- *Basic Research*

Educational Program for Women at Reproductive Age Regarding Human Papilloma Virus Prevention at Rural Areas

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Abstract

Background: Human papillomavirus (HPV) is typically transmitted through skin-to-skin contact during sexual activity. **Aim**: The study aimed to evaluate the effect of educational program for women at reproductive age regarding human papilloma virus prevention at rural areas. **Study design:** A quasi-experimental design was used. **Setting:** Family medicine centers affiliated with the Shesht El-Enaam health unit at El-Behara Governorate. **Sample:** Purposive sample includes 98 women at reproductive age. **Tools:** First tool: A structured interviewing questionnaire consisting of four parts was used. **Part I:** To assess demographic characteristics of the studied women, **Part II:** To assess women's' Menstrual and gynecological history and **Part III:** To assess women's knowledge about human papilloma virus. **Second tool:** To assess the studied women's health beliefs towards HPV vaccination. **Third tool:** To assess the studied women's attitudes about human papillomavirus and its vaccination; cervical cancer and Pap smear test. **Results:** The current study showed that the mean age of the studied women was 27.07±4.97. Also, 83.7%, 82.7%, and 87.8% of women had satisfactory levels of knowledge, healthy beliefs and positive attitudes about the prevention of the human papilloma virus at rural areas post-implementation of the educational program, respectively. **Conclusion:** The findings of this study concluded that there was lack of knowledge regarding prevention of human papilloma virus infection among women, at reproductive age, which in turn affected their health beliefs and attitudes toward it. Highly statistically significant improvements occurred in the total score of knowledge, health beliefs and their attitudes post-educational program .As well, women's awareness increased after implementing the educational program at rural areas. **Recommendations:** Increasing HPV vaccination rates among the rural population by subsidizing the vaccine, conducting awareness campaigns, and providing convenient access to vaccination sites in rural areas.

Keywords: Human Papilloma Virus, sexual intercourse, rural areas, vaccination, women at reproductive age.

Introduction

Human papillomavirus (HPV) is typically transmitted through skin-to-skin contact during sexual activity. HPV infections are not limited to penetrative intercourse; non-penetrative sexual activities can also transmit the virus. Over 30 different types of HPV can infect the genital areas. Infection with human Papillomavirus (HPV), the most common sexually transmitted infection, is a major risk factor for developing cervical cancer worldwide. The virus could also result in multiple health complications and various anogenital cancers for both sexes *(Bruni et al., 2020)*.

There are more than a hundred different subtypes of the human papillomavirus, with nearly forty of them having the potential to infect the genitalia directly. Certain high-risk types, including 16 and 18, can cause abnormal cervical cells, which may progress to cancer in the mouth or genitals. HPV vaccination is crucial in preventing cancers linked to the human papillomavirus *(Hampson et al., 2021)*.

Cervical cancer is a significant health crisis, particularly for women in developing nations. Every year, half a million women worldwide are diagnosed with cervical cancer, where more than 80% discovered the disease at an advanced, less treatable stage. Cervical cancer is preventable and curable *(Khalifa et al., 2023)*.

In 2006, the United States Food and Drug Administration (FDA) granted approval to the first HPV vaccine, designed to prevent cervical cancer from developing. Then, two additional vaccines were developed to prevent HPV infection. The HPV vaccine is typically given to children when they are 11 or 12 years old, but it can also be administered as early as age 9. The World Health Organization recommends that all countries include HPV vaccines in their regular immunization programs. Currently, these vaccines are widely administered globally and are included in the mandatory immunization programs of 105 nations *(WHO, 2020)*.

Human papillomavirus vaccination is an effective approach for primary prevention of cervical cancer and genital warts. By reducing the need for treatment and follow-up care, it can significantly lower the global impact of cervical cancer *(Villavicencio et al., 2023)*.

Vaccines were introduced in Egypt in 2009, and the country's official vaccination centers now offer two types of vaccines at few locations; experts say not many people have been keen to make use of them. The number of necessary doses and their timing vary depending on the age of the individual, as outlined by WHO guidelines. In some cases, up to three doses may be required. Last year, the WHO revised its guidelines, concluding that one dose of the vaccine is adequate protection for females below the age of 20, in light of new scientific findings *(WHO, 2023)*.

Regular Pap smear and HPV tests are crucial for early detection of abnormal cervical cells and the HPV virus. Early detection and treatment of abnormal cervical cells are possible through Pap smears. A Pap smear is suggested for all women between 21 and 65 years. HPV testing allows women to self-collect vaginal samples, eliminating the need for an initial pelvic exam. Subsequent cervical cancer screenings are unnecessary for three years if both HPV and Pap tests yield normal results *(Khalifa et al., 2023)*.

The healthcare needs of individuals living in rural areas are different from those in urban areas, and rural areas often suffer from a lack of access to healthcare. These disparities are the result of geographic, demographic, socioeconomic, myths, cultures and beliefs *(Stephens & Stephanie, 2020).*

Community health nurses should educate women of different ages to improve their knowledge and attitude. They could potentially put their knowledge to practical use and take ownership of women's issues. Eventually, community health nurses can play a crucial role in enhancing women's reproductive health and preventing HPV and cervical cancer-related illnesses and deaths. Community health nurses use their healthcare expertise and knowledge of available screening options to educate women about HPV and cervical cancer *(Kieti, 2020).*

1.1 Significance of Study

The World Health Organization and UNICEF are working together to significantly increase the number of girls worldwide who receive the HPV vaccine by 2030 as part of their plan to eradicate cervical cancer. This target supports the Sustainable Development Goals by focusing on improving access to essential medicines and vaccines (SDG 3.b) *(National Cancer Institute, 2021).*

In Egypt, 38.6% of women have HPV and 67.2% of them have cervical cancer as a complication of HPV. Annually, about 744 cervical cancer deaths occur and 1,320 new cervical cancer cases are diagnosed. In Egypt, cervical cancer is the 12th leading cause of cancer-related deaths in women. Cervical cancer is the 9th deadliest cancer among Egyptian women aged 15 to 44 *(HPV Information Center, 2023).*

Rural women are generally less likely to get vaccinated against HPV or screened for cervical cancer. This is often due to a lack of awareness about the risks associated with these diseases. Also, women residing in rural areas face a heightened risk of cervical cancer due to factors such as early marriage and multiple pregnancies. Moreover, many rural communities worldwide lack essential medical and social services, hindering access to expert advice and guidance. Additionally, rural communities often have limited access to cancer prevention programs, such as cervical cancer screenings and HPV vaccinations *(Zhetpisbayeva et al. 2023)*.

