

Effectiveness of Lifestyle Modification on Endometriosis Symptoms among Reproductive Age Women

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Abstract

Background: Endometriosis is a severe condition that affects roughly 190 million women of reproductive age globally. In order to alleviate their symptoms, women afflicted with this condition often use alternative therapy such as lifestyle modification. **This research aims** to examine the effectiveness of lifestyle modification on endometriosis symptoms among reproductive age women. **Method:** A quasi-experimental design approach was adopted. A convenience sample of 50 endometriosis-diagnosed women was recruited. The research was performed at Obstetrics and Gynecology outpatient Clinics associated with Menoufia University Hospital and Shebin El-Kom Teaching Hospital. A structured interviewing questionnaire, visual analogue scale, and women's practice questionnaire were used. **Results:** The mean knowledge scores of the study group were statistically significant higher at one month and three months after the intervention (20.90 ± 1.51 vs. 19.7 ± 1.31 , respectively) than before the intervention (14.02 ± 2.04) where, ($p < .001$). Also, there was a significant reduction in the endometriosis-related pain symptoms intensity (dysmenorrhea: 40%, 8%, and 4%; chronic pelvic pain; 30%, 4%, and 2%, dyspareunia 20%, 4%, and 2%, painful urination 6%, 0%, and 0%; dyschezia 4%, 0%, and 0%, respectively) at one month and at two months after the intervention compared to before the intervention. **Conclusion:** Lifestyle modification intervention including healthy dietary habits, and physical activity for women with endometriosis was an effective intervention in increasing their knowledge and decreasing the severity of endometriosis-related pain symptoms after the intervention than before. **Recommendations:** Lifestyle modification is needed for all women with endometriosis as well as more study on their consumption and efficacy. It is advised that all women with endometriosis have access to a simple and thorough handbook on lifestyle modifications to alleviate their endometriosis-related pain.

Key Words: lifestyle modification intervention, pain symptoms, women with endometriosis

Introduction

Endometriosis is one of the most prevalence benign gynecological illnesses affecting among 5-15% of women of reproductive age. Endometriosis is defined by the existence of endometrial tissue outside the uterine cavity, and it often leads to numerous surgeries, pelvic discomfort, adnexal mass, and infertility (Armour et al., 2020). Endometriosis

might remain asymptomatic and be discovered accidentally (Abd El-Kader et al., 2019).

Nevertheless, it may develop signs such as painful defecation (dyschezia), painful menstruation (dysmenorrhea), painful micturition (dysuria), painful intercourse (dyspareunia), lower back or abdominal discomfort, cyclic rectal bleeding or hematuria (bowel or bladder invasion), chronic pelvic pain (non-cyclic abdominal and pelvic pain of at

least 6 months duration), and cyclic dyspnea due to catamenial pneumothorax, predisposition to the formation of adenocarcinoma and into surrounding tissues bleeding, leading to inflammation, scarring formation and adhesions (**Abd El-Mouty et al., 2019**). It is odd that the intensity of symptoms does not correspond well with the size or advancement of lesions (**Agarwal et al., 2019, and Al-Jefout, 2020**).

The origin of endometriosis is still unknown, however retrograde menstruation is commonly acknowledged as a contributing factor. Failure of immune systems to remove ectopic tissue and aberrant differentiation of endometriosis tissue have been identified as underlying processes in a stromal-cell defect related with excessive oestrogen, prostaglandin, and progesterone levels, as well as progesterone resistance (**Asencio et al., 2019; Aslan et al., 2020, and EL Sayedet et al., 2021**).

There is no cure for endometriosis; however painkillers, hormone therapy, and surgery are often utilized to alleviate endometriosis symptoms (**Streuli et al., 2013**). Nevertheless, standard therapy may not always provide the intended effects on symptoms and health. In addition to conventional therapy, endometriosis patients employ a variety of self-care activities and alternative treatments to manage their symptoms. These treatments include nutritional supplements, herbal medications, yoga/meditation, transcutaneous electrical nerve stimulation, dietary modifications, osteopathy, exercise, massage, herbalism, Chinese medicine and acupuncture, (**El-Maraghy, et al., 2021**).

One theory for the management of endometriosis is that dietary fat regulates the female body's prostaglandins synthesis, which induce uterine spasms and alter the functioning of the ovaries. It is believed that elevated levels of prostaglandins may result in increased oestrogen synthesis, which may impact the formation of endometrial tissue. Other researches reveal a correlation among high-fat diets and estrogen amounts; the female body produces more oestrogen in proportion to the amount of fat in the diet. This also applies to

obese women, who are quite likely to be fat if they consume a diet heavy in red meat and low in fruits and vegetables (**Farshi et al., 2020**).

Unfortunately, few researches on endometriosis and lifestyle examine if particular diets or levels of physical activity are associated with a rise in endometriosis symptoms, rather than whether these factors alleviate endometriosis symptoms. Diets lacking in nutrients cause alterations in oxidative stress and lipid metabolism and induce epigenetic aberrations that play a role in the disease's origin and development. Omega3-rich foods with anti-inflammatory properties, N-acetylcysteine, vitamin D, and resveratrol supplementation, and increased intake of fruits, vegetables (ideally organic), and whole grains have a preventive impact, lowering the risk of disease onset and probable reversal (**Gad and Dawoud, 2021**).

