Effect of Implementing Continuous Care Model on Health-Related Behaviors and Quality of Life among Women with Preeclampsia

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Abstract

Background: Preeclampsia is the leading cause of maternal and perinatal morbidity and mortality worldwide, but it is more prevalent in developing countries. **Aim** was to investigate the effect of implementing continuous care model on health-related behaviors and quality of life among women with preeclampsia. **Design**: A quasi-experimental research design was utilized. **Setting:** The study was conducted at the Obstetrics and Gynecology Outpatient Clinic of Benha University Hospital. **Sample**: A purposive sample of 70 pregnant women diagnosed with preeclampsia was recruited and divided equally into study and control groups (35 women per group). **Tools:** Three tools were used to collect data; a structured interviewing questionnaire, health-related behaviors regarding preeclampsia questionnaire, and World Health Organization quality of life-BREF. **Results:** There was no statistically significant difference between mean scores of health-related behaviors regarding preeclampsia and quality of life before implementation of the continuous care model in both groups ($P > 0.05$). After implementing the continuous care model, the mean scores of health-related behaviors and quality of life in the study group were significantly higher than in the control group ($p \leq 0.001$). A significant positive correlation between total scores of health-related behaviors regarding preeclampsia and quality of life in both groups before and after implementation of continuous care model ($P \leq 0.001$). **Conclusion:** Implementing the continuous care model had a positive effect on improving preeclampsia-related health behaviors and the quality of life for women with preeclampsia. **Recommendations**: The continuous care model should be incorporated as a nursing intervention for promoting women's health behaviors and improving quality of life within preeclampsia care.

Keywords: Continuous Care Model, Health-related Behaviors, Quality of Life, Preeclampsia

Introduction

Preeclampsia is a multi-system disorder of pregnancy associated with the development of hypertension, which appears most commonly after 20 weeks of pregnancy and frequently near term. It is a rapidly progressive condition marked by high blood pressure and protein in urine **(Belay and Wudad, 2019; American College of Obstetricians and Gynecologists, 2019).** Preeclampsia is still one of the main causes of maternal morbidity and mortality, affecting 2-8% of all pregnancies worldwide and up to 10% in developing countries **(World Health Organization, 2018)**.

Preeclampsia may be classified as mild or severe, depending on the severity of the organ dysfunction. It is also categorized into two types: Early-onset preeclampsia (which occurs before 34 weeks of pregnancy) and late-onset preeclampsia (which occurs after 34 weeks of pregnancy). Despite symptoms of early and late-onset preeclampsia are similar, early-onset preeclampsia is correlated with a higher risk of complications than late-onset preeclampsia **(Wilkinson and Cole, 2018)**.

There are several risk factors of preeclampsia including primigravida, age (under 18 years of age or advanced age at pregnancy), family history of preeclampsia, prior history of preeclampsia, obesity, genetic factors, diet, gestational diabetes, multiple

gestations, and preexisting medical conditions such as chronic hypertension **(Shiozaki and Saito, 2018; Gabbe et al., 2016)**.

Preeclampsia can negatively affect pregnancy outcomes, maternal complications including eclampsia, placental abruption, postpartum hemorrhage, preterm delivery, increased cesarean section rates, increased risk of cardiovascular diseases, venous thromboembolism, and maternal mortality. Neonatal complications as intrauterine growth retardation, prematurity, asphyxia at birth, and neonate intensive care unit admission **(Kongwattanakul et al., 2018)**.

Health behaviors and lifestyle most significantly determine the level of health (**Boguszewski et al., 2018)**. Health-promoting behaviors comprise proper nutrition, physical exercise, emotional control, stress management, and the development of individual relationships. In contrast, unhealthy eating habits, smoking, an incapability to control stress, and a sedentary lifestyle can cause adverse consequences **(Kazemi et al., 2018)**.

Quality of life is an individual's perception of condition and satisfaction with the existing condition. Quality of life (QOL) is a broad concept that incorporates aspects of social, environmental, economic, as well as health satisfaction. The goal of healthcare is to improve the quality of life. Using educational theories and models is one approach for modifying one's lifestyle **(Fadaei et al., 2016).**

The use of nursing models is one of the most important guides for clinical practices and research. Care models are one of the tools using by competent nurses **(Khodaveisi et al., 2017)**. The Continuous Care Model (CCM) is a regular process for efficient, interactive, and continuous communication between woman and nurse for identifying women needs and concerns and sensitizing them to accept continuous health behaviors and assisting women in sustaining health promotion and improvement. CCM comprises four phases: Orientation, sensitization, control, and evaluation. CCM introduces the woman as an effective factor of continuing care in the health process. Additionally, applying this model affects in a better understanding the women's problems, empowering, and engaging the women and family in problem-solving (**Borji et al., 2016)**.