Therefore, the purpose of this study was to evaluate the effect of educational program for women at reproductive age regarding human papilloma virus prevention at rural areas.

Aim of the study

The study aimed to evaluate the effect of educational program for women at reproductive age regarding human papilloma virus prevention at rural areas through:

1. Assessing women's knowledge regarding human Papilloma virus prevention and infection.
2. Assessing women's health beliefs regarding human Papilloma virus vaccination.
3. Assessing women's attitudes regarding human Papilloma virus vaccination and Pap smear

4. Designing and implementing an educational program for women at reproductive age regarding human Papilloma virus prevention at rural areas.

Research Hypothesis

The current study hypothesized that the educational program will improve women's knowledge, health beliefs and attitudes regarding human Papilloma virus prevention at rural areas.

Subjects & Methods

Study design:

A quasi-experimental design was utilized to collect the data relevant to this study.

I.   Technical Design:

The technical design includes; the settings, subjects and tools used in the study.

Settings:

The study was carried out at family medicine centers affiliated with the Shesht El-Enaam health unit at El-Behara Governorate.

Sampling of setting:

Multi stage sample was used in this study as the following: **stage I:** The directorate of Health Affairs at El-Behara Governorate is divided into 15 health administrations, **stage II:** One of them, namely Itai El-Baroud health Administration, which contains 10 health units, **stage III:** One of these health units was chosen, namely Shesht El- Enaam, which includes seven family medicine centers and **stage IV:** 50% was chosen, approximately four centers. The final settings include Shesht El-Enaaam center, Abo Shady center, El-Hawata center and EL-Shaira center.

Sampling:

Type:

A purposive sample was used: women selected from records kept in family medicine centers from previous settings, according to certain criteria of selection.

 Subject criteria:

- Women aged 20–50 years.

- Women agreed to participate in the research.

- Women are available at the time of data collection.

Size:

Based on the below formula, the estimated sample size is 98 women who were attending the centers to receive health services in the period, starting from February 2024 until July 2024 settings, which was calculated from the total number of women who registered in previous

family medicine centers during the year 2023 (751 women at reproductive age affiliated with the ministry of health).

The sample was calculated according to the power analysis formula as follows:

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]}$$

$$n = \frac{751*(0.50*0.50) = \textbf{187.75}}{750*(0.0036 / 1.6384) = 750*0.00220 = 1.65 + 0.25 = \textbf{1.9}} \quad \textbf{98}$$

Which:

n= Sample size.

N= Total Population.

Z= The standard value corresponding to confidence level 80% which is (1.28).

d= Margin of Error 0.06.

p= Population Proportion= 0.50.

Based on the above formula, the sample size is 98 *(Steven &Thompson, 2012).*

Family health centers	Total number	Sample
Shesht El-Enaaam	287	38
El-Hawata center	216	28
EL-Shaira center	132	17
Abo Shady center	116	15
Total	**751**	**98**

Tools of the study

Data were collected through:

Tool I: A structured Interviewing Questionnaire: It included four parts:

Part I: Socio-demographic characteristics of the women such as age, marital status, educational level and occupation.

Part II: Menstrual and gynecological history such as age of menarche, types of menstrual problems, age of marriage, abortion, gravida, parity, redness and swelling in external genital organs, types of sexually transmitted disease, history of cervical cancer and history of Papilloma virus.

Part III: A pre/post program Women's knowledge assessment format: about human Papilloma virus adopted from *(Naz, et al. 2020) & (Chan, et al. 2021)* and translated into Arabic by researchers which included 32 questions concerned with**:**

- **Section (1):** knowledge related to human Papilloma virus infection (12 questions) such as definition, causes, transmission, vulnerable group, effect, early detection, types of HPV, symptoms of HPV, shape of warts, complications, diagnosis and prevention.

- **Section (2)**: knowledge related to HPV vaccine (7 questions) such as age of vaccination starting, route, number of doses taken before the age of 15 years, number of doses taken between 15-26 years, number of doses taken between 27-45 years, side effects of vaccine and contraindications.

- **Section (3)**: knowledge related to PAP smear test (10 questions) such as age to start having a PAP smear, appropriate time to do a PAP test, time is required for a repeat cervical examination, purpose of the PAP smear, repeating of PAP smear in normal case, successfully reducing incidence and mortality of cervical cancer, PAP smear is a non-invasive and relatively inexpensive method, women should have PAP smear since the onset of sexual activity, woman should not have sex 48 hours before having a PAP smear and in the normality of PAP smear, women need it in the future.

- **Section (4)**: knowledge related to cervical cancer (3 questions) such as cervical cancer is a complication of human Papillomavirus infection, symptoms and early detection.

❖ **Scoring system:**

Total items are 62 points. There are 4 sections: knowledge related to human Papilloma virus infection (32 points), knowledge related to HPV vaccine (14 points), knowledge related to PAP smear test (10 points), and knowledge related to cervical cancer (6 points). The overall number of correctly answered questions has been determined as the total knowledge and categorized into two levels: 50% and more (31-62 points) were deemed satisfactory and less than 50% (0-30 points) were deemed unsatisfactory.

Tool II: pre/post program Health beliefs Assessment format: towards HPV **vaccination**: It was developed by *(Larasati, et al. 2020)* and translated into Arabic by researchers which included HPV is good for health just like other vaccines, taking the HPV vaccine is a good idea because it is recommended by the government, the HPV vaccine would be a good way to prevent HPV infection, etc.

❖ **Scoring system:**

Each step of women's health beliefs has 3 levels of answers: agree, uncertain and disagree. These were respectively calculated as follows: 3 for agree, 2 for uncertain and 1 for disagree. For each item of health beliefs, the score of the items summed- up and the total equals 18 points and is divided by the number of items. These scores were converted into a percent score and the total health beliefs score was classified as the following: healthy beliefs when the total score equals or is more than 50 percent (from 9-18 points); unhealthy beliefs when the total score is less than 50 percent (from 0-8 points).

