Impact of a Maternity Nurse-Led Lifestyle Coaching Program on Health-Promoting Behaviors among Infertile Women

Safaa Abu Setta 1, Amira Abd-Elnaser Yousef2, Ashour E.S3, & Amira Magdy Ashrey Elsehemy 4
1, 2, & 4 Lecturer of Maternal and Newbon Health Nursing, Faculty of Nursing, Menoufia University.
3 Assistant Professor of Maternal and Newbon Health Nursing, Faculty of Nursing, Menoufia University

Abstract

Background: Unsuitable reproductive outcomes and human health may be related to various environmental and lifestyle variables. Therefore, helping infertile women and increasing their odds of pregnancy may begin with changing fertility-related behaviors. **Aim:** The aim of this study was to find out the impact of a maternity nurse-led lifestyle coaching program on health-promoting behaviors among infertile women. **Design:** This study employed a quasi-experimental research design with two groups (pre-test and post-test). **Setting:** In the Menoufia Governorate, the study was carried out at the obstetrics and gynecological department outpatient clinics at University Hospital and Shebin El-Kom Teaching Hospital. **Sample:** For this study, 150 infertile women were chosen as a purposeful sample. **Instruments:** The three main data collection tools were a structured interview questionnaire, a lifestyle assessment questionnaire, and a health-promoting lifestyle profile. **Results:** The overall mean score of the health-promoting lifestyle profile domains like interpersonal relationships, stress management, physical activity, nutrition, spiritual development, and health responsibility relationships in infertile women under study increased post-coaching program compared to those who received the conventional intervention. Additionally, the clinical pregnancy had occurred among nearly one-quarter of the studied women in the study group who received and followed the coaching program guidelines compared to the control group **Conclusion:** After completing a lifestyle coaching program supervised by a maternity nurse, the infertile women in the study showed higher scores for health-promoting behaviors than those who got the traditional intervention. **Recommendations:** Maternity nurses' lifestyle coaching program should be clinically applicable and integrated into the daily routines of infertile women.

Keywords: Maternity nurse-led lifestyle, coaching program, health-promoting behaviors, infertile women.

Introduction

Infertility, according to Kanwal et al. (2022), is a difficult circumstance with cultural components that affect women in all facets of their lives and is linked to biological, mental, ethical, social, and economic issues. According to the World Health Organization, infertility is a condition of the male or female reproductive system that can be classified as either primary or secondary. The inability to conceive after a year of unprotected sexual activity without any previous pregnancy is known as primary infertility. When couples are unable to conceive again, this is known as secondary infertility (WHO, 2022).

Additionally, Ashraf et al. (2020) demonstrated that risk factors for female infertility include being overweight or underweight, hormonal imbalances that cause irregular ovulation, fibroids, tubal obstructions, reduced oocyte quality, chromosomal abnormalities, age over 27, a history of pelvic inflammatory disease (PID), smoking and alcohol use, decreased frequency of coitus, congenital anomalies of the cervix and uterus, and immune system deficiencies. Meanwhile, they added that infertile women also exhibit much greater levels of stress, anger, anxiety, and despair, in addition to self-blame and suicidal ideation.

Furthermore, Okafor et al. (2022) define a person's lifestyle as their way of life, which may include different eating and nutritional practices, sleeping patterns, smoking, physical activity, stress-reduction strategies, and medical service utilization. They added that a person's lifestyle impacts on their overall health and well-being. Therefore, according to Ricci (2020), encouraging healthy habits and leading a healthy lifestyle guarantee maintaining health.

Numerous studies have discovered a connection between lifestyle choices and infertility. Accordingly, several lifestyle and environmental factors may be related to human health and inappropriate reproductive outcomes (Vatanparast et al., 2022; Okafor et al., 2022). Similarly, Tang et al. (2022) recommended that

modifying fertility-related behaviors is the first step in assisting infertile women and enhancing their chances of conception. Modifiable habits in one's lifestyle can be employed as an assisted reproductive factor.

According to Cox et al. (2022), lifestyle encompasses all personal activities influenced by several circumstances. They also stated that a healthy lifestyle includes the following six elements: nutrition, physical activity, stress reduction, health accountability, social connections, and spiritual development that leads to self-actualization (Razeghi et al., 2022). These actions enhance people's psychological development, self-actualization, and general wellness.

According to the World Health Organization (2022), health promotion is a responsibility that extends beyond the health sector and is linked to everyone in the community who leads a healthy lifestyle. Also, it is a process of empowering individuals to raise their control power and improve their health. However, according to Afshani et al. (2022), these activities are necessary for enhancing life quality, preserving health, and encouraging reproduction.

Additionally, as health coaches, maternity nurses are crucial in evaluating infertility, which calls for a thorough history and physical examination conducted in an appropriately sensitive setting and informing infertile women about healthy habits and behaviors that enhance their quality of life (Hassan et al., 2021). Correspondingly, Normand and Bober (2020) recommended that healthy lifestyle behaviors include maintaining a balanced diet, weight reduction, regular physical exercises, compliance with medical regimens, and effective stress management. Therefore, the purpose of this study was to determine how a lifestyle coaching program conducted by a maternity nurse affected the health-promoting habits of infertile women.

Significance of the study

Infertility prevalence has significant psychological, economic, demographic, and medical implications. According to the WHO (2020), around 20% of developed-country couples and 25% of underdeveloped-country couples have experienced infertility at some point in their relationship. Additionally, Salman et al. (2022) discovered that 186 million people and 48 million couples worldwide experience infertility. Also, Shahzad et al. (2022) said that infertility affects 12% of Egyptian couples, primary infertility affects 4.3% of these women, and secondary infertility affects 7.7%. More than 25 million women between the ages of 15 and 49 are present in Egypt, indicating that at least 3 million are infertile (Salman et al., 2022).

As a result, Ramadan and Said (2018) demonstrated that female factors are responsible for at least 64% of all fertility issues. These factors may be caused by environmental factors, aging, weight changes, and lifestyle choices, as well as underlying medical conditions such as endometriosis, polycystic ovaries, pelvic inflammatory disease, fallopian tube damage that interferes with ovulation, and premature ovarian failure. Likewise, Almulhim et al. (2023) represented that one sort of health intervention that encourages women to develop and meet health-related goals is health coaching. Thus, the purpose of this study was to determine how a maternity nurse-led lifestyle coaching program affects health-promoting behaviors among infertile women.

The aim of the study

To find out the impact of a maternity nurse-led lifestyle coaching program on health-promoting behaviors among infertile women.

Research hypotheses:

H1: Infertile women who received a maternity nurse-led lifestyle coaching program are expected to have higher health-promoting behavior scores than those who received the conventional intervention.

H2: Infertile women who received a maternity nurse-led lifestyle coaching program are expected to have a higher success rate of treatment by the occurrence of pregnancy than those who received the conventional intervention.

Operational definitions:

A maternity nurse-led lifestyle coaching program is a program developed under the framework of a healthy lifestyle model provided to infertile women who are educated and trained by maternity nurses regarding lifestyles to modify their lifestyle and improve their health-promoting behaviors. It was measured using a lifestyle assessment questionnaire instrument.

Health-promoting behaviors refer to all behaviors that empower individuals to increase their control power and improve their health. They were measured using the Health-Promoting Lifestyle Profile (HPLP II).

Method

Research Design: This study employed a quasi-experimental design with two groups (pre-test and post-test).

Research Settings: Outpatient clinics of the obstetrics and gynecology department at University Hospital and Shebin El-Kom Teaching Hospital, Menoufia Governorate, were the settings of the study for selecting all cases. The chosen hospitals represent a high attendance rate from the surrounding urban and rural areas.

Sample Type: For the study, a purposive sample was chosen.

Sample size: To fulfill the study's objectives, 150 infertile women who satisfied the inclusion requirements were enrolled.

Sample size calculation:

150 subjects (75 subjects in each group) were selected based on a higher differential rate of improvement (mean difference = 19.3) among the nurse-led lifestyle coaching intervention group (107.42 ± 15.08) compared to the control group (126.72 ± 3.01), respectively, according to Mirian et al., 2023. The ratio of exposed to unexposed is 1:1 and a minimum of 80% power at a two-sided 95% significant level.

