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Original Article

Application of Continuous Care Model on Health-Related Behaviors And Quality of Life Among Infertile Women

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Abstract

Background: Female infertility is considered a crisis in women's life and affects different aspects of their quality of life. Infertile women need to improve health-related behaviors and sustain the appropriate quality of life through continuous education. **Aim:** The study aimed to evaluate the effect of the application of a continuous care model on health-related behaviors and quality of life among infertile women. **Design:** A quasi-experimental design was utilized. **Setting:** The study was conducted at the obstetrics and gynecology outpatient clinic and In vitro fertilization (IVF) unit at Benha University Hospital. **Sampling:** A convenient sample of (80) infertile women attended the previously mentioned settings and was divided equally into control and intervention group. **Tools:** Three tools were used for data collection; a structured interviewing schedule, Health-related behaviors, and a quality of life (QOL) tool. **Results:** present a highly statistically significant improvement was revealed in the intervention group compared with the control group after implementing the continuous care model ($p \leq 0.001$). Additionally, after the implementation of the continuous care model, the mean \pm SD of total quality of life score in the intervention group was higher than the control group, which was (76.13 ± 8.36 versus 56.68 ± 3.92) respectively. Also, there was a highly statistically difference in the total quality of life scores of the intervention group more than the control group ($p \leq 0.001$). **Conclusion:** Implementing the continuous care model has improved health-related behaviors and the quality of life among infertile women. **Recommendations:** Integration of the continuous care model as a routine nursing intervention for improving infertile women's health-related behaviors and quality of life.

Keywords: Continuous care model, health-related behaviors, quality of life, infertile women

Introduction

Infertility is a failure to conceive after one year of sexual activity. Female factors constitute 40-55% of infertility causes, and 50% of infertile women consider infertility the biggest problem in their lives (*WHO, 2020*). One of the most contributing factors to female infertility is adopting unhealthy behaviors, which aggravate more medical problems (*Ma et al., 2018*).

Advancements in science, technology, and the invention of modern methods for infertility treatment, like in vitro fertilization, have created hope for infertile women. These have also caused them to bear more stress and undergo long treatment periods. Further, unhealthy behaviors threaten the outcome of infertility treatment and adversely trigger the quality of infertile women's life (*Latifnejad, 2019*).

Health-related behaviors refer to the modifiable behaviors and ways of life that could influence the general health and well-being of infertile women affecting fertility (*Acharya & Gowda, 2017*). Studies showed that health promotion behaviors improve the life quality of infertile women and adopt healthy lifestyles, which are the most important factors for preventing additional risks of fertility. Hence, health-related behaviors and lifestyles enhance infertile women's life quality, save their health, and

help them perform daily activities more efficiently (*jeihooni, et al., 2020*).

The role of health-related behaviors in the etiology of infertility has generated a growing interest among researchers. Several authors have provided evidence of an association between unhealthy behaviors and infertility in women; it include; eating fat-rich diets, delayed childbearing due to education, exercise, exposure to pollution, and caffeine consumption, risky sexual behaviors, drug misuse, anxiety depression, cellular phones, and radiation (*Alabi, 2020*).

In addition to a sedentary lifestyle, behaviors refer to time spent doing little or no movement while awake or sitting, adversely affecting the quality of infertile life. It is one important modifiable risk factor for infertility since biological evidence supports the association between physical activity and infertility. Furthermore, adapting health promotion behaviors such as walking and exercise increases insulin sensitivity, improves ovarian functioning, and may improve the chances of conception. Physical exercise benefits overweight or obese infertile (*Silvestris, 2019*).

Quality of life is an extensive concept and includes psychological, social, environmental, economic, and health satisfaction aspects. Infertile women usually describe infertility as

the most stressful event of their life and frequent and continuous periods of treatment as the periods of crisis which increase the perception of infertile women about current conditions and positively improve the satisfaction and quality of life (*Zare et al., 2015*).

The continuous care model (CCM) is designing and providing a plan to facilitate acceptance, high insight, health promotion behaviors improvement, and quality of life. Crucial aspects of the continuous care model (CCM) in fertility care are providing adequate information, continuity of care, and active involvement of infertile women in their treatment course. This model introduces effective, interactive, and continuous communication between infertile women and nurses to recognize their needs and problems. It helps them positively adopt more healthy behaviors through tailored information and an organized set of instructions (*Sadeghi, 2014*).

Nurses are in a position to support continuity of care for infertile women seeking fertility assistance and play an essential role in performing physical exams, promoting healthy behaviors, and understanding adverse psychological issues of infertility. It is important to explore social history to identify possible risk factors for infertility and encourage sustained health-related behaviors

that promote overall quality of life (*World Health Organization, 2019*).

Nurses provide continuity of care within the continuous care model allowing ongoing infertile women communication, timely follow-up, and optimizing adherence to health-related behaviors, including exploration of nutrition, taking a supplementary vitamin, compliance with relaxation programs, and avoidance of exposure to any toxins (*Thable, Duff, and Dika, 2020*).

Significance of study

Infertility is a growing health problem, as one in six couples worldwide has infertility. Infertile women are the most strongly affected by infertility. They may suffer the consequences of a divorce and grapple with loneliness (*Malgorzata et al., 2022*). In addition to being subjected to societal stigmatization, these situations expose women to tremendous stress, affecting their quality of life (*Eniola et al., 2017; Kiani et al., 2020*).

Health-related behaviors are obviously under the control of the women. They are modifiable to improve some risk factors of infertility, positively affect reproductive health, favor desirable results in managing infertility, and enhance the quality of life (*Ilacqua et al., 2018*).

Nurses must direct healthcare to educate, modify, and improve health-related behaviors and properly provide improvements to the quality of infertile life. One of the methods for modification of a sedentary lifestyle is to use educational theories and recent models as continuous care models in following organized steps to modify infertile unhealthy behaviors and adopt more healthy ones. That urges the researchers to conduct the current study; besides, there is very limited research handling this topic in Egypt.