Moving on to physical activities or exercise as another factor of lifestyle, it appears that regular physical exercise has protective properties against diseases involving inflammatory processes, as it increases the systemic cytokines levels with antioxidant and anti-inflammatory properties and reduces oestrogen levels. Evidence suggests that endometriosis symptoms stem from an inflammatory peritoneal response brought on by endometrial implants that have become ectopic (**Ghonemy et al., 2021**).

In addition, it is known that women who engage in vigorous physical activity tend to have more light periods, lower ovarian stimulation, and decreased oestrogen production. In one research which examined the relationship among intense physical activity and the likelihood of endometriosis in women, discovered that women who practiced 2.5 hours of vigorous exercise (jogging, biking, or aerobics) were 63% and have less tendency to develop endometriosis (**Huijs & Nap, 2020**).

In terms of how these activities influence the health of women in general and endometriosis in particular, it is known that physical activity produces endorphins. When physical activity is performed, the brain

produces endorphins, which are "feel-good" chemicals. These naturally occurring hormones function as analgesics to alleviate pain. Exercising regularly reduces oestrogen in the body, and the objective of endometriosis therapy is to reduce oestrogen amount in order to alleviate endometriosis symptoms (Jones et al., 2021).

Therefore, based on the current evidence, it is impossible to determine the true significance of physical activity in endometriosis. The commitment of nurses is to help and support patients in making lifestyle adjustments (diet and exercise) that enhance the patient's health and well-being. Nurses play a crucial job in healthcare via disease management by supporting and giving lifestyle adjustment to endometriosis patients and their families in order to adapt to this illness, as well as by serving as a source of follow-up. This will increase the quality of treatment to enhance the quality of life, relieve pain, and prevent future illness development (Lerdal et al., 2018).

Significance of the Study

Endometriosis prevalence varies from 6-10% globally, and 20-90% of women with pelvic discomfort or infertility have been diagnosed with the condition (Missmer et al., 2020). While it is impossible to quantify the incidence of endometriosis in Egypt due to documentation or filing system lack for endometriosis subjects, the only accurate diagnostic test is laparoscopy. As noted in clinical practice at Menoufia Hospital and other private clinics, the disease prevalence in Egypt began to rise (Mohamed, 2020). This study allowed the researchers to investigate a hitherto undiscovered nursing-based treatment strategy for endometriosis and endometriosis-related pain relief.

Aim of the Study:

- To examine the effectiveness of lifestyle modification on endometriosis symptoms among reproductive age women.

Research Hypotheses:

1- Women with endometriosis who participate in healthy lifestyle modification intervention will have a higher knowledge score than before participating in the intervention.

2- Women with endometriosis who participate in healthy lifestyle modification intervention will have a competent practices score than before participating in the intervention.

3- Women with endometriosis who participate in healthy lifestyle modification intervention will have a lower endometriosis-related pain symptoms score than before participating in the intervention.

Operational definitions:

- Lifestyle modification intervention:

Lifestyle factors, such as physical activity and diet, have a significant influence in lowering endometriosis-related symptoms. It was measured using instrument I: a structured interviewing questionnaire; instrument II: visual analogue scale (VAS), and instrument III: women's practices questionnaire.

- Endometriosis symptoms or

Endometriosis Related Pain: Common symptoms of endometriosis include painful periods (dysmenorrhea); cramps and pelvic pain that may begin before a menstrual period and continue for several days throughout it, abdominal and lower back pain and pain during or after sex as well as pain with bowel movements or urination, excessive bleeding, intermenstrual bleeding, and infertility. Other symptoms include lethargy, diarrhea, constipation, bloating, and nausea, particularly during menstruation. It was measured using instrument II: visual analogue scale (VAS).

- In the current research, pain is induced by an inflammatory response and the loss of endometrial cells, manifesting itself pelvic/abdominal or lower back pain, headache, joint pain, gastrointestinal symptoms, heavy menstrual flow, dyspareunia, and dysmenorrhea.

Method

Research Design:

- A quasi-experimental research approach (one group pretest, posttest) was applied to carry out the present research.

Research Settings:

The research was performed at Obstetrics and Gynecology outpatient affiliated with Menoufia University Hospital and Shebin El-Kom Teaching Hospital. These clinics are governmental and are known to have a high flow rate of women from rural and urban areas.

Sampling:

A convenience sample of 50 women diagnosed with endometriosis that fulfilled the inclusion criteria were selected including, all women diagnosed with endometriosis during the reproductive age, various stages of endometriosis, and without any chronic medical or gynecological disorders.

Sample size:

Based on reviewing the previous studies such as **Metwaley and Desokey, (2018)** that examined the same outcomes and found significant differences in women's scores of knowledges and symptoms of endometriosis with a moderate effect size (Cohen D = 0.6). Thus, the average size was 50 women. The sample size was measured at a 95% confidence interval, 80% power, and a significant level of 5% to detect significant differences. So, a convenience sample of 50 women with endometriosis was recruited for the research.