Tool III: Pre-post Women's attitudes assessment format: about human Papillomavirus and its vaccination; cervical cancer and PAP smear test. It was developed by *(Dönmez, et al. 2020)* and translated into Arabic by researchers. It included two sections:

Section (1): Women's attitude about human Papillomavirus and its vaccination contain (12 items) such as HPV is dangerous and life-threatening, HPV can cause cervical cancer, obtaining a uterine smear makes the woman feel anxious, vaccination against human Papillomavirus is important to prevent cervical cancer, I will recommend this vaccine to my friends and family, etc. **(pre/post program)**.

Section (2): Women's attitudes about cervical cancer and PAP smear test contain (8 items) such as cervical cancer is a preventable disease, cervical cancer can be detected early by PAP test, , the most common category of cervical cancer is women with multiple sexual relations and who are married at a young age, etc. (**pre/post program**).

❖ Scoring system:

Likert scale women's attitudes score: (3) agree, (2) neutral, (1) disagree. The score of the items was summed up and the total equals 60 points and is divided by the number of items. These scores were converted into a percent score and the total attitude score was classified as the following: Positive attitude when total score equals or is more than 50 percent (30–60 points) and negative attitude when total score is less than 50 percent (0–29 points).

Operational Design:

Preparatory phase:

A review of recent, past, national and international related literature or various aspects related to the topic was done using articles, textbooks and internet searches to become familiar with the research problem and to develop the tools of the study.

Content validity:

It was ascertained by a group of five experts from the Family and Community Health Nursing Department, Faculty of Nursing, Ain Shams University. Their feedback was sought on the tools' format, layout, consistency, accuracy, and relevance of content. All required modifications were completed as instructed.

Reliability:

The tool's reliability was assessed as moderate to high through the Cronbach's alpha test. The results also suggest that the tool's items are closely connected. The Cronbach's alpha for the questionnaire was computed as 0.860 for knowledge, 0.859 for health beliefs and 0.927 for attitude, indicating strong reliability of the tools.

Pilot study:

To assess the feasibility, clarity, and practicality of the study's methodology, a pilot test was conducted involving 10 women, representing 10% of the target population, within the previously mentioned settings. In addition, the pilot study allowed the researchers to estimate the time needed for participants to finish the questionnaires. The pilot study demonstrated that the tools worked as intended without requiring modifications. Consequently, the women who participated in the pilot were incorporated into the primary study group. These women lacked adequate knowledge, held unhealthy beliefs, and displayed negative attitudes towards prevention of human Papilloma virus at rural areas before participating in the program. As a result, they required a program to address these issues.

Field work:

Following approval, researchers introduce themselves to the head nurses of previous family medicine centers and describe the aim and components of the program. The researchers conducted their study three days a week, from 9 a.m. to 2 p.m., in the pre-mentioned settings. They began each visit by introducing themselves to the studied women, who had been chosen

based on predetermined criteria. The study spanned six months, beginning in February and concluding in July 2024. Researchers at the Shesht El-Enaam family medicine center collected data from an average of four to five women daily. A total of 38 studied women participated in the study, which was completed within a two-week period and at El-Hawata Family Medicine Center collected data from an average of two to three studied women per day over a two-week period. A total of 28 women participated in the study.

Researchers at El-Shaira Family Medicine Center collected data from an average of one to two women per day over a two-week period. A total of 17 studied women participated in the study and at Abo Shady Family Medicine Center collected data from an average of one to two women per day over a two-week period. A total of 15 studied women participated in the study. The study measured the program's impact by administering pre- and post-program tests to assess the studied women's knowledge, health beliefs, and attitudes.

Ethical considerations:

Approval was obtained from the Ethical Committee of the Faculty of Nursing at Ain Shams University (Ethical code is 24.01.209). They also discussed ethical concerns with health unit directors and head nurses of each setting. Before starting the study, the researchers discussed the aim of the research with participating women. Following this, these women gave their formal consent to be involved in the study. Participant privacy was protected by keeping information confidential and anonymous. Data was used solely for research purposes.

Administrative Design

The Dean of the Faculty of Nursing at Ain Shams University submitted a formal letter detailing the research and its goals to secure permission for the study. The letter was initially sent to the Director of the Shesht El-Enaam Health Unit. It was then passed on to the directors of four centers: Shesht El-Enaam, El-Hawata, El-Shaira, and Abo Shady, where the research would occur.

Educational Program Instruction:

It was implemented through four phases:

Phase I: Program Development

A comprehensive examination of relevant recent, current, national and international related literature was done. Data was collected through books, journals, magazines, and internet searches related to the prevention of the human Papilloma virus at rural areas. The researchers designed the program based on pre-test results.

Phase II: Assessment

Researchers assessed the needs of studied women in rural areas, assessing their knowledge, health beliefs, and attitudes about HPV prevention through a pre-test. The pre-test was administered three times weekly for two weeks at each setting. Each test took between 20 and 30 minutes to complete. This process spanned eight weeks overall.

Phase III: Program Implementation

The researchers met with the studied women for educational sessions two days per week, choosing from Saturday, Wednesday, or Thursday. The program was rolled out over four

months for all pre-mentioned settings. Each center implemented the program independently within a one-month timeframe. The program was executed at the reception desks of these centers.

The researchers had educational sessions with the studied women at Shesht El-Enaam center from the beginning of February 2024 to the first half of March 2024, El-Hawata center from the second half of March to the end of April 2024, El-Shaira center from the beginning of May to the first half of June 2024, Abo Shady center from the second half of June 2024 to the end of July 2024.

Program sessions:

A total of eight sessions were divided into two sessions per week, implemented over four weeks at family medicine centers. Pre- and post-program assessments were administered twice to evaluate the studied women's knowledge, beliefs, and attitudes.

The program began with an introduction explaining its goals and purpose. Beginning with the second meeting, each session started with a brief summary of the prior session's key points and outlined the goals for the next, using language accessible to all participants. Each session concluded with a summary of the discussion, time for questions and answers, and a plan for the next session. This was not done for the final session, as it ended with feedback on the overall process.