Aim of the Study

The current study aimed to evaluate the effect of the application of a continuous care model on health-related behaviors and quality of life among infertile women.

Research Hypotheses

Hypothesis 1: Implementing the continuous care model will improve health-related behaviors among infertile women.

Hypothesis 2: Implementing the continuous care model will improve the quality of life among infertile women.

1.4. Operational Definitions

The continuous care model is one caring model that introduces the infertile woman as an effective factor of continuing care in the health process through four planned phases: Orientation, sensitization, control, and

evaluation (*Moghaddam, Hanieh & Eghtedar, 2020*).

Health-related behaviors are any behaviors of an individual that are part of everyday functioning and affect their health (*Malgorzata et al., 2022*).

Subjects and method

Research design:

A quasi-experimental research design was utilized to achieve the aim of this study.

Setting:

The study was carried out at the obstetrics and gynecology outpatient clinic and In Vitro Fertilization (IVF) unit at Benha University Hospital, Benha City, Egypt.

Sampling:

Sample type & size: A convenient sample of 80 infertile women was enrolled and equally allocated into two groups (the intervention group who engaged in the continuous care model to receive planned care besides hospital care, and a control group who received hospital care only).

Based on data from literature (*Ali et al., 2019*), considering level of significance of 5%, and power of study of 80%, the sample size can be calculated using the following formula:

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \times 2(SD)^2}{d^2}$$

where, SD = standard deviation obtained from previous study; $Z_{\alpha/2}$, for 5% this is 1.96; Z_{β} , for

80% this is 0.84 and d, for the expected difference. Therefore,

$$n = \frac{(1.96 + 0.84)^2 \times 2(10.8)^2}{(6.8)^2} = 39.6$$

Based on the above formula, the sample size required is 40 in each group

Each group was 40 women with the following inclusion and exclusion criteria.

Inclusion criteria:

Infertile women in the fertility age (20-35 years), diagnosed with primary or secondary infertility, sexually active, and normal fertility investigations (e.g., FSH, LH, estradiol, prolactin).

Exclusion criteria:

Infertile women had medical diseases such as cardiovascular, diabetes, pulmonary disorders, hyperthyroidism, hypothyroidism, epilepsy, and male infertility causes.

Tools of data collection

Data were collected using three tools.

Tool (I): **The researchers designed a structured interviewing sheet.** The tool was divided into three parts:

Part (1): **Socio-demographic characteristics** of the studied women included age, place of residence, educational level, occupation, and monthly income. Besides, the husband's profile, such as age, educational level, and occupation.

Part (2): **Infertility history** included data related to the family history of infertility,

failed infertility treatment, duration of infertility, duration of seeking infertility care, number of living children, and type of infertility.

Tool II: Health-related behaviors regarding infertility.

It was adapted from *Fehintola (2017); Abdelaliem (2011)* to assess women's self-reported health behaviors to control and manage infertility. It comprised nine items, namely, maintaining a healthier weight, encouraging a balanced diet, avoiding excessive caffeine consumption, compliance with relaxation programs to reduce sources of stress, avoiding all unnecessary medications and recreational drugs, avoiding excessive irradiation by reducing contact with electronic gadgets like mobile phones, avoid dealing with wrong perceptions and beliefs about infertility, avoid engaging in sedentary lifestyle behaviors, and passive smoking should be avoided.

Scoring system:

The items were rated based on a three-point Likert scale; always (score 3), sometimes (score 2), and never (score 1). The range of obtained scores was between 9 and 27, with higher scores indicating more engagement in healthy behaviors.

Tool III: The quality of Life (QoL) questionnaire was designed by *World Health Organization (2012)* and translated into Arabic to assess the perception of the quality

of life among infertile women in the previous two weeks. It consisted of 24 items in four domains: Physical health (7 items), psychological (6 items), social relationships (3 items), and environment (8 items), as well as two items on overall QOL and general health.

Scoring system:

Each item is scored on a five-point Likert scale ranging from 1 to 5 (1 for the lowest and 5 for the highest agreements with the item). The domain score is calculated using item scores within each domain. The domain mean scores are multiplied by four and converted on a scale of 0 to 100, with two items related to satisfaction with the overall quality of life and general health being omitted from the calculation of the total scale score. Higher scores reflect better quality of life.

Validity and reliability of tools:

Tools of data collection were reviewed for content validity by three experts in the obstetrics nursing field (one professor in the faculty of nursing -at Ain Shams university and two professors in the faculty of nursing -at Benha university) and two experts in the community nursing field (assistant professors in faculty of nursing, Kafr El-Sheikh university). The tools were judged for clarity of questions and appropriateness of the content. Minor modifications were made based on experts' suggestions for modifying some items, such as adding the husband profile data

to the socio-demographic part in tool I. From the experts' perspective, the tools were considered valid. The reliability of tools was assessed using Cronbach's alpha coefficient. Internal consistency for health-promoting behaviors regarding the infertility tool was 0.87, and QoL tool internal consistency ranged from 0.66 to 0.84 for the four domains and from 0.86 to 0.91 for the total score (*WHO, 2012*).

Ethical considerations

Each infertile woman was told about the research's aim, benefits, and activities to gain confidence and trust. After that, each woman was asked to sign a consent form. All data gathered would be kept confidential and used for research purposes. The women's autonomy and freedom from any harm were ensured. Each woman was informed that participating in the study was completely voluntary and withdrawal at any time would not impact the provided care. The subjects were coded to ensure anonymity. The control group received a designed instructional content after the continuous care model implementation was completed.