Instruments

Instrument I: A structured interviewing questionnaire: It included

Part (I): Demographic characteristics and obstetrical and gynecological history of the studied sample as age, education, residence, occupation, income, gravidity, parity, endometriosis sites, duration, and kinds of previous surgical procedures for its treatment

Part (II):

-Level of knowledge of the studied sample regarding endometriosis such as definition, common symptoms; complications.

- Level of knowledge of the studied sample regarding lifestyle modification (diet and physical activity) as food types that affect

endometriosis symptoms, and exercise type that favorably or adversely affect endometriosis symptoms.

Scoring system:

The total knowledge score included (9) closed-ended questions. Each correct and complete answer was scored (2), correct and incomplete answer was scored (1), whereas incorrect or don't know was scored (0). The total score as the following: Good > 75% of total knowledge score, fair knowledge: 75% - > 50% of total knowledge score, and poor if the present study score was less than 50% (Mohamed and Hassan, 2020; Metwally and Desoky, 2018).

Validity of the instrument

Three experts (two experts in Maternal and Newborn Health Nursing and one expert in Obstetrics and Gynecology) evaluated the instrument's content and internal validity to determine its validity.

Reliability of the instrument

Researchers employed test-retest reliability to evaluate the internal consistency of the instrument. It was accomplished by administering the same test to the same subjects under identical settings. The results of numerous examinations were compared.

Instrument II: Visual Analogue Scale (VAS)

This scale aims to evaluate the severity of endometriosis-related pain symptoms, including dysmenorrhea, dysuria, dyspareunia, pelvic pain and dyschezia.

Scoring system:

Women were asked to rate the present score of pain sensations related with endometriosis. NRS grading the pain level from 0 to 10, level (0) indicated no pain, levels 1 to 3 indicated mild pains, levels 4 to 6 indicated moderate pains, and levels 7 to 10 indicated severe pain.

Validity of the instrument

Four experts (two experts in Obstetric and Newborn Health Nursing and two experts in Obstetrics and Gynecology) evaluated the instrument's content and internal validity to determine its validity.

Reliability of the instrument

Researchers employed test-retest reliability to evaluate the internal consistency of the instrument. It was accomplished by administering the same test to the same subjects under identical settings. It had reasonable internal reliability and good test-retest reliability. All dimensions in the instrument were internally reliable with Cronbach's α scores ranged from 0.75 to 0.90 which revealed that all of the coefficients were desirable and satisfactory.

Instrument III: Women's Practices Questionnaire; this instrument was adopted by Jenkinson et al. (2004) to evaluate women's practices, which include physical activity and food habits. Scoring: women who tested high received a "2," those who checked average received a "1," and those who selected low received a "0." (0). Women's practices were categorized as follows: - ($\leq 50\%$): Incompetent practices. - (50% - 75%): Acceptable practices. - ($\geq 75\%$): Competent procedures.

Validity of the instrument

Five experts in Maternal and Newborn Health Nursing and Obstetrics and Gynecology evaluated the clarity, application, and comprehensiveness of the questions to determine the validity of the instrument. Accordingly, suggested improvements were implemented, and the final form was adjusted.

Reliability of the instrument

The Cronbach's Alpha Coefficients test found that this instrument comprised of highly homogeneous items, as described by the instrument's moderate to high reliability, that was calculated to be 0.781% for practices.

Pilot study

Pilot research was done on 10% of the examined women (five women with endometriosis) to ensure the stability of the findings, evaluate the practicability and clarity of the instruments, and ascertain the amount of time required to answer the questions. Women who participated in the pilot trial were omitted from the sample once a specific change was made to the instrument.

Ethical Considerations: An official permission was obtained from the administrative personnel. The researchers briefed the ladies on the purpose of the study and advised them that the information collected would be kept secret and that their participation was optional. Written informed consent was obtained from each woman.

Study fieldwork

Data was collected over a six-month period, from January 1, 2022, to July 31, 2022. Data was through four phases: a preparatory phase, an assessment phase, an implementation phase, and an evaluation phase.

A preparatory phase and assessment phase:

Using a standardized questioning form and pre-testing women's knowledge and illness symptom assessment, interviews were conducted. The researchers introduced themselves to the women and discussed the purpose, advantages, and methods of the study. Researchers communicated women who met the inclusion criteria and were willing to participate in the research. Using an instrument (I), prior to the women's menstruation, a baseline examination of sociodemographic, medical, and obstetrical data and information regarding endometriosis was undertaken, using face-to-face interviews to plan for the next meeting and to train the women on how to utilize the VAS during their upcoming menstruation. In addition, women's pain levels were examined using an instrument (II) by telephone since the majority of women failed to

see the researcher at that time. Each woman required 20 minutes to complete the questionnaire, whereas VAS required just one minute.

