

Effect of Roy Adaptation Model on Sexual Function and Pain Coping Strategies among Women with Early Stage of Cervical Cancer

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Abstract

Background: Cervical cancer is treatable type of cancer, especially when detected early and managed effectively. Despite this, half of women diagnosed with cervical cancer experience problems with sexual function. **Aim:** The aim of the study was to evaluate the effect of Roy adaption model on sexual function and pain coping strategies among women with early-stage of cervical cancer. **Design:** This study was conducted as quasi-experimental design. **Setting:** This study was conducted at Benha University Hospitals in Benha, Egypt, at the gynaecological inpatient unit and the outpatient clinics. **Sampling:** A Purposive sample included 68 women was used. **Tools:** four tools were used for data collection including a structured interviewing questionnaire (demographic data and knowledge sheet), Roy adaptation model scale, coping strategies questionnaire, and female sexual function index. **Results:** Through all programme phases, the control group did not show any statistically significant positive association between total RAM and the total of other variables. Although there was a strong association between total RAM and total (knowledge, coping mechanisms, and sexual function) in the study group after three and six months of program application. **Conclusion:** The use of a nursing strategy based on Roy's Adaptation Model enhanced sexual function and pain coping strategies among women with early stage of cervical cancer. **Recommendation:** Provide instructional guidelines for women with cervical cancer to promote adaptation to sexual issues.

Keywords: Cervical cancer, Roy-adaptation model and Sexual function.

Introduction

Cervical cancer (CC) is a major public health concern worldwide and a significant cause of mortality and morbidity, being the 4th common cancer amongst women globally with 85% of cases occurring in developing countries. The peak of the disease is observed among women in the sixth decade of life. In recent years, there has been an increase in morbidity in women in the age range between 35 and 44 (*Chisale Mabotja et al., 2021*).

Early stage of cervical cancer (carcinoma is only in the cervix disregard extension to corpus) is most often caused by certain types of human papillomavirus, a common sexually transmitted infection, frequent in women aged (18–30). Stage I tumors are divided into two basic groups by the International Federation of Gynecology and Obstetrics (FIGO) staging system: stage IA (microinvasive) and stage IB (gross tumor). (*Liberacka-Dwojak, and Izdebski, 2021*).

The majority of gynecologic cancer survivors face persisting sexual debilitating problems over time. All of the treatment modalities used to effectively treat cancer, have the potential to significantly impair sexual function, being

an unsolved problem that causes distress in cancer survivors, with repercussions on the quality of life (*Bacalhau et al., 2020*).

Changes in female sexuality in women with gynecological cancer, at the anatomical and physical level, are well established, including anatomical changes such as vaginal shortening, vaginal elasticity; and physical changes, such as dyspareunia, infertility, and post-coital vaginal bleeding; and other changes related to sexual response, arousal, and excitement, including changes in desire, orgasm and arousal, and vaginal lubrication, as well as the decrease in frequency of sex and sexual activities (*Abd El Salam et al., 2021*).

Major cancer-related complications such as pain have been recorded in advanced illness (86%), radical treatment (59%) and cancer survivors (33%) (*Kuguyo et al., 2021*). Coping is often divided into two categories: active coping and passive coping. Active coping is when a patient makes an effort to manage their suffering by using their own internal resources. In contrast, passive coping is characterized by a propensity to avoid activities, a sense of powerlessness in dealing with the pain, and a handing over of control of the discomfort to other outside resources. Physical inactivity may result

from passive coping, which is followed by physical decline (*Prell et al., 2021*).

Women who diagnosed with cervical cancer face complex problems including physiological, psychological, social, and spiritual problems. Women must learn to deal with these difficult issues. One of the best conceptual frameworks and coping mechanisms for nursing practice, research, and teaching is Roy's Adaptation Model (RAM). RAM improves the nurses' capacity to increase person-environment interaction and deliver an efficient adaptation. (*Alidoost et al., 2021*).

The use of RAM improved chronic illness adaptive responses. Numerous researches that looked at the impact of social support based on RAM and found that the model is useful in improving communication among cancer-stricken women and decreased mood disorders and feelings of loneliness. The model proposes three psychological and one physiological way of response to environmental stimuli. Self-concept, dependency, and role function are examples of psychosocial modes (*Adib-Hajbaghery et al., 2021*).

Nurses as a part of health care providers have responsibilities to help women in dealing with cervical cancer. Nurses can provide nursing care by using a variety of nursing theories so that the nursing care provided is optimal, so nursing activities shift away from being service-centered to serving in a patient-focused manner (*Maryati et al., 2018*).

Although, there is significant gaps noted that no nursing models were used to improve sexual function and pain coping among women with cervical cancer, the nurse is capable of advocating a broad view of sexuality, emphasizing relationship and sensuality as essential components for sexual function and pain coping strategies, making an effort to uncover trends in thought and opinions, diving deeper into the problem, and having the potential to generate answers to complex questions (*Muchlisin et al., 2021*).

Significance of the problem:

Cervical cancer has represented a major public health problem worldwide. Each year there are about 500,000 new cases and over 270,000 deaths due to this disease. Currently, cervical cancer in the developing nations is heavily falling with the magnitude of 85% of the cases and

88% of the deaths due to cervical cancer. The lifetime risk and problem associated with cervical cancer in developing countries is 35% with greater lifetime risk than women in high income countries (*Habte et al., 2021*).

Understanding the impact of cervical cancer on survival is critical to enabling health and social professionals to promote strategies to improve the quality of life of women cervical cancer survivors. It may also assist health care providers in actual practices and improve women's sexual health and quality of life (*Maree and Hotslander 2021*).

Roy's model of adaptation aims to increase patients' physiological and cognitive adaptability to chronic conditions. RAM healthcare initiatives can reduce unhealthy behaviors and increase compatibility. This model may serve as a helpful guide for nurses while providing patient care as well as a template for a variety of patients' adjustment and compliance programs (*Hatami and Hojjati., 2019*).

Aim of the study

The study aimed to evaluate the effect of Roy adaptation model on sexual function and pain coping strategies among women with early stage of cervical cancer. This aim will be achieved through the following objectives:

- 1-Assess women's knowledge regarding cervical cancer.
- 2- Assess women's sexual function during cervical cancer.
- 3- Assess women's pain coping strategies toward cervical cancer.
- 4- Design health educational program based on Roy adaptation model.
- 5- Implement health educational program based on Roy adaptation model.
- 6-Evaluate women's knowledge, sexual function and pain coping strategies after application of RAM.