Pilot study

The pilot study was conducted on ten percent of the total sample (8 women) to assess the tools' clarity, simplicity, relevancy, and applicability. In addition, the time required for data collection was estimated to detect any

problem that occurred during data collection. No modifications were made, and infertile women in the pilot study were included in the main sample size.

Procedure

Upon obtaining formal approval from the Director of Benha University Hospital for conducting this research, the researchers visited the previously mentioned setting three days a week from 9.00 am to 1.00 pm until the pre-determined sample size was completed. Each woman recruited for the study was interviewed individually; on average, 1-2 women were interviewed per week. This study lasted eight months, from the beginning of September 2021 to the end of April 2022. For the study group, the continuous care model was implemented in four stages: Orientation, sensitization, control, and evaluation.

A- Orientation stage

It was the first step in which the researchers introduced themselves, clarified the study aim and expectations, explained the various stages of the model to the infertile women (intervention group), created motivation, and pointed out the importance of continuing care contact between the researchers and the studied women, explained the ways of communication and identified the required phone calls schedules until the end of the intervention. At this stage, consent forms were signed, and data collection tools (tools I, II,

and III) were filled out while the infertile women waited for a medical appointment. Three tools were completed in about 20-25 minutes.

B-Sensitization stage

It was performed to engage the infertile women in the continuous care process, examine their basic needs, and justify their necessity considering the treatment adherence. Each woman attended four educational sessions (two sessions weekly); every session lasted about 30 to 45 minutes in a separate room in the pre-mentioned setting using discussion, role-playing, video teaching, and PowerPoint presentations. Feedback on the previous session was taken at the beginning of the new one; accordingly, the prepared educational content was re-discussed with full clarification.

First session: The researchers intended to provide an overview of infertility, including; definition, prevalence, types, causes, risk factors, treatment adherence, and prevention of infertility.

Second session: The researchers educated the infertile women about the importance of engaging in health promotion behaviors to manage and prevent further implications of infertility, including avoiding excessive caffeine consumption, avoiding all unnecessary medications and recreational drugs, avoiding excessive irradiation by

reducing contact with electronic gadgets like mobile phones and avoid passive smoking.

Third session: The researchers discussed the importance of maintaining a healthier weight and obtaining a balanced diet with high protein, low salt, and low fat, and drinking plenty of water daily besides necessary food requirements. Also, the importance of getting enough rest, maintaining sleep quality, and performing regular physical activity.

Fourth session: The researchers explained the importance of commitment to schedule follow-up, the prescribed medications, and stress reduction through compliance with relaxation programs and avoiding dealing with wrong perceptions and beliefs about infertility. Also, the concept of quality of life and the relation between compliance with health-related behaviors and improved quality of life of infertile women. Furthermore, the instructional booklet was provided to the studied women at the end of this session.

C- Control stage

During this stage, the researcher maintained mutual communication with the studied women through weekly phone calls for each woman (8 calls) for two months, according to the women's preferred time for making phone calls (morning or afternoon). Each woman's weekly phone call lasted approximately 10 minutes and varied depending on a woman's educational needs and questions to help

women strengthen and promote healthy behaviors. Also, any educational needs or new health problems were identified, addressed, and resolved.

D- Evaluation stage

After three months of implementation, the effect of continuous care model implementation was evaluated using health-related behaviors regarding the infertility questionnaire (tool II) and QoL (tool III). The follow-up was done via telephone with 18 women who could not attend the pre-mentioned study setting, and the others attended.

- The control group received hospital routine care that focused on the diagnosis and medical treatment as well as brief instructions about treatment adherence. The evaluation started with the control group to avoid bias using tools II and III. After completing the evaluation, the researchers gave them the instructional booklet.

Data analysis

Data were analyzed using Statistical Package for Social Science (SPSS version 24.0) software. Descriptive statistics were presented as (frequency, percentage, mean, and standard deviation). Inferential statistics were utilized (chi-square or Fisher's exact test for qualitative variables and independent t-test for quantitative variables). Additionally, Pearson's correlation coefficient test was used. A

statistically significant difference was considered at a p-value ≤ 0.05 , and a highly statistically significant difference was considered at a p-value ≤ 0.001 .

Results

Table 1 shows that 67.5% and 72.5%, respectively, of the intervention and control groups were 30 years old with a mean \pm SD 28.63 \pm 1.78 and 29.41 \pm 1.01 years. Besides, 57.5% and 62.5% of the intervention and control groups had secondary education, respectively, and 70.0% and 62.5%, respectively, of the intervention and control groups were employed. Regarding monthly income 37.5% and 35.0% of the intervention and control groups had somehow enough income, respectively.

Table 2 demonstrates Mean \pm SD of husband's age of 34.63 \pm 1.78 years and 34.41 \pm 1.93 years, respectively, in the intervention and control group, while 40.0% and 37.5% of the study and control group, their husband had higher education. In addition, 52.5% and 55.0% of study group and control group their husband work laborer jobs respectively.

Table 3 clarifies that 72.5%, 67.5%, and 57.5%, 52.5% of the intervention and control groups had no family history of infertility and had no history of failed infertility treatment, respectively. As well as Mean \pm SD of the duration of infertility in intervention and control groups, were 1.723 \pm 0.11 and 1.561 \pm

0.41% respectively. Also, 100% of both groups had 1-3 years of seeking infertility care, while 5% and 7.5% and 95% and 92.5% respectively, of the intervention and control groups had one living child and were primary infertility.

Table 4 demonstrates that there was no statistically significant difference between the intervention and control groups concerning all health-related behaviors regarding infertility before implementing the continuous care model (p >0.05). While highly statistically significant improvements were achieved in the intervention group compared with the control group after implementation of the continuous care model (p ≤ 0.001) regarding items of maintaining a healthier weight, encouraging a balanced diet, avoiding excessive caffeine consumption, compliance with relaxation programs to reduce sources of stress, avoid all unnecessary medications and recreational drugs and to avoid excessive irradiation by reducing contact with electronic gadgets like mobile phones.