Implementation phase:

In this phase, women received health education during their first hospitalized visit or follow-up. At the beginning of the session, each woman received a booklet with information on the illness, life style modification and pain management techniques. During the first session, the researchers established relationship with the women and provided verbal instructions on the illness process, including its definition, signs and symptoms, diagnosis, and therapy options. Endometriosis-related pain might be affected by a healthy diet high in fibres (fruits and vegetables) and healthy cooking methods (boiling and grilling), as well as increased intake of anti-inflammatory and antioxidant-rich foods, such as a diet rich in Omega 3. In addition, education on the negative effects of excessive salt, fried foods, caffeine, and fatty red meat on endometriosis-related pain. Also, information on the sorts of exercises that woman may utilize 2-3 times per week for 20–30 minutes. During this session, the researchers instructed the women on how to indicate their pain level on the line among the two endpoints of VAS and requested that they plot and score their pain level as the pain happened (e.g., during menstruation, intercourse, defecation, etc.). A month later, at the second session, the researchers visited with the women to confirm that they had followed their instructions and to answer any questions. The third meeting occurred at the conclusion of the third month. Utilizing VAS, women's knowledge acquisition and progress were evaluated. During follow-up, each patient was contacted by telephone or face-to-face in outpatient gynecological clinics at least once every 2-3 weeks for about three months to reinforce the supplied information and address questions. Due to their exhaustion, several women dropped to attend and instead to connect through telephone. Various women called to address certain difficulties pertaining to this instructional topic, and the researchers provided a phone response.

Evaluation phase:

Each woman was observed twice: first, using instruments I and II throughout the interview and evaluation phase. The second assessment was conducted three months after the health education session were implemented. All women were evaluated based on their endometriosis-related information, lifestyle modifications (diet and exercise), and pain levels.

Statistical analysis: All statistical analysis were performed by SPSS, which compiled and analyzed the data (Statistical Package for the Social Science; SPSS version 22). The statistical information was shown as mean standard deviation or frequency and percentages. A paired (t) test was utilized to calculate the mean difference between pre- and post-test scores. The Chi-square test was utilized to differentiate between two distinct qualitative data categories (χ^2). It was calculated utilizing Pearson's technique of moment correlation. P value of 0.05 or less was considered statistically significant.

Results

Table (1) represents the socio-demographic characteristics of the studied women. The mean age of the study group was 31.02 ± 4.65 years. According to the level of education, one-half of the study group (50%) had secondary education. Regarding marital status, about three-fourths of the study group was married (80%). Regarding residence, about two-thirds of the study group was from rural areas (70%). Regarding family income, most of the study group stated that they had not enough income (80%). Regarding the sites of endometriosis, 50.0% of the study group had ovarian endometriosis. The duration of endometriosis was 64% > 5 years. Almost 70% of the study group stated that they had previous laparoscopy surgery for treatment of endometriosis.

Table (2) illustrates the level of knowledge of the study group regarding endometriosis before the intervention, at 1

month and 3 months after the intervention (pretest, post-test and follow-up). It revealed that there was statistically significant difference among the study group regarding their level of knowledge about endometriosis before the intervention, at 1 month and 3 months after the intervention where the mean knowledge scores were statistically significant higher at 1 month and three months after the intervention (20.90 ± 1.51 & 19.7 ± 1.31) than before the intervention (14.02 ± 2.04) where ($p < .001$).

Figure (1): Shows the total knowledge score of the study group before the intervention (pre), at 1 month (post), and 3 months after the intervention (follow-up). There was a poor knowledge score before the intervention (pre-test) in 94.0% of the studied women. While the majority of the study group (66.0%) had fair knowledge 1 month after the intervention (post-test) and a good knowledge score in 72.0% at 3 months after the intervention (follow-up).

Table (3) illustrates the dietary habits of the studied women with endometriosis before the intervention, at one month, and three months after the intervention. The table clarifies that there was a statistical significant difference before the intervention and at 1 month after the intervention and among before the intervention and 3 months after the intervention regarding the dietary habits of the studied women with endometriosis. Before the intervention, most (90% and 70%) of the sample depended on red meat in their meals and carbohydrate also, and 65% of them depend on fried food, during three months after receiving health education, the majority (96%) of the sample adjusted their eating habits to include more fruits and green vegetables in their meals, the same proportion (64%) chose to boil their food while cooking.

Table (4) summarizes the physical activities of the studied women with endometriosis before the intervention, at one month and three months after the intervention. The table summarizes that there was a statistically significant difference before the intervention, 1 month, and 3 months after the

intervention regarding the physical activities of the studied women with endometriosis. Where, nearly two-thirds (63%) of the studied group had low physical activities before the intervention. In contrast, nearly two-thirds (63%) of them had high physical activities 1 month after the intervention. In addition, at 3 months after the intervention, there were high physical activities in 93% of the studied group

Table (5): illustrates the endometriosis-related symptoms of the study group before the intervention, at 1 month, and at 3 months after the intervention. It showed that the endometriosis-related symptoms (dysmenorrhea, chronic pelvic pain, dyspareunia, dysuria and dyschezia) (dysmenorrhea: 40%, 8%, and 4%; chronic pelvic pain; 30%, 4%, and 2%, dyspareunia 20%, 4%, and 2%, painful urination 6%, 0%, and 0%; dyschezia 4%, 0%, and 0%) respectively reduced at one month and at two months after the intervention than before the intervention.