General program objectives:

To improve women's awareness related to the human Papilloma virus through increasing their knowledge, health beliefs and attitude.

Teaching methods: The researchers used a variety of teaching methods, such as brainstorming, group discussion and lectures about the human Papilloma virus and how to prevent it.

An instructional teaching video film: video clips, PowerPoint slides, and pictures about human Papilloma virus were prepared by the researchers and included route and time of vaccination, sign and symptoms, risk factors, diagnosis, and prevention of human Papilloma virus; also how to preform Pap smear test.

An instructional teaching booklet in simple Arabic, using clear and concise words and an illustrated colored Paper booklet were given to each woman entitled "Educational Program for Women at Reproductive Age Regarding Human Papilloma Virus Prevention at Rural Areas" as guidance at home to ensure that the women understood the information included in the program and to be sure that the women could apply.

Phase IV: Program Evaluation

The purpose of this phase was to determine the program's impact on participants' knowledge, beliefs and attitudes. They were tested after the program ended. The researchers analyzed the program's outcomes for similarities, differences, strengths, and weaknesses. This all happened one week after the program was completed.

IV. Statistical Design

The researchers entered the coded data from their study into a computer program called SPSS

(version 22) to analyze it. They used basic statistics like frequencies, means, and standard deviations to describe the data. They also used chi-square, independent t-test and one-way ANOVA Test to compare data from two groups (likely before and after a program) and Pearson's correlation to assess the relationships between two continuous variables. They considered the results statistically significant at p < 0.05 and highly significant at p < 0.001.

Results

Table (1): presents the demographic characteristics of women at reproductive age. It clarifies that the mean of women's ages included in the study was 27.07±4.97. Concerning women's level of education, 57.1% of them were in secondary education, while 4.1% of them were not read and write. About their occupation, 71.4% of women were housewives.

Table (2): reveals that the mean of the studied women at age of marriage included in the study was 21.93±2.60 and 50% of the married women were gravida three or more, while 20.4% of them were para three or more. About abortion, 29.6% of them had an abortion. Regarding history of Papilloma virus, 6.1% of the studied sample suffered from Papilloma virus. As well, 11.2% of them had a history of cervical cancer.

Table (3): It shows a significant improvement in the studied women's knowledge pre/post program regarding knowledge about human Papilloma virus and its vaccination (10.2%, 81.6%, &17.3%, respectively) and knowledge about PAP smear and cervical cancer (15.3%, 79.6%, & 20.4%, 89.8%, respectively). There were highly statistically significant differences between pre/post-program (p <0.001).

Figure (1): shows the total level of the studied women's knowledge regarding human Papilloma virus prevention pre/post educational program. It reveals that 18.4% of women had a satisfactory level of total knowledge pre-program, which improved to 83.7% post-program with highly statistically significant improvement (p <0.001).

Table (4) clarifies that there was a marked improvement in all items of the studied women regarding their total health beliefs towards human Papilloma virus vaccination, including general health beliefs, perceived benefit, perceived susceptibility toward HPV, feeling of worry, and perceived severity at post-intervention with a highly statistically significant difference (p <0.001) between pre and post-program.

Figure (2): displays the total level of the studied women's health beliefs towards human Papilloma virus vaccination. It reveals an improvement in women's health beliefs pre/post program, as 23.5% of studied women had a healthy beliefs score pre-program, which improved to 82.7% post-program, with highly statistically significant improvement (p <0.001).

Table (5): clarifies that there was a marked improvement in all items of the studied women attitudes regarding human Papilloma virus vaccination and PAP smear post implementation of the educational program (29.6%, 88.8% & 25.5%, 82.7%, respectively) with a highly statistically significant difference (p <0.001) between pre and post program.

Figure (3): shows the total level of the studied women's attitudes pre/post educational program regarding human Papilloma virus vaccination and Pap smear. It reveals an improvement in women's attitudes pre/post program, as 26.5% of women had a positive attitude pre-program, which improved to 87.8% post-program, with highly statistically

significant improvement (p <0.001).

Table (6): displays correlation between the studied women's total knowledge score, total health beliefs score and total attitudes score. It reveals that there were highly statistically significant differences between the studied women's total knowledge, total health beliefs and total attitude between pre and post- program**.**

Table (7): detects a relation between demographic characteristics of the studied women and their total knowledge score, total health beliefs score and total attitudes score pre/post program, it reveals that there were highly statistically significant differences between educational level and post total knowledge, health beliefs and total attitude (P <0.001).

Table (1): Distribution of the Studied Women According to Their Demographic Characteristics (n = 98).

| Demographic data of the studied women	No.	%
Age (Years)		
20≤25	29	29.6
25≤30	37	37.8
30≤35	20	20.4
35-40	12	12.2
Mean ± SD	**27.07±4.97**	
Marital status		
Single	22	22.4
Married	65	66.3
Divorced	9	9.2
Widowed	2	2.0
Educational level		
Not read & write	4	4.1
Read & write	20	20.4
Secondary education	56	57.1
University / Postgraduate Education	18	18.4
Occupation		
Working	28	28.6
Housewife	70	71.4

Table (2): Distribution of the Studied Women According to Their Gynecological and Obstetric History (N=98).

Gynecological and obstetric history	No.	%
Age of menarche		
< 12 years old	55	56.1
≥12 years old	43	43.9
Mean ± SD	**12.31±0.91**	
Menstrual problems		
Yes	69	70.4
No	29	29.6
Types of menstrual problems (n=69)		
Pelvic and abdominal pain	20	29.0
Hemorrhage	4	5.8
All of the above	45	65.2
Age of marriage		
< 20	19	19.4
20≤25	69	70.4
25-30	10	10.2
Mean ± SD	**21.93±2.60**	
Abortion		
Yes	29	29.6
No	69	70.4
Gravida		
None	39	39.8
1-2	10	10.2
3 or more	49	50.0
Parity		
None	39	39.8
1-2	39	39.8
3 or more	20	20.4
Redness and swelling in external genital organs		
Yes	19	19.4
No	79	80.6
Sexually transmitted disease		
Yes	4	4.1
No	94	95.9
Types of STDs (n=4)		
Chlamydia	3	75.0
Gonorrhea	1	25.0
Syphilis	0	0.0
Trichomoniasis	0	0.0
History of Papilloma virus		
Yes	6	6.1
No	92	93.9
History of cervical cancer		
Yes	11	11.2
No	87	88.8

Table (3): Distribution of Studied Women According to Their Total Knowledge about Human Papilloma Virus prevention at Pre and Post Implementation of Educational Program (n=98).