Figure 1 illustrates that, before the implementation of the continuous care model, the mean total scores of health-related behaviors regarding infertility in the intervention and control groups were 18.7 and 18.2, respectively. However, after implementing the continuous care model, the mean total scores of health-related behaviors

improved significantly in the intervention group compared to the control group, 37.14 versus 20.2, respectively.

Table 5 elaborates that, before the implementation of the continuous care model, the mean±SD of total quality of life scores showed impaired quality of life in the intervention and control groups (56.35±3.27 and 55.89±3.65), respectively, with no statistically significant difference ($p > 0.05$). While, post implementation of the continuous care model, the mean±SD of total quality of life score in the intervention group was higher than the control group (76.13±8.36 versus 56.68±3.92) respectively, with a highly

statistically significant difference ($p \leq 0.001$). Such significant differences also existed in the domain of physical health of quality of life ($p \leq 0.05$), and a highly statistical difference in the domain of psychological and social relationships, environmental health, and the total quality of life scores, and general health ($p \leq 0.001$).

Table 6 displays a highly significant positive correlation between total health-related behaviors scores regarding infertility and quality of life in intervention group after implementation of the continuous care model ($p \leq 0.001$).

Table 1. Distribution of the studied women according to socio-demographic characteristics (n=80).

Items	Intervention group n=40	Control group n=40	X / FET ²	P-value
	No(%)	No(%)		
Age (years)				
< 30	27(67.5)	29(72.5)	0.952	0.329ns
≥ 30	13(32.5)	11(27.5)		
Mean ± SD	28.63 ± 1.78	29.41 ± 1.01	t=1.738	0.087 ns
Place of residence				
Rural	22(55)	21(52.5)	1.72	0.142
Urban	18(45)	19(47.5)		
Educational level				
Primary education	1(2.5)	3(7.5)	1.597 €	0.450 ns
Secondary education	23(57.5)	25(62.5)		
Higher education	17(42.5)	12(30.0)		
Occupation				
Housewife	12 (30.0)	15(37.5)	0.979	0.322 ns
Employed	28(70.0)	25(62.5)		
Monthly income				
Not enough	10(25.0)	9(22.5)	2.197 €	0.822ns
Somehow enough	15(37.5)	14(35.0)		
Enough	15(37.5)	17(42.5)		

no statistically significant difference ($p > 0.05$)

t= independent t-test €Fisher Exact Test.

Table 2. Distribution of the studied women according to husband profile (n=80).

Items	Intervention group n=40	Control group n=40	X / FET ²	P-value
	No. (%)	No. (%)		
Family history of infertility				
Yes	11 (27.5)	13 (32.5)	7.21	0.47ns
No	29 (72.5)	27 (67.5)		
History of failed infertility treatment				
Yes	17(42.5)	19 (47.5)	5.28	0.25 ns
No	23(57.5)	21 (52.5)		
Duration of infertility, year				
1-3	31 (77.5)	32 (75)	3.78	0.974 ns
3-6	5 (12.5)	5 (12.5)		
6-9	4 (10.0)	3 (7.5)		
Mean ± SD	1.723±0.11	1.561± 0.41	t=1.748	0.177 ns
Duration of seeking infertility care, year				
1-3years	40 (100.0)	40 (100.0)	2.12	1.22 ns
No living children				
1	2(5.0)	3(7.5)	1.11	0.97 ns
Type of infertility				
Primary	38(95.0)	37(92.5)	21.24	0.45 ns
Secondary	2(5.0)	3(7.5)		

no statistically significant difference ($p > 0.05$) , t= independent t-test €Fisher Exact Test.

Table 3. Distribution of the studied women according to infertility history (n=80).

Items	Intervention group n=40	Control group n=40	X / FET ²	P-value
	No (%)	No (%)		
Husband's age (years)				
< 30	12 (30)	14 (35)	8.12	0.54
≥ 30	28 (70)	26 (65)		
Mean ± SD	34.63 ± 1.78	34.41 ± 1.93	t=1.738	0.087 ns
Husband's educational level				
Primary education	9 (22.5)	10 (25)	7.51€	0.31
Secondary education	15 (37.5)	15 (37.5)		
Higher education	16 (40)	15 (37.5)		
Husband's occupation				
Laborer	21 (52.5)	22 (55)	4.1	0.24
Employee	19 (47.5)	18 (45)		

no statistically significant difference ($p > 0.05$) , t= independent t-test €Fisher Exact Test.

Table (4): Distribution of the studied women (intervention and control groups) regarding health-related behaviors of infertility before and after implementation of the continuous care model (n=80).