Figure (2): illustrates the intensity of endometriosis-related pain symptoms of the studied women before the intervention, 1 and 3 months after the intervention. There was statistically significant difference at before the intervention 1 and 3 months after the intervention. Where the majority of the studied women had severe pain related to endometriosis symptoms (88.0 %) the intervention. But the majority of them had moderate pain related to endometriosis symptoms (86.0 % - 90.0%) respectively at 1 month and 3 months after the intervention (p -value < 0.001).

Table (6) illustrates the correlation among endometriosis symptoms of the studied women, and their compliance for diet, and exercise, there was a statistically significant positive correlation among all items. This means that as improvement in lifestyle modification (diet and exercise) increased endometriosis symptoms decreased or were relieved.

Table (1) Demographic characteristics of the Studied Women (N=50)

Variables	Studied women (N=50)	
	No.	%
Age:		
Mean \pm SD		31.02 \pm 4.65
Residence:		
- Rural	35	70%
- Urban	15	30%
Educational Level		
- Illiterate	8	16%
- Basic	25	50%
- Secondary	15	30%
- University	2	4%
Income:		
- Enough	10	20%
- Not enough	40	80%
Marital status		
- Married	40	80%
- Single	10	20.1%
Sites of endometriosis		
- ovarian	25	50 %
- -rectovaginal	5	10 %
- -tuba	20	40 %
Duration of endometriosis (years)		
- - 1-2	3	6 %
- - 3-5	15	30 %
- - >5	32	64 %
Types of previous surgery for treatment		
- Laparotomy	2	4 %
- Laparoscopy	35	70 %
- Cystectomy	4	8 %
- Cyst drilling or cauterization	2	4 %
- None	7	

Table (2) Level of knowledge of the studied women regarding the Endometriosis (Pretest/Posttest intervention and Follow-up) (N=50)

Variables	Before the intervention		At one month after the intervention		At three months after the intervention		X ²	P- value
	No.	%	No.	%	No.	%		
Anatomy and physiology of reproductive systems:								
- know	Incorrect	31	62.0	0	0.0	0	0.0	X ² 1=0.04 X ² 2=52.08** X ² 3=58.14** P1=0.50 P2=0.000** P3= 0.000**
- incomplete	Correct and	19	38.0	25	50.0	18	36.0	
-	Correct and complete	0	0.0	25	50.0	32	64.0	
Definition:								
- know	Incorrect and I don't	32	64.0	0	0.0	0	0.0	X ² 1=0.17 X ² 2=53.41** X ² 3=60.98** P1=0.42 P2=0.000** P3= 0.000**
- incomplete	Correct and	18	36.0	33	66.0	16	32.0	
-	Correct and complete	0	0.0	17	34.0	34	68.0	
Causes:								
- know	Incorrect and I don't	0	0.0	0	0.0	0	0.0	X ² 1=0.67 X ² 2=6.76* X ² 3=10.51** P1=0.26 P2=0.008 P3= 0.001
- incomplete	Correct and	17	34.0	18	36.0	13	26.0	
-	Correct and complete	33	66.0	32	64.0	37	74.0	
Signs and symptoms:								
- know	Incorrect and I don't	37	74.0	4	8.0	0	0.0	X ² 1=0.05 X ² 2=34.39** X ² 3=40.87** P1=0.50 P2=0.00 P3= 0.00
- incomplete	Correct and	13	26.0	32	64.0	25	50.0	
-	Correct and complete	0	0.0	14	28.0	25	50.0	
Common sites:								
- know	Incorrect and I don't	14	28.0	0	0.0	0	0.0	X ² 1=0.34 X ² 2=42.90** X ² 3=49.96** P1=0.84 P2=0.00 P3= 0.00
- incomplete	Correct and	34	68.0	17	34.0	10	20.0	
-	Correct and complete	2	4.0	33	66.0	40	80.0	
Diagnosis:								
- know	Incorrect and I don't	32	64.0	0	0.0	0	0.0	X ² 1=0.05 X ² 2=51.23** X ² 3=57.28** P1=0.97 P2=0.00 P3= 0.00
- incomplete	Correct and	16	32.0	26	52.0	10	20.0	
-	Correct and complete	2	4.0	24	48.0	40	80.0	
Complications:								
- know	Incorrect and I don't	30	60.0	2	4.0	0	0.0	X ² 1=0.04 X ² 2=41.51** X ² 3=58.26** P1=0.83 P2=0.00 P3= 0.00
- incomplete	Correct and	20	40.0	26	52.0	16	32.0	
-	Correct and complete	0	0.0	22	44.0	34	68.0	
Treatment:								
- know	Incorrect and I don't	33	66.0	2	4.0	0	0.0	X ² 1=1.05 X ² 2=53.11** X ² 3=54.86** P1=0.21 P2=0.00 P3= 0.00
- incomplete	Correct and	17	34.0	30	60.0	15	30.0	
-	Correct and complete	0	0.0	18	36.0	35	70.0	
Mean total knowledge scores		14.02± 2.04		20.90 ± 1.51		19.7±1.31		t1 =0.82 t2 =43.5** t3 =70.9** P1=0.71 P2=0.000 P3= 0.000

P1=Comparison among pretest and posttest.

