Kauffman, C., Andes, D., Clancy, C., Marr, K., Ostrosky-Zeichner, L., Reboli, A., Schuster, M., Vazquez, J., Walsh, T., Zaoutis, T., & Sobel, J., (2015):** Clinical Practice Guideline for the

Management of Candidiasis: 2016 Update by the Infectious Diseases Society of America. *Clinical Infectious Diseases*, 62(4), e1–e50. <https://doi.org/10.1093/cid/civ933>

- **Prasanthi, M., Ilankoon, S., Sampatha, C., Goonewardena, E., Fernandopulle, R., Pradeep, P., & Perera, R., (2017):** Women's Knowledge and Experience of Abnormal Vaginal Women on the Other Side of War and Poverty: Its Effect Discharge Living in Estates in Colombo District, Sri Lanka on the Health of Reproduction Lanka. *Aras Part Medical International Press*, 5(2), 90–96. <https://doi.org/10.15296/ijwhr.2017.17>
- **Sacks D., Black M., & Li X., (2015):** Adverse pregnancy outcomes using the international association of the diabetes and pregnancy study groups criteria: glycemic thresholds and associated risks. *Obstet Gynecol*, 126:67–73
- **Sahin S., Özdemir K., Unsal A., Aygin D., & Nemut T., (2016):** An evaluation of the relationship between genital hygiene practices. *Genital infection. Gynecol Obstet*; 3:187.
- **Sopian, I., Adam, M., Than, L., Thian, L., & Doblin, S., (2016):** Yeast Infection and Diabetes Mellitus among Pregnant Mother in Malaysia. *Malays J Med Sci.*, 23(6), 27–34.
- **Tinelli, A., (2018):** Vaginal infections in diabetic woman. January. <https://doi.org/10.1285/i25327518v2i1p51>
- **Varner M., Rice M., & Landon M., (2017):** Pregnancies after the diagnosis of mild gestational diabetes mellitus and risk of cardiometabolic disorders. *Obstet Gynecol*, 129:273–80.
- **World Health Organization (2015):** A multi-country study on gender, sexuality and vaginal practices: Implications for sexual health. Department of Reproductive Health and Research