

Effect of Instructional Nursing Strategies on Endometriosis Symptoms

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ABSTRACT

Context: Endometriosis is a chronic and incurable condition associated with debilitating pain and sub-fertility that affects approximately 176 million women worldwide.

Aim: To measure the effect of instructional nursing strategies on endometriosis symptoms.

Methods: A quasi-experimental (pre/post-test) design was utilized. The study was conducted at gynecological clinics at Ain Shams University Maternity Hospital. A purposive sample of sixty women who meet the criteria of the study. Data were collected through three tools; endometriosis structured interviewing questionnaire, endometriosis health profile questionnaire, in addition to women compliance follow up record.

Results: The study sample age was 32.47±5.24. There was a highly statistically significant improvement in women's knowledge regarding endometriosis after implementing instructional nursing strategy and at follow-up time compared to their knowledge before it at p-value ≥0.001. Also, there was a highly statistically significant improvement in women's practices to alleviate endometriosis symptoms after three months of implementing instructional nursing strategy compared to their self-care practices before it at p-value 0.001. Moreover, women who followed instructional nursing strategies had highly statistically significant improvement on endometriosis-related symptoms, pain, and fatigue after implementing the instructional nursing strategy at p-value ≥0.001.

Conclusion: Women with endometriosis who follow instructional nursing strategies will have fewer symptoms, better knowledge, and improved self-care practices. An awareness program should be developed to upraise women's knowledge regarding endometriosis, and self-care management is recommended.

Keywords: Instructional nursing strategies, endometriosis symptoms

1. Introduction

Endometriosis is a common condition that affects women during the reproductive years. It involves the growth and placement of endometrial tissue outside the uterine cavity, which triggers a chronic inflammatory reaction resulting in pain and adhesions (Brown *et al.*, 2017).

The prevalence of endometriosis in women of reproductive age is around 10%, which means one woman in ten affected by the disease and 176 million women worldwide suffering from endometriosis. Also, a range from 20%-50% in asymptomatic women was found to have endometriosis during laparoscopy, 30%-40% in infertile women, and 80% in women with chronic pelvic pain (Parasar *et al.*, 2018).

There are some suspected risk factors for endometriosis which include: Menstrual cycle factors as early onset of menstruation, heavy or painful periods, short menstrual cycles (less than 27 days) and long periods (more than one week), also allergies – such as food, eczema, and hay fever, obesity, family history of endometriosis. Moreover, exposure to toxins and environmental pollutants

contributes to the development of endometriosis (Seckin, 2020).

The symptoms of endometriosis depend on the location of the disease. The pain of endometriosis is a common symptom associated with menstruation. It includes abdominal pain, heavy periods, and abdominal bloating. Bowel problems were by far the next most common issue, with rectal and anal pain being especially troublesome, along with diarrhea and constipation (Morassutto *et al.*, 2016). The other physical symptoms included backache, painful urination, pain on sexual intercourse, and joint pain. There were also more diffuse systemic manifestations of endometriosis, such as feeling generally unwell, malaise, fatigue, and depression (Gupta *et al.*, 2015).

Moreover, diagnosis of endometriosis is proven by histology of either a directly biopsied vaginal lesion from a scar or tissue collected during laparoscopy. So, the gold standard of diagnosis is laparoscopy, which depends on the ability of the surgeon to recognize the peritoneal disease in all its different appearances (Yousef *et al.*, 2019)

Endometriosis has a severe negative impact on all aspects of women's life. Firstly, the physical impact of pain, other symptoms, treatment side-effects, and physical appearance limits normal daily physical activities such as housing, shopping, and child caring. Secondly,

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marital/sexual relationship impact, because of pain and bleeding during or after sex, and failure to have orgasm lead to a decrease in the frequency of intercourse or avoiding having sex (Moradi et al., 2014).

A multi-disciplinary holistic approach is considered best practice treatment for endometriosis, aiming to relieve symptoms and minimize complications, including medical treatment (as pain-relieving and hormone treatment) and surgical treatment. Laparoscopy and hysterectomy are sometimes recommended where symptoms have significantly affected a woman's quality of life. Also, evidence-based self-management practices through lifestyle modification as exercise, nutritional changes, and good sleep habits might help women with endometriosis symptoms (Sanghera et al., 2016).

