



## Effectiveness of an Online Educational Program about Vaginitis in Improving Knowledge among College Female Students in Jordan

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### ABSTRACT

**Background:** Female reproductive tract infection including vaginitis is considered as one of the most public-health issues and is known as a silent epidemic that might affect adolescents. Educational health programs are very effective in improving adolescent knowledge and practices regarding vaginitis and its preventive measures. **Aim:** The aim of this study was to assess the effectiveness of an online educational program in improving first-year college girls' knowledge about vaginitis and its preventive measures in Jordan. **Methods:** A convenience sample consisting of 120 participants of first-year college female students were recruited and randomly assigned into intervention and control groups. A pre-test was conducted for both groups and a post-test was conducted 2 weeks after the intervention for both groups. **Findings:** The results showed a significantly higher mean in the intervention group (M= 26.17; SD= 3.24) compared to the control group (M= 17.49; SD = 5.91) after conducting the educational program ( $p < 0.00$ ), which means that the educational program about vaginitis is effective in improving girls' knowledge. **Conclusions and Recommendations:** Using short 2-hour lectures, using effective online and high-tech teaching methods and good follow-up would be very beneficial to improve the knowledge level among adolescents.

**Keywords:** Vaginitis; Effectiveness of educational program; Adolescent girls; Knowledge; Preventive measures; First year college students.

### What does this paper add?

1. First-year college girls have a moderate level of knowledge regarding vaginitis.
2. The proposed educational program was shown to improve first-year college girls' knowledge towards vaginitis and its prevention.
3. More attention is required to the vaginitis-education programs that adolescents receive at school and university.

### Introduction

Adolescence is a period between 11 and 19 years of age, which is defined as a transient phase between childhood and adulthood, where rapid physiological, emotional and sexual growth happens. It is considered a critical period in human life in which one becomes an adult (WHO, 2019). Although most of them are preventable, adolescent girls complain of different reproductive health problems, including complicated pregnancy and sexually transmitted infections

(Nazimahparvaiz, 2018; WHO, 2019). Female reproductive-tract infections including vaginitis are considered among the most public-health issues, known as a silent epidemic that might affect adolescents (Eldien et al., 2018). Consequently, adolescent reproductive health has become an important element of global health (Abdul-Aziz et al., 2019).

Vaginitis is an inflammation of the vaginal wall that is caused by yeast, viral, bacterial or trichomoniasis infections (Abdelnaem & Hamido, 2019). Vaginitis can be diagnosed using a combination of symptoms, physical examination findings and office-based or laboratory testing. Symptoms include the presence of abnormal vaginal discharge, vulvovaginal discomfort and thick with bad-odor secretions. Bacterial vaginosis is traditionally diagnosed with Amsel criteria, although Gram stain is the diagnostic standard. Newer laboratory tests that detect *Gardnerella vaginalis* DNA or vaginal fluid sialidase activity have similar sensitivity and specificity to Gram stain. The diagnosis of vulvovaginal candidiasis is made using a combination of clinical signs and symptoms with potassium hydroxide microscopy. DNA probe testing is also available. Additionally, culture can be helpful for the diagnosis of complicated vulvovaginal candidiasis (Paladine & Desai, 2018). Bacterial vaginitis increases the risk of developing infections, such as simplex virus type II, *Trichomonas vaginitis*, *Neisseria gonorrhoea*, *Chlamydia trachomatis* and HIV acquisition and transmission (Abu Salem et al., 2017; Kenyon and Crucitti, 2013). Untreated infections can result in serious health, social and emotional consequences and lead to gynecological morbidity (Eldien et al., 2018) and further affect the woman's ability to stay at work or school, thereby increasing absenteeism rate, altering sexual functioning, damaging self-image and decreasing quality of life (Kenyon & Crucitti, 2013).