The sample size can be calculated using the formula

$n = [(Z\alpha/2 + Z\beta)^2 \times \{2(ó)^2\}]$. $(\mu1-\mu2)$ 2n is the sample size.

$\mu1$ is the pre-test mean.

$\mu2$ is the post-test mean.

$\mu1-\mu2$ is the mean difference between the test before and after.

ó is the standard deviation.

$Z\alpha/2$: Depending on the significance level, this is 1.96 $Z\beta$ for 5%. Power determines this; for 80%, it is 0.84.

The participants' inclusion criteria are

Women who have at least one of the modifiable risk factors that have been demonstrated to adversely affect fertility (body mass index less than 18.5 kg/m² and greater than 25 kg/m², excessive or nonexistent exercise), or who suffer from primary or secondary infertility, caffeine consumption of more than 300 mg/day, and high levels of stress), women who have a mobile phone with Wi-Fi availability, using WhatsApp or Telegram; attending all intervention sessions, and completing follow-up.

Exclusion criteria for the participants:

Women with no modified risk factors, women who declined to participate in the study, women with male factor infertility, women older than 40, and those who did not complete the program sessions and follow-up were excluded.

Instruments for data collection:

Three main instruments were employed to get the necessary information:

Instrument I: Section 1: Individual Information: Age, education level, occupation, residence, income, and length of marriage were all included.

Section II: Past menstrual history: It covered the frequency, length, interval, and amount of menstruation.

Section III: History of Infertility: Infertility type, duration, causes, length of time seeking infertility therapy, forms of infertility treatment, and history of ART trials were all included.

Part IV: Reproductive parameters: It included baseline parameters before the intervention, such as the number of pregnancies, the number of deliveries, the total number of stillbirths, abortions, and living children, and reproductive parameters after the intervention, such as current clinical pregnancy.

Instrument II: Questionnaire on Lifestyle Assessment: It was taken from Emokpae & Brown (2021). It aimed to assess women's lifestyles, which negatively affect infertility treatment. It included seven parts.

Part I: Anthropometric measurement: This was used to assess the degree of obesity for both groups. It was done by calculating BMI as an indicator of the degree of obesity by kg/m² for both groups. In this study, the researchers determined obesity by a measure, that is, BMI, based on calculating the height and weight of the women and ascertaining the following: low weight = less than 18.5; normal weight = 18.5–24.9; overweight = 25–29.9; and obesity = BMI < 30.

Part II: Assessment of physical activity: This was used to assess the performance of any physical activity or exercise.

Part III: Presence of passive smoking

Part IV: Eating habits: This was used to assess if women had healthy diets and ate more than they needed and the number of caffeinated drinks, such as tea and coffee, for more than 300 mg/day.

Part V: Sleeping pattern: This was used to assess the average amount of sleep each day (if < six hours, six to eight hours, or >8 hrs.).

Part VI: Suffering from stress: This was added to assess whether women suffered from stress or not.

Part VII: Environment: This was used to assess the exposure to environmental pollutants or chemicals.

Instrument III: The HPLP, or Health-Promoting Lifestyle Profile: Kuan and colleagues (2019) embraced it for measuring health-promoting lifestyle behavior. It comprised six main domains. The 48 health-promoting behavior items in the HPLP tool were divided into six domains: stress management (eight items), physical activity (eight items), interpersonal relationships (seven items), nutrition (eight items), spiritual growth (eight items), and health responsibility (nine items).

Scoring system of health-promoting lifestyle profile (HPLP):

A Likert-type scale was used to measure each behavior, with ranges of never (1), occasionally (2), frequently (3), and always (4). The total score of the HPLP ranges from 48 to 192 and is determined by taking the average score of all 48 HPLP components. Four more levels are assigned to the total HPLP score: low (range 48–86), moderate (range 87–126), good (range 127–164), and outstanding (range 165–192). More frequent health-promoting actions are indicated by high scores on each subscale.

Validity:

The validity of the instruments was assessed by three specialists, including two professors of maternity and newborn health nursing from the Faculty of Nursing and one from the obstetrics and gynecology department at the Faculty of Medicine. They were also asked to score the completeness and clarity of the items. The panel's evaluation of the sentence's appropriateness and intelligibility indicated that changes were made by "rephrasing and canceling."

Reliability:

The researchers employed test-retest reliability to examine the instruments' internal consistency. It was achieved by providing the same instruments for the same subjects in comparable circumstances over two or more times. The reliability score for the health-promoting lifestyle profile (Instrument III), Cronbach's alpha test result, was 0.868. The reliability score of Cronbach's alpha test regarding the lifestyle assessment questionnaire (Instrument II) was 0.854. The coefficient indicates that the items seem appropriate and have an average internal consistency.

Administrative Approvals: To conduct the study, a formal letter was obtained from the dean of Menoufia University's faculty of nursing and sent to the directors of the university and teaching hospitals. The directors of the mentioned settings formally granted permission to conduct the study.

Ethical Considerations: The Committee of Research and Ethics at Menoufia University's Faculty of Nursing granted its clearance in Juli 2022, number (812). To secure women's cooperation and acceptance for recruitment into the study, the researchers introduced themselves to them and described the nature and goal of the research. All women gave informed consent after being told before enrolling in the study. Every woman was aware that participation in the research was voluntary and that she might leave at any time. Every woman was given the option to decline to take part. Any questions they had on the specifics of the study were welcome.

Pilot study:

A pilot study was carried out to evaluate the instruments' viability, suitability, and comprehensibility. The selection criteria were performed on 15 participating women or 10% of the sample. Based on the results of the pilot study, the researchers changed a few of the questions. All participating women who participated in the pilot study were excluded from the study participants to ensure the stability of the results and make the necessary modifications.

Study fieldwork:

Data was gathered in the Maternal & Child Health Care Centers over three months, from the beginning of January 2024 to the end of June 2024. Depending on the availability of the women who fulfilled the inclusion criteria, it involved five to ten women per day, two days a week (Monday and Wednesday), from 9:30 am

to 12 pm. The health coaching lifestyle program was conducted through six stages, as follows:

A-Preparatory stage:

Reviewing recent and relevant literature was part of the study's initial phase. Additionally, understanding different study facets using books, papers, periodicals, magazines, and the internet to create data-gathering tools. Additionally, the researchers carried out a pilot study. To submit the content of the health coaching program, the researchers first carried out WhatsApp and Telegram groups. Before beginning the trial, the institutional authorities of the two hospitals were provided with formal written approval.

B- Interviewing and assessment stage:

Before beginning the intervention, the researchers started selecting and interviewing women who met the inclusion criteria, introduced themselves to all of them, and explained the purpose and counseling sessions for the infertile women (intervention group) were planned at different points in the program. Additionally, the researchers inspired the women under study, emphasized the value of ongoing care contact, described the channels of communication, and requested their phone numbers to join via WhatsApp and Telegram groups, then got approval for participation by signing the written consent. It was made clear that participation was completely optional and that their data would be kept private to gain the trust and confidence of infertile women.

In addition, each woman was interviewed to gather information about her personal data, menstrual history, and infertility history using instruments I. Also, the instruments II lifestyle assessment questionnaire was assessed by asking the woman questions regarding eating habits, physical activity, passive smoking, sleeping patterns, suffering from stress, and the surrounding environment such as pollutants or chemicals.

In addition, the researchers assessed the women for their anthropometric measurements using an electronic scale for measuring weight and height. Then, the researchers calculated the BMI according to the equation of height (cm) to weight (kg) and classified the women according to their BMI if they had a normal BMI, were underweight, overweight, or obese. The interview took place outside the outpatient clinics in the waiting room. Each woman took between twenty and thirty minutes to complete the questionnaire. In terms of the health-promoting behavior profile, a pre-test was administered to each woman individually, as each domain of the health-promoting behavior profile was evaluated separately, and the overall score was determined using instruments III. The results from the pre-test questionnaire were used to adjust the content of the coaching program.