Research hypotheses:

H1- Women with early cervical cancer who will receive health educational program based on Roy's adaptation model will have a higher level of knowledge than who will not receive this health educational program.
H2- Women with early cervical cancer who will receive health educational program based on Roy's adaptation model will have improved sexual function than who will not receive this health educational program.

H3- Women with early cervical cancer who will receive health educational program based on RAM will have proper pain coping strategies than who will not receive this health educational program.

H4- Women with early cervical cancer who will receive health educational program based on RAM will become more adaptive than who will not receive this health educational program.

Operational definitions:

Roy's adaptation model: adaptation model that used in nursing to improve sexual function and healthy behaviors of women with early cervical cancer and consisting of four modes that enabled for the detection and control of maladaptive behaviors: physiological, self-concept, interdependence, and role function modes.

Sexual function: refers to how the body of the woman react to the changes occurs in sexual process during cervical cancer.

Pain coping strategies: refers to behaviors, thoughts, and emotions that woman use to overcome pain associated with cervical cancer.

Subjects and Method

Research Design: This research used a quasi -experimental design (Non-equivalent groups design) study and control group through pre and post-test.

Research setting

This study was carried out in the Benha University Hospital in Benha, Egypt, in the gynaecological inpatient unit and the outpatient clinics. This hospital is serving Qalyubia Governorate and the surrounding areas and provides all medical services, including cancer.

Sample type and size

A Purposive sample included all women (68 women) who visit the previous mentioned setting at the time of research (6 months) and met the research **inclusion Criteria:** age ≥ 25 years, diagnosed with early stage of cervical cancer, married with sexually active, don't use any drugs affecting the sexual health or antidepressant medications, free from stressors that have occurred within the past six months, free from chronic illness or psychological disorders, and accepted to participate in the study.

All women who meet inclusion criteria were included in the study as cases with cervical cancer coming to the hospital is relatively low.

The sample was randomly divided into two groups (study group involved 34 women

who received health educational program based on Roy adaptation model and control group involved 34 women who received knowledge and routine care only).

Sample technique:

The sample was randomly divided so that the first case was considered from the control group and the second case from the intervention group so that the control group had odd numbers and the intervention group had even numbers to avoid bias

Tools of data collection

Three tools were utilized to collect data:

Tool (I): Structured interviewing questionnaire: designed by the researchers based on literature review (*Aziz et al., 2022*); (*Musonda et al., 2022*); (*Mijiti et al., 2023*) and written in simple clear Arabic language and composed of four parts:

Part I: General characteristics which including: women's age, residence, educational level, occupation, age of marriage and monthly family income.

Part II: Obstetrics history: gravidity, parity and method of contraception.

Part III: Anthropometric measurements: (weight and height) to calculate Body Mass Index (BMI).

Part V: knowledge regarding cervical cancer: included (10) multiple choice questions about definition, risk factors, causes, signs and symptoms, prevention, diagnosis, screening procedures, methods of treatment complications of disease, knowledge about pap smear.

Knowledge scoring system

Each complete answer was assigned a score (2) and a score (1) was given for incomplete answer while, a score (0) was given when the answer was I don't know. The total knowledge scores ranged from 0-20 scores and classified as the following: (*Aziz et al., 2022*)

- Adequate knowledge $\geq 50\%$
- Inadequate knowledge $< 50\%$

Tool (II): "Roy Adaptation Modes Scale" (RAMS) adapted from *Russo S.A., (2019)* and included four modes. Each mode includes some of questions which used for observations of maladaptive behaviors of women with early cervical cancer.

1- Physiologic Mode: involved (10) items as (Breathing, Note the color of lips, remain calm, drink enough fluids, and eat a well-balanced diet, sleep, rest, dizziness or fatigue, pain management and changes in hearing, vision, and the ability to feel or touch)

2- Self-Concept Mode: involved (10) items as the following (Don't look in the mirror, think about getting better, Recognize the importance of looking presentable, take care of myself, Maintain personal neatness, Rely on spiritual strength, Recognize the importance of looking healthy, Remain positive, Dream of getting healthy, Manage stress through spirituality).

3- Role Function Mode: which included (9) items as (I am aware that I have to change my role, I am capable of taking care of myself, Face transitions bravely, do not fear change, I am capable of making changes in my normal daily functions, Can't perform or behave as expected when working in groups, I'm capable of helping others, Think my manual skills does not meet the expectations of my job/boss/coworkers demands and No longer have the character to endure my positions' demands)

4- Interdependence Mode: which included (10) items as (Know that my family loves me, even with my illness, have support systems to help me, have developed relationships with people to help me, Feel secure and safe, My colleagues understand and support me, My friends are close to me in difficult times, I feel I can count on God, Recognize the security provided by family, Recognize the security provided by work and In my relationship I'm not the same person)

Scoring system:

Each answer was measured and given a score according to a five-point Likert scale as the following: Never (1), rarely (2), Sometimes (3), Often (4) and Always (5). The range of total score was 38 to 190. The higher score means more adaptive behavior regarding cervical cancer (*Roy and Andrews 2009*). Total Adaptation of Roy Model received scores ranging from: Highly adapted when the overall score was $\geq 75\%$

- While the overall score was 60% - <75%, adaptation was moderate.
- Slight adaptation when the final score was < 60%

Tool (III): Coping Strategies Questionnaire (CSQ) which adapted from *Monticone et al., 2014* and included 27 sentences listed under six subscales which applied to evaluate how woman deal with pain.

- 1- Imagine things that help being happy.
- 2- Guess people that woman love to have fun with.

- 3- Think back to pleasant past experiences.
- 4- Engage in female-pleasing activities like watching television or listening to music.
- 5- Attempt to think about something pleasant.
- 6- Make an effort to act as if nothing occurred.
- 7- Don't pay attention to pain.
- 8- Remind that pain should not interfere with what she is doing.
- 9- Even when feeling pain, try to carry on.
- 10-Don't think about pain.
- 11-Ignore the pain.
- 12-Act as if the pain is not present.
- 13-Assume that the pain is foreign to the body.
- 14-Pretend that the pain does not belong to woman.
- 15-Try to keep oneself away from pain, as if it belonged to somebody else.
- 16-Try to think that the pain does not belong the body but that it is something foreign.
- 17-Feeling of intolerance to the pain.
- 18-Have the feeling of not being able to move forward.
- 19-Worried about when the pain will end.
- 20-Have a feeling that it is not worth living.
- 21-The pain is terrible and the woman feels that it overwhelming.
- 22-The pain is terrible and the woman feels it will never get better.
- 23-Ask God to shorten the duration of the pain.
- 24-Hope the pain will end.
- 25-Trust in faith in God.
- 26-The woman tell herself to overcome the pain.
- 27-The woman tell herself to have courage and to move forward.