Vaginitis is the most common gynecological problem that affects women worldwide with a prevalence rate of 7-13% in general populations and 10-25% among adolescents (Raphaelidis, 2015; Donders & Bedro, 2017). In Jordan, *Candida vaginitis* and *Trichomonas vaginitis* rates were 3.5% and 36%, respectively, which is considered very high in comparison with rates in developed countries ranging between 10% and 25% (World Health Organization, 2010).

Improving genital-hygiene practices seems to be the most important element in preventing vaginal infections and optimizing vaginal health (Simms-Cendan, 2019;

Wadi & Denning, 2018; Okumus & Demirci, 2016). Nurses and midwives could be an active part as educators in improving girls' knowledge and preventive measures against vaginitis. This might decrease its prevalence and negative consequences on girls' health who will be mothers in the future. Previous health educational programs showed their effectiveness in improving adolescents' knowledge and practices regarding vaginitis and its preventive measures (Mokarrami & Tavakoli, 2019; Nazimahparvaiz, 2018; Okumus & Demirci, 2016; Parsapure et al., 2016). Therefore, it is very important to plan educational health programs to improve knowledge and preventive measures of vaginitis. Educating girls about the early detection of abnormal conditions in their bodies may contribute to early diagnosis and increase the success of treatment.

In developing countries, including Jordan, adolescent girls complain of insufficient correct information about reproductive health as they feel uncomfortable seeking healthcare service because of lack of privacy and confidentiality regarding reproductive health and its problems like vaginitis (de Souza et al., 2018). Further, the cultural norms, social stigma, inadequate provision of health information by the parents and poor communication between adolescent girls and their parents are factors limiting receiving correct information about sexual and reproductive health (de Souza et al., 2018; Venugopal et al., 2020). Embarrassment and hesitation to discuss sexual concerns and similar topics by healthcare professionals (HCPs) also hinder females to disclose their problems, which might increase the prevalence of the disease (Alnuaimi et al., 2020; de Souza et al., 2018). A Jordanian study found that there was insufficiency of understanding reproductive health among Jordanian youth (Ali et al., 2018).

Despite the high prevalence of vaginitis globally and in the Arab region, including Jordan, and despite its negative consequences on females' health, according to the researchers' knowledge, there is no previous study about the effectiveness of an educational program in improving the knowledge of vaginitis among adolescents in Jordan. Therefore, this study aimed to assess the effectiveness of using an online educational program in providing knowledge about vaginitis and its preventive measures among first-year college female students in Jordan.

## **Methods**

### **Design and Participants**

A quasi-experimental design (pre-and post-tests in two groups) was used. The sample was recruited from two large colleges in Irbid city; Nusayba Al-Mazeneiah College for Nursery and Midwifery and the Institute of Allied Medical Sciences. The two colleges were randomly assigned to either the experimental or the control group using a coin-flipping procedure. Then, all students from the Institute of Allied Medical Science (n=57) were assigned to the control group, while the Nusayba Al-Mazeneiah College for Nursing and Midwifery female students (n=63) were assigned to the experimental group. Inclusion criteria were first-year college single females between 18 and 19 years of age, able to read and write Arabic language and having an internet access. Exclusion criteria were students who were older than 19 years of age and who had a previous history of vaginitis or received previous education about vaginitis. The sample size was calculated using power analysis. For this study, a power level of 0.8, alpha of 0.05 and medium effect size (Cohen, 1992) were used. It was estimated that 128 participants (64 in each group) were needed and were approached by the third researcher. Eight of the students were excluded from the study, as they did not fill the post-test questionnaire leaving a final sample of 120 participants.

### **Measures and Procedure**

The questionnaire consisted of two parts. Part one consisted of 14 socio-demographic and personal items. Part 2 of the questionnaire that was developed by Ahmad and Omar (2017) consisted of 32 multiple-choice questions to assess the knowledge of female adolescents regarding vaginitis and its prevention. For the knowledge part, a score of 1 was assigned to the correct answer, while a score of 0 was assigned to the wrong answer. The total score ranged between 0 and 32. Based on Ahmed and Omar (2017), the maximum score occurs when the respondent obtains 32 grades representing 100%. The total score was categorized into three levels as follows: good (adequate) knowledge if the score was between 21 and 32 (representing >75%), average (moderate) knowledge if the score was between 11 and 20 (representing 50 -75%) and poor (inadequate) knowledge if the score was between 1 and 10 (representing <50%).