C- Planning stage:

The lifestyle coaching program was designed according to the needs identified in the pre-intervention assessment stage. So, the colored guide booklet was designed based on intensive related literature and up-to-date clinical guidelines. The booklet is in plain Arabic, with colorful diagrams and images for illustration, and includes two chapters. The program covered brief information regarding infertility, which was included in the first chapter, with more emphasis on the health-promoting lifestyle behavior included in the second chapter, such as the nutritional guidelines, physical exercise guidelines, stress management measures, and general guidelines regarding infertility treatment. First of them:

- Nutritional guidelines included drinking plenty of water, not less than 3-5 liters/day; consuming more veggies and a range of balanced foods; consuming healthy monounsaturated fats rather than trans and saturated fats; consuming at least half of grains whole; and consuming adequate dairy and other foods high in calcium, avoiding plants that contain toxic inflammatory chemicals, avoiding high sugar and carbohydrate diets (bread, rice, potatoes, and sugary sweets like candy). Poor eating habits cause inflammation and have an impact on the generation of vital reproductive hormones. A high-sugar diet can also disrupt the maturation of eggs, decreasing the likelihood of fertilization. Consume 400 micrograms of folic acid daily from supplements and foods such as fortified cereals and dark leafy green vegetables., fish oil (Omega 3s), and multivitamins (vitamin E, C, zinc, folic acid, and selenium) that help in meeting nutrient needs and promote a healthy weight and human cell production.

- Physical exercise guidelines included encouraging low to moderate intensity/impact exercise like yoga, walking at least 1-2 hours, and standing. Avoid high-intensity, high-impact exercises such as leaping, CrossFit, and heavy lifting.
- Stress management measures included praying, reading the Quran or a book, and engaging in relaxation exercises like deep breathing, progressive muscular relaxation, visualization, and meditation. Getting enough sleep, exercising frequently, eating a well-balanced diet, and allowing time for recreation. Taking warm baths, chatting with loved ones and friends to prevent isolation, and consuming natural, calming herbs and supplements
- General instructions included avoiding smoking (passive either first, second, or third-hand smoking). Smoking causes the body to be overloaded with harmful substances that harm sperm and egg DNA. Additionally, it disrupts the synthesis of hormones and fertilization Avoiding exposure to chemicals or polluted environments such as pesticides and detergents. Avoiding non-prescription health medications, which lower hormone levels, impair eggs and sperm, and inhibit ovulation. Getting enough time to sleep, as sleep deprivation and insomnia alter the circadian cycle of the body, which affects the production of hormones. Also, maintaining ideal body weight, as obesity and excess weight raise the chance of miscarriage, ovulation problems, and monthly irregularities.

D-Intervention stage (for the study group only):

To improve the positive health behaviors of infertile women, a maternity nurse-led lifestyle coaching program was presented. It was implemented over two sessions through the Zoom application. Infertile women were divided into subgroups. Each group comprised twenty-five infertile women. Each group was added to WhatsApp and Telegram groups by the researchers after appropriate dates and times had been set with them.

The researchers used a PowerPoint presentation and video teaching to emphasize certain items to facilitate knowledge gaining and shared it on WhatsApp and Telegram groups. Following the study group's counseling sessions, the researchers shared a booklet and PowerPoint slides with simple Arabic language and other instructive pictures, which made the material more understandable on WhatsApp and Telegram groups. Feedback on the prior session was conducted at the start of the current one.

Session's description of the study intervention:

Session	Session objectives	Session contents	Session duration
Frist session	Infertile women would be able to acquire sufficient knowledge regarding infertility.	Overview of infertility, types, causes, risk factors, investigation, and treatment.	30-45 minutes
Second session	Infertile women would be able to mention the importance of engaging in health-promoting lifestyle behaviors to manage and prevent further implications of infertility and list them.	Nutritional infertility guidelines, physical exercise infertility guidelines, stress management measures, and general guidelines regarding infertility treatment.	30-45 minutes

As part of the control group, the women got only routine hospital care, including maintaining a good diagnostic and treatment environment, diagnosis and medical treatment, brief instructions about treatment adherence, monitoring the patients' questions, and building complete health files. They also assessed their lifestyle and health-promoting behavior regarding the pre-test for infertility. The researchers did not intervene on their behalf. They received a booklet about infertility using WhatsApp and Telegram groups only.

This cohort also received a lifestyle coaching program for two sessions after the intervention with the same level of quality.

E- Stage of control:

Control stage: For three months, the researchers continued to communicate with the women under study via weekly WhatsApp messages or phone calls (12 messages), based on the women's preferred times for messaging or calling (morning or afternoon). This phase addressed the educational needs of women as well as any queries that support and encourage healthy behavior. Any new health issues were also found, dealt with, and rectified.

F- Stage of evaluation:

The stage began 12 weeks after intervention in both groups to estimate the effect of the lifestyle coaching program on women's health-promoting behavior and degree of compliance with program instructions using instrument III (post-test). In addition to assessing current reproductive parameters by assessing the incidence of clinical pregnancy among the studied infertile participants using instrument I, part IV, (post-test only). To prevent bias, the control group was evaluated first. This stage took place during follow-up of the studied women outside the outpatient clinics in the selected study settings.

Limitation of the study:

- Some of the infertile participants did not go to the outpatient clinics for follow-up after three months of study. The researchers overcame this limitation through filling out the instrument III and assessing the clinical pregnancy (instrument I part IV) (post-test) by calling these women and taking their responses of these instrument post-coaching program.
- At the time of Zoom meetings, some participants had no internet work and some were busy. The researchers overcame this limitation through sending the recording of Zoom meetings on WhatsApp and Telegram to hear it at any time convenient for them with follow-up.
- 17 women from the control group and 5 from the intervention group dropped out after two months of the study. The researchers replaced them with other infertile who women met the inclusion criteria.

Statistical Analysis: Data was coded and analyzed using SPSS version 25. Descriptive statistics, including central tendency and dispersion, were used to summarize the sample characteristics. The Kolmogorov-Smirnov test was conducted to check for normality. Inferential statistics, including chi-square tests and independent t-tests, were used to evaluate the research hypotheses. The significance level was set at $p < 0.05$.

Results:

Table (1) displays the personal data of the subjects in the study. The table indicates that the majority of the participants were university-educated, not working with insufficient income, and rural residents with no difference between the studied participants. As for the age and marriage duration, the participants in the study were all 31 years old, and there was no difference between the two groups. and within the marriage duration of 6-7 years old.

The menstrual history of the subjects in the study is shown in Table (2). The research and control groups did not differ statistically significantly including menstrual duration, interval, frequency, or amount.

Table (3) represents the infertility history among the studied participants. The table reveals that the majority of the participants were infertile from 4-5 years, seeking infertility treatment from 3 years. Additionally, 34.7% & 41.3% of both the control group and the study group took hormonal therapy as infertility treatment. While 65.3% and 81.3% of the control group and the study group had no prior history of the ART trial.

Figure (1) demonstrates the types of infertility in the study and control groups. It shows that 54.7 % & 60% of both the study and control groups, respectively, had a history of primary infertility due to PCOS.

Figure (2) demonstrates the causes of infertility in the study and control groups. It shows that 44.0% and 46.7% of both the study and control groups, respectively, had PCOs.

Table (4) represents the infertility history of the participants in the study. There is not a statically significant difference among the participants regarding infertility history. According to gravidity, 52% of the study group did not have any pregnancy before compared to 60% in the control group. In addition, 64.0% of the control group had never given birth, but 68.0% of the study group had. In terms of prior

abortion history, 89.3% of the research and control groups didn't have an abortion before. Most members of the control group and study did not have birth. Regarding the number of children living, 65.3% & 68.0% of the research and control groups lacked any children living.

Table 5 shows the lifestyle assessment profile of the participants before the intervention, as most of the research participants possessed a high BMI (> 25 kg). They also drank caffeinated beverages for more than 300 mg/day (52.0% & 72.0%) and did not eat a healthy diet (80.0%&74.7%). Regarding physical exercises, the majority of them (81.3% & 88.0%) hadn't performed any physical activity or exercise. Additionally, over 50% of the participants in the study had 6-8 hours of sleep per day and suffered from stress (62.7% &57.3%). While 100% of the control and study groups were not exposed to environmental pollutants or chemicals.