28- Scoring system:

- 29- The score based on 3-points Likert scale as always scored as (3), sometimes scored as (2) and never scored as (1). The higher score means proper pain coping strategies.

Sub-scale	Items number	Score range	Higher score	Lower score
Distract yourself	1,2,3,4,5	5-15	15	5
Catastrophism	17,18,19,20, 21,22	6-18	18	6
Ignore painful sensations	6,7,10,11,12	5-15	15	5
Distance yourself from pain	13,14,15,16	4-12	12	4
Self-affirmation strategies	8,9,26,27	4-12	12	4

Pray	23,24,25	3-9	9	3
Total score		27-81	81	27

Tool (IV): Female Sexual Function Index (FSFI): It was adopted from *Reed et al., 2012* and have 19 sentence to assess the sexual function of the woman in the last month before interview, and measure six domains including (desire domain, arousal, lubrication, orgasm, satisfaction and sexual pain).

The first domain is (Desire): which covered by two questions: (times and amount of sexual desire).

The second domain is (Arousal): which covered by four questions: (timing and intensity of arousal during a sexual interaction, as well as the likelihood that arousal will occur during a sexual interaction and the intensity of the interaction).

The third domain is (Lubrication): which covered by four questions: frequency of lubrication or difficulty of lubrication during a sexual relationship or intercourse, frequency of lubrication until the end of sexual activity, and difficulty of lubrication until the end of sexual activity or intercourse.

The third domain is (Orgasm): which covered by three questions: frequency of orgasms, obstacles to orgasm, and satisfaction with the orgasm-inducing capacity of sexual engagement.

The fourth domain is (Satisfaction): which covered by three questions made up the satisfaction domain were concerned with how satisfied respondents were with husbands' levels of emotional closeness, sexual relationships with them, and general sexual lives.

The fifth domain is (Pain): which covered by three questions: frequency of pain or discomfort during vaginal penetration, the frequency of pain or discomfort after vaginal penetration and the intensity of pain during or after).

Scoring system:

The following table shows Female Sexual Function Index Domain Scores and Full-Scale Score:

	Numbers of Questions	Scoring Range	Factor	Minimum Score	Maximum Score
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Desire	1, 2	1 – 5	0.6	1.2	6.0
Arousal	3, 4, 5, 6	0 – 5	0.3	0	6.0
Lubrication	7, 8, 9, 10	0 – 5	0.3	0	6.0
Orgasm	11, 12, 13	0 – 5	0.4	0	6.0
Satisfaction	14, 15, 16	0 (or 1) – 5	0.4	0.8	6.0
Pain	17, 18, 19	0 – 5	0.4	0	6.0
Full Scale Score Range				2.0	36.0

Validity

Tools of the present study was reviewed by panel of five experts of academic nursing staff in the Obstetrics and Gynecological Health Nursing to test content validity and sentences clarity.

Reliability

The reliability was done by *Cronbach's alpha coefficient test* to measure the internal consistency of tools used in data collection. Internal consistency for knowledge sheet was 0.980, internal consistency for Female Sexual Function Index was 0.964, internal consistency for Coping Strategies Questionnaire was (CSQ-R 0.72 to 0.86), and internal consistency for Coping Strategies Questionnaire was 0.93

Ethical considerations

Before starting this study, Ethical approval was granted by the Scientific Research Ethical Committee in Faculty of Nursing, Helwan University. Purpose of study and objectives were explained by researchers to participated women to gain their cooperation and establishing a rapport with them, Participants were assured that all obtained data were treated confidentiality. Participation in the study was voluntary and women can withdraw at any time from the study.

Pilot study

The pilot study was carried out on 10% of total time of data collection (3 weeks) before actual data collection and included 7 women to test applicability and clarity of tool, and determine needed time to complete questionnaires, The sample of pilot study was included in the main study sample, as there was no modification required.

Field work

First, Approval to conduct the study was obtained from the directors of Benha

University Hospital, then the researchers visited the previous mentioned study setting 3 days\week from 9 am to 2 pm. The current study started from the beginning of May 2021 to the end of April 2022 (lasted for 12 months)

A-Assessment phase: In this phase the researchers interviewed women in the waiting area in front of the obstetrics and gynecological clinic on the ground floor and inside the department of obstetrics and gynecology on the sixth floor, explained the study purpose and asked them for participation. Then, each woman was interviewed separately to obtain baseline data through the first tool which contain general data, medical and sexual history, and knowledge related to cervical cancer. Then the researchers assess women sexual function (second tool) and pain coping strategies (third tool)

According to Roy adaptation model there are four phases of assessment to determine maladaptive behaviors of women regarding cervical cancer (the final tool):

Phase I: Physiologic adaptation: Most women with early cervical cancer do not suffer from obvious symptoms, while few women may suffer from minor vaginal bleeding after intercourse or between menstrual cycles. General assessment include breathing pattern, nutrition, fluid balance, rest, sleep and others related to physiological condition.

Phase II: Self-concept assessment: to identify how women see themselves, level of anxiety and how to manage stress.

Phase III: Role function assessment: to assess if there is change in their role as a wife or mother, relationships with husband or children or in her job and also assess alteration in her community activities.

Phase IV: Interdependence assessment: to assess existence of support systems as family, friends or even co-worker and if she feel secure and safe.

The time of interview was 30-45 minutes for each woman. In this phase, researchers start to determine the educational needs for each woman which help in the planning phase. Women's telephone number was obtained to facilitate contact with women for follow up.

B- Planning phase: based on obtained information from the assessment phase, nursing diagnosis will be formulated as: anxiety, stress, fear, and change in self-concept and role function as a wife, altered family process and spiritual distress related to the nature of disease. The researchers review relevant literatures and design an educational program based on Roy

adaptation model, also prepare an educational booklet which written in simple Arabic language illustrated by figures. Sessions' numbers, contents, various teaching methods and the instructional media were determined as "lectures, discussions, videos and other helpful tools such as laptop and PowerPoint presentations" The objectives of the program were constructed as following:

General objective: aimed to improve women's knowledge, sexual function and pain coping strategies regarding cervical cancer.