P2=Comparison among pretest and Follow-up.

P3=Comparison posttest and Follow-up.

t= t-test.

****** = highly statistically significant (p< 0.0001).

Figure (1): Total Knowledge Scores of the Studied Women regarding the endometriosis before the Intervention, at 1 Month, and 3 Months after the Intervention (N=50)

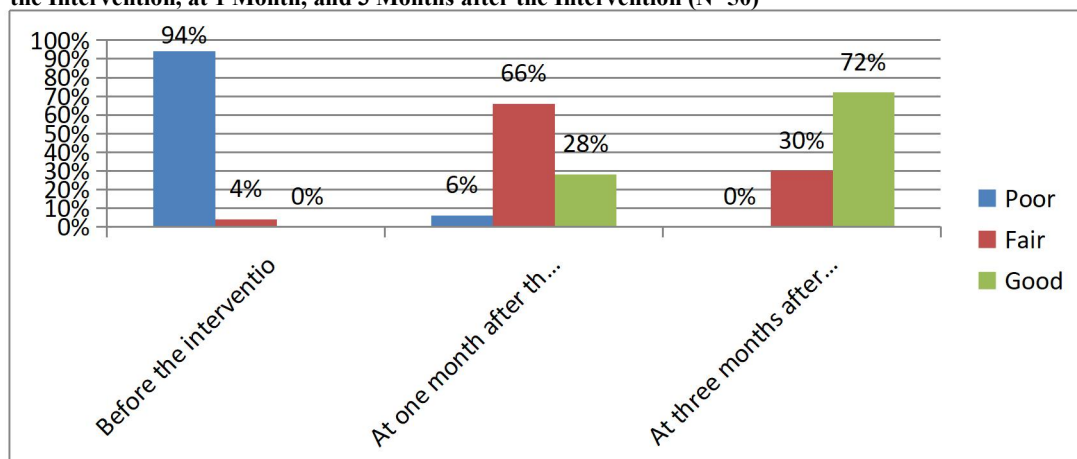


Table (3) Dietary Habits of the Studied women with endometriosis (Pretest/Posttest intervention and Follow-up) (N=50)

Variables	Before the intervention		At one month after the intervention		At three months after the intervention		χ^2	P
	No	%	No	%	No	%		
Fruits and vegetables	12	24.0	45	90.0	48	96.0	$X^2_1=24.00^{**}$	P1= 0.00
Red meat	45	90.0	32	64.0	3	6.0	$X^2_2=31.27^{**}$	P2= 0.00
Carbohydrate	37	74.0	6	12.0	6	12.0	$X^2_3= 0.79ns$	P3= 0.27
Mixed	5	10.0	14	28.0	18	36.0		
Way of cooking women prefer								
Boiled	4	8.0	24	48.0	32	64.0	$X^2_1=36.27^{**}$	P1= 0.00
Fried	28	56.0	1	2.0	1	2.0	$X^2_2=69.70^{**}$	P2= 0.00
Grilled	3	6.0	24	48.0	1	2.0	$X^2_3=9.54^*$	P3=0.002
Foundry	15	30.0	1	2.0	1	2.0		

B: ns = not significant ($p > .05$) * = significant ($p < .05$) ** = highly statistically significant ($p < .001$).

- X^2_1 and P: Comparison between before the intervention and one month after the intervention.

- X^2_2 and P2: Comparison between before the intervention and three months after the intervention.

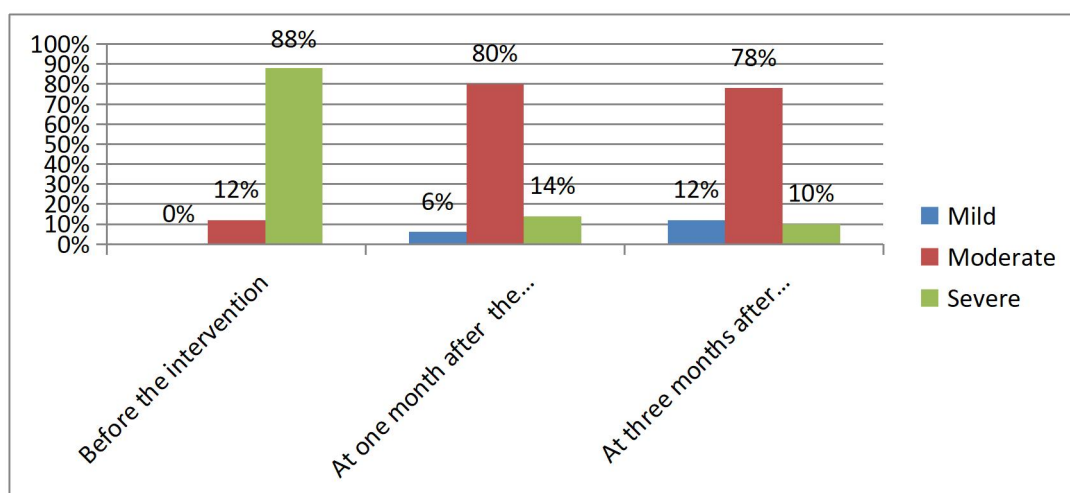
- X^2_3 and P3: Comparison between one month and two months after the intervention.