The English version of the questionnaire was

translated into Arabic language and back-translated into English. Then, it was assessed by the original authors of the questionnaire and by five experts in the field of nursing and midwifery for accuracy, validity, relevance and clarity. A pilot study was carried out on 20 students. The findings of the pilot study indicated that the questions were relevant and that the educational material was comprehensive, culturally appropriate, clear and easy to understand. In the current study, Cronbach's alpha for the post-test was 0.89.

According to the situation of the COVID-19 pandemic, it was agreed that the educational program will be conducted online using Zoom application. A valid and reliable package of the educational program designed by Ahmed and Omar (2017) was used to teach the participants about vaginitis and its preventive measures. The experimental group received one full online lecture (2 hours) regarding vaginitis definition, risk factors, signs, symptoms and preventive measures using Zoom application. The researcher used a PowerPoint presentation and videos to emphasize certain items to facilitate knowledge gaining. At the end of the lecture for the experimental group, a brochure containing all materials on vaginitis and its preventive measures was sent out to all participants by email in Pdf format. The researchers kept in touch with participants in the experimental group for two weeks after the completion of the lecture using WhatsApp to send related information, discuss the brochure content and answer any questions. Recorded videos of the lecture were sent to the participants to ensure that the information was entrenched among them. The control group received a 2-hour online lecture about iron-deficiency anemia using evidence-based practice and valid reference (Mousa et al., 2016). The Arabic educational package about anemia was prepared by the authors and was checked by five experts in nursing and midwifery. The same educational process and procedure were followed for the control group (e.g. PowerPoint, video, Zoom and brochure). The third author conducted all lectures and follow-ups. Figure 1 displays the educational-program outline.

The Institutional Review Board (IRB # 39/135/2020) approval was obtained prior to data collection. Then, permissions to conduct the study were gained from the selected colleges before data collection. Consent forms were obtained from students by email. All information about the study was fully disclosed to the participants.

The participants were assured that their participation is voluntary and that the collected data will be kept confidential while the results might be used in nursing conferences or journal publications. Additionally, they

were reassured that only the authors would have access to the collected data and that no invasive procedure will be included.