Specific objectives:

After application of educational program based on Roy adaptation model, the woman should be able to:

- Identify the etiology of cervical cancer.
- Outline the treatment and management options available for cervical cancer.
- Modify health practices regarding cervical cancer.
- Improve sexual function.
- Use proper pain coping strategies regarding
- Identify how to manage stress and anxiety.

C-Implementation phase: Researchers started with dividing participated women into two groups (intervention group and control group) by randomization to avoid bias, each group have the same items of treatment.

For intervention group:

The aim of the implementation phase was to change or manipulate any stimuli that affect physically or psychologically behavior of the client, so the Application of RAM was carried out through four sessions, the duration of each session ranged from 30-45 minutes including periods of discussion, PowerPoint presentation and educational videos. Each woman attended these sessions individually or in a small group (two or three women) as desired. After each session, feedback about the previous session was done to ensure understanding and the objectives of the new topics were mentioned.

- **First session:** at the beginning educational booklet was distributed to women after giving an orientation introduction about the booklet. This session was theoretical and varies topics were discussed as an overview about anatomy of the cervix, sexual function,

physiology of sexual response either for women or men, this session included detailed information about cervical cancer as: risk factors, signs and symptoms, diagnosis and treatment options.

- **Second session:** It's a practical session in which the researchers illustrated the health needs, exercise program as (pelvic muscle exercise as Kegel exercises), daily activities, healthy eating habits, and stress role.

- **Third session:** the researchers started by feedback about the previous sessions then provide the woman with instructions that help the woman to improve sexual life (as lubricant gel, and effective communication before starting sexual relation) also teach woman how to manage stress and deal with pain.

- **Fourth session (Practical session):** the maladaptive behaviors that were found from Roy's model pre-program implementation were manipulated and consultation or recommendations was offered to modify the maladaptive behaviors also, the woman was encouraged to develop some skills as relaxation techniques like (meditation, yoga, massage or imagination) and positive thinking. The researchers provide women with telephone number to call for any further explanation.

For control group: only have routine care as nursing care for bleeding if present ,provide medications as prescribed by doctor and researchers gave them the booklet at the unit.

D- Evaluation phase:

This phase includes an evaluation of sexual function and adaptation of the woman through post-test after three months of application by using the same previous tools used in the beginning of the study. Follow up was done via telephone after six months to ensure retention of knowledge and improvement of sexual function and pain-coping strategies.

9- Statistical analysis of data:

After verifying the data, it was entered into the computer using the program of statistical package for social sciences (SPSS) version 2021, then data was tabulated and analyzed. Mean, standard deviation, frequency, and percentage were used as descriptive statistics, while independent t-tests and chi-square tests were used to determine significance. A significant level value was taken into consideration when $p \leq 0.05$. When $p \leq 0.001$, a highly significant level value was taken into consideration.

Results

Table (1) represents that the mean age of control and study groups were (32.67 ± 5.38 and 34.02 ± 6.90 years) respectively. Regarding residence, more than half of the control and study groups (58.8 % and 52.9%) respectively live in rural areas. As regards level of education, more than half of control groups (52.9%) were secondary education while nearly half of study group (47.1%) were secondary and high education. Moreover, nearly two thirds of both groups were working. The mean of marriage age of control and study groups were (28.08 ± 6.14 and 29.91 ± 5.09 years) respectively. According to income, income of nearly quarter of control group (73.5%) and more than two thirds of study group (67.6%) was not enough Also, there was no statistically significant difference between both groups regarding general characteristics ($p > 0.05$).

Table (2) reveals that about two-fifth of the control group (36.7%) and nearly half of the study group (46.6%) were nulligravida. Nearly half of both groups (46.6%) were nullipara. Also more than half of the control group (55.9%) and nearly half of the study group (44.2%) used pills as method of contraception. Moreover, there was no statistically significant difference between both groups regarding, number of gravida parity and method of contraception ($p > 0.05$).

Table (3) represents that the mean weight of both control and study groups were (89.02 ± 9.80 and 83.41 ± 12.63) kg respectively, and the mean height of both control and study groups were (160.61 ± 5.56 and 160.63 ± 6.35) cm respectively. In addition, the mean BMI of both control and study groups were (34.61 ± 4.48 and 32.63 ± 4.84) kg/m² respectively. Also, there was statistically significant difference between both groups regarding weight while there was no statistically significant difference between both groups regarding height and body mass index ($p > 0.05$).

Table (4) reveals that there was no statistically significant difference in the mean score of the total knowledge before the program application ($P > 0.05$). However, after three and six months of program application, the mean score of the study group was significantly higher than the mean score of the control group ($P < 0.001$).

Figure (1) represents that (73.5% and 67.6%) of the study group had good knowledge after three and six months of program application respectively compared with (13.3%) of the control group had good knowledge after three and

six months of program application respectively.

Table (5) demonstrates that, pre program's application, there was no statistically significant difference between the two groups' mean scores for the total Roy application model score and its dimensions ($P > 0.05$). However, after three and six months of program application, mean scores for RAM and its dimensions of the study group were significantly higher than those of the control group ($P < 0.001$).

Figure (2) represents that (67.6 % and 61.8%) of the study group had high adaptation with early stage of cervical cancer after three and six months of program application respectively compared with (8.8%) of the control group had high adaptation with early stage of cervical cancer after three and six months of program application.

Table (6) clarifies that, prior program's application; there was no statistically significant difference between mean scores for the total coping strategies and its parts of both groups ($P > 0.05$). However, after three and six months of program application, mean scores for coping strategies and its parts of the study group were significantly higher than those of the control group ($P < 0.001$).

Table (7) clarifies that, before application of the program; there was no statistically significant difference between total mean scores of sexual function dimensions of both groups ($P > 0.05$). However, after three and six months of program application, total mean scores of sexual function dimensions of the study group were significantly higher than those of the control group ($P < 0.001$).

Figure (3) illustrates that, before implementation of RAM, the mean total scores of sexual function in the control and study groups were 18.06 and 18.36, respectively. However, after three and six months of program application, the mean total scores of sexual function increased significantly in the study group compared to the control group 26.56 and 26.03 versus 20.18 and 20.52 respectively.

Table (8) clarifies that through all programme phases, the control group did not show any statistically significant positive association between total RAM and the total of other variables. While there was highly positive association between total RAM, and total (knowledge, coping strategies and sexual function) in the study group after three and six months of program application.