Nursing strategy can be defined as the decisions, plans, and actions undertaken to achieve specific health care goals for improving and maintaining women's health (Martin & McFerran, 2008). So gynecological nurses play a vital role in health promotion through disease management and infertility prevention to improve quality of life, through a reduction in the impact and burden of disease at individual and community levels, reduce pain, and prevent further progression of disease (Australian Health Ministers' Advisory Council, 2018).

2. Significance of the study

The incidence of endometriosis is difficult to determine in Egypt due to inadequate recording. In Africa, Egypt is considered the 6th country that loses the healthiest life from endometriosis, about 18 per 100,000 people, according to the *Institute for Health Metrics and Evaluation at the University of Washington* (2016).

In addition, there are serious delays in diagnosis from the onset of pain symptoms till the final diagnosis of endometriosis which arises between 7 to 12 years. The disease may be mistakenly dismissed as routine menstrual pain, particularly in younger women. Lack of awareness of symptoms may at first be attributed to other health problems, like pelvic inflammatory disease, fibroids, or irritable bowel syndrome (Riazi et al., 2015).

So that nursing strategies for women with endometriosis have an essential role for alleviating endometriosis-related symptoms through providing easily accessible information and evidence-based practices which include simple lifestyle changes as diet, exercise, pain, and stress management aiming to empower women, improve quality of life, reduce pain, and prevent further progression of the disease.

3. Aim of the study

The present study was conducted to measure the effect of instructional nursing strategies on endometriosis symptoms through the following:

- Assess women's knowledge about endometriosis.
- Assess women's self-care practices regarding endometriosis symptoms.

- Evaluate the effect of instructional nursing strategies on endometriosis symptoms.

3.1. Research Hypothesis

The current study hypothesized that: Women with endometriosis who follow instructional nursing strategies will have fewer symptoms, better knowledge, and improved self-care practices.

4. Subjects & Methods

4.1. Research Design

A quasi-experimental design was used to fulfill the aim of this study. A quasi-experiment is a research design that attempts to establish a cause and effect relationship between independent and dependent variables. Nursing strategies are the independent variable that could alleviate endometriosis symptoms (dependent variable) (Thomas, 2021).

4.2. Study setting

The study was conducted at gynecological clinics in outpatient clinics at Ain shams University Maternity Hospital. The gynecological clinics are present on the third floor of the clinics building and consist of one room and waiting room in which the researchers provide the instructional nursing strategies.

4.3. Subjects

A purposive sample technique was used. The sample size was calculated according to the following statistics formula $n = Z^2 \cdot p(1-p) / d^2$; a sample of 63 women was included in the study, representing 10% of the total endometriosis women who attended at the previously mentioned setting in the previous year. The final sample size was 60 endometriosis women (3 women dropped out due to the concern with medical or surgical treatment to get pregnant).

Inclusion criteria

- Women are medically diagnosed with different grades of endometriosis (minimal, mild, and moderate grade) regardless of their age, educational level, and parity.
- Had telephone number for contact.
- Can read and write to fill in the study tools.
- Free from any medical or gynecological problems except endometriosis.

4.4. Tools of data collection

Three tools were used for data collection related to this study in addition to Arabic supportive material "Developed instructional nursing strategies":

4.4.1. Endometriosis Structured Interviewing Questionnaire

The researcher designed it in the Arabic language after reviewing the related literature. It assessed the necessary data which covered the aim of the study. The questionnaire was divided into three parts:

Part 1 assessed women's socio-demographic characteristics such as age, residence, occupation, educational level, marital status, and income.

Part 2 assessed women's knowledge regarding endometriosis. It was developed by researchers based on the study of *Abd El-Mouty et al. (2016)*. It consisted of six open-ended questions that included knowledge about the definition, risk factors, signs, symptoms, stages, the impact of endometriosis on women's lives, factors that increase the symptoms, and management of endometriosis. Overall test-retest reliability coefficients were Cronbach's alpha values of 0.86.

Scoring system

The response to the items ranged from 3= correct, 2= incomplete correct, 1=incorrect. This part was used three times (pre, post-intervention, and in follow-up). The total score of women's knowledge was 18 marks. The total scores were graded as poor <50%, average 50-<70%, good 70-100%.

Part 3 assessed women's self-care practices as reported by women" to alleviate endometriosis symptoms. It was adapted from *Jenkinson et al. (2001)*. It consisted of six closed-ended questions and included self-care practices about rest, diet, exercises, medications, follow-up, and family support. Score reliability of Cronbach's alpha was 0.90.