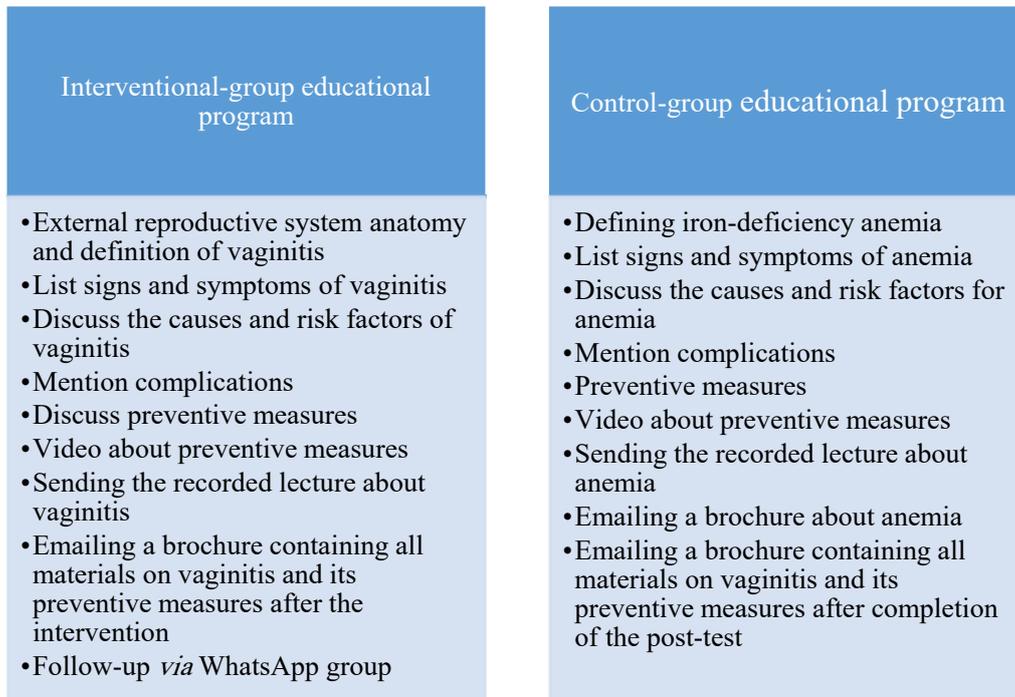


Figure 1. Educational-program outline

The third researcher met the teachers who were responsible for the classes of students and asked them to join the student group on WhatsApp. Next, she contacted the students and agreed with them to create and activate the two groups on the Zoom application (control and experimental) for further interaction and for delivering the lecture. She held the first meeting with each group on WhatsApp group and introduced herself, briefly explained the nature and the purpose of the study and sent invitation and information sheets to participants. The researcher and students from both groups agreed upon suitable date and time to conduct the online lecture. Both groups received the workshops on the same day, the 7<sup>th</sup> of November 2020. Pre-test questionnaires were collected online by using Google Forms. The post-test questionnaires were collected two weeks after the intervention for both groups on the same day by sending a new link for the post-test. All participants from both groups needed from 25 to 30 minutes to complete the pre-test and the post-test questionnaires.

### Statistical Analysis

Statistical analysis was performed using SPSS, version 23. Descriptive statistics (mean and percentage) were used to describe the sample demographic characteristics. The analysis of covariance (ANCOVA) was used to evaluate the effectiveness of the educational program in improving students' knowledge about vaginitis and its prevention. ANCOVA was used to statistically control the effect of the covariates (pre-test and self-learning). A test of normality showed that the study sample was normally distributed. Moreover, preliminary checks were conducted to ensure no violation of the assumptions of normality, linearity, homogeneity of variance and homogeneity of regression slopes (assessed by histograms, Levene's test, Cronbach's alpha, correlation coefficients and scatter plots). The *P*-value was set at 0.05.

### Results

#### Description of the Total Sample

The final sample was 120 participants; 57 in the control group and 63 in the experimental group. As shown

in Table 1, participants were aged between 18 and 19 years ( $M=18.40$ ,  $SD=0.49$ ) and most of them had a nuclear family ( $n=110$ , 91.7%). The household income ranged from 90-1900 ( $M= 415.72$  (587\$),  $SD=246.45$  (348\$)) Jordanian Dinars (JD). Almost a half of them earned more than 350 JD (494.22\$) monthly (46.7%). Most participants lived in villages ( $n=81$ , 67.5%). More than a half of the students' fathers had a high-school qualification ( $n=62$ , 51.7%), whereas less than one tenth of the fathers had a primary-school qualification ( $n=9$ , 7.5%). Around two thirds of the fathers were employees ( $n=83$ , 69.2%), whereas 37 of them did not work (30.8%).

Less than a half of their mothers had higher education ( $n=46$ , 38.3%) and nearly a half of them completed high school ( $n=49$ , 40.8%). Most of the students' mothers were housewives ( $n=99$ , 82.5%), most of the participants' houses had good ventilation ( $n=113$ , 94.2%) and a clean water supply ( $n=113$ , 94.2%) and 49 of the houses had a casual toilet facility (40.8%) with enough cleansing of the bathroom ( $n=98$ , 81.7%). More than a half of the participants ( $n=62$ , 51.7%) did not have any prior information about vaginitis and its prevention. The most frequent source of information for the participants was self-learning ( $n=67$ , 55.8%).