Table (1): frequency distribution of studied women (study and control groups) regarding their general characteristics (n=68).

General characteristics	Control group (n=34)		Study group (n=34)		X ²	p-value
	no	%	no	%		
Age (years)						
• 25 - < 30	10	29.4	5	14.7	2.839	0.242
• 30 - < 35	13	38.2	19	55.9		
• 35 - ≥ 45	11	32.4	10	29.4		
Mean ± SD	32.67 ± 5.38		34.02 ± 6.90			
Residence						
• Rural	20	58.8	18	52.9	0.944	0.331
• Urban	14	41.2	16	47.1		
Level of education						
• Primary education	3	8.8	2	5.9	0.628	0.731
• Secondary education	18	52.9	16	47.1		
• High education	13	38.2	16	47.1		
Occupation						
• Housewife	13	38.2	15	44.1	0.243	0.622
• Employee	21	61.8	19	55.9		
Age of marriage (years)						
• < 20	5	14.7	7	20.6	0.405	0.525
• 20 ≥	29	85.3	27	79.4		
Mean ±SD	28.08 ± 6.14		29.91 ± 5.09			
Income						
• Enough	9	26.5	11	32.4	0.283	0.595
• Not enough	25	73.5	23	67.6		

No statistically significant difference ($p > 0.05$)

*Statistically significant ($P \leq 0.05$)

Table (2): frequency distribution of studied women (study and control groups) regarding their obstetrics history (n=68).

Items	Control group (n=34)		Study group (n=34)		X ²	p-value
	no	%	No	%		
Number of gravida						
• Nulligravida	11	36.7	13	46.4	3.722	0.445
• 1	5	16.7	5	17.9		
• 2	7	23.3	8	28.6		
• 3	2	6.7	1	3.6		
• more or equal 4	5	16.7	1	3.6		
Parity						
• Nullipara	13	46.4	13	46.6	0.531	0.912
• 1	5	19.7	7	23.3		
• 2	9	26.5	6	17.6		
• 3	0	0	1	3.6		
Method of contraception						
• IUD	8	23.6	6	17.6	3.814	0.282
• Pills	19	55.9	15	44.2		
• Injection	7	20.5	12	35.3		
• Ligation	0	0	1	2.9		

No statistically significant difference ($p > 0.05$).

Table (3): mean and standard deviation of studied women (study and control groups) regarding their anthropometric measurements.

Anthropometric measurements	Control group (n=34)				Study group (n=34)				t= test	p-value
	Min	Max	Mean	±SD	Min	Max	Mean	±SD		
Weight	57	115	89.02	9.80	60	115	83.41	12.63	2.047	0.045*
Height	150	175	160.61	5.56	150	175	160.63	6.35	0.900	0.821
BMI	23.73	44.44	34.61	4.48	24.97	44.44	32.36	4.84	1.988	0.051

t= independent t test

No statistically significant difference ($p > 0.05$)

*Statistically significant ($P \leq 0.05$)

Table (4): Comparison of knowledge mean score of studied women regarding early stage cervical cancer through the program phases (n=68).

Groups	Phases	Preprogram		3 months after program application		6 months after program application	
		Mean	±SD	Mean	±SD	Mean	±SD
Control group		4.64	2.32	5.61	2.86	6.76	2.68
Study group		5.08	2.57	17.02	4.96	14.79	4.68
t test		1.42		11.615		8.673	
p-value		0.081		0.000**		0.000**	

**A high statistically significant difference ($P \leq 0.001$)

No statistically significant difference ($P > 0.05$)

t= independent t test

Figure (1): Percentage distribution of studied women (study and control groups) regarding their total knowledge level about cervical cancer through the program phases (n=68)

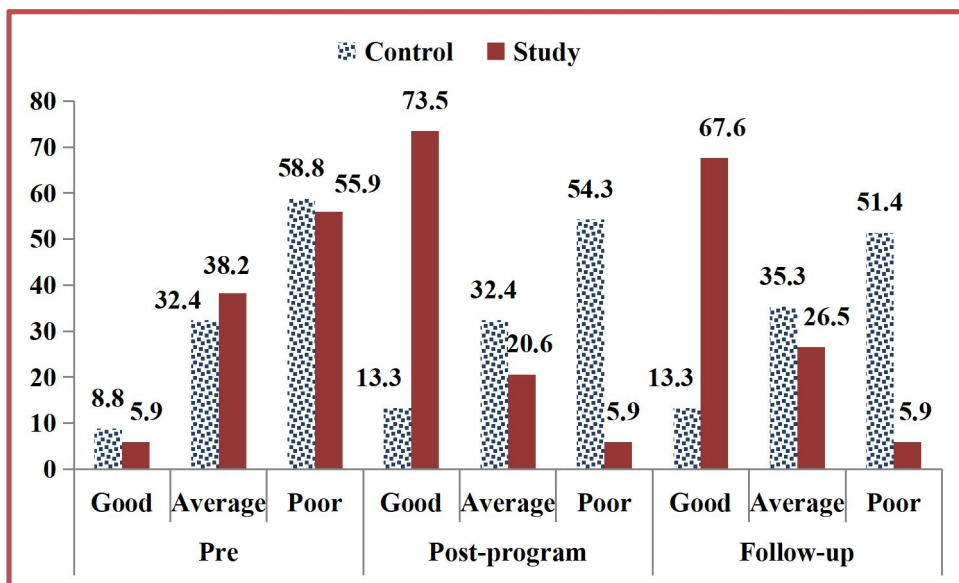


Table (5): Mean scores comparison of RAM regarding early stage of cervical cancer through the program phases for both groups (n=68):

Dimension	Group	Preprogram		3 months after program application		6 months after program application	
		Mean	±SD	Mean	±SD	Mean	±SD
Total physiologic mode	Control group	15.00	2.87	15.70	2.95	15.64	3.56
	Study group	16.47	3.15	24.47	5.43	23.82	5.99
t/p-value		1.377	0.061	8.253	0.000**	6.833	0.000**
Total self-concept mode	Control group	15.91	1.48	16.23	1.85	16.61	2.48
	Study group	16.17	2.34	24.88	4.38	23.20	4.29
t/p-value		0.660	0.100	10.593	0.000**	7.737	0.000**
Total role function mode	Control group	16.44	3.34	16.94	4.08	16.23	3.47
	Study group	16.20	3.77	22.14	4.39	20.55	2.97
t/p-value		0.272	0.786	5.059	0.000**	5.511	0.000**
Total interdependence mode	Control group	15.64	1.95	17.20	1.77	16.97	2.00
	Study group	16.05	1.61	23.58	4.17	23.05	3.61
t/p-value		0.948	0.347	8.200	0.000**	8.581	0.000**
Total Roy modes	Control group	64.00	6.12	66.08	8.06	65.47	8.46
	Study group	64.91	7.73	95.08	17.30	90.64	14.84
t/p-value		0.312	0.124	8.858	0.000**	8.593	0.000**

**A high statistically significant difference ($P \leq 0.001$)

No statistically significant difference ($P > 0.05$)

t= independent t test

Figure (2): Percentage of studied women (study and control groups) regarding Roy adaptation model with early stage of cervical cancer through the program phases (n=68).