The comparison of the study and control groups' health-promoting activities before and after the program is shown in Table (6). According to the study, there was a highly statistically significant difference between the study and control groups ($p \leq 0.001$), and the infertile women's scores on the health-promoting lifestyle profile domains—health responsibility, physical activity, nutrition, spiritual growth, interpersonal relationships, and stress management—were higher after the intervention than before.

Table (7) illustrates the connection between total health promotion score and personal data after the intervention in the study and control groups. The table indicated a significant relationship between the level of the wife's education and the total health promotion score after the study group's intervention (P-value ≤ 0.05). However, there was no discernible correlation between women's income, occupation, or place of living. and the total level of health promotion score post-intervention among the study and control groups.

Figure (3) demonstrates the total level of health-promoting activities before and during the intervention. It reveals that 63% of the study group had a moderate level before the program, then it became 83% excellent level compared to 15% and 0% in the control group.

Figure (4) demonstrates the incidence of clinical pregnancy the study group experienced following the training. It reveals that the lifestyle coaching program had a significant impact, as evidenced by a 16% increase in clinical pregnancy rates among women who followed program instructions.

Table 1: Distribution of the participants based on their characteristics (n=150)

Variables	The participants				χ2	P value
	Study group (n=75)		Control group (n=75)			
	No.	%	No.	%		
Age						
Mean±SD	31.53±4.20		31.40±5.98		t 0.158	>0.05ns
Place of residence						
Rural	38	50.7%	50	66.7%	3.959	>0.05ns
Urban	37	49.3%	25	33.3%		
Level of wife education						
Illiterate	10	13.3%	17	22.7%	4.676	>0.05ns
Primary school	7	9.4%	2	2.7%		
Secondary school	25	33.3%	23	30.7%		
University	33	44.0%	33	44.0%		
Occupation of wife						
Not working	39	52.0%	45	60.0%	2.174	>0.05ns
Working	36	48.0%	30	40.0%		
Marriage's duration						
Mean±SD	7.32±4.34		6.73±3.83		t 0.887	>0.05ns
Income						
Enough	30	40.0%	26	34.7%	1.021	>0.05ns
Not enough	37	49.3%	43	57.3%		
Enough and save	8	10.7%	6	8.0%		

N.B. ns non statistically significant; t independent sample t-test

Table 2: Participants' distribution according to menstrual history (n=150)

Variables	Study participants				χ2	P value
	Study group		Control group			
	No.		No.	%		
Duration of menstruation						
3-7 days	42	56.0%	52	69.3%	4.950	>0.05ns
<3 days	18	24.0%	17	22.7%		
> 7 days	15	20.0%	6	8.0%		
Interval of menstruation						
21-35 days	35	46.7%	32	42.7%	0.488	>0.05ns
<21 days	4	5.3%	3	4.0%		
>35 days	36	48.0%	40	53.3%		
Frequency of menstruation						
Regular	35	46.7%	31	41.3%	0.433	>0.05ns
Irregular	40	53.3%	44	58.7%		
Amount of menstruation						
Mean±SD	2.28±0.79		2.20±0.94		t 0.560	>0.05ns

N.B. ns non statistically significant; t independent sample t-test

Table 3: Participants' distribution according to their history of infertility (n=150)

Variables	Study participants				χ2	P value
	Study group		Control group			
	No.	%	No.	%		
Types of infertility						
Primary	41	54.7 %	45	60.0%	3.236	>0.05ns
Secondary	34	45.3%	30	40.0%		
Duration of infertility						
Mean±SD	4.63±3.16		5.29±2.49		1.420	>0.05ns
Causes of infertility						
PCOS	33	44.0%	35	46.7%	t 17.661	≤0.05*
Endometriosis	8	10.7%	5	6.7%		
Tubal obstruction	1	1.3%	2	2.7%		
Uterine adhesions	4	5.3%	0	0.0%		
Uterine fibroids	2	2.7%	10	13.3%		
Salpingitis	3	4.0%	0	0.0%		
Endometrial hyperplasia	4	5.3%	0	0.0%		
Unknown cause	20	26.7%	23	30.7%		
The duration of seeking infertility treatment						
Mean±SD	3.81±2.72		3.54±2.43		t 0.631	>0.05ns
Types of infertility treatment						
Hysteroscope	11	14.7%	4	5.3%	26.623	≤0.001**
Induction of ovulation	21	28.0%	40	53.3%		
Hormonal therapy	26	34.7%	31	41.3%		
Other treatment	17	22.7%	0	0.0%		
History of ART trial						
yes	26	34.7%	14	18.7%	4.909	≤0.05*
No	49	65.3%	61	81.3%		
If yes, the number of trials						
Mean±SD	1.73±0.87		1.64±0.92		t 0.297	>0.05ns

N.B. ns non-statistically significant; * statistically significant; ** highly statistically significant; t-independent sample t-test