Items	groups	Intervention group n= 40			Control n= 40			X ² / FET (P-value)
		Always No. (%)	Sometimes No. (%)	Never No. (%)	Always No. (%)	Sometimes No. (%)	Never No. (%)	
Maintaining a healthier weight	Before	5(12.5)	7(17.5)	28(70.0)	9(22.5)	8(20.0)	23(57.5)	0.265 € (0.797) ns
	After	29(72.5)	5(12.5)	6(15.0)	11(27.5)	14(35.0)	15(37.5)	42.213 € (0.000) **
Encourage balanced diet	Before	12(30.0)	15(37.5)	13(32.5)	14(35.0)	17(42.5)	9(22.5)	2.222 € (0.329) ns
	After	32(77.5)	7(17.5)	1(2.5)	16(40.0)	17(42.5)	7(17.5)	40.783 € (0.000) **
Avoid excessive Caffeine consumption	Before	10(25.0)	12(30.0)	18(45.0)	12(30.0)	9(22.5)	19(47.5)	1.75 €(0.21) ns
	After	30(75.0)	5(12.5)	5(12.5)	11(27.5)	7(17.5)	22(30.0)	32.302 € (0.000) **
Compliance with relaxation programs to reduce sources of stress	Before	0(0.0)	2(5.0)	38(95.0)	0(0.0)	6(15.0)	34(85.0)	1.429 € (0.232) ns
	After	27(67.5)	7(17.5)	6(15.0)	5(12.5)	8(20.0)	27(67.5)	28.802 € (0.000) **
Avoid all unnecessary medications and recreational drugs	Before	20(50.0)	15(37.5)	5(12.5)	22(30.0)	7(17.5)	11(27.5)	1.476 € (0.478) ns
	After	40(100.0)	0(0.0)	0(0.0)	18(45.0)	10(25.0)	12(30.0)	41.828 € (0.000) **
Avoiding excessive irradiation by reducing contact with electronic gadgets like mobile phones	Before	5(12.5)	11(27.5)	24(60.0)	7(17.5)	13(32.5)	20(50.0)	1.499 € (0.473) ns
	After	33(82.5)	7(17.5)	0(0.0)	15(37.5)	15(37.5)	10(25.0)	37.993 € (0.000) **
Avoid dealing with wrong perceptions and beliefs about infertility	Before	2(5.0)	9(22.5)	29(72.5)	3(7.5)	10(25.0)	27(67.5)	0.239 € (0.887) ns
	After	22(30.0)	12(30.0)	6(15.0)	5(12.5)	12(30.0)	23(32.5)	28.23 € (0.016) *
Avoid sedentary lifestyle behaviors.	Before	16(40.0)	6(15.0)	18(45.0)	17(42.5)	9(22.5)	14(35.0)	0.993€ (0.609) ns
	After	40(100.0)	0(0.0)	0(0.0)	21(27.5)	10(25.0)	9(22.5)	26.739 € (0.034) *
passive smoking should be avoided	Before	13(32.5)	5(12.5)	22(30.0)	15(37.5)	6(15.0)	19(47.5)	0.984 €(0.12) ns
	After	34(85.0)	6(15.0)	0(0.0)	6(15.0)	19(47.5)	15(37.5)	25.657 € (0.042) *

ns statistically significant difference ($P > 0.05$), € FET: Fisher Exact Test, *A statistically significant difference ($P \leq 0.05$), **A high statistically significant difference ($P \leq 0.001$).

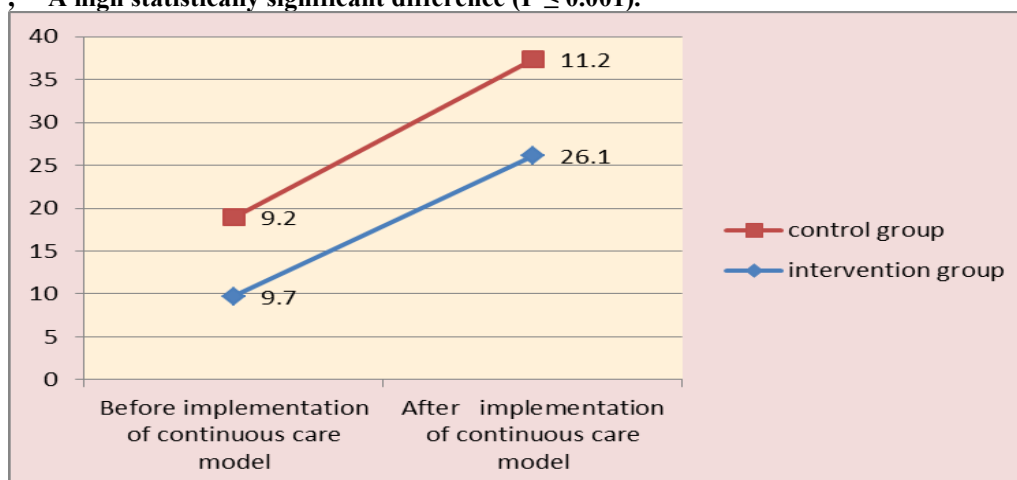


Figure 1. Mean scores of health-related behaviors regarding infertility of intervention and control groups before and after implementation of the continuous care model (n=80).

Table 5. Comparison of mean scores of quality of life between intervention and control groups before and after implementation of continuous care model (n=80)

Domains		Intervention group n= 40	Control group n= 40	Independent t-test	P value
		Mean \pm SD	Mean \pm SD		
Physical health	Before	61.17 \pm 3.12	62.23 \pm 3.58	5.325	0.281
	After	84.61 \pm 8.80	83.16 \pm 3.58	8.610	0.05*
Psychological health	Before	34.86 \pm 3.12	33.69 \pm 3.78	1.413	0.162
	After	64.86 \pm 9.76	34.06 \pm 3.64	11.812	0.000**
Social relationships	Before	59.46 \pm 6.39	58.69 \pm 6.76	0.491	0.625
	After	77.92 \pm 10.03	59.48 \pm 7.12	9.387	0.000**
Environmental Health	Before	59.94 \pm 5.92	58.91 \pm 6.59	0.687	0.495
	After	75.43 \pm 7.92	60.14 \pm 7.14	8.480	0.000**
The overall quality of life	Before	55.31 \pm 2.91	56.17 \pm 2.86	1.525	0.132
	After	79.77 \pm 3.09	57.37 \pm 4.71	10.998	0.000**
General Health	Before	55.61 \pm 2.43	55.11 \pm 3.77	0.640	0.524
	After	79.80 \pm 11.01	56.74 \pm 5.72	11.000	0.000**
Total score	Before	56.35 \pm 3.27	55.89 \pm 3.65	0.578	0.565
	After	76.13 \pm 8.36	56.68 \pm 3.92	12.390	0.000**

no statistically significant difference ($P > 0.05$)

*A statistically significant difference ($P \leq 0.05$)

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

Table 6. The correlation coefficient between total health-related behaviors regarding infertility and quality of life scores in the intervention and control groups before and after implementation of the continuous care model (n=80).