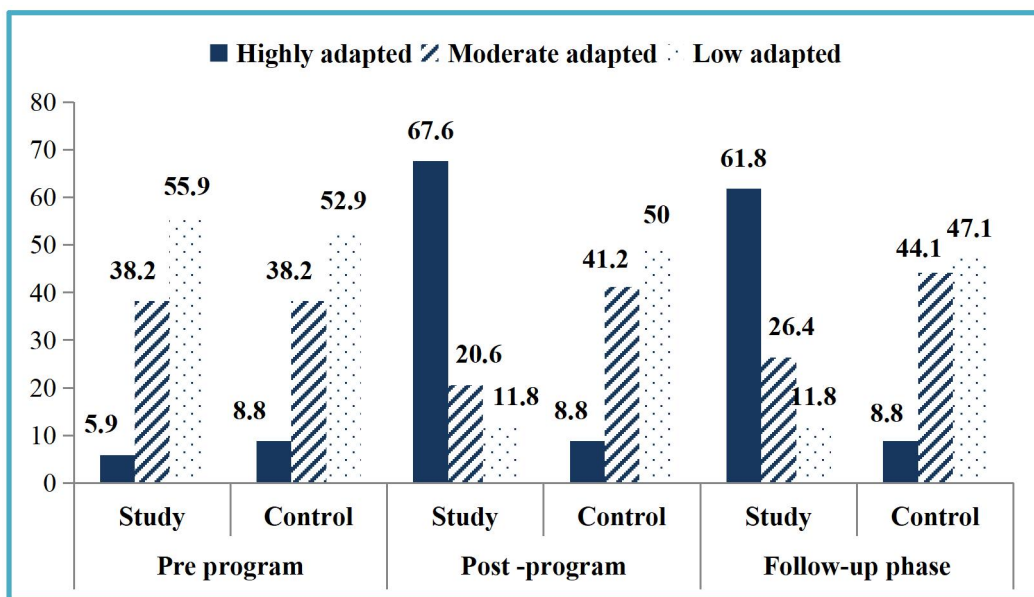


Table (6): comparison of mean scores of coping strategies regarding early stage of cervical cancer of control and study groups through the program phases (n=68).

Coping strategies	groups	Preprogram		3 months after program application		6 months after program application	
		Mean	±SD	Mean	±SD	Mean	±SD
Distraction	Control group	9.23	1.72	9.38	2.04	9.35	2.02
	Study group	9.41	2.13	14.97	3.38	12.58	2.52
t/p-value		0.375	0.709	8.232	0.000**	5.826	0.000**
Catastrophism	Control group	11.20	1.82	11.91	1.69	12.14	1.37
	Study group	11.82	1.73	16.64	3.16	15.44	2.25
t/p-value		1.433	0.157	7.698	0.000**	7.265	0.000**
Ignore painful sensations	Control group	9.08	1.79	8.94	1.47	9.08	1.72
	Study group	8.58	1.30	14.08	2.68	11.97	1.88
t/p-value		1.312	0.194	9.782	0.000**	6.574	0.000**
Distance from pain	Control group	8.00	1.82	7.91	1.79	8.00	1.84
	Study group	7.85	1.61	11.44	3.16	10.00	2.20
t/p-value		0.352	0.726	5.655	0.000**	4.062	0.000**
Self-affirmation strategies	Control group	6.50	1.26	7.11	1.27	6.82	0.99
	Study group	6.55	.92	9.73	2.09	9.08	1.42
t/p-value		0.505	0.801	6.229	0.000**	7.598	0.000**
Pray	Control group	4.00	0.98	4.20	1.17	4.41	0.98
	Study group	3.80	.74	5.97	1.64	6.41	1.30
t/p-value		1.357	0.521	5.096	0.000**	7.122	0.000**
Total coping strategies	Control group	49.02	5.97	49.47	5.21	49.82	3.94
	Study group	47.73	4.90	72.85	13.66	65.50	8.32
t/p-value		0.976	0.333	9.324	0.000**	9.921	0.000**

**A high statistically significant difference ($P \leq 0.001$)No statistically significant difference ($P > 0.05$)

t= independent t test

Table (7): comparison of mean scores of studied women regarding their sexual function through the program phases (n=68).

Dimension	Max	Control group		Study group		T test	p-value
		Mean	±SD	Mean	±SD		
Total desire							
Pre program	6	2.52	0.50	2.35	0.48	1.46	0.147
3 months after program application		2.82	0.75	3.08	1.11	5.48	0.000**
3 months after program application		3.00	0.60	3.17	0.86	6.484	0.000**
Total arousal							
Pre program	6	3.94	1.17	3.23	1.12	2.52	0.014
3 months after program application		3.55	1.39	4.91	2.23	7.42	0.000**
3 months after program application		3.62	0.94	5.73	1.54	7.771	0.000**
Total lubrication							
Pre program	6	3.29	1.40	3.02	1.60	0.724	0.472
3 months after program application		3.47	1.69	4.26	1.35	7.63	0.000**
3 months after program application		3.52	1.73	5.97	0.73	6.295	0.000**
Total orgasm							
Pre program	6	3.55	1.07	3.17	1.11	2.32	0.023
3 months after program application		3.94	1.32	5.53	0.78	7.34	0.000**
3 months after program application		4.07	1.40	5.76	0.74	5.972	0.000**
Total satisfaction							
Pre program	6	3.35	1.61	3.11	1.45	0.63	0.529
3 months after program application		3.35	1.53	5.11	.51	5.62	0.000**
3 months after program application		3.32	1.51	5.79	0.36	5.135	0.000**
Total pain							
Pre program	6	4.70	1.05	4.50	1.16	0.764	0.448
3 months after program application		5.03	1.23	3.67	1.80	5.70	0.000**
3 months after program application		5.61	0.65	2.78	1.31	15.152	0.000**

**A high statistically significant difference ($P \leq 0.001$)

No statistically significant difference ($P > 0.05$)

t= independent t test

Figure (3): mean scores of total sexual function of study and control groups through the program phases (n=68).