Figure 1: Types of infertility in the study and control groups

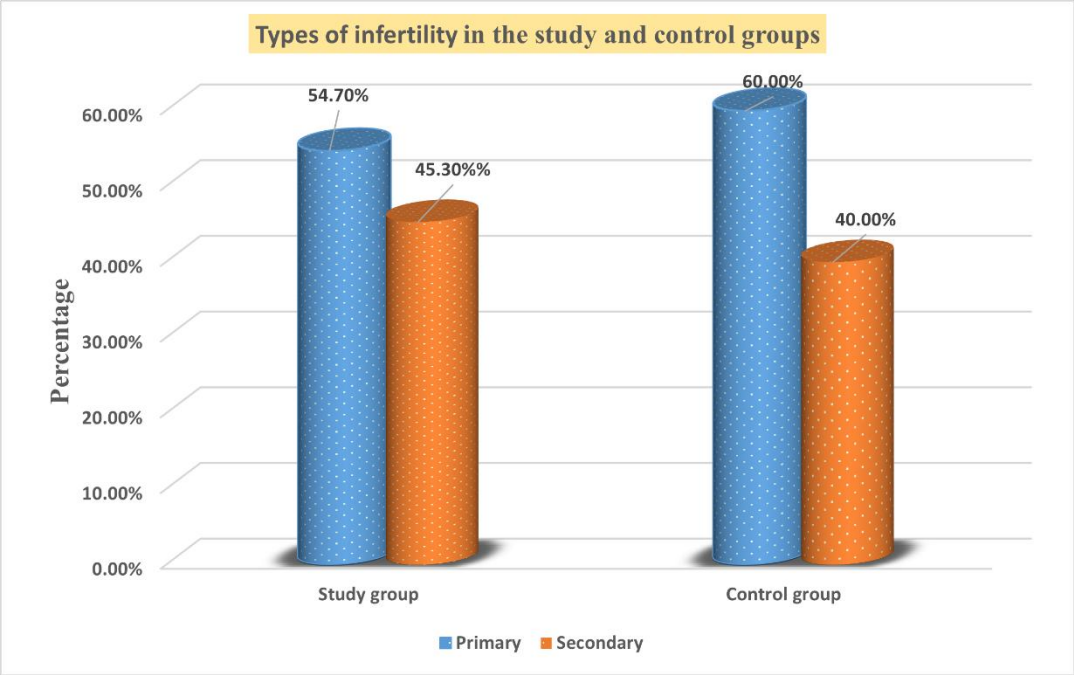


Figure 1: Causes of infertility in the study and control groups

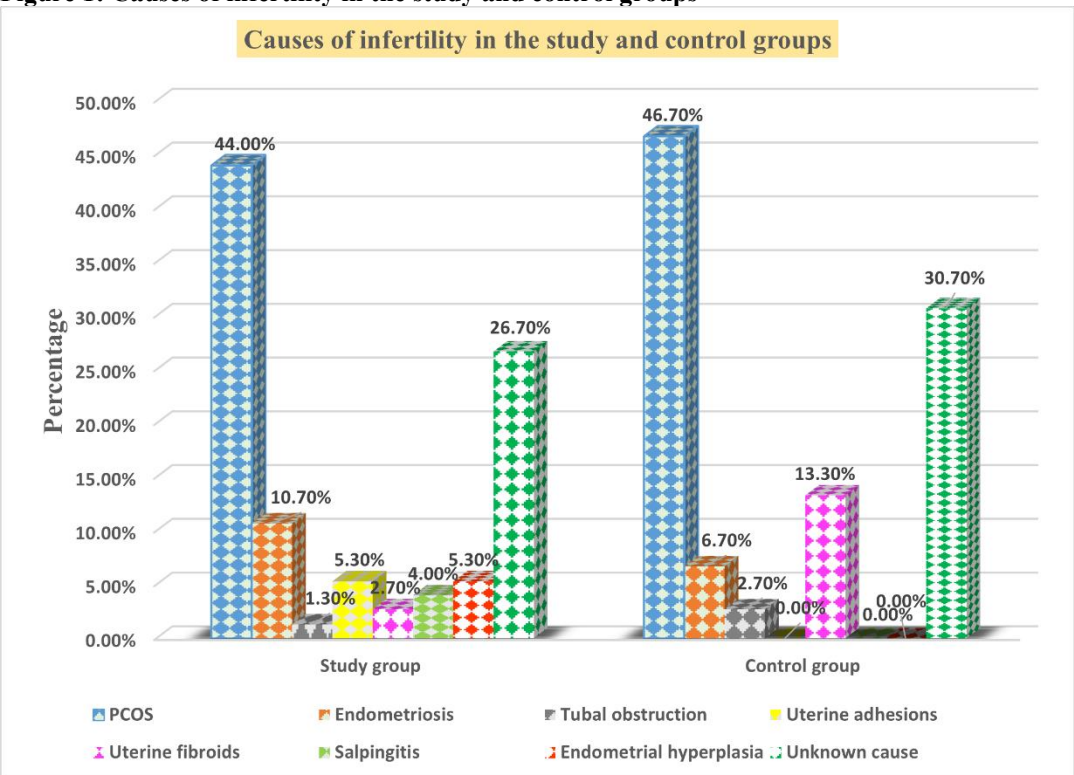


Table 4: Distribution of the studied participants based on their reproductive history (n=150)

Variables	Study participants				χ2	P value
	Study group		Control group			
	No.	%	No.	%		
Number of previous pregnancies						
Once	15	20.0%	16	21.3%	2.794	>0.05ns
Twice	15	20.0%	12	16.0%		
Three times	6	8.0%	2	2.7%		
No one	39	52.0%	45	60.0%		
Number of previous deliveries						
Once	11	14.7%	13	17.3%	0.758	>0.05ns
Twice	11	14.7%	13	17.3%		
Three times	2	2.7%	1	1.3%		
No one	51	68.0%	48	64.0%		
Number of previous abortions						
Once	2	2.7%	3	4.0%	0.533	>0.05ns
Twice	4	5.3%	4	5.3%		
Three times	2	2.7%	1	1.3%		
No one	67	89.3%	67	89.3%		
Number of stillbirths						
Once	0	0.0%	0	0.0%	a	a
No one	75	100.0%	75	100.0%		
Number of living children						
Once	13	17.3%	13	17.3%	0.421	>0.05ns
Twice	11	14.7%	10	13.3%		
Three times	2	2.7%	1	1.3%		
No one	49	65.3%	51	68.0%		

N.B. ns non-statistically significant; * statistically significant; a Since the number of stillbirths is constant, no statistics are calculated.

Table 5: Lifestyle assessment profile of the studied participants before the intervention (n=150)

Variables	Study participants				χ^2	P value
	Study group		Control group			
	No.	%	No.	%		
1- Anthropometric measurement						
BMI						
Mean±SD	27.02±3.49		26.53±4.05		0.783	>0.05ns
2. Smoking						
Passive smoking						
Yes	24	32.0%	23	30.7%	0.031	>0.05ns
No	51	68.0%	52	69.3%		
3. Healthy habits						
Caffeinated drinks such as tea and coffee for more than 300 mg/day						
Yes	39	52.0%	54	72.0%	9.000	≤0.05*
No	36	48.0%	21	28.0%		
Eating a healthy diet						
Yes	15	20.0%	19	25.3%	0.609	>0.05ns
No	60	80.0%	56	74.7%		
4. Physical activity						
Performing any physical activity or exercise						
Yes	14	18.7%	9	12.0%	1.284	>0.05ns
No	61	81.3%	66	88.0%		
5. Sleeping pattern						
Average number of hours of sleep per day						
6-8 hours per day	44	58.7%	43	57.3%	0.088	>0.05ns
less than 6 hours per day	25	33.3%	25	33.3%		
More than 8 hours per day	6	8.0%	7	9.3%		
6. Stress						
Suffering from stress						
Yes	47	62.7%	43	57.3%	0.444	>0.05ns
No	28	37.3%	32	42.7%		
7. Environment						
Expose to any environmental pollutants/ chemicals						
No	75	100.0%	75	100.0%	a	a

N.B. ns non statistically significant; * statistically significant; a. No statistics are computed because the environment is constant

Table 6: Health-Promoting Behaviors Comparison between the Control and study groups Before and after the Program (n=150)

Variables	Pre		Post		t test	P value
	Study Group	Control group	Study group	Control group		
Total health responsibility score						
Mean±SD	16.13±4.07	14.26±4.05	31.88±2.51	14.60±4.14	**t 1** 2.812 **t 2** 30.844	**P1**>0.05ns **P2**≤0.001**
Total physical activity score						
Mean±SD	10.68±4.08	10.00±3.51	25.53±3.46	10.52±3.39	**t 1** 1.093 **t 2** 26.787	**P1**>0.05ns **P2**≤0.001**
Total nutrition score						
Mean±SD	16.14±5.20	12.81±3.44	28.58±1.70	13.24±3.31	**t 1** 4.628 **t 2** 35.661	**P1**>0.05ns **P2**≤0.001**
Total spiritual growth score						
Mean±SD	17.36±3.81	14.02±4.20	28.82±2.30	14.00±4.19	**t 1** 5.083 **t 2** 26.831	**P1**>0.05ns **P2**≤0.001**
Total stress management score						
Mean±SD	13.92±2.77	12.77±3.36	29.06±1.99	14.60±6.80	**t 1** 2.278 **t 2** 17.673	**P1**>0.05ns **P2**≤0.001**
Total interpersonal relationship score						
Mean±SD	17.94±3.10	13.94±3.11	27.14±1.15	13.97±3.12	**t 1** 7.881 **t 2** 34.244	**P1**>0.05ns **P2**≤0.001**

N.B. t 1 & P1 means before the intervention; t 2 & P2 means after the intervention

Table 7: Relationship between total Health Promotion score and personal data after the intervention in the control and research groups

Variables	Post	
	Study group	Control group
	Mean±SD	Mean±SD
Place of residence		
Rural	170.15±5.47	176.50±16.57
Urban	171.94±8.31	179.80±19.23
T **P value**	1.103 >0.05ns	1.5053 >0.05ns
Level of wife education		
Illiterate	172.50±6.18	72.58±7.96
Primary school	165.57±6.92	54.00±0.00
Secondary school	170.04±7.27	79.95±17.84
University	172.51±6.67	87.54±20.29
F **P value**	4.577 ≤0.05*	2.328 >0.05ns
Occupation of wife		
Not working	69.11±7.46	79.22±18.86
Working	72.82±6.17	79.22±18.86
T **P value**	1.352 >0.05ns	0.981 >0.05ns
Income		
Enough	171.96±6.57	76.26±15.13
Not enough	169.81±7.45	82.79±19.35
Enough and save	173.25±6.34	87.83±23.79
F **P value**	1.229 >0.05ns	1.481 >0.05ns

N.B. ns non-statistically significant; * statistically significant; t-independent sample t-test; F one-way ANOVA

Figure (3) Total Level of health-promoting habits before and during the intervention