Variables		total health-related behaviors			
		Intervention group		Control group	
		r	p	r	P
Total quality of life score	Before	0.178	0.12	0.194	0.91
	After	0.864	0.000**	0.319	0.01*

*A statistically significant difference ($P \leq 0.05$) ,**A high statistically significant difference ($P \leq 0.001$)

Discussion

Infertility is a multifactorial condition constituting a worldwide public health problem. Infertility is a global problem that affects interpersonal and social relationships and threatens the marital life of infertile

couples. Females with infertility experience less marital satisfaction than infertile males (*Musa & Osman, 2020*).

The cornerstone of managing infertility is the modifiable risk factors that will aid in medical treatment and promote health-related

behaviors to preserve women's fertility and enhance life quality (*Latifnejad & Rasoulzadeh, 2017*). In light of the previous, the current study was conducted to evaluate the effect of application of continuous care model on health-related behaviors and quality of life among infertile women.

Regarding socio-demographic characteristics, the current study clarified that the mean \pm SD of the intervention group age was 28.63 \pm 1.78 years, while the control group was 29.41 \pm 1.01 years. This result is anticipated because it is the normal age of childbearing. This finding could be justified as this age constitutes the normal reproductive age for fertility and seeking pregnancy. Also, more than half of both groups had secondary education, about two-thirds of both groups were employed, and almost one-third of both groups had somehow enough income. These findings are supported by *Namdar et al. (2017)*, who conducted a study about "Quality of life and general health of infertile women. Health and quality of life outcomes," and documented that the mean age of the patients was 29.4 \pm 5.2 years. More than half were employed, and more than one-third had academic education. Moreover, *Sezgin et al., (2016)*, who conducted study on disability, psychiatric symptoms, and quality of life in infertile women, in Turkey found that high levels of education, residency in urban areas,

and higher monthly income increase the of QOL in infertile women.

Regarding the husband profile, the present study showed that the mean \pm SD of the intervention group age was 34.63 \pm 1.78) years, while the control group was 34.41 \pm 1.93 years. Less than half of the intervention group had higher education, more than two-thirds of the control group had secondary education, and more than half of both groups were laborers. These results were in the same line with *Fadaei et al. (2016)*, who conducted a study on "The effect of educating based on continuous care model on the infertility treatment related quality of life" revealed that the mean \pm SD of the intervention group age was 33.52 \pm 4.517 years, while the control group was 33.58 \pm 6.185 years. More than half of both groups were laborers. Also, this is on the same line with *Rahimian & Jarareh (2015)* who study the predictive role of self-efficacy, optimism and demographical characteristics in infertility-related quality of life and mentioned that the age, husband's educational attainment, duration of infertility and a history of unsuccessful infertility therapies influence on quality of life among infertile women.

These similarities in results favored the implementation of the present study as the husbands' education permits them to recognize that infertility is not the problem of a woman alone and is well ready to provide emotional

and social support to their wives to engage in more health-related behaviors that might complete with treatments and achieving favorable outcomes.

Concerning infertility history, the present study revealed that more than two-thirds of the two groups had no history of infertility; more than half of the two groups had no history of failed infertility treatment. The majority had 1-3 years in seeking infertility care, but the minority had one living child, and the majority of both groups were primary infertility. These results of the current study were the same as a study titled "Emotional reaction to the diagnosis of infertility in Kuwait and successful clients' perception of nurses' role during treatment" conducted by *Omu ,F and Omu, A (2020)* revealed that more than two-thirds of subjects were primary infertility.

At the same time, the present results are discordant with *Musa and Osman's (2020)* results, who conducted a study about the Risk profile of Qatari women treated for infertility in a tertiary hospital and documented that the minority of infertile participants had primary infertility.

Concerning health-related behaviors regarding infertility before and after the implementation of the continuous care model, the current study revealed that a highly statistically significant improvement was

achieved in the intervention group compared with the control group after the implementation of the continuous care model ($p \leq 0.001$). Regarding items of maintaining a healthier weight, encourage a balanced diet, avoid excessive caffeine consumption, compliance with relaxation programs to reduce sources of stress, avoid all unnecessary medications and recreational drugs and to avoid excessive irradiation by reducing contact with electronic gadgets like mobile phones. Thus, the results of the study confirmed the research hypothesis.

These findings were consistent with *Latifnejad and Rasoulzadeh (2017)*, who conducted "The Effect of Collaborative Infertility Counseling on Marital Satisfaction in Infertile Women Undergoing In Vitro Fertilization: A Randomized Controlled Trial" which showed that collaborative infertility counseling improved healthy behaviors as proper nutrition, avoidance of excessive caffeine & alcohol consumption and reduce stress levels in females with infertility undergoing In Vitro Fertilization. These similarities in findings revealed that the application of continuous care model on health-related behaviors and quality of life among infertile women had a positive effect on a better understanding of their infertility condition and treatment, having an active role in making informed decisions to change

sedentary lifestyles into healthier behaviors. And, the continuing sensitization process through regular attendance at sessions followed by weekly follow-up care, this all motivated, encouraged, and enabled these women to adhere to healthy behaviors. This section of results supported the first research hypothesis of the current study titled "Implementation of the continuous care model will have improved health-related behaviors among the infertile women than those who will not receive it."