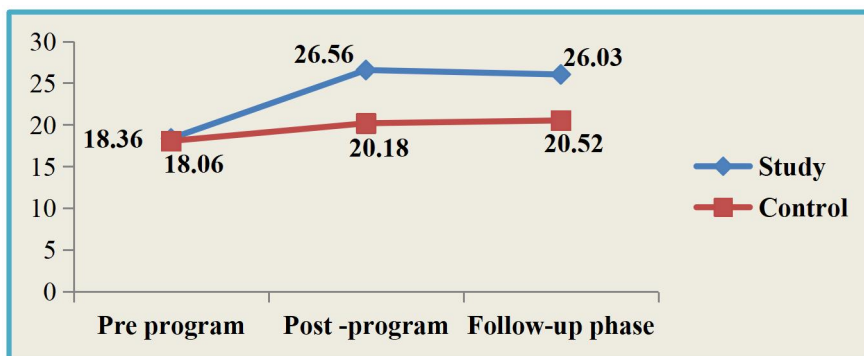


Table (8): correlation between RAM model, and total (knowledge, coping strategies and sexual function) among studied women (study and control groups) regarding cervical cancer through the program phases (n=68).

Items	Total Roy adaptation model											
	Control group						Study group					
	Preprogram		3 months after program application		6 months after program application		Preprogram		3 months after program application		6 months after program application	
	R	p-value	r	p-value	r	p-value	r	p-value	R	p-value	r	p-value
Total Knowledge	0.175	0.354	0.207	0.239	0.045	0.800	0.239	0.173	0.915	0.000**	0.733	0.000**
Total coping strategies	0.245	0.298	0.090	0.614	0.188	0.288	0.206	0.242	0.928	0.000**	0.830	0.000**
Total sexual function	0.366	0.189	0.059	0.745	0.201	0.255	0.392	0.222	0.904	0.000**	0.650	0.000**

No statistically significant difference ($p > 0.05$)**A high statistically significant difference ($P \leq 0.001$)**Discussion**

Cervical cancer has created a devastating impression on women's lives worldwide. Nurses as nursing care providers help women with cervical cancer to develop the care management plans. Roy's adaptation model (RAM) is a nursing strategy that is excellent for use with women who have cervical cancer in the early stages. The impact of this application changed the lives of clients and families so that they are required to adapt to these changes. Nurses need to know the woman's self-concept to help women adapt to the changes experienced so that the quality of life would be optimal (*Sand et al., 2023*).

Sexual problems associated with early-stage cervical cancer have preoccupied many researchers for a long time to determine its prevalence and types. Evaluation of efficient therapies to prevent or treat cancer-related sexual dysfunction is the topic that is still being ignored. To maximize the sexual health of cancer survivors, collaborative intervention with gynaecologists, sexologists, radiotherapists, and nursing staff would be advantageous. (*Mishra, et al., 2021*). So, the current study intended to evaluate the effect of RAM on sexual function and pain coping strategies among women with early stage of cervical cancer.

A woman's health can be significantly influenced by general traits. Regarding general characteristics of the studied groups, the results of the present study cleared that there was no statistically significant difference between the studied groups in terms of general characteristics. The homogeneity of the study population may be to blame for this. This result agreed with *Gonul et al., (2019)* who found that that there were no statistically

significant differences in socio-demographic data were identified among the three groups.

The effect of gynecologic cancers on sexuality depends on multiple factors such as psychosexual factors, biologic factors, and age (*Mishra et al., 2021*). The results of the current study represented that the mean age of control and study groups were (32.67 ± 5.38 and 34.02 ± 6.90 years) respectively. This highlights the importance of screening and early detection for cervical cancer at younger age. This result comes in the same line with (*Ghalavandi, et al., 2021*) who mentioned that the mean age of the participants was (32.96 ± 5.99 years). Also, this result nearly agreed with (*Kong et al., 2019*) who concluded that early stage of cervical cancer comprise the majority of young women.

Regarding residence, more than half of both groups live in rural areas. This may be due to most rural women belong to a low socioeconomic background, poor sanitary circumstances and have many other risk factors that contribute to cervical cancer. Also, variation across geographical regions in rural areas reported a lower likelihood of screening adherence than urban areas.

Education has been showed to be a source of empowerment for females. As regards level of education, more than half of control groups were secondary education while nearly half of study group were university education or high. This result nearly agrees with *Alkalash, et al., (2020)* who demonstrated that about half of the participants were secondary educated. Moreover, nearly two thirds of both groups working. So, work stress emerged as significant predictor of unhealthy lifestyle and non-adaptation with pain.

According to marriage age the result of the present research demonstrated that the mean of marriage age of control and study

groups were (28.08 ± 6.14 and 29.91 ± 5.09 years) respectively. This result agrees with *Shin, et al., (2022)* who confirmed that late marriage and childbirth influence adherence to cervical cancer.

According to income, income of nearly quarter of control group and more than two thirds of study group was not enough. This result is in accordance with *Brisson et al., 2020* who reported that cervical cancer is the second most frequent cancer among women in low-income and lower-middle-income countries

Regarding obstetric history, the findings of the current study showed that about two-fifth of the control group and more than forty-five percent of the study group were nulligravida. Nearly half of both groups were nullipara. Also more than half of the control group and nearly half of the study group used pills as method of contraception. This result nearly comes in accordance with *Maryati, et al., (2018)* who stated that “the risk factors of respondents for cervical cancer were null-gravidity, null-parity, and oral contraceptive history due to increasing estrogen level that contributes to cervical cancer”.

Obesity is one of the most predisposing factors of sedentary lifestyle and can be a risk factor for developing early stage of cervical cancer into progressive stages. Concerning body mass index, the results of the present research stated that the mean body mass index of both control and study groups were (34.61 ± 4.48 and 32.63 ± 4.84) kg/m² respectively. Based on the results of *Sand et al., (2023)* who found that overweight and obese women are less likely than women of normal weight to participate in screening against cervical cancer. Also, this result is congruent with *Rives, et al., (2021)* who indicated that the studied women's average BMI is 34.0 kg/m². Increasing awareness, knowledge and understanding of women toward cervical cancer will be an important step in promoting the health of women and can be achieved through the provision of an educational intervention (*Sand et al., 2023*).