The nurse's role in the care of a woman with preeclampsia focuses on close monitoring of blood pressure and ongoing evaluation for signs of disease progression. Fetal monitoring is necessary during a pregnancy. The woman is required to monitor blood pressure on a regular basis and report any elevated readings also tested the amount of protein contained in urine and checked weight daily. A woman should take daily fetal movement counts, a well-balanced diet with no sodium restriction is advised. Besides, a woman is advised to drink six to eight 8-oz glasses of water per day **(Ricci et al., 2017).**

Significance of the study

Preeclampsia is one of the most common pregnancy complications and remains the leading cause of maternal morbidity and mortality (70000 to 80000 per year) worldwide **(Romuald et al., 2019)**. In developing countries, the incidence of preeclampsia ranges from 1.8 % to 16.7% of pregnant women. Preeclampsia affects 10% of African women, which is considerably higher than the global rate of 2% **(Belay and Wudad, 2019).** In an Egyptian study to estimate the prevalence of hypertensive diseases of pregnancy, found that 4.2% had pregnancy-induced hypertension, 3.8 % had preeclampsia and 0.3% had eclampsia **(Gabal et al., 2017)**.

One of the caring models is the continuous care model, which is intended to provide a plan for accepting and improving women's insight and responsibility for continuing care and controlling illness and potential complications **(Rahmani et al., 2017).** Considering that the best educational programs lose the desired impact over time without follow-up. Accordingly, combining follow-up and continuous care with education can improve adherence to health behaviors in women with preeclampsia, lowering the risk of maternal and neonatal complications and thus improving quality of life. Furthermore, to our knowledge, no previous studies have examined the effect of a continuous care model on preeclampsia women's healthy behaviors and

quality of life. Therefore, this study was carried out.

Aim of the study:

The aim of this study was to investigate the effect of implementing continuous care model on health-related behaviors and quality of life among women with preeclampsia.

Research hypothesis:

Women with preeclampsia who will receive a continuous care model exhibit more engagement in health-related behaviors and a better quality of life than those who do not receive it.

Subjects and method

Research design:

A quasi-experimental research design (Pre-test/Post-test control group) was utilized to achieve the aim of this study.

Setting:

The study was carried out at the Obstetrics and Gynecology Outpatient Clinic of Benha University Hospital, Benha City, Egypt.

Sampling:

Sample size: The sample size was calculated using **Daniel, (1999)** formula, where n = desired sample size, p = prevalence of preeclampsia was estimated to be 3.8 % in a previous study conducted in Egypt (**Gabal et al., 2017**). The margin of error was 5%, and the degree of confidence was 95%. d = 0.05, Z = 1.96. Accordingly, a sample size of 56 women is expected. To account for the rates of non-response or loss to follow-up, the sample size was increased by 25%, bringing the final sample size to 70.

Sample type: A purposive sample of 70 pregnant women was recruited for the study based on inclusion criteria; diagnosed with preeclampsia (systolic blood pressure < 160 mmHg and diastolic blood pressure < 110 mmHg with proteinuria ± 2 in urine test strip), gestational age 20 to 24 weeks, literate, a single viable fetus, free from obstetrical complications as gestational diabetes and eclampsia, as well as other chronic or psychiatric disorders affect pregnancy perception of QoL, and willing to participate in the study. The exclusion criteria were reluctance to continue cooperation, a prior history of hypertension, and attendance a previous equivalent intervention. The sample was divided equally into two groups, and the allocation ratio was 1:1. The study group included 35 women who received continuous care model implementation, the control group included 35 who received routine hospital care.

Tools of data collection

Data was collected using three tools.

Tool (I): A structured interviewing questionnaire was designed by the researchers based on a thorough review of the literature **(Tessema et al., 2015; Wilkinson and Cole, 2017)**. The questionnaire was divided into three parts:

Part (1): Demographic characteristics of the studied women included age, educational level, occupation, residence, and monthly income.

Part (2): Previous and current obstetric history included data related to the gravidity, parity, number of abortions, number of antenatal care visits during the current pregnancy, and gestational age.