Scoring system

Each question was scored as two for done and scored as one for not done. So, woman's self-care practices were considered satisfactory if women had equal or more than 60% or more of total practice scores, while unsatisfactory if women had less than 60% of total practice scores.

4.4.2. Endometriosis Health Profile Questionnaire

It was adapted from *Jenkinson et al. (2001)*. The original tool (EHP-30) includes 30 questions, plus visual analog scale "VAS.", Fatigue Severity Scale (FSS), and general quality of life. Researchers adopt 17 questions only, visual analog scale "VAS.", Fatigue Severity Scale (FSS), which meet the aim of the study and the inclusion criteria of the study sample.

The questionnaire contained three parts:

Part 1 contained three main sections, including seventeen statements. The first nine questions assessed the impact of endometriosis on women's general health, and the next four questions assessed the impact of endometriosis on women's work. Finally, the last four questions assessed the impact of endometriosis on women's sexual relations. This tool was used twice before implementing the instructional nursing strategy and after three months of implementation.

Scoring system

Each statement scored by five items, never equal one mark, rarely equal two, sometimes equal three, often equal four, and always equal 5. The results were presented as mean and SD

Part 2 was a visual analog scale "VAS." It was used to assess the subject's level of pain intensity. VAS consists of a straight line with the endpoints defining extreme limits.

Scoring system

VAS rated pain level from 0 to 10, level (0) as no pain, level from 1 to 3 as mild pain, a score from 4 to 6 as moderate pain, and score from 7 to 10 indicated worst or severe pain. The subject verbally selected a value that is most in line with the intensity of pain they experienced. The findings were compared as mean and SD before and after the intervention.

Part 3 was The Fatigue Severity Scale (FSS). It is a method of evaluating the impact of fatigue on women. The FSS questionnaire contains nine statements that rate the severity of subject fatigue symptoms. A low value (1) indicated strong disagreement with the statement, while value (2) indicated uncertainty and a high value, and (3) indicated strong agreement. This tool was used twice before implementing the instructional nursing strategy and after three months of implementation. Overall test-retest reliability coefficients were Cronbach's alpha values of 0.88.

4.4.3. Women Compliance Follow-up Record

The compliance was recorded as reported by women included in the study to assess women's compliance for instructional nursing strategies, including the date of follow-up, nutrition, exercise, pain, and stress management. Women compliance for each strategy scored as never (1), sometimes (2), and always (3).

Supportive material: The developed instructional nursing strategies. The researcher developed these strategies based on a review of the literature *Donatti et al. (2017)*. It was used to help endometriosis women know and perform healthy practices in their daily life to alleviate endometriosis symptoms which include diet, exercises, pain, and stress management.

4.5. Procedures

Tools validity: The data collection tools were submitted to a panel of three nursing experts in obstetric and gynecological nursing to test the content validity. Modifications were done according to the panel's judgments on clarity of sentences and appropriateness of the content. The reliability was done by Cronbach's Alpha coefficient test, which revealed that tools consisted of relatively homogenous items.

Ethical considerations: The approval was obtained from the Scientific Research Ethical Committee in the Faculty of Nursing at Ain Shams University before starting the study. The researcher clarified the aim of the study to women with endometriosis that included in the study. The researcher assured maintaining anonymity and confidentiality of the subject data. Women had the right to withdraw from the study at any time.

The preparatory phase included reviewing the current local and international related literature using books, articles, scientific journals, and periodicals to develop tools for data collection.

Official approval was obtained from the Dean of Faculty of Nursing, Ain Shams University, and the director

of Ain Shams University Maternity Hospital as approval for data collection through a written letter containing the title and aim of the study.

The pilot study was carried out on seven cases for three weeks included in the main study sample; no modification was done in the tools, so the pilot sample was included within the main study sample. It was conducted to test the study process, evaluate the tools' efficiency, content validity, and all the research process steps to find the possible obstacles and problems faced during data collection.

Fieldwork: The researcher collected data two days per week from 9 am to 2 pm. Data were collected through 12 months from November 1, 2018, till the end of November 2019. After women had been fully informed about the research and consented to participation in the research, the data collection procedure was done through three phases; assessment, implementation, and evaluation.