The current study hypothesized that women with early cervical cancer who will receive health educational program based on Roy's adaptation model will have a higher level of knowledge than who will not receive this health educational program. The results of present study supported this hypothesis and clarified that there was no statistically significant difference in the mean score of the total knowledge before the program application. However, after three and six months of program application, the mean

score of the study group was significantly higher than the mean score of the control group. This may be due to that the increase of the knowledge level was expressed as the effect of intervention based on Roy adaptation model which, by extension, reflects on the behavior changes and coping with pain.

This result is consistent with the findings of *Alkalash et al., (2020)*, who reported a notable improvement in participant knowledge of cervix cancer's aetiology, risk factors, prevalence, and screening when compared to before the program's implementation.

Additionally, this result is consistent with *bu et al.'s (2019)* findings that the intervention group had more knowledge about cervical cancer than the control group, as seen by a higher mean for the intervention.

One of the nursing models that is frequently applied in nursing research is the RAM. According to the RAM, behaviors are a reflection of how people choose to respond to stimuli (*Goudarzi et al., 2022*). **The current study hypothesized that women with early cervical cancer who will receive health educational program based on RAM will become more adaptive than who will not receive this health educational program.**

The results of present study supported this hypothesis and revealed that pre program's application; there was no statistically significant difference between the two groups' mean scores for the total RAM and its dimensions. However, after three and six months of program application, means scores for RAM and its dimensions of the study group were significantly higher than those of the control group. This is because RAM provides a useful framework for supporting nursing care provided by nurses

This finding is consistent with the findings of *Maryati et al., (2018)*, who found that Roy's adaptation model was effective in the early stages of cervical cancer patients, including physiological, psychological, social, and spiritual changes.

Also, *Mathew and Devi, (2020)* stated that “RAM was found to be significantly effective in improving the quality of life of patients with cervical cancer”.

Coping strategy with pain is an important element of effective treatment. It is believed that an impact of a coping style on pain is essential. The pain coping strategy may contribute to understanding the determinants of pain and its influence on patients' attitudes towards treatment for illness and therapy (*Belgen, et al., 2022*). **The current study hypothesized that women with early cervical**

cancer who will receive health educational program based on Roy's adaptation model will have proper pain coping strategies than who will not receive this health educational program.

The results of present study supported this hypothesis and reported that, prior program's application; there was no statistically significant difference between mean scores for the total coping strategies and its parts of both groups. However, after three and six months of program application, means scores for coping strategies and its parts of the study group were significantly higher than those of the control group. This result can be explained by the fact that women's knowledge of their health problems and the use of intervention based on Roy's model help in using better ways to overcome pain and enhance a positive view on life.

The results of present study were supported by *Christiansen et al., (2022)* who concluded that the use of various individual social, mental, and physical coping strategies allowed the women to manage daily lives. Also *Hundie, et al., (2022)* stated that "majority of the participants use coping strategies for dealing with the side effects of gynaecological cancer, such as sexual issues".

Gynaecological cancer can affect one or more phases of the sexual response cycle through alterations of sexual function. Researchers should look into how inclusive sexuality education and training may be better integrated into the training programs of healthcare workers (*Obora, et al., 2022*). **The current study hypothesized that women with early cervical cancer who will receive health educational program based on Roy's adaptation model will have improved sexual function than who will not receive this health educational program.**

The results of present study supported this hypothesis and revealed that before application of the program; there was no statistically significant difference between mean scores for the total sexual function dimensions of both groups. However, after three and six months of program application, means scores for the total sexual function dimensions of the study group were significantly higher than those of the control group. This confirms the efficacy of the program based on RAM, as better understanding of the relationship between physical and psychological adaptation can help improving sexual life and support healthy adaptive measures.

This result is congruent with *Afify, S., S.,M. et al., (2022)* who found that, at the

post-intervention phase, there was a highly statistically significant difference between both groups with regard to all items of sexual function domains.

Furthermore, *Erol Ursavaş et al., (2021)* concluded that RAM-based program assisted group of intervention in favorably contributing to physiologic, self-concept, role-function, and interdependent modes by creating a positive effect on enhancing sexual functions.

Moreover *Ali, et al., (2022)* stated that women's sexual function highly significantly improved once the nursing strategy based on RAM was put into practice.

The results of the present research clarified that there was no statistically significant positive correlation between total RAM, and total (knowledge, coping strategies and sexual function) in the control group through program phases. While there was highly positive correlation between total RAM, and total (knowledge, coping strategies and sexual function) in the study group after three and six months of program application. This emphasize on positive effects of Roy adaptation model on all variables.

This result nearly agreed with *Afify, S., S.,M. et al., (2022)* who found that the study group during post-intervention phase, demonstrated a highly significant positive association between the overall score (knowledge and sexual function) and RAM.

Another study done by *Ali, et al., (2022)* reported that there was a highly statistically significant positive association between total adaptation score and total sexual score in both groups at the pre-intervention, post-intervention, and follow-up phases. This study also clarified the existence of highly statistically significant positive correlation between total adaptation score and total sexual score in both groups.

Conclusion

The use of a nursing strategy based on Roy's Adaptation Model enhanced sexual function and pain coping strategies among women with early stage of cervical cancer. In addition, the women became highly adapted to their condition, demonstrated high levels of health-promoting behaviors, and experienced fewer negative emotions. Also, this study concluded that RAM-based care plan is considered as a simple and noninvasive intervention that greatly reduces physical and psychological health issues.

Recommendations

- Providing instructional guidelines for women with cervical cancer to promote adaptation to sexual problems.
- Distributing simple and brief booklets and posters in all gynecological settings sexual life and coping strategies toward cervical cancer.

Further researches:

- Provide maternity nurses with educational programmes on the Roy adaption model to help them learn to cope with sexual issues associated with cervical cancer.
- Integrate sexual health promotion in routine nursing care provided for women with cervical cancer.

Study limitations:

The university hospital is one of the main hospitals frequented by patients from all the surrounding areas. Therefore, sometimes the interview place was crowded. The researchers overcame this problem with the help of nursing in providing a quiet and private place for the interview.

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Conflict of interest

The researchers declared that there was no conflict of interest.

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