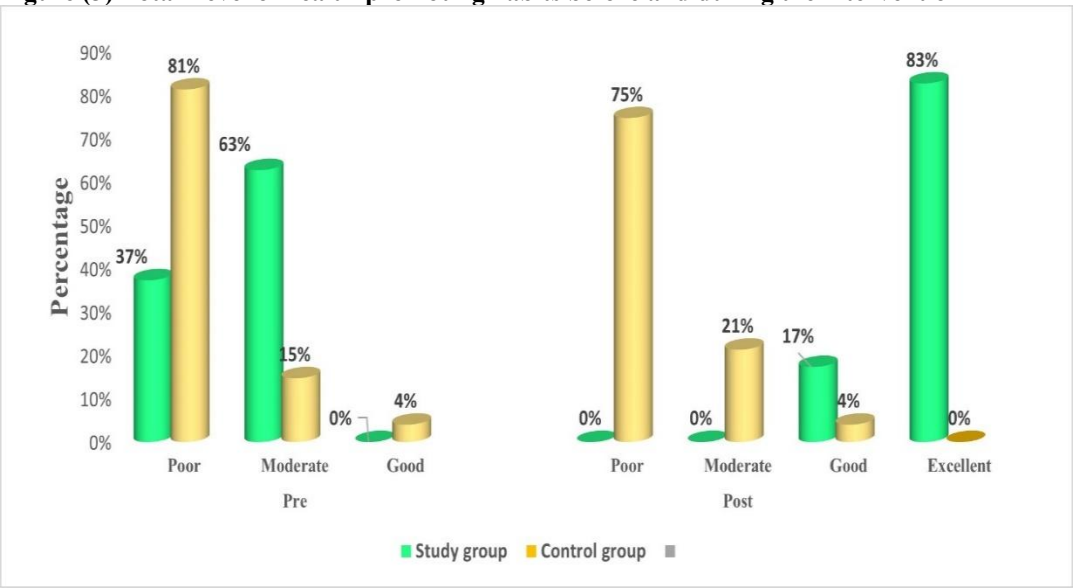
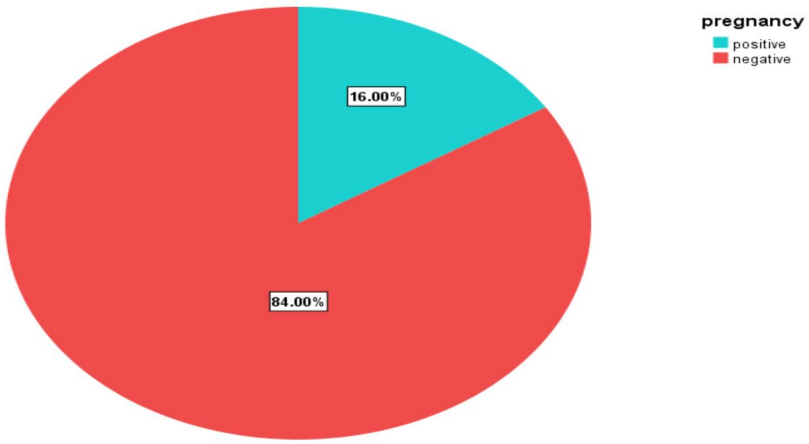


Figure 4: The study group's incidence of clinical pregnancy after the program



Discussion:

Numerous lifestyle factors have been shown to affect women's fertility throughout the past few decades. Despite this proof, a lot of infertile women still fail to recognize the influence of a healthy lifestyle on their ability to conceive (Emokpae & Brown., 2021). So, this study was carried out to assess how a lifestyle coaching program taught by a maternity nurse affected the health-promoting behaviors of infertile women.

Regarding the personal information of the infertile women under examination, the current study's findings made it clear that the mean age of the study and control groups was thirty-one years old, and the mean duration of marriage in the study and control groups was seven years. The reason for this discovery could be that most of the studied women involved were in the childbearing years, and this may be the preferable age for seeking medical treatment. Additionally, there is societal pressure to marry before the age of thirty, as most of them had a university education, so they discovered infertility after two or three years of not having children after marriage.

These results are in line with studies by Masoud et al. (2023), who assessed how maternity-led pro-fertility lifestyle interventions affected the health-promoting habits of women receiving treatment for infertility in Sohag, Egypt. According to their findings, the average age of the women under study was thirty-one years, and nearly two-thirds had been married for five to eight years.

Similarly, these findings were supported by Almowafy et al.'s (2021) research on the "emotional dimensions of life quality and associated variables for a group of infertile Egyptian women who are attending the International Islamic Center in Egypt." According to their findings, the participants' average age was 28 years old, and their average marriage length was seven years. Nevertheless, these results ran counter to those of a study conducted in Benha City, Egypt, by Baiomy et al. (2023) on the quality of life among infertile women. According to their research, the average age of the women they looked at was thirty-nine.

Regarding the studied women's occupations, over half of the infertile women who had a higher educational degree in both groups were not working, and more than two-fifths of them had a university education. This is not surprising as most Egyptian women are unemployed despite their university education, especially since the majority of them reside in rural regions. These results were consistent with those of Baiomy et al. (2023), who found that over half of the women in the study were unemployed and that somewhat more than two-fifths had a university degree.

In contrast, these findings do not contrast with research by Mohamed et al. (2019), who assessed the relationship between infertility in women and their quality of life at Alexandria University. Their findings found that over one-third of the infertile women in the study lacked literacy. Also, a preliminary study by Mikhael et al. (2022) on" stress and infertility in a sample of Egyptian women in Banha City. According to their assessment, over 50% of women were employed. From the perspective of the researcher, this difference may be due to their different culture.

Concerning family income and domicile of the infertile women under study, the current study found that over 50% of participants in both groups lived in rural areas, and a high proportion of them did not have enough family monthly income. These results were confirmed by Baiomy et al. (2023) in Egypt, who stated that more than two-thirds of women lived in rural areas. In contrast, these results disagreed with research by Wdowiak et al. (2021), who evaluated infertility's quality of life in treated women in Poland and revealed that most participants were from urban areas. Also, Moridi et al. (2019), who investigated the causes and risk factors of infertility in southern Iran, declared that more than four-fifths of women had enough monthly income.

Regarding menstrual history, the current research discovered that the two groups did not differ statistically significantly. However, according to the current findings, a greater percentage of the infertile women in both groups under study experienced irregular menstruation, and the interval of the menstrual cycle was more than thirty-five. In contrast, a follow-up study on "fertility and menstrual pattern in infertile patients after laparoscopy in a tertiary care hospital" was conducted in Bangladesh by Mahtab et al. (2020) and in Egypt by Biomy et al. (2023). According to their findings, almost one-half of the women in the study were infertile and had regular menstruation. This difference might seem to be due to disparities in infertility causes between current research and the previous studies. Also, it may be due to the majority of infertile women in the current study research suffering from polycystic ovarian syndrome.

In terms of infertility history, according to the results of the current study, over half of the infertile women in both groups had a history of primary infertility. This is in line with the findings of a study by Masoud et al. (2023), which stated that over one-half of the participants had a history of primary infertility. Conversely, a study conducted in 2019 by Sanad et al. examined the risk factors for infertility in women who visited rural family health centers in the Menoufia Governorate. According to their findings, the majority of participants had a history of secondary infertility, whereas less than one-quarter had a history of primary infertility. These results might be explained by the differences in the prevalence of risk factors,

diagnostic criteria, causes of infertility, and cultural differences.

Furthermore, the current research said that of the women surveyed, the most frequent reason for infertility was polycystic ovarian syndrome; nearly two-fifths of them in the control and study groups had PCOS. These findings were supported by Mohamed et al.'s (2019) research. They disclosed that over one-half of the participants had polycystic ovarian syndrome. The similarity between the previous study and the present study may be explained by the fact that the majority of women who were researched had problems in their ovaries, and this is the main cause of their infertility.