The assessment phase was done at gynecological clinics, where the researcher met each participant individually and filled data collection tools at the first meeting. Tools of data collection required 25-30 minutes to fill by each participant.

Implementation phase: Instructional nursing strategy was concerned mainly with endometriosis women healthy lifestyle through four main components; diet, exercise, pain, and stress management. Researchers conducted orientation sessions plus three instruction sessions with participants based on women's needs after revising data collection tools at baseline assessment. Each session had a maximum of 3-4 women.

The researcher started the orientation session by providing women knowledge about the definition of endometriosis, risk factors, signs, symptoms, the impact of endometriosis on women's life, diagnosis, and different management for endometriosis.

The first instruction session was concerned with diet. This teaching session ranged from 20-30 minutes, and the session researcher used different methods as visual aid "pictures" and group discussion on this instruction. Women were instructed to follow healthy nutrition, including all five groups, fruits, vegetables, dairy, protein, and grains. Moreover, varying the protein by adding plant-based protein like beans and legumes to lower red meat consumption and focus on healthy fats like Omega 3's.

The second instruction session was related to exercises. This session ranged from 30-40 minutes. The researcher explained the importance of regular exercises for alleviating endometriosis-related symptoms, then explained different types of exercise that women should perform. The exercises included relaxation exercises, deep breathing, meditation, yoga, and pelvic floor strengthening as Kegel exercises. Stretching and flexibility exercises, including hip and buttocks stretch, were included. Also, exercises to avoid it as running, jumping, and other high-impact activities, were explained to the women under study. In this session, demonstration, redemonstration, and role-play have been used as a method of teaching.

The third instruction session was focused on pain and stress management. This session ranged from 15-20 minutes. Researchers explained the importance of pain and stress management for alleviating endometriosis-related symptoms and dealing with pain and stress. In this session, the researcher used group discussion as a teaching method; a

t the end of three instruction sessions, supportive material (Arabic booklet) was distributed to each woman. Also, the researchers trained the women about how to mark their pain level on the visual analog scale and asked women to plot and rate their level of pain during its occurrence (e.g., during menstruation, intercourse, defecation). The women were also instructed about how to rate their fatigue by the fatigue severity scale.

The researcher conducted follow-up telephone calls for each woman every two weeks until three months to ensure women's compliance with nursing strategies using a follow-up sheet and responding to any inquiry.

Evaluation phase: After implementing the nursing strategies, the effect of the intervention was assessed immediately through the post-test, and three months later by using the second and third part of the first tool and the second tool to evaluate the effect of instructional nursing strategies on knowledge, self-care practices, and endometriosis symptoms.

4.6. Limitations of the study

Three cases were withdrawn during data collection due to the concern with medical or surgical treatment to get pregnant.

4.7. Data analysis

The collected data were coded, organized, revised, and analyzed by the researcher through Pentium 4 personal computer using the program (Excel version 2000 and statistical package of social science (SPSS) version 20. Data were presented using descriptive statistics in the form of frequencies and percentages. Test of significance was used to determine the association between the variables using the r and Chi-square test (X^2). The significance of the results was considered as follows:

- No significant difference was obtained at $p > 0.05$.
- the significant difference obtained at $p \leq 0.05$.
- The highly significant difference was obtained at $p \leq 0.01$.

5. Results

Table 1 reveals that 55% of study samples' ages ranged between 30 to 39 years, with a mean age of 32.47 ± 5.24 . Regarding residence, 56.7% of the study samples were from urban areas. Moreover, 53.3% of women did not work. Concerning educational level, 56.7% of women had high education. As regards marital status, 73.3% of women were married. On the other hand, 80% of the women had enough income.

Table 2 shows a highly statistically significant difference in women's knowledge regarding endometriosis after implementing instructional nursing strategy and at

follow-up time compared to their knowledge before it (p 0.001).

Table 3 explains a highly statistically significant difference in women's self-care practices before implementing instructional nursing strategies versus follow-up.

Table 4 indicates a highly statistically significant difference in women's general health after three months of implementing instructional nursing strategies compared to their general health before it. At the same time, there is no statistically significant difference in women's work-life after implementing instructional nursing strategy compared to their work-life before it. Moreover, there is a highly statistically significant difference in women's sexual relations after implementing instructional nursing strategies compared to their sexual relations before it. After three months of implementing the instructional nursing strategies,

the total health profile shows a significant improvement than before the intervention.