Knowledge dimensions	Pre intervention				Post intervention				Test of sig.	P-value
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No.	%	No.	%	No.	%	No.	%		
Knowledge about the human Papilloma virus	10	10.2	88	89.8	80	81.6	18	18.4	t=20.05	0.000**
Mean ± SD	11.82±3.41				26.57±6.38					
Knowledge about Vaccination	17	17.3	81	82.7	82	83.7	16	16.3	t=19.06	0.000**
Mean ± SD	5.28±1.77				11.73±2.94					
Knowledge about Pap Smear	15	15.3	83	84.7	78	79.6	20	20.4	t=17.46	0.000**
Mean ± SD	3.48±1.32				7.95±2.42					
Knowledge about cervical cancer	20	20.4	78	79.6	88	89.8	10	10.2	t=12.75	0.000**
Mean ± SD	2.16±0.62				3.62±1.12					

**t=** Paired t. test, **SD=** Standard deviation   **Highly significant at p ‹ 0.001.
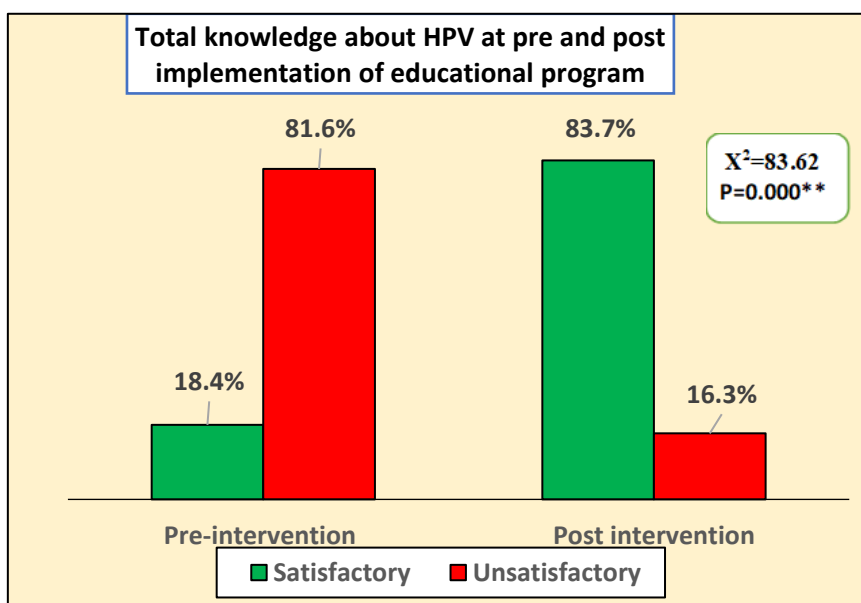
Figure (1): Distribution of the Studied Women According to Their Total Knowledge about Human Papilloma Virus prevention at Pre and Post Implementation of Educational Program (N=98).

Table (4): Distribution of Studied Women According to Their Total Health Beliefs towards Human Papilloma Virus Vaccination at Pre and Post Implementation of Educational Program (N=98).

Statements	Pre-intervention	Post-intervention	t	P-value
	Mean ± SD	Mean ± SD		
General health beliefs				
HPV vaccine is good for health just like other vaccines.	1.78±0.92	2.62±0.76	**9.043**	**0.000****
Taking the HPV vaccine is a good idea because it is recommended by the government.	1.63±0.64	2.64±0.52	**12.61**	**0.000****
Perceived benefit				
The HPV vaccine would be a good way to prevent HPV infection.	1.37±0.72	2.50±0.77	**12.51**	**0.000****
Perceived susceptibility toward HPV				
I think I will get infected with HPV.	1.79±0.82	2.52±0.77	**6.811**	**0.000****
Feeling of worry				
I am worried about getting infected with HPV.	1.69±0.63	2.12±0.67	**5.307**	**0.000****
Perceived severity				
Infection with HPV can lead to serious illness.	1.37±0.72	2.63±0.76	**13.62**	**0.000****

**t:** Paired t test. **P=** p-value. No significant at p >0.05. **Highly significant at p ‹ 0.0.
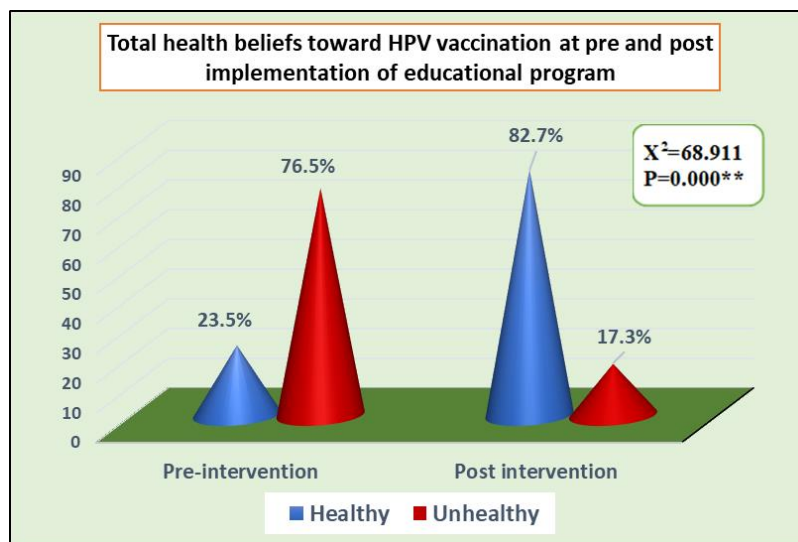
Figure (2): Distribution of the Studied Women According to Their Total Health Beliefs towards Human Papilloma Virus Vaccination at Pre and Post Implementation of Educational Program (N=98).