In terms of the lifestyle profile of the studied infertile women, the current research discovered that the control group and the study's women's mean BMIs were twenty-seven, which indicates that most of the participants in both groups were classified as overweight or obese class I. Masoud et al.'s study from Egypt in 2023 and Ramadan and Said's (2018) investigation into the impact of an educational intervention for infertile women regarding natural fertility approaches and sexual abilities for increasing sexual function confirmed these findings. According to their findings, almost one-half of the infertile women were overweight or obese, and their BMI was more than twenty-five Kg/m2. Similarly, research by Talmor and Dunphy (2015) on "obesity and female infertility in Australia" has shown that compared to women of average weight, those with a high body mass index have a higher chance of being infertile. Obesity affects seventy percent of infertile women, according to statistics. Obesity not only has an impact on one's physical appearance, but it also disrupts the body's hormone and enzyme balance.

Regarding passive smoking, the current research found that nearly one-third of the studied women in both groups were subjected to secondhand smoke. Moreover, more than two-thirds of the infertile group were exposed to passive smoking, according to research by Sanad et al. (2019), which was consistent with this finding. Amirkhani et al. (2018) also found a correlation between infertility and abortion in nonsmoking women who had a history of passive smoking during their childhood and adolescence in Tehran"; their findings concluded that passive smoking increased infertility risk.

Regarding healthy habits, the majority of the women in both categories, according to the current study, were consuming caffeinated drinks such as tea or coffee for more than three hundred mg/day. Also, more than three-quarters of them do not have a healthy diet. These findings align with the findings of Masoud et al. (2023), who stated that three-quarters of participants drank caffeinated beverages greater than three hundred mg/day. This might be because the vast majority of participants reside in rural regions and are more vulnerable to risk factors of infertility due to a difference in traditions and beliefs. In addition to a lack of knowledge about the effect of these beverages on fertility.

Regarding physical activity, the current research revealed that almost four-fifths of the women in the study among the two groups were not performing any physical exercises. This result was consistent with research by Sanad et al. (2019) in Egypt, who concluded that most women didn't exercise regularly and that this had a significant relationship with infertility.

Regarding stress and sleeping patterns, the current research found that in both groups, over one-half of the individuals experienced moderate stress. However, they sleep six to eight hours per day. These results were confirmed by Masoud et al.'s (2023) research, which revealed that almost two-fifths of the individuals in the study experienced intense stress. These results could be explained by societal burdens, diagnostic tests, failed treatment, unfulfilled desires, and even financial burdens that view infertility as a stressor.

According to the current study's findings about the study and control group's health-promoting lifestyle profiles, the overall mean score of health-promoting behavior categories like interpersonal relationships, stress management, physical activity, nutrition, spiritual development, and health responsibility relationships was increased post-coaching program among the study group compared to those who received the conventional intervention with highly statistically significant differences in contrast to the pre-coaching course. Healthy activities may help to explain

these results because the lifestyle coaching program emphasizes healthy lifestyle behaviors such as nutritional guidelines, physical exercise guidelines, stress management measures, and general guidelines regarding infertility treatment.

This is consistent with research conducted by Masoud et al. (2023). According to their results, participants' overall health-promoting lifestyle score improved significantly after the intervention as compared to before. The impact of social network-based motivational interviewing on health-promoting behaviors and quality of life among infertile women with polycystic ovaries is also examined in research by Hamzehgardeshi et al. (2023). Their results showed that following the WhatsApp social network-based motivational interviewing intervention, participants in the intervention group exhibited a significant increase in health-promoting behaviors compared with the control group.

According to the relationship between the infertile women's health-promoting lifestyle level and their sociodemographic traits, the degree of education of infertile women and the overall degree of health-promoting lifestyle among the research group after the intervention were significantly correlated, but there is no significant relationship between infertile women's residence, monthly income, occupation and the total level of health-promoting lifestyle among the study and control group. According to the researchers, this significant relationship might be due to most of the studied participants having a high level of education, which has an impact on changing lifestyles for the better and thus better healthy behaviors. Also, due to the impact of the lifestyle coaching program, which was provided to the study group. These outcomes matched Masoud et al.'s (2023) research, whose findings concluded that there was a correlation between the participant's education level and overall health-promoting lifestyle score before and after the intervention periods. Additionally, Mirghafourv et al. (2018) research on the demographic predictors of a health-promoting lifestyle in infertile couples in Egypt" confirms these outcomes, and the studied participants reported that one of the determinants of a healthy lifestyle is education. Therefore, the overall score of leading a healthy lifestyle and the score across all aspects were raised by raising the educational level.

Regarding the incidence of clinical pregnancy among the infertile women that were part of the study and control groups, current research discovered the augmented effect of the lifestyle coaching program, as evidenced by the occurrence of clinical pregnancy among nearly one-quarter of the studied women in the study group who received and followed the coaching program guidelines compared to the control group. From the researchers' point of view, this might be because the study group received and followed lifestyle coaching program guidelines, including nutrition, physical activity, stress management guidelines, and general infertility guidelines, other than the control group, which received the conventional intervention. As a result, the reproductive endocrine, both the left and right ovaries' volumes increased, as well as fat metabolism decreased, resulting in higher menstruation rates of recovery, ovulation, and pregnancy in women who are obese and infertile.

These results are in line with research by Masoud et al. (2023), which found that almost one-third of the women in the study had positive pregnancies after receiving the lifestyle intervention. Similarly, Kim and Nho (2022) on "lifestyle interventions for adults with infertility in Korea". Their results found that there is a link between infertility and lifestyle. Also, more exercise, and a better diet improve general reproductive well-being and boost conception rates. As a result, healthcare providers should educate infertile women and couples about the need to make lifestyle changes.

This could be explained by physical activity enhancing health status, which may induce modifications to the energy balance, which is closely associated with the reproductive system (Emokpae and Brown, 2021). Also, physical exercise may improve assisted reproductive outcomes by restoring ovarian function and clomiphene citrate sensitization during basic ovulation induction (Yusuf et al., 2021). Additionally, regular physical exercise might help decrease stress and worry, both of which are substantial risk factors for the result of assisted reproduction (Masoud et al., 2023).

Therefore, the results of this research suggest that a maternity-led lifestyle coaching program intervention can effectively promote health-promoting behaviors and lead to positive health behavior changes. The findings of this study can be helpful for obstetricians and infertility professionals as well. Lastly, conduct lifestyle coaching programs and give participants options that suit their needs.

Conclusion:

The results of the present study indicate that infertile women showed significantly higher health-promoting behaviors scores after receiving a maternity nurse-led lifestyle coaching program compared to those who received the conventional intervention. This includes various domains such as accountability for one's health, exercise, diet, spiritual development, stress reduction, and interpersonal relationships. This supports the research hypothesis. In addition, the current research findings indicated that infertile women exhibited a higher success rate of treatment by occurrence of pregnancy to one-quarter of the women who received a maternity nurse-led lifestyle coaching program compared to those who received the conventional intervention, confirming the second research hypothesis. Thus, the research hypotheses were supported by the data of this study.

Recommendations:

In light of the findings of the present study, the following suggestions are made:

- Infertile women should get health education from the maternity nurse about healthy lifestyles and health promotion regarding methods of infertility treatment.
• The maternity nurse-led lifestyle coaching program ought to be clinically relevant and incorporated into infertile women's daily care.
• Use the health-promoting lifestyle coaching program to put healthy living ahead of ART.

Suggestions for future research:

- The current study's replication among infertile males.
- Additional studies are needed in this field to assess the effect of the lifestyle coaching program regarding infertile women's quality of life.
- More research is needed to use practical strategies to increase adherence and retention in health-promoting habits and quality of life.
- More research is still required to evaluate the impact of a lifestyle coaching program that promotes wellness on the likelihood of conception in infertile women.

References

Afshani S, abooei A, Ruhani A. (2022): Lived experience of infertile women of their infertility issue. Woman Dev Politics.20(1):1–21. https:// doi. org/10. 22059/ *jwdp*. 2021. 327319. 10080 49.

Almowafy A, Abdel-Fattah NH, Hammour ZE. (2021): Emotional dimension of quality of life and related factors for a sample of Egyptian infertile females attending the International Islamic Center. *Journal of Recent Advances in Medicine*. 12(1): 46-53.