Table 5 reveals highly statistically significant differences in women's pelvic pains (during the period, during intercourse, and at any other times) three months after implementing the instructional nursing strategies (follow up) compared to their pains before it.

Table 6 indicates a highly statistically significant difference in women's fatigue after three months of implementing instructional nursing strategies compared to their fatigue before it p-value <0.01.

Table 7 indicates a statistically significant positive correlation between endometriosis-related symptoms: Pain, fatigue, general health, work-life, sexual relation of the studied sample, and women compliance with instructional nursing strategies (diet, exercises, and stress management).

Table (1): Frequency and percentage distribution of the studied women's socio-demographic characteristics (n= 60).

Socio-demographic variables		No	(%)
Age			
20-29 year		10	16.7
30-39 year		33	55.0
40-49 year		17	28.3
Mean ± SD		32.47±5.24	
Residence			
Urban		34	56.7
Rural		26	43.3
Occupation			
Work		28	46.7
Not work		32	53.3
Educational level			
Secondary		26	43.3
High		34	56.7
Marital status			
Single		16	26.7
Married		44	73.3
Income			
Enough		48	80.0
Not enough		12	20.0

Table (2): Comparison of the study sample knowledge regarding endometriosis before, after implementation of instructional nursing strategy and at follow-up (n=60).

Knowledge level	Before implementation		After implementation		At follow up (after three months)		Chi-square	P-value
	No.	%	No.	%	No.	%		
Poor	8	13.3	0	0.00	0	0.00	8.94	0.001
Average	48	80.00	11	18.3	8	13.3	16.33	0.001
Good	4	6.7	49	81.7	52	86.7	9.36	0.001

Table (3): Comparison of the study sample self-care practices for alleviating endometriosis-related symptoms before and after three months of implementing the instructional nursing strategy (n=60).

Self-care practice level	Before implementation		After implementation		At follow up (after three months)		Chi-square	P-value
	No.	%	No.	%	No.	%		
Unsatisfactory	38	63.3	16	26.7	10	16.7	6.84	0.01
Satisfactory	22	36.7	44	73.3	50	83.3	12.57	0.001

Table (4): Comparison of studied women endometriosis health profile before and three months of implementing the instructional nursing strategies.

Health profile dimensions	Before implementation	Three months after implementation	Paired T-test	P-value
	Mean ± SD	Mean ± SD		
Endometriosis effect on woman's general health	22.43±4.59	19.23±3.70	7.95	0.001
Endometriosis effect on woman's work-life	4.90±5.03	4.88±5.00	1.73	0.12
Endometriosis effect on woman's sexual relation	10.66±7.00	8.43±5.55	8.83	0.001
Total	38.00±8.75	32.56±6.86	7.77	0.001

Table (5): Comparison of studied women's pain before and after three months of implementing the instructional nursing strategies.

Variables	Before implementation	Three months after implementation	Paired T-test	P-value
Pelvic pain during period	2.77±0.43	1.83±0.46	8.76	0.001
Pelvic pain during intercourse (dyspareunia)	1.93±1.25	1.47±1.04	6.06	0.001
Pelvic pain at any other times	1.13±0.90	0.53±0.62	6.59	0.001

Table (6): Comparison of studied women fatigue before and after three months of implementing the instructional nursing strategies.

Variable	Before implementation	Three months after implementation	Paired T-test	P-value
Fatigue	15.73±2.95	12.90±2.88	10.35	0.001

Table (7): Correlation between endometriosis-related symptoms and compliance to instructional nursing strategies.

Health profile dimensions	Woman's compliance with diet		Woman's compliance for exercises		Woman's compliance for stress management	
	r	p	r	p	r	p
Pelvic pain during period	0.80	0.02	0.98	0.02	0.78	0.04
Pelvic pain during intercourse (dyspareunia)	0.78	0.04	0.83	0.03	0.80	0.03
Pelvic pain at any other times	0.82	0.02	0.88	0.03	0.74	0.04
Fatigue	0.85	0.02	0.84	0.03	0.84	0.03
General health	0.77	0.04	0.82	0.03	0.72	0.04
Work life	0.74	0.04	0.84	0.03	0.70	0.04
Sexual relation	0.72	0.04	0.85	0.03	0.70	0.04
Total EHP-30	0.89	0.01	0.97	0.001	0.80	0.03

6. Discussion

Endometriosis is a long-term condition that can cause acute and chronic pain and fatigue. It has a significant impact on the woman's quality of life, including relationships and sexuality, fertility, ability to work, and mental health. So, nurses and other health professionals play an essential role in health promotion and disease management by providing evidence-based, easily accessible information about endometriosis and ways of managing it (Lönnqvist & Erkkilä, 2017).