Table (5): Distribution of the Studied Women According to Their Total Attitudes Regarding Human Papilloma Virus Vaccination and Pap Smear at Pre and Post Implementation of Educational Program (N=98).

Attitude dimensions	Pre intervention				Post intervention				Test of sig.	P-value
	Positive		Negative		Positive		Negative			
	No.	%	No.	%	No.	%	No.	%		
HPV infection and HPV vaccination	29	29.6	69	70.4	87	88.8	11	11.2	**t=21.54**	**0.000**
Mean ± SD	16.45±4.61				25.28±5.04					
Pap smear and cervical cancer	25	25.5	73	74.5	81	82.7	17	17.3	**t=17.30**	**0.000**
Mean ± SD	11.86±3.41				18.46±3.82					

X^2**:** Chi-square test**, t=** Paired t. test, **SD=** Standard deviation   **Highly significant at $p < 0.001$.
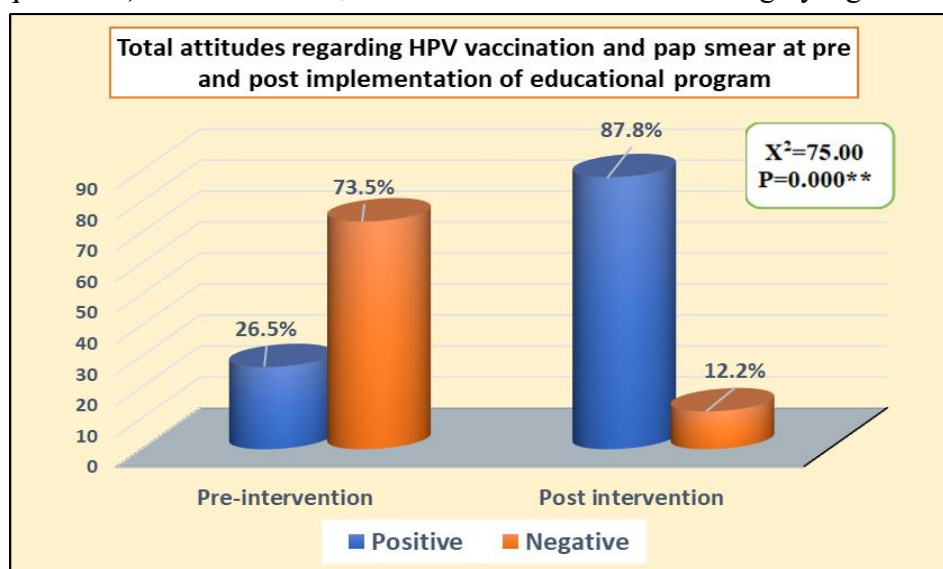
Figure (3): Distribution of the Studied Women According to Their Total Attitude Regarding Human Papilloma Virus Vaccination and Pap Smear at Pre and Post Implementation of Educational Program (N=98).

Table (6): Correlation between Total Knowledge Score, Total Health Beliefs Score, Total Attitudes Score among the Studied Women at Pre and Post Implementation of Educational Program (n=98).

Variables		Total knowledge score		Total health beliefs score	
		Pre intervention	Post intervention	Pre intervention	Post intervention
Total knowledge score	**R**	1	1		
	p				
Total health beliefs score	**R**	0.626	0.318	1	1
	p	0.000**	0.001**		
Total attitude score	**R**	0.723	0.652	0.786	0.403
	p	0.000**	0.000**	0.000**	0.000**

r= coefficient correlation test.   **p=** p-value   *Significant at $p < 0.05$.
 **highly significant at $p < 0.01$.
Interpretation of r: **Weak** (0.1-0.24)   **Intermediate** (0.25-0.74)
Strong (0.75-0.99)   **Perfect** (1).

Table (7): Relation between the Studied Women's' Demographic Data and Their Total Knowledge Score, Total Health Beliefs Score, Total Attitude Score at Pre and Post Implementation of Educational Program (n=98).

Demographic data of the studied women		Total knowledge score		Total health beliefs score		Total attitudes score	
		Pre Intervention	Post intervention	Pre intervention	Post intervention	Pre intervention	Post intervention
Age	**20-<25**	18.75±0.9	45.48±15.8	8.00±0.00	16.41±7.77	24.86±2.21	37.89±7.8
	25-<30	23.81±6.6	50.75±11.7	10.64±3.4	14.64±3.83	29.6±7.76	44.24±1.2
	30-<35	28.35±6.5	50.50±2.94	9.75±3.10	13.20±4.39	30.80±9.0	47.00±6.9
	35-40	19.50±2.6	57.16±3.12	10.33±3.4	16.00±0.85	29.33±6.40	44.33±4.7
Test of Sig.		**F=15.75 p=0.000****	**F=3.135 p=0.029***	**F=5.145 p=0.002****	**F=4.726 p=0.004****	**F=3.966 p=0.010***	**F=5.46 p=0.002****
Marital status	**Single**	19.22±1.82	46.45±13.3	8.00±0.00	13.81±3.67	24.81±1.73	39.09±68
	Married	24.06±7.19	51.03±11.8	10.47±3.37	16.30±1.95	30.24±7.99	44.55±96
	Divorced	22.0±0.0	52.88±2.20	8.00±0.00	9.55±3.08	25.33±2.00	41.00±30
	Widowed	20.50±0.70	39.0±12.7	8.000±0.0	12.00±5.65	22.50±0.70	41.50±22
Test of Sig.		**F=3.698 p=0.014***	**F=1.608 p=0.193**	**F=5.778 p=0.001****	**F=21.03 p=0.000****	**F=4.930 p=0.003****	**F=2.38 p=0.081**
Educational level	**Illiterate**	19.50±1.73	28.50±1.73	8.00±0.0	12.50±5.19	24.0±2.0	31.0±6.5
	Read & write	20.65±1.42	48.45±12.1	8.00±0.0	14.20±3.79	24.85±1.63	37.60±6.1
	Secondary education	21.82±6.24	50.03±11.9	8.87±2.35	19.96±3.31	26.44±5.36	42.71±8.9
	University	28.50±6.96	56.0±4.48	14.22±2.26	16.77±0.64	39.50±5.04	52.22±3.5
Test of Sig.		**F=8.043 p=0.000****	**F=7.235 p=0.000****	**F=38.45 p=0.000****	**F=3.064 p=0.008****	**F=41.64 p=0.000****	**F=16.2 p=0.000****
Occupation	**Working**	22.92±6.9	54.60±7.19	10.75±3.4	16.14±1.69	29.10±7.21	47.32±6.92
	Housewife	22.62±6.0	48.05±12.8	9.20±2.65	14.60±3.68	28.14±7.3	41.18±9.8
Test of Sig.		**t=0.214 p=0.831**	**t=2.546 p=0.012***	**t=2.380 p=0.019***	**t=2.123 p=0.036***	**t=0.609 p=0.544**	**t=3.216 p=0.002****