**Table 1. Frequencies and percentages for demographic categorical variables**

<b>Demographic Variables</b>	<b>Number (n)</b>	<b>Percentage (%)</b>	
<b>Group</b>	Control	57	47.5
	Experimental	63	52.5
	Total	120	100
<b>Family type</b>	Nuclear	110	91.7
	Extended	10	8.3
<b>Residence</b>	City	37	30.8
	Village	81	67.5
	Badia	2	1.7
<b>Father's education</b>	Illiterate	0	0
	Primary school	9	7.5
	Secondary school	21	17.5
	High school	62	51.7
	Higher education	28	23.3
	Total	120	100
<b>Father's occupation</b>	Farmer	3	2.5
	Employee	38	31.7
	Private work	8	6.7
	Other work	34	28.3
	Not working	37	30.8
	Total	120	100
<b>Mother's education</b>	Primary school	5	4.2
	Secondary school	15	12.5
	High school	49	40.8
	Higher education	46	38.3
	Illiterate	5	4.2
	Total	120	100
<b>Mother's occupation</b>	House wife	99	82.5
	Working	21	17.5
	Total	120	100
<b>Ventilation</b>	Good	113	94.2
	Bad	7	5.8
<b>Toilet facility</b>	Causal	49	40.8
	Modern	24	20
	Both	47	39.2
<b>Clean water supply</b>	Present	113	94.2
	Not present	7	5.8
<b>Cleansing of bathroom</b>	Enough	98	81.7
	Not enough	22	18.3

Demographic Variables		Number (n)	Percentage (%)
<b>Prior information about vaginitis and its prevention</b>	No	62	51.7
	Yes	58	48.3
	Total	120	100
<b>Sources of information</b>	<b>Self-learning</b>		
	Yes	67	55.8
	No	53	44.2
	<b>Mass media</b>		
	Yes	38	31.7
	No	82	68.3
	<b>Health personnel</b>		
	Yes	34	28.3
	No	86	71.7
	<b>Health class in school</b>		
	Yes	48	40
	No	72	60
	<b>Other</b>		
Yes	58	48.3	
No	62	51.7	

**Description of the Demographic Differences between the Two Groups**

A chi-square test was conducted to compare the proportions of the categorical variables for demographic data between both groups in terms of family type, area of residence, father’s educational level, mother’s education level, mother’s work, house ventilation, clean water supply, toilet facility, cleansing bathroom, prior information about vaginitis and its prevention and

sources of information. Only the proportion of participants in the experimental group who received vaginitis information from self-learning ( $n=41$ , 65%) was significantly different ( $p=0.03$ ) from that in the control group ( $n=26$ , 45.6%). Other variables were not significantly different between the two groups. For that, self-learning was entered into the ANCOVA test as a covariate. For more details, see Table 2.

**Table 2. Comparison of demographic categorical variables between the 2 groups**

Variables		Control (N & %)	Experimental (N & %)	P-value
<b>Family type</b>	Nuclear family	(n=53, 92.2%)	(n=56, 88.8%)	0.62
	Extended family	(n=4, 7%)	(n=6, 9.5%)	
<b>Area of residence</b>	Urban	(n=18, 31.5%)	(n=19, 30.1%)	0.86
	Rural	(n=39, 68.4%)	(n=44, 69.8%)	
<b>Father’s education</b>	Educated	(n=39, 68.4%)	(n=51, 80.9%)	0.11
	Not educated	(18, 31.5%)	(12, 19%)	
<b>Father’s occupation</b>	Working	(n=38, 66.6%)	(n=45, 71.4%)	0.57
	Not working	(n=19, 33.3%)	(n=18, 28.5%)	
<b>Mother’s education</b>	Educated	(n=45, 78.9%)	(n=50, 79.3%)	0.95
	Not educated	(n=12, 21%)	(n=13, 20.6%)	
<b>Mother’s occupation</b>	Working	(n=6, 10.5%)	(n=15, 23.8%)	0.13
	Not working	(n=25, 43.8%)	(n=47, 74.6%)	
<b>Ventilation</b>	Good	(n=55, 96.4%)	(n=58, 92%)	0.30
	Bad	(n=2, 3.5%)	(n=5, 7.9%)	
<b>Clean water supply</b>	Present	(n=52, 91.2%)	(n=61, 96.8%)	0.19
	Not present	(n=5, 8.7%)	(n=2, 3.5%)	
<b>Toilet facility</b>	Casual	(n=20, 35%)	(n=29, 46%)	0.46
	Modern	(n=12, 21%)	(n=12, 19%)	
	Both	(n=25, 43.8%)	(n=22, 34.9%)	