According to the mean scores of quality of life between intervention and control groups before and after the implementation of the continuous care model. There were significant differences existed in the domain of physical health of quality of life ($p \leq 0.05$), and a highly statistical difference in the domain of psychological and social relationships, environmental health, and the overall quality of life and general health ($p \leq 0.001$). These results were in congruence with *Zhu et al. (2021)* who performed a study on "The effects of comprehensive nursing intervention on the negative emotions of patients with infertility" and revealed that The QOL scores of each dimension showed no significant differences between the two groups ($p > 0.05$) pre-intervention. However, they were significantly higher after the intervention ($p < 0.05$). and also the present results in agreement with a

study conducted by *Baghaei et al., (2015)* who reported that quality of life in patients was significantly increased in all dimensions by implementing the continuous care model over three months, Furthermore, *Fadaei et al., (2016)* found that after applying a continuous care model, the mean score of infertility treatment-related quality of life in the intervention group was significantly higher than in the control group.

This accordance with the present results, reflects the importance of providing infertile women help, support, and education to adopt more healthy behaviors and build a new life, besides the above results achieved the second research hypothesis that "implementation of the continuous care model will have an improvement in the quality of life among infertile women than who will not receive it."

Regarding the Correlation coefficient between total health-related behaviors of infertile women and quality of life scores, the current study showed a highly significant positive correlation between total health-related behaviors scores regarding infertility and quality of life in intervention group after implementation of the continuous care model ($p \leq 0.001$). These findings are supported by *Keramat et al. (2014)* in a study, "Quality of life and its related factors in infertile couples," which illustrated that the associations between quality of life and self-esteem, social support,

sexual satisfaction, and marital satisfaction were significant. Moreover, this is supported by *Baloushah et al. (2021)*, who investigated the quality of life of infertile couples who seek in vitro fertilization (IVF) in the Gaza Strip, Palestine, and concluded that infertility affects the Quality of life of infertile Palestinian couples as the mean scores of a total of QoL and its subscales (emotion, mind/body, social, core, tolerability, and treatment) are lower before applying interventions and significantly increased after intervention. These improvements due to better education given and a better understanding of couples of their condition to overcome the social pressure put on them. This accordance with the results, emphasized the positive effect of adopting more health-related behaviors to improve the quality of life, woman's capability to perform selfcare activities would improve quality of life. And this can also have a positive effect on reducing costly invasive procedures during therapy journey.

Conclusion

Based on the results of the research, the implementation of the continuous care model had improved the health-related behaviors among infertile women as there were highly statistically significant improvements were achieved in health-related behavior scores of the intervention group compared with the control group after implementation of the

continuous care model ($p \leq 0.001$), additionally the continuous care model had improved the quality of life among the infertile women there was a highly statistically difference in the total quality of life scores of the intervention group more than the control group ($p \leq 0.001$). Hence, the research aim was achieved, and the research hypotheses were supported.

Recommendation:

The following recommendations are suggested, considering the findings of the study:

- Integration of the continuous care model as a routine nursing intervention for improving infertile women's health-related behaviors and quality of life.
- Distribute illustrated booklet with simple explanations and figures about improving health-related behaviors and quality of infertile women in the obstetric and gynecological outpatient clinic.

Further studies are suggested to:

- Using a large sample size for generalization
- Ongoing educational program for healthcare staff about utilizing the continuous care model for promoting health-related behaviors and quality of life for infertile women.

Limitations of the study:

There are three limitations. The first is that non-probability convenient sampling limits the generalization of study results. The second is the difficulties in organizing and scheduling phone calls. The third is the need for national and international references that examined the selected variables.

Reference:

- Abdelalim, R., ELShiekh, M., & EL kholy G., (2011).** Lifestyle Patterns concerning Female Infertility, questionnaire, master thesis, Benha University, Egypt.
- Acharya S., & Gowda C. H. ,(2017).** Lifestyle factors associated with infertility in a rural area: A cross-sectional study, *International Journal of Medical Science and Public Health.* [6\(3\)](#) p: 502-506 ,DOI: [10.5455/ijmsph.20170852309092016](#).
- Alabi O., (2020).** A qualitative investigation of surrogacy as a panacea for infertility in Nigeria, *F1000Research*,9(103), (<https://doi.org/10.12688/f1000research.20999>).
- Ali S., Yousif A, Abdelati I.,(2019).** Quality of Life of Infertile Couples at Mansoura University Hospital. *Port Said Scientific Journal of Nursing.* 2019;6(1):229-43.
- Amiri M., Chaman R., Sadeghi Z., Khatibi R., Ranjbar M., (2017).** Quality of Life Among Fertile and Infertile Women, *Iran Journal of Psychiatry Behaviors Science*,11(1):e5641.[doi: 10.5812/ijpbs.5641](#).
- Baloushah s., Barjasteh S., Elsous A. Aldirawi A., (2021).** Quality of life of infertile couples in the Gaza Strip, Palestine, *Asian Pacific Journal of Reproduction* 2021; 10(6): 262-268.
- Baghaei R, Mashallahi A, and Khalkhali H.,(2015).** The effect of Applying Continuous Care Model on the Quality of Life in Heart Failure Patients. *J Urmia Nurs Midwifery Fac* 2015;13: 666-675.
- Eniola OW, Adetola AA, Abayomi BT. (2017):** A review of female infertility; important etiological factors and management. *J Microbiol Biotechnol Res.* 2017;2(3):379–85.
- Fadaei M., Damghanian M., Rahimi F., ShahrokhN., (2017).** The effect of educating based on continuous care model on the infertility treatment related quality of life, *Nursing Practice Today*, 3(3): 81-90.
- Fehintola A., Fehintola F., Ogunlaja A., Awotunde T., Ogunlaja I. & Onwudiegwu U. (2017).** Social meaning and consequences of infertility in Ogbomoso, Nigeria. *Sudan Journal of Medical Sciences* 12 (9). DOI: [10.532/smpbs.5641](#).
- Fadaei M, Damghanian M, Rahimi-Kian F, Shahrokh Nejad Tehrani E, Mehran A.(2016).** The effect of educating based on a continuous care model on the infertility treatment-related quality of life. *Nurs Pract Today.*; 3(3): 81–90. Available online at: <http://npt.tums.ac.ir>.
- Ilacqua A, Izzo G, Emerenziani GP, Balari C & Aversa A (2018).** Lifestyle and fertility: the influence of stress and quality of life on male fertility. *Reproductive Biology and Endocrinology* 16 115. ([HTTPS:// doi.org/10.1186/s12958-018-0436-9](https://doi.org/10.1186/s12958-018-0436-9))
- jeihooni A., Rakhshani T., Gholampour Y.,(2020).** Investigating the Effect of an Educational Intervention on Health Promotion Behaviors, Hope Enhancement, and Mental Health in Cancer Patients, *Research square* <https://www.researchsquare.com/article/rs-22721/v1>.
- Keramat A., Masoomi S., Mousavi S., Poorolajal J., Shobeiri F., & Hazavhei, S. (2014).** Quality of life and its related factors in infertile couples. *Journal of research in health sciences*, 14(1), 57–63.
- Kiani Z., SimbarM., HajianS. And Zayeri F., (2020).** Development and psychometric evaluation of a quality of life questionnaire for infertile women, *Reproductive Health*, 17(140) P 2-9.
- Latifnejad R., Hadizadeh F., Simbar M., Khadem N., (2019).**Challenges of Donor Selection: The Experiences of Iranian Infertile Couples Undergoing Assisted Reproductive Donation Procedures, *The Iranian Journal of Obstetrics, Gynecology, and Infertility.* 16(88):1-13. Issues such as accessibility of medical.
- Latifnejad Roudsari R and Rasoulzadeh Bidgoli M (2017).** The Effect of Collaborative Infertility Counseling on Marital Satisfaction in Infertile Women Undergoing In Vitro Fertilization: A Randomized Controlled Trial, *Nursing Midwifery Studies journal.* 6(2):e36723. DOI: 10.5812/nmsjournal.36723.
- Ma F., Cao H., Song L., Liao X., Liu X. (2018).** Effects of comprehensive care on mood and quality of life in infertile women, *International Journal Clinical Exploration Medicine*, vol 11 (8),p:4072–9.
- Malgorzata N. I, Malgorzata L., Bogdan O. , Dariusz U. , Dorota D. and Zych B.,(2022).**Health Related Behaviors and Life Satisfaction in Patients Undergoing Infertility Treatment, *International Journal of Environment Research and Public Health* (19) 1, <https://doi.org/10.3390/ijerph19159188> <https://www.mdpi.com/journal/ijerph>.