Part (3): Maternal systolic and diastolic blood pressure measurements (mmHg). As well as Body Mass Index (BMI) was calculated using the formula: Weight (kg) / height (m^2), and categorized according to **World Health Organization, (2000).**

Tool II: Health-related behaviors regarding preeclampsia questionnaire

This questionnaire was designed by the researchers after reviewing the literature **(Koh et al., 2016; Ricci et al., 2017; Afefy and Kamel, 2019)** to assess self-reported health behaviors that women were practiced to control and manage preeclampsia. It comprised 11 items namely, measuring blood pressure daily, checking and recording weight daily, checking urine for proteinuria by dipstick daily, consuming the recommended preeclampsia diet (high protein, low salt, low fat), drinking 8 to 10 glasses of water daily, participating in regular physical activity, compliance with prescribed medications, taking rest and

adequate sleep, managing and coping with stress, counting fetal kicks daily, as well as compliance with recommended antenatal visits.

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 11 and 33, with higher scores indicating more engagement in healthy behaviors.

Tool III: World Health Organization Quality of Life - BREF (WHOQOL-BREF)

The WHOQOL-BREF was adopted from **World Health Organization (1996)** and translated into Arabic language to assess the perception of the quality of life among women with preeclampsia 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:

On a five-point Likert scale ranging from 1 to 5, each item of WHOQOL-BREF is scored (1 for the lowest, and 5 for the highest agreements with the item). The domain score is calculated using items 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 total scale score. Higher scores reflect a better quality of life.

Validity and reliability of tools:

Tools of data collection were reviewed for content validity through three experts in the obstetrics and community nursing field. The tools were judged for clarity of questions and appropriateness of the content. Minor modifications were made based on experts' suggestions in formulating some items. From the experts' perspective, the tools were considered valid.

The reliability of tools was assessed using Cronbach's alpha coefficient. Internal consistency for health-related behaviors regarding preeclampsia questionnaire was 0.87, and WHOQOL-BREF internal consistency ranged from 0.66 to 0.84 for the four domains, and from 0.86 to 0.91 for the total score (**WHOQOL Group, 1998)**.

Ethical considerations

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

Pilot study

The pilot study was carried out on ten percent of the total sample (7 women) to assess clarity, simplicity, relevancy, and applicability of the tools. In addition, to detect any problems peculiar during data collection, and the time required for data collection was estimated. There were no modifications made, and 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 study, the researchers visited the previously mentioned setting three days a week from 9.00 am to 1.00 pm until predetermined sample size was completed. Each woman recruited for the study was interviewed individually; on average, 5-7 women were interviewed per week. This study lasted nine months, from the beginning of February 2019 to the end of October 2019.

For the study group, the continuous care model was implemented in four stages: Orientation, sensitization, control, and evaluation.

Orientation stage 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 woman, created motivation, and elucidated 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. Three tools were completed in about 20-25 minutes.

Sensitization stage was performed to engage the women in the preeclampsia continuous care process. Each woman attended four educational sessions (two sessions weekly); every session lasted about 30 to 45 minutes in the separate room at the prementioned setting using discussion, question and answer, role-playing, PowerPoint presentations, and video teaching. Feedback from the previous session was taken at the beginning of the new one, accordingly, the addressed educational content was re-discussed with full clarification.

First session: The researchers intended to provide an overview of preeclampsia, including definition, causes, risk factors, classifications, maternal and fetal complications, preventive, curative measures, and prescribed medications of preeclampsia.

Second session: The researchers taught women about the necessity of engaging in health-related behaviors to control and manage preeclampsia, including the importance and procedure of measuring and recording blood pressure on a regular basis, weight daily, and teaching women how to check proteinuria with dipstick, as well as the importance and procedure of counting and recording fetal movements daily.

Third session: The researchers discussed dietary management to preeclampsia as high protein, low salt, low fat, and drinking plenty of water daily. Also, the importance of getting enough rest, maintaining sleep quality, and performing regular physical activity. Besides, the importance of compliance with prescribed medications.

Fourth session: The researchers explained the importance of commitment to recommended antenatal visits. The importance of stress reduction and techniques to overcome preeclampsia-related stress. Also, the concept of quality of life and the relation between compliance with healthy behaviors and improved quality of life in preeclampsia women. Educational booklets were provided to the studied women at the end of this session.

Control stage, during this stage, mutual relationships between researchers and the studied women are maintained through weekly phone calls for each woman (8 calls) throughout 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 for strengthening and internalizing healthy behaviors. Also, any new educational needs or health problems were identified, addressed, and resolved.

Evaluation stage, the effect of continuous care model implementation was evaluated using health-related behaviors regarding preeclampsia questionnaire (tool II), and WHOQOL-BREF (tool III) after one month of follow-up via telephone.

For the control group received hospital routine care that focused on diagnosis and medical treatment as well as brief health education about blood pressure measurement and taking prescribed medications. The evaluation started first with the control group to avoid bias by using tools II and III.