Variables		Control (N & %)	Experimental (N & %)	P-value
<b>Cleansing bathroom</b>	Enough	(n=46, 80.7%)	(n=52, 82.5%)	0.79
	Not enough	(n=11, 19.2%)	(n=11, 17.4%)	
<b>Prior information</b>	Yes	(n=27, 47.3%)	(n=31, 49.2%)	0.84
	No	(n=31, 54.3%)	(n=32, 50.7%)	
<b>Sources of information</b>	<b>Self-learning</b>			0.03*
	Yes	(n=26, 45.6%)	(n=41, 65%)	
	No	(n=31, 54.3)	(n=22, 34.9)	
	<b>Mass media</b>			0.70
	Yes	(n=19, 33.3%)	(n=19, 30.1%)	
	No	(n=38, 66.6%)	(n=44, 69.8%)	
	<b>Health personnel</b>			0.12
	Yes	(n=20, 35%)	(n=14, 22.2%)	
	No	(n=37, 64.9%)	(n=49, 77.7)	
	<b>Health class in school</b>			0.15
Yes	(n=19, 33.3%)	(n=29, 46%)		
No	(n=38, 66.6%)	(n=34, 53.9%)		
<b>Other</b>			0.37	
Yes	(n=30, 52.6%)	(n=28, 44.4%)		
No	(n=27, 47.3%)	(n=35, 55.5%)		

\*Significant at 0.05 or less.

An independent sample t-test was conducted to compare the means of the continuous variables (age and income) for the demographic characteristics between

both groups. The results showed that there were no significant differences between the two groups (Table 3).

**Table 3. Socio-demographic characteristics of the participants by study group variable**

Variables	Group	M	SD	Df	T	P
<b>Age</b>	Control (n=57)	18.45	0.50	118	1.19	0.23
	Experimental (n=63)	18.34	0.48			
<b>Household income</b>	Control (n=57)	417.89	267.96	118	0.09	0.92
	Experimental (n=63)	413.73	235.39			

### Description of the Vaginitis Knowledge

Findings of the pre-test revealed that the control group's knowledge mean was 17.82 ( $SD=4.39$ ) and the experimental group's knowledge mean was 18.46 ( $SD=3.07$ ) and that there were no significant differences between the means of the two groups ( $t = -0.92$ ,  $p = 0.35$ ). Pre-test knowledge scores were entered into the ANCOVA test as a covariate.

### Effectiveness of the Educational Program in Improving Knowledge of Vaginitis and Its Prevention

Analysis of covariance (ANCOVA) was performed. The independent variable was the study group and the dependent variable consisted of post-test scores on participants' knowledge. The dependent variable was

tested in a separate model. For the dependent variable, the covariates were the participant scores on the pre-test knowledge (Polit and Beck, 2011) and self-learning. These variables were included and retained in the ANCOVA test because of their potential effects on the outcome and since self-learning differed significantly between the two study groups. The correlations between covariates were examined and showed no statistical significance. Model fit of the ANCOVA was assessed using R-square.

After adjusting for the pre-test scores of knowledge and self-learning, there were significant differences between the two groups in the post-test scores on participant knowledge ( $f=100$ ,  $P=0.00$ , partial  $\eta=0.46$ ); partial  $\eta$  indicated a high effect size according to Cohen's (1988) guidelines (see Table 4 for more details).