Table (4) Physical activities of the studied women with endometriosis (Pretest/Posttest intervention and Follow-up) (N=50)

Variables	Before the intervention	At one month after the intervention	At three months after the intervention	χ^2	P
Physical activities					
Low	63.3%	13.3%	3.3%	33.373	0.031*
Average	23.3%	23.3%	6.3%		
High	13.3%	63.3%	93.3%		

Table (5) Endometriosis-Related Symptoms of the Studied Women before the Intervention, at 1 Month and 3 Months after the Intervention (Pretest, Posttest and Follow-up) (N=50)

Variables	Before the intervention		At one month after the intervention		At three months after the intervention		χ^2	P
	No	%	No	%	No	%		
Dysmenorrhea	20	40%	4	8%	2	4%	39.85 **	0.00
Dyspareunia	10	20%	2	4%	1	2%	36.85 **	0.00
chronic pelvic pain	15	30%	2	4%	1	2%	17.43 **	0.00
Painful urination	3	6%	0	0%	0	0%	4.08 ns	0.06
Dyschezia	2	4%	0	0%	0	0%	2.22 ^{ns}	0.10

Figure (2): The Intensity of Endometriosis-Related Pain Symptoms of the studied women before the Intervention, at 1 Month and 3 Months after the Intervention (N=50).**Table (6) Correlation between Endometriosis-Related Symptoms of the Studied Women, and their compliance with diet, and exercise at 3 months post-intervention (N=50)**

Variables	Women's compliance for			
	Diet		Exercise	
	r	P	R	P
Dysmenorrhea	0.80	0.02*	0.98	0.02*
Dyspareunia	0.78	0.04*	0.83	0.03*
chronic pelvic pain	0.84	0.04*	0.83	0.03*

* Correlation is significant at less than 0.05 levels

Discussion

The current study's results demonstrated that the three research hypotheses were supported. The findings were discussed in the following sequence: 1- socio-demographic data of the studied women 2- findings regarding the level of knowledge of the studied women regarding endometriosis. 3-findings related to lifestyle modifications of the studied women with endometriosis before and after the Intervention. 4- Endometriosis related symptoms

of the studied women before and after the intervention.

The result of the current research showed that about three-fourths of the studied women were married and two-thirds of them were from rural areas. This finding was in accordance with who study "Improving the quality of life among women with endometriosis: an intervention study" in Egypt and stated that more than three-quarters of the

studied groups were from rural residences and married.

Regarding the duration of endometriosis, in the present study, nearly two-thirds of the studied women had duration of endometriosis more than five years. This finding is largely consistent with **Mohamed (2020)**, who reported that up to fifty percent of the research sample's period from symptoms start to diagnosis was more than three years. **Agarwal et al. (2019)** also documented delays ranging between four and eleven years between symptoms onset and diagnosis. Several variables, involving misdiagnosis and symptoms "normalization", worsen this delay. The occurrence of diagnostic delays is a worldwide phenomenon; patients face the effects of diagnostic delays, including chronic symptoms and a proportionally negative effect on quality of life, development of central sensitization and degradation of the patient-physician relationship

Knowledge level of the studied women before the intervention, at one month, and three months after the intervention (pretest, posttest and follow-up). It revealed that there was statistically significant difference among the study group regarding their level of knowledge about endometriosis before the intervention, at one month and three months after the intervention where the mean knowledge scores were highly statistically significant higher at one month and three months after the intervention than before the intervention.

Researchers' point of view, this lack of knowledge before intervention may be attributed that this disease is not common among a large proportion of women. Also, this increase in knowledge level after intervention may be due to attendance at the educational sessions, positive reinforcement, and the women's interest in lifestyle modification instruction, such as "correct food, exercise,"

Abd El-Mouty et al. (2019) was consistent with the findings of the present study; there were substantial changes in the degree of endometriosis-related knowledge among the studied women after the educational session and at the follow-up period. This may be attributed

to the introduction of educational sessions that raise the knowledge and practice level among women. In addition, women with a high degree of education are better exposed to many sources of knowledge on illness treatment. The increased level of education has a good impact on their practice and knowledge.

The present research demonstrated that there was a significant increase in lifestyle modification nursing program knowledge and self-care behaviors for all chosen items.

Moradi et al. (2018) conducted a study in Australia and pointed out that Changes in lifestyle, such as exercise, food, and sleep, are used to treat endometriosis-related pain symptoms.

Regarding dietary habits of the studied women, the current research proven that before intervention most of the sample ate red meat in their meals dependent and carbohydrate also, two third of them depend on fried food, while three months after receiving health education, the majority of participants altered their diets to include more fruits and green vegetables, with two-thirds of the sample preferring to boil their food.