Accordingly, instructional nursing strategies for women with endometriosis include simple lifestyle changes such as diet, exercise, pain, and stress management. Providing proper knowledge and healthy practices regarding endometriosis to alleviate endometriosis-related symptoms and improve women's health and wellbeing is an integral part of their treatment plan (Mette et al., 2016).

Based on this important issue, the present study was conducted to measure the effect of instructional nursing strategies on endometriosis symptoms.

Regarding general characteristics, the result of the present study reveals that slightly more than one-half of women were between 30-39 years old with a mean age of 32.47±5.24. Regarding the place of residence, more than half were from urban areas, and more than half of them did not work. Concerning marital status, near three fourth of them were married. At the same time, more than half of them were highly educated. Besides, more than three fourth of them had enough income.

This finding may be justified because all literature research and reviews indicated identified age for endometriosis is 30-39 years old and a severe period of delay between the time onset of signs and the age of diagnosis is about 7-12 years. This finding might be due to stigma around menstrual issues, which make teens, parents hesitant to see/refer to the gynecologist, especially in a non-sexually active young woman. Also lack awareness among all age groups regarding menstrual health.

The present study findings partially agreed with *Abd El-Kader et al. (2019)*, who carried out a study on 109 cases with endometriosis to identify the impact of adhesions associated with endometriosis on quality of life

among infertile women. They reported that the mean age of cases was 32.1 ± 5.6 while 41.4% of them had a college education or above, also 75.6% of them did not work. This similarity could be justified by both studies carried out in the same community.

The current study displays a highly statistically significant improvement in women's knowledge regarding endometriosis after implementing instructional nursing strategies and at follow-up time compared to their knowledge before it. This finding might be due to using a simple and clear language for the instructional nursing strategies, which can be clearly understood by the study sample, enhancing their awareness about endometriosis.

The previous findings were consistent with *Abd El-Mouty et al. (2016)*. They conducted a study to raise the awareness of Mansoura University working women about endometriosis and stated a significant change in the knowledge level of the studied women about all content of the educational session regarding endometriosis at post education and follow up time compared to their knowledge before the educational session.

On the same line, the current study reveals a highly statistically significant improvement in women's reported self-care practices to alleviate endometriosis symptoms before implementing instructional nursing strategy and follow-up. This finding could be due to women's interest in the educational components of instructional nursing strategies as a proper diet, exercise, pain, and stress management that help the study sample gain information about how to alleviate the symptoms of endometriosis.

The previous findings also support *Ghonemy and El Sharkawy (2017)*. They conducted a study to evaluate the impact of changing lifestyle on endometriosis-related pain and reported significant differences in women's dietary habits and exercises at three months post education compared to pre-health education level ($p\text{-value} < 0.05$).

The current study shows a highly statistically significant improvement in women's general health after implementing instructional nursing strategies compared to their general health before it. This finding reflected the effectiveness of instructional nursing strategy on woman's general health.

In addition, the current study displays a non-statistically significant difference in woman's work-life after implementation of instructional nursing strategies compared to their work-life before it. This finding could be justified as more than half of the study sample did not work so that the effect of the instructional nursing strategies did not come to a clear effect on the endometriosis symptoms. However, the current study's noticeable findings are the positive correlation between work-life and women's compliance with diet, exercise, and stress management that could explain the positive effect of adherence to a healthy lifestyle.

El-Maraghy et al. (2017) conducted a study to assess the impact of endometriosis-related symptoms on work productivity in Egypt. They concluded that endometriosis has a significant negative impact on the work productivity of women. Also, they proved that most women reported

that work-related activities were affected due to their physical health; about two-third accomplished less than expected, more than half reported physical limitations.

The current study shows a highly statistically significant improvement in women's sexual relations after implementing an instructional nursing strategy compared to their sexual relations before it. This finding might be attributed to effective educational nursing strategies that focus on the main health problem of women with endometriosis, such as pain and sexual difficulties that helped the women cope with their condition.