**Table 4. Mean, SD, adjusted mean and adjusted standard error for the participants' knowledge for the control and experimental groups among first-year college students in the pre- and post-test measurements, by study group**

Outcome variable	Control group (n=57)			Intervention group (n=63)			T-test for the pre-test	F
	Test	Unadjusted mean (standard deviation)	Adjusted mean (standard error)	Test	Unadjusted mean (standard deviation)	Adjusted mean (standard error)		
<b>Self-learning</b> <b>0.55(0.49)</b>								
Knowledge	Pre-test	17.82(4.39)		Pre-test	18.46(3.7)		-1.3	1.95
	Post-test	17.49(5.91)	17.61(0.60)	Post-test	26.17 (3.24)	26.09(0.57)		
<b>R Squared = 0.51</b>			P-value = 0.000**			Partial eta = 0.4		
<b>Adjusted R Squared = 0.49</b>								

### Discussion

Up to the researchers' knowledge, this study is the first in Jordan discussing such a sensitive topic that has been historically a taboo. The current study showed a significant effect of the educational program about vaginitis and its preventive measures on the level of knowledge among female adolescents, which is consistent with previous studies (Mokarrami & Tavakoli, 2019; Nazimahparvaiz, 2018; Okumus & Demirci, 2016; Parsapure et al., 2016). At the pre-test, we found that around 70% of the students had moderate knowledge regarding vaginitis and its prevention. This might be because almost a half of our participants had prior information about vaginitis from different sources. This finding is consistent with a study that was conducted on 70 women using a quasi-experimental design (Salini, 2010). The researcher reported that pre-test knowledge score of girls showed that 87.5% of them had moderate knowledge and 12.5% had inadequate knowledge regarding vaginitis and its prevention (Salini, 2010). On the other hand, our study result was inconsistent with Ahmed and Omar (2017) who reported that more than three quarters of the students had poor knowledge in their pre-test (75.5%).

From those who had prior information, the majority had the information from self-learning and a small proportion received information from health personnel. This result contradicts with a Jordanian study on first-year university students showing that mass media was the main source of information (28%) (Qrgez & Abu Rashid, 2017). In another Jordanian study, friends and social media were the major sources of information (58.4% and 17.8%, respectively), while 3.1% reported

receiving information from health personnel (Abdel-Qader & Al Meslamani, 2020). This difference might be due to the sensitivity of the topic in our study that is rarely discussed in media or between friends. Evidently, Jordanian HCPs have an ineffective education role about sensitive topics due to different reasons (Alnuaimi et al., 2020; Mrayan & Cornish, 2015). However, when HCPs were asked about their perception, they were optimistic and willing to expand their roles to increase awareness of girls, boys and their teachers regarding sexuality issues during the early stages of their life (Alnuaimi et al., 2020).

The only item that remained with the same score was seeking care from HCPs. Researchers reported that because of the strong social and religious values placed on virginity, unmarried women are criticized from the community and health workers if they try to obtain information about contraception and sexuality (Mrayan & Cornish, 2015). Negative outcomes are about not seeking, or delayed seeking, of medical care due to rigid cultural and religious beliefs that are not easy to be changed (Withers et al., 2018). So, more work is needed to resolve this problem and remove the barriers between girls and HCPs.

Despite the moderate level of knowledge before the intervention, we identified many misconceptions and significant knowledge deficit in some critical aspects, such as the anatomy of the reproductive system, signs and symptoms of vaginitis and some preventive measures' practices that need attention. For example, the majority of students had unsatisfactory score levels in the pre-test about identifying the organ of intercourse and the definition of vaginitis. This may be attributed to

the insufficient basic information gained from their study at school, as only 33.3% in the control group and 46% in the experimental group received such information at school. DeJong and El-Khoury (2006) argued that although sex education is increasingly included in Arab school curricula, teachers are often too embarrassed to talk about these issues and mainly discuss issues of sexuality when teaching biology or anatomy to students. Students also might feel embarrassed to discuss such reproductive problems. This result agrees with Abd El-Salam et al. (2018) who mentioned that most female students suffer from knowledge deficit about reproductive problems and feel ashamed to discuss such issues.