The previous result of present study was in constant with **Ghonemy and El Sharkawy, (2017)** that conducted a study in Egypt and found a strong connection among endometriosis symptoms and diets heavy in red meat and low in green vegetables and fruits. This is consistent with previous research that has shown similar links among these dietary habits and endometrial cancer and fibroids (noncancerous tumors of the uterus). A study comparing healthy women and women with endometriosis found that women who ate beef every day were almost twice as likely to have endometriosis, but those who had seven or more servings of fruits and vegetables each week were at least forty percent less likely (**Healthy Women, 2017**). Some young women with endometriosis report feeling better when they eat a balanced diet and some specialists believe that ingesting certain foods alleviates endometriosis symptoms by reducing inflammation and estrogen levels in the body. Even if consuming

nutritious food does not always alleviate your "endometriosis" symptoms, a good diet has many additional advantages (**Health Guides, 2017**).

Concerning endometriosis-related symptoms, the current research demonstrated that endometriosis-related symptoms (dysmenorrhea, dyspareunia, dyschezia, dysuria and chronic pelvic pain,) decreased significantly one and three months after the intervention than before the intervention.

From the researcher's perspective, this improvement may be attributable to the influence of effective instructional supporting recommendations and lifestyle changes that play a significant part in managing endometriosis symptoms and assisting people in coping with the condition.

According to **Mirzaee and Ahmadi (2021)** Steady physical activity reduces insulin resistance and hyperinsulinemia. Hyperinsulinemia may increase the concentration of estrogens by lowering the concentration of SHBG and increasing the concentration of insulin-like growth factor-1 (IGF-1), which can stimulate endometrial cell proliferation by lowering the concentration of insulin-like growth factor-1 binding protein 1. (IGFBP-1). They added that Regular physical exercise seems to protect against inflammatory processes and oxidative stress, since it increases systemic anti-inflammatory cytokine levels.

This current result was in agreement with **El Sayed and Aboud, (2018)** who reported that after one and two months of educational intervention implementation, compared to the control group, the intensity of endometriosis-related pain symptoms reduced considerably in the study group. In addition, **Ghonemy and El Sharkawy (2017)** found that endometriosis-related discomfort was significantly reduced. The previous finding was consistent with **Mohamed's (2020)** finding of a highly statistically significant decrease in women's pelvic pain and fatigue after the implementation of the nursing programme compared to their level before the implementation of the programme, as

instructional nursing programs enable women to manage their pain, fatigue, and depression. This may be due to women's growing interest in lifestyle alterations, such as a healthy diet, physical activity, and non-pharmacological therapy, which teach them how to adapt to endometriosis in order to combat symptoms like pain, weariness, and depression.

Finally, the current research outcomes revealed a positive correlation among post-intervention improvement in lifestyle modification and endometriosis symptoms. As improvement in lifestyle modification (diet and exercise) increased endometriosis symptoms were decreased or relieved.

Ghonemy and El Sharkawy (2017) found a considerable correlation among endometriosis symptoms and diets heavy in red meat and low in fresh vegetables and fruit. In contrast, this study indicated that there was not any significant correlation among post-education exercise with symptoms severity. From the researcher's perspective, this variance may be attributable to cultural shifts on the significance of exercise for our health, besides socio-demographic norms of women that can impede this issue.

Also, from the researcher's point of view, a combination of diet and physical activity results in a more effective and preferable outcome than diet alone or physical activity alone. Additionally, this improvement may be attributable to education's influence. As endometriosis may have a tremendous influence on the lives of individuals afflicted, affecting their quality of life, participation in daily and social activities, physical and sexual functioning, relationships, educational and vocational productivity, mental health, and well-being.

Consequently, these everyday obstacles and comprehensive educational chances influence the health and well-being of afflicted persons throughout their lifetimes. Additionally, it benefits mental and emotional wellness. Therefore, it is necessary to make a significant effort to prevent this debilitating condition in future generations of women by increasing

awareness of endometriosis, its diagnosis, and its treatment (Missmer, et al., 2020).

Conclusion

The findings showed that: - Lifestyle modification intervention such as healthy diet and physical activity regularly have a major impact on knowledge score, practice score, and endometriosis-related pain symptoms score. Women with endometriosis who participate in healthy lifestyle modification intervention have a higher knowledge score than before participating in the intervention. This approved the first research hypothesis.

Women with endometriosis who participate in healthy lifestyle modification intervention have a higher competence practice score than before participating in the program. This approved the second research hypothesis.

Women with endometriosis who participate in healthy lifestyle modification intervention have a lower endometriosis-related pain symptoms score than before participating in the program. This approved the third research hypothesis. Therefore, we fail to accept the null hypothesis.

Recommendations

In light of the research' findings, the following are suggested:

- All women with endometriosis need nursing programs emphasizing lifestyle adjustments, as well as more study on their efficacy and utility.

- Counseling about diet and physical activity for women with endometriosis-related symptoms is recommended.

- To increase the generalizability of the findings, it is suggested that the current research be repeated with a larger probability-based sample size.

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