Moghaddam T, Hanieh R., Eghtedar S.(2020). Effects of the Continuous Care Model on the Health-Promoting Lifestyle in Breast Cancer Survivors, *Holistic Nursing Practice journal*, 34(4), p 221-233doi:10.1097/HNP.0000000000000392

Musa S., Osman S., (2020). Risk profile of Qatari women treated for infertility in a tertiary hospital: a case-control study. *Fertil Res and Pract*, <https://doi.org/10.1186/s40738-020-00080-5>

NamdarA., NaghizadehM., Zamani M., Yaghmaei F., & Sameni H., (2017). Quality of life and general health of infertile women. *Health and quality of life outcomes*, 15(1), 139. <https://doi.org/10.1186/s12955-017-0712-y>. PMID: 28701163; PMCID: PMC5508693.

Omu, F. E., & Omu, A. E. (2020). Emotional reaction to diagnosis of infertility in Kuwait and successful clients' perception of nurses' role during treatment. *BMC nursing*, 9, 5. <https://doi.org/10.1186/1472-6955-9-5>

Rahmani A, Moradi Y, Aghakarimi K, Hossain-Gholipour K., (2017).Effect of Continuous Care Model on Self-Care Behaviors in Heart Failure Patients: A Randomized Controlled Trial (Continuous Care Model for Self-Care Behaviors Promotion). *Bali Medical Journal*, 6(3): 557–561.

Rahimian B. I, Jarareh J. (2015) The Predictive Role of Self-Efficacy, Optimism and Demographical Characteristics in Infertility-Related Quality of Life. *Journal of Urmia Nursing And Midwifery Faculty.*;13(4):268-76

Sadeghi Sherme M., Razmjooei N., Ebadi A., Najafi S., Asadi-Lari M., (2014). Effect of applying continuous care model on quality of life of patients after

coronary artery bypass graft, *Iranian Journal of Critical Care Nursing*.2014; 4(1): 61-70.

Sezgin H, Hocaoglu C, Guvendag-Guven ES (2016). Disability, psychiatric symptoms, and quality of life in infertile women: a cross-sectional study in Turkey. *Shanghai arc psychiatry.* ; 28(2):86–94.

Silvestris E., Lovero D., and Palmirota R., (2019). Nutrition and female fertility: an independent correlation, *Frontiers in Endocrinology* (10)3,p.46. <https://doi.org/10.3389/fendo.2019.00346>.

Thable, N., DuffE., and Dika CH., (2020). The Nurse Practitioner, Vol. 45(5), Copyright © 2020 Wolters Kluwer Health, Inc. All rights reserved.www.tnpj.com

World Health Organization (WHO) ,(2020). Infertility, 11th Revision (ICD-11), Geneva: WHO December 2020.

World Health Organization, (2019), Sexual and reproductive health. www.who.int/reproductivehealth/topics/infertility/en.

World Health Organization, (2012). WHOQOL: Measuring Quality of Life *Final revision* <https://www.who.int/tools/whoqol>

Zare E, Bahrami N, Soleimani MA., (2015). Comparison of Self-esteem in Fertile and Infertile Women, *Iran Journal of Nursing*. Vol.27, No.90.

Zhu, H., Xu, S., Wang, M., Shang, Y., Wei, C., & Fu, J., (2021). The effects of comprehensive nursing intervention on the negative emotions of patients with infertility. *American journal of translational research*, 13(7), 7767–7774.