Almulhim.A.N., Hartley.H., Norman.B., Caton.S.G., Goyder.E., (2023): Behavioural Change Techniques in Health Coaching-Based Interventions for Type 2 Diabetes: A Systematic Review and Meta-Analysis, *B MC Public Health*, 23 (5); 1-21

Amirkhani J, Yadollah Damavandi S, Mirlohi SM, Nasiri SM, Parsa Y, Gharehbeglou M, (2018): Correlation between abortion and infertility among nonsmoking women with a history of passive smoking in childhood and adolescence *J Reprod Med* Vol (12), No (2).

Ashraf S, Tanveer T, Taneja N, Awasthi A and Janardhan an R, (2020): A study to assess knowledge, attitude and practice of infertility among adults in Indian Population, *World Journal of Pharmaceutical Research*, Vol (9), No (11)

Baiomy B, Abd El-Aziz M, Sabry S, Abd El-Aziz S. (2023): Quality of life among infertile women in Banha City. *Journal of Nursing Science*. Benha. 4(2): 834-842.

Cox C, Thoma M, Tchangalova N, Mburu G, Bornstein M, Johnson C, et al. (2022): Infertility prevalence and the methods of estimation from 1990 to 2021: a systematic review and meta-analysis. *Hum Reprod.* Open. 2022; (4): hoac051.

El Nasr EM, and Eraky EM (2016): Risk factors of secondary infertility among women attending outpatient clinic at Cairo University Hospital; suggested guideline. *World J Nurs Sci,* Vol (2), No 01–10

Emokpae, M. A., & Brown, S. I. (2021). Effects of lifestyle factors on fertility: practical recommendations for modification. Reproduction and Fertility, 2(1), R13-R26.

Hamzehgardesh Z, Elyasi F, Moosazadeh M, Ahmadi I, Jahanfar S, Ahmadian M, and Ansari F, (2023): The Effect of Social Network-Based Motivational Interviewing on Health- Promoting Behaviors and Quality of Life among Infertile Women with Polycystic Ovary. *Research Square J*. The link of trial, https://doi.org/10.21203/rs.3.rs-3591010/v1.

Hassan, S., Siddiqui, S., and Bruce, D. (2021): Health status and quality of life of women seeking infertility treatments in Baluchistan, Pakistan. *British journal of social work*. 50 (9). PP.1401–1418.

Kanwal, I., Shahid, M., and Bacha, R. (2022). Sonographic evaluation of various causes of female infertility: A literature review. *Journal of diagnostic medical sonography*. 38(2), Pp. 155-159.

Kuan, G., Kueh, Y. C., Abdullah, N., & Tai, E. L. M. (2019). Psychometric properties of the health-promoting lifestyle profile II: cross-cultural validation of the Malay language version. BMC public health, 19, 1-10.

Kim EJ1, Nho JH1, (2022): Lifestyle Interventions for Adults with Infertility, *Journal of Lifestyle Medicine*, Vol (12), No (2)

Mahtab NT, Mahmud N, Chowdhury TS, Chowdhury TA, Begum T. (2020): A follow-up study on fertility and menstrual pattern in infertile patients after laparoscopy in a tertiary care hospital in Bangladesh. *BIRDEM Medical Journal*. 10(2): 125-9.

Masoud A, Madkour A, Abdelrhman M, Zaghloul M, Abd Elzaher O, and Abdelhafez A. (2023): Effect of Maternity-Led Pro-Fertility Lifestyle Intervention on Health- Promoting Behaviors of Women undergoing Infertility Treatment. *Egyptian Journal of Health Care, EJHC* Vol. 14. No.1.

Mirghafourvand M, Sehhati F and Rahimi M, (2018),: Health-promoting Lifestyle and its Demographic Predictors in Infertile Couples Referred to Infertility Clinic of Tabriz Al-Zahra Hospital, *Journal of Caring Sciences*, Vol(3), No(3)

Mikhael V, El-Hamad M, El-Bakry S, Abdel-Halem R. (2022): A preliminary study of stress and infertility among Egyptian female sample in Benha City. *Egyptian Journal of Psychiatry*. 2022; 9(3): 79-90.

Mirian, Z., AbdiShahshahani, M., Noroozi, M., Mostafavi, F., & Beigi, M. (2023). Effect of intervention based on the 5A self-management model on the improvement of behaviors related to women's reproductive health after legal abortion. *Scientific Reports*, *13*(1), 11316.

Mohammed, B., Ibrahim,W., Badran, E., and Mohammed, N. (2019): Effect of educational intervention about nutrition for infertile women on their knowledge in preconception period. *Assiut scientific nursing journal*. 8 (20). PP. 79-90.

Moridi, A., Roozbeh, N., Yaghoobi, H., Soltani, S., Dasht, S., Shahrahmani, N., and Banaei, M. (2019): Etiology and risk factors associated with infertility. International journal of women's health and reproduction sciences. 7 (3). PP. 346–353.

Normand.M. P., & Bober. J., (2020): Health coaching by behavior analysts in practice: How and why. Behavior Analysis: *Research and Practice*, 20(2):108–119. https://doi.org/10.1037/bar0000171

Okafor, A., Saanu, O., Olayemi, O., and Omigbodun, O. (2022): Characterization of primary female infertility in a Nigerian tertiary hospital. *African*

journal of reproductive health. 26(8). PP. 66-82.

Ramadan S A and Said A R, (2018): Effect of an Educational Intervention for Infertile Women Regarding Natural Fertility Methods and Sexual Skills for Improving Sexual Function, *American Journal of Nursing Research*, Vol. 6, No. 1, 1-11

Razeghi Nasrabad HB, Hosseini Chavoshi M, Abbasi Shavazi MJ. (2022): Prevalence of infertility by clinical, epidemiological, demographic definitions and its determinants in Tehran, Iran. *J Gorgan Univ Med Sci*. 2022;24(1):60–7.

Ricci, S., (2020): Essential of maternity newborn and women health nursing, 4 ed., USA; Lippincott st Williams & Wilkins, pp: 70-71.

Salman, T., Khalaf, K., and Hussain, A. (2022): Infertility rate and relationship between infertility status and microbial infections among women in Baquba City. *International journal of health sciences*. 6(2). PP. 1175–1186.

Sanad Z F, Kalil N A and Beddah E S, (2019): Infertility and related risk factors among women attending rural family health facilities in Menoufia Governorate, *Menoufia Medical Journal*, Vol (32), No (4).

Shahzad, H., John, A., Ali, A., Ashraf, A., and Naeem, A. (2022): Incidence of infertility in females and evaluation of its causes using ultrasonography: Incidence and causes of infertility in females. *Pakistan Biomedical journal*. 5 (1). PP. 55-58.

Tang, N., Jia, Y., Zhao, Q., Liu, H., Li, J., Zhang, H., Han, L., and Huangfu, C. (2022): Influencing factors of dyadic coping among infertile women: A path analysis. *Front. Psychiatry*. 13(1). PP. 93-99.

Vatanparast, M., Yasini Ardekani, M., Anvari, M., Kalantari, A., Yaghmaie, F., and Royani, Z. (2022): Resilience as the predictor of quality of life in the infertile couples as the most neglected and silent minorities. *Journal of reproductive and infant psychology.*40(3). PP. 216-227.

Wdowiak, A., Anusiewicz, A., Bakalczuk, G., Raczkiewicz, D., Janczyk, P., Makara-Studzi ´nska, M. (2021). Assessment of quality of life in infertility treated women in Poland. *Int. J. Environ. Res. Public health*. 18 (5). P. 275.

World Health Organization (WHO, 2020): Infertility, available at https://www.who.int/news-room/fact-sheets/detail/infertility accessed at the fourteenth of September 2020

World Health Organization (WHO,2022) : Health Promotion , available at https://www.who.int/teams/health-promotion/enhanced-wellbeing/first-global- conference/actions accessed by 2022

Yusuf S and Anand S, (2021): Body-mass index, abdominal adiposity, and cardiovascular risk. *Lancet*, Vol (7), No (1)