F= One Way ANOVA Test**.**   **t:** Independent t-test**.**   **No significant at p > 0.05.**
*Significant at p ‹ 0.05. **highly significant at p ‹ 0.01.

Discussion

Worldwide, cancer is a major mortality concern. Cervical cancer in particular is caused by the presence of various high-risk HPV strains. Given the high prevalence of cervical cancer-related fatalities in developing regions such as Egypt *(WHO, 2022).* The development and implementation of comprehensive prevention and screening programs for Egyptian women about HPV and cervical cancer is imperative *(El Sayed et al., 2022),*

Regarding demographic characteristics of the studied women, the current study revealed that the mean age was 27.07±4.97 years; more than two-thirds of them were aged 25≤30 years and were married. Also, more than half of them had secondary education. More than one quarter of studied women were working.

The current study results are consistent with *Surakatu et al. (2022)*, who studied knowledge, attitude, and practices of cervical cancer screening among female teachers in an urban

community in Lagos, Nigeria, and found that the 86.3% of participants were in the age range of 25-35, and 63.7% of them were women with secondary education. On the other hand, the current study findings were inconsistent with those of the study carried out by *Eghbal et al. (2020),* who studied evaluating the effect of an educational program on increasing cervical cancer screening behavior among rural women in Iran, and found that 83.7% of the participants in the experimental group were illiterate or had elementary education.

Regarding the gynecological and obstetric history of the studied women, the current study results showed that the mean age of menarche was 12.31±0.91; more than half of them were aged < 12 years. Also, less than three quarters of participants had menstrual problems, and approximately two-thirds then suffered from hemorrhage, pelvic, and abdominal pain.

Concerning the age of marriage, less than three quarters of the studied women married at 20–25 years; half of them have 3–4 pregnancies; about two-fifth have 1-2 parties; and the majority of the women haven't Sexually transmitted disease or a history of Papilloma virus.

The current study results are in the same line with *Surakatu et al. (2022),* who reported that 44.3% of the studied sample had 1-3 times of pregnancy, 82.4% of them had more than three children, and 77.1% of women were married at the age of 21-30 years. On the other hand, the current study findings were disagreed by *El Sayed et al. (2022),* who conducted a study in Tabuk, Saudi Arabia and found that 34.9% of participants had gravida 1-2, and 58.7% ranged from 1-2 of parity. The researcher attributed frequent childbearing to the ignorance of some women about different types of family planning methods in their childbearing period and also in rural areas; they believe that children are traitors.

Women's knowledge regarding human Papilloma virus prevention in this study indicated that about one-tenth of women had satisfactory knowledge about human Papilloma virus and about one-fifth about vaccination of it in preprogram implementation. These minorities increased to be the majority post-program implementation, with highly statistically significant differences (p-value < 0.001).

In the current study, women's knowledge regarding Pap smear and cervical cancer improved from more than one tenth and about one-fifth, respectively, in the preprogram to more than three quarters and about the most post-program implementation with highly statistically significant differences (p-value < 0.001).

These current study findings are in congruence with those of a study conducted by *Ghalavandi et al. (2021),* who indicated that 87.6% of participants had good knowledge about HPV infection and the HPV vaccine after implementation of educational intervention.

These findings are in agreement with *Eittah et al. (2020),* who conducted a study in Sudan and illustrated that the score of knowledge before the intervention was 16.8% regarding cervical cancer, the human papilloma virus and its vaccination, while after the educational intervention, the level significantly.

Moreover, the results of the current study are confirmed by *El Sayed et al., (2022),* who demonstrated that 84.9% of the studied sample had good knowledge regarding Papilloma virus infection and its vaccination at post-intervention phases. From the researchers' point of view, the educational program provided the women with simplified and summarized information that can enhance knowledge and attitudes.

Concerning the total level of women's knowledge regarding human Papilloma virus prevention, less than one-fifth of women under study had satisfactory knowledge of preprogram implementation. Meanwhile, in the post-program, it raised to the majority with highly statistically significant differences (p-value < 0.001). These findings are in agreement with those of the study conducted by **Tiiti et al. (2022)** about the "knowledge of human papilloma virus and cervical cancer among women attending gynecology clinics in Pretoria, South Africa," who revealed that all the women had poor knowledge scores about cervical cancer prevention before the program and improved to 23.2% and 84.7% of the women having an average and good level of knowledge, respectively, with highly statistically significant differences (p-value < 0.001).

Concerning the mean scores of health beliefs towards human Papilloma virus vaccination, the present study indicated that the studied women after the program got highly significant difference scores regarding the general health beliefs, perceived benefit, perceived susceptibility toward HPV, feeling of worry, and perceived severity compared with the scores before the program (p-value < 0.001). The mean score increased from 9.64±2.98 the pre-program phase to 15.04±3.30 to 3.30 in the post phase. These results were in the same line with a study conducted in Egypt by **Ibrahim et al. (2021),** who reported that after implementation of the self-learning package, there was a significant increase in the mean scores of health belief model constructs. Also, these results were in agreement with a study carried out by **El Sayed et al., (2022),** who revealed that education based on the health belief model was effective and improved all items of the health belief model. From the researchers' point of view, the educational sessions had a positive impact on women's health beliefs toward human papilloma virus vaccination due to correct misconceptions about the human papilloma virus.