The previous findings partially supported with *EL Sayed and Aboud (2018)*, who conducted a study to investigate the effect of an educational intervention on quality of life and sexual function in women with endometriosis and proved a significant difference in the mean scores between both groups after one and two months of implementation of an educational intervention which included nonpharmacological management strategies for relieving endometriosis-related pain symptoms such as frequent rest periods, application of heat to the lower abdominal, massage, and regular physical exercise ($p \leq 0.001$).

On the same line, the current study reveals a highly statistically significant reduction in women's pelvic pains after implementing an instructional nursing strategy compared to their pains before it. This improvement may be due to successful instructional nursing strategies and lifestyle changes that touched the subjects' everyday needs and helped women manage their symptoms.

The previous findings are also consistent with *Yousef et al. (2019)*, who conducted a study to evaluate severe dysmenorrhea for early recognition of endometriosis among adolescent girls and reported a statistically significant improvement in the level of pain and the number of symptoms associating dysmenorrhea among girls after three months post-educational management ($p=0.018$ and 0.000 , respectively). It was found that while all-girls had severe dysmenorrhea before management, only 28.2% of them had severe dysmenorrhea at post-management.

On the other hand, the current study indicates a highly statistically significant difference in women's fatigue after implementing instructional nursing strategy compared to their fatigue before it. This result reflected the effectiveness of instructional nursing strategies on empowering endometriosis women to manage their fatigue.

The previous findings also support *Donatti et al. (2017)*, who conducted a study to observe a correlation between coping strategies, depression, levels of stress, and perception of pain in patients with endometriosis and reported that patients who used positive coping strategies had less exhaustion and fatigue ($p < 0.004$). These findings support the current research hypothesis.

Furthermore, the current study shows a statistically significant positive correlation between endometriosis symptoms (pain, fatigue) and women's compliance with the diet. This relation could be justified as many studies proved that diet has an essential role in the pathogenesis of endometriosis because it influences several processes

related to the disease, such as inflammation, prostaglandin metabolism, and estrogen activity, so dietary modification can help to minimize the symptoms of endometriosis (Hughes, 2017).

The previous study findings were similar to Armour *et al.* (2019), who concluded that diet was used by almost half the women in the survey. Also, women had high self-reported improvement scores. Additionally, dietary changes may reduce pelvic pain symptoms.

Moreover, the present study reveals a statistically significant positive correlation between endometriosis symptoms (pain, fatigue) and women's exercise compliance. This correlation could be justified as the researcher selects the most simple, effective, and easily performed exercises that encourage and help the women to comply with performing them.

The previous findings also were on the contrary with Ghonemy and El Sharkawy (2017), who reported a nonstatistical significant correlation between three months post-education exercise practices (physical activity) with the severity of symptoms ($r=0.052$, $p=0.87$).

The previous findings also supported EL Sayed and Aboud (2018), who concluded a positive correlation between endometriosis-related pain after two months of educational intervention ($r=0.541$, $p=0.000$). The intervention used included nonpharmacological management strategies for relieving endometriosis-related pain, such as regular physical exercise by walking three times per week for 15-30 minutes and following a healthy diet for endometriosis.

In addition, the present study displays a positive correlation between endometriosis symptoms (pain, fatigue) and women's compliance with stress management. This finding might be because endometriosis is usually associated with multiple types of pain that trigger stress. Hence, women need to develop appropriate coping mechanisms and manage their emotions to stressors, which is achieved through compliance with current instructional nursing strategies.

The previous study findings were in the same line as Donatti *et al.* (2017), who found a positive association between coping, depression levels, type, stress levels, and pain intensity in patients with endometriosis.

7. Conclusion

The current study's findings supported the hypothesis that women with endometriosis who follow instructional nursing strategies had fewer symptoms, better knowledge, and improved self-care practice regarding endometriosis.

Moreover, there was a positive correlation between endometriosis symptoms (pain, fatigue) of the studied sample and their compliance with instructional nursing strategies regarding diet, exercises, and stress management.

8. Recommendations

In the light of the findings of this study, the following recommendations are suggested:

- An awareness program should be developed to upraise women's knowledge and self-care management regarding endometriosis.
- Application of instructional nursing strategies at different clinics offering care for women suffering from endometriosis-related symptoms.
Further research is suggested:
- Evaluate the effect of instructional nursing strategies versus other methods of alleviating endometriosis-related symptoms such as nonpharmacological therapy.

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