The current study revealed that most of the students complained of lack of knowledge about preventive measures before the intervention. Petrova et al. (2015) agreed that a half of the students did not follow preventive measures of vaginal infection. For example, in our study, only a quarter of students knew that excessive use of beverages should be avoided to prevent vaginitis. However, all students (100%) answered this question correctly after the intervention. The preference of Jordanian university students to eat snacks and sugary food and drink fizzy drinks while ignoring their side effects might be the reason for paying attention to this information (Alshammari and Piko, 2020). The current study also showed that only 21% of the students knew the best way of drying sanitary clothes and this percentage increased to 50% after the intervention, yet it did not reach the optimal level. This result might be because Jordanian mothers who look after their children hold the responsibilities of household activities including washing clothes (USAID, 2020). Including parents in educational programs would be essential to improve the knowledge and practices for some items.

Regarding the cleaning of the perineum and changing underwear daily, the students had a satisfactory level before the intervention and this increased significantly after the intervention. In Islam, cleaning the private parts is an essential personal hygienic practice (Abd Hamid et al., 2016). However, the right technique of cleaning the perineum needed improvement in the pre-test and the intervention succeeded to increase the percentage from 50.8% to 70%.

The results of the current study showed significant differences in participants' knowledge between the two

groups after controlling the effect of self-learning. The experimental group had a significantly higher knowledge level than the control group. Mokarrami and Tavakoliwho used the same design to determine the effect of an educational program on preventive behaviours of vaginitis and their findings support our results. They used the random-sampling method among 80 health ambassadors aged between 18 and 49 years and reported that the educational program had a significant positive effect on participants' knowledge ( $p < 0.001$ ) (Mokarrami & Tavakoliwho, 2019). Another study examined the effectiveness of health education in improving knowledge regarding vaginitis using an experimental design on 350 women from 10 health-care centres and concluded that the intervention used has a positive effect on knowledge mean scores in the interventional group (Parsapure et al., 2016).

This study had several limitations. Using nonrandomized sampling might be more appropriate rather than using convenience sampling. However, randomization was difficult because of the COVID-19 pandemic. The researchers submitted an IRB to the Ministry of Education to recruit school-age girls; however, the IRB was refused due to the sensitivity of the topic in our culture for school-age students. Then, college students were recruited and this may have limited the range of participants' age to 18-19 years only. Including more group ages might influence the results. Self-report bias might be another limitation, where girls might have answered questions in a manner that shows them to be of a good character.

## **Conclusions**

The assessment of knowledge among first-year college female students about vaginitis and its prevention revealed that the majority of them had moderate knowledge before conducting the intervention. This study proved the effectiveness of the educational program about vaginitis and its preventive measures in increasing the level of knowledge among college female students. Using a short 2-hour lecture, as well as using effective online and high-tech teaching methods and a good follow-up proved to be very beneficial in improving knowledge levels among adolescents.

## **Implications for Nursing**

Based on our results, the role of nurses and midwives

in providing adolescents with appropriate information about reproductive health in general and vaginitis in particular needs improvement. There is a need to focus more on improving nurses' and midwives' roles as educators. This might be achieved by offering them continuous educational workshops about reproductive health and how to educate adolescents. Reproductive-health teaching by school teachers should also be revised and evaluated to assess their level of knowledge and, in turn, this may enhance the level of students' health. The findings of this study might also help policy makers to adopt this educational program to improve primary reproductive health at the community level. This study encourages the collaboration between the Ministry of Health, the Ministry of Education and the

Ministry of Higher Education and Scientific Research to adopt reproductive-health educational programs at schools, colleges and universities.

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No conflict of interest is declared by the authors.

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