Regarding the total health beliefs score of the studied women towards human Papilloma virus vaccination at pre- and post-implementation of educational program, this study result indicated that less than one quarter of women had positive beliefs in pre-program while improving to the majority in post-program with a highly statistically significant difference (p-value < 0.001). These results were in agreement with those of the study conducted by **El Sayed et al., (2022),** who found a significant improvement in the participants' scores post-intervention related to human Papilloma virus vaccination. This may be because of the educational program, as it provides the participants with valuable information that can affect their health beliefs and preventive behaviors.

About women's attitudes toward human Papilloma virus vaccination and Pap smear, the present study result revealed that there are highly statistically significant improvements after educational program, with scores increasing from pre- to post-program phases. The mean score increased from 28.41±7.06 the pre-program phase to 42.94±8.93 post-program. These findings are relatively similar to those of **Eittah et al. (2020),** who revealed that 83.6% of the participants' attitudes was highly positive after the implementation of the educational intervention. Similarly, the study findings correspond with those of **Ampofo et al. (2020),** which illustrated that 93.4% of the respondents did not know about the neutral history of cervical cancer and 26.9% of them believed that HPV vaccine would prevent cervical cancer, although 86.9% of them believed that HPV vaccine would prevent cervical cancer. Few respondents had a positive attitudes regarding adverse events following immunization. From the researchers' point of view, the improvement of women's knowledge leads to a positive impact of their attitudes and beliefs.

Regarding the total attitudes score of women at reproductive age related to human Papilloma virus vaccination and Pap smear, this study results clarified that more than one quarter of women had a positive attitudes in preprogram, while improved to the majority in post-program with a highly statistically significant difference (p-value < 0.001). These results were in agreement with those of the study conducted by *Ibrahim et al. (2021)*, who found that 88.2% of participants had positive total attitudes scores at post-intervention with a highly statistically significant difference (p-value < 0.001). This may be due to educational sessions that provided the women with valuable information that can positively affect their beliefs, which in turn positively affect their attitudes.

Regarding the correlation between women's knowledge and their attitudes toward human Papilloma virus prevention, the current study found a positive correlation between knowledge and attitudes after an educational program. Satisfactory knowledge about the Papilloma virus was linked to a significantly more positive attitudes among women. This result is congruent with *Rahangdale et al. (2022)*, who reported that participants with good knowledge of HPV and cervical cancer were more positive in their attitudes and willing regarding cervical cancer and HPV than participants with poor knowledge. This can be attributed to the fact that improved knowledge is in turn improving attitudes and vice versa, which underlines the importance of educational program.

On the other hand, this result can be contrary to the result of *Sonawane et al. (2020)*, who illustrated that the women have favorable attitudes towards HPV vaccination; however, they have significant and major misunderstandings in critical items. This dissimilarity of the present study result with the result of this study could be due to different demographic characteristics, traditions, and beliefs of the studied population.

Furthermore, the study found a highly positive statistically significant correlation between women's knowledge score and their health beliefs scores regarding human Papilloma virus prevention. These findings are congruent with *Bogers et al. (2022)*, who reported that there was a significant positive correlation between total knowledge and total health beliefs scores. This improvement could be attributed to the positive impact of the educational program on women's health beliefs regarding human Papilloma virus vaccination.

As detected in the current study result, there was a highly statistically significant relation between women's post-program total score of knowledge and their demographic characteristics, where highly statistically significant differences were found between women's knowledge and their educational level. This finding is agreed with *Hampson et al. (2021)*, who stated that age and level of education were significantly associated with the highest knowledge score among women with higher education and were more likely to have adequate knowledge. These findings may be because highly educated women pay more attention to health and have more opportunities to obtain relevant information and increasing their knowledge.

Conclusion

The findings of this study concluded that there was lack of knowledge regarding prevention of human papilloma virus infection among women, at reproductive age, which in turn affected their health beliefs and attitudes toward it. Highly statistically significant improvements occurred in the total score of knowledge, health beliefs and their attitudes post-educational program .As well, women's awareness increased after implementing the educational program at rural areas.

Recommendations

This research led to the following recommendations:

- Increasing HPV vaccination rates among the rural women population by subsidizing the vaccine, conducting awareness campaigns, and providing convenient access to vaccination sites.

- Informational brochures with images and diagrams about early detection and screening for human papillomavirus (HPV) and cervical cancer should be provided to nurses and all women visiting family medicine centers and maternity hospitals.

- Further studies need to be performed about the effect of educational programs for preparatory and secondary school students regarding the prevention of the human papilloma virus and cervical cancer.

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الملخص العربى

برنامج تعليمى للنساء في سن الإنجاب فيما يتعلق بالوقاية من فيروس الورم الحليمي البشري في المناطق الريفية

المقدمة: ينتقل فيروس الورم الحليمي البشري (HPV) عادةً عن طريق ملامسة الجلد للجلد أثناء النشاط الجنسي. ويمكن أن يؤدي الفيروس أيضًا إلى مضاعفات صحية متعددة وسرطانات شرجية تناسلية مختلفة لكلا الجنسين

الهدف: تهدف الدراسة إلى تقييم أثر البرنامج التعليمى للنساء في سن الإنجاب فيما يتعلق بالوقاية من فيروس الورم الحليمي البشري في المناطق الريفية.

التصميم: تم استخدام التصميم شبه التجريبي

النتائج: متوسط عمر النساء كان 27.07±4.97. كما أن 83.7% و82.7% و87.8% من النساء لديهن مستويات مرضية من المعرفة والمعتقدات الصحية والمواقف الإيجابية حول الوقاية من فيروس الورم الحليمي البشري في المناطق الريفية بعد تنفيذ البرنامج التعليمي.

الخلاصه والتوصيات: تطبيق برنامج تعليمي للنساء في سن الإنجاب له تأثير إيجابي إحصائيا على معارفهن ومعتقداتهن الصحية واتجاهاتهن حول الوقاية من فيروس الورم الحليمي البشري في المناطق الريفية. ولذلك يجب زيادة معدلات التطعيم ضد فيروس الورم الحليمي البشري بين سكان الريف من خلال دعم اللقاح، وإجراء حملات توعية، وتوفير سهولة الوصول إلى مواقع التطعيم.

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