Data analysis

Data were analyzed using Statistical Package for Social Science (SPSS version 25) software. Descriptive statistics were used (frequency, percentage, mean, and standard deviation). Inferential statistics were used (chi-square or Fisher's exact test for qualitative variables, and independent t-test for quantitative variables). Pearson's correlation coefficient test was used. A statistically significant difference was considered at a p-value ≤ 0.05, a highly statistically significant difference was considered at a p-value ≤ 0.001.

Limitations of the study:

There are three limitations, the first, non-probability purposive sampling limits the

generalization of study results. The second, no stable place for conducting the educational sessions, as well as difficulties in organizing and scheduling phone calls. The third, lack of national and international references that examined the selected variables.

Results

Table 1. Distribution of the studied women according to demographic characteristics (n=70)

Groups / Variables	Study group n=35		Control group n=35		X^2/ FET	P-value
	No	%	No	%		
Age (years)						
< 30	23	65.7	19	54.3	0.952	0.329 ns
≥ 30	12	34.3	16	45.7		
Mean ± SD	28.63 ± 1.78		29.41 ± 1.93		t=1.738	0.087 ns
Educational level						
Primary education	5	14.3	3	8.6		
Secondary education	17	48.6	14	40.0	1.597 €	0.450 ns
University education	13	37.1	18	51.4		
Occupation						
Working	11	31.5	15	42.9	0.979	0.322 ns
Housewife	24	68.5	20	57.1		
Residence						
Urban	10	28.6	7	20.0	0.699	0.403 ns
Rural	25	71.4	28	80.0		
Monthly income						
Enough	9	25.7	11	31.4	0.299	0.584 ns
Not enough	26	74.3	24	68.6		

ns no statistically significant difference (p > 0.05) t= independent t test € Fisher Exact Test

Table (1) displays that; the mean age of the study and control groups was 28.63 ± 1.78 and 29.41 ± 1.93 years, respectively. Less than half 48.6% of the study group had a secondary education, whereas 51.4% of the control group had a university education. Regarding occupation, 68.5% of the study group and 57.1% of the control group were housewives. Concerning residence, 71.4% and 80.0% of study and control groups living in rural areas, respectively. More than two-thirds of two groups had not enough monthly income. There was no statistically significant difference between both groups regarding demographic characteristics (p > 0.05).

Table 2. Distribution of the women in the study and control groups according to previous and current obstetric history (n=70)

Groups / Variables	Study group n=35		Control group n=35		X^2/FET	P-value
	No	%	No	%		
Gravidity						
Primigravida	26	74.3	24	68.6		
2-3	7	20.0	6	17.1	1.443€	0.486 ns
≥ 4	2	5.7	5	14.3		
Parity						
Nullipara	26	74.3	24	68.6		
1-2	6	17.1	7	20.0	0.315€	0.861 ns
≥ 3	3	8.6	4	11.4		
Number of abortions						
Non	33	94.2	34	97.1	0.348€	0.551 ns
1-2	2	5.8	1	2.9		
Number of ante natal care visits during the current pregnancy						
Once	4	11.4	2	5.7		
Two times	10	28.6	8	22.9		
Three times	18	51.4	19	54.3	1.942€	0.584 ns
More than three times	3	8.6	6	17.1		
Gestational age (weeks)						
Mean ± SD	22.46 ± 0.82		22.17 ± 1.25		t =1.133	0.261 ns

ns no statistically significant difference (p > 0.05) t= independent t test € Fisher Exact Test

Table (2) clarifies that, 74.3% and 68.6% of the study and control groups were primigravida respectively, 17.1% and 20.0% of the study and control groups delivered 1-2 times, respectively. As well as 94.2% and 97.1% of the study and control groups had no history of abortion, respectively. Regarding the number of antenatal care visits during the current pregnancy, 51.4% of the study group and 54.3% of the control group were three times. The mean gestational age of the study and control groups was 22.46 ± 0.82 and 22.17 ± 1.25 weeks, respectively. No statistically significant difference between two groups regarding the previous and current obstetric history ($p > 0.05$).

Table 3. Comparison between mean blood pressure and body mass index measurement in the study and control groups (n=70)

Groups / Variables	Study group n=35	Control group n=35	Independent t-test	P value
	Mean ± SD	Mean ± SD		
Systolic blood pressure (mmHg)	145.71± 4.56	144.75 ± 4.36	0.937	0.352^{ns}
Diastolic blood pressure (mmHg)	97.43 ± 9.27	95.57 ± 8.81	0.859	0.393^{ns}
Body Mass Index (kg /m2)	31.98 ± 0.37	31.27 ± 1.62	1.848	0.070^{ns}

^{ns} no statistically significant difference ($p > 0.05$)

Table (3) shows that mean systolic and diastolic blood pressure for the study and control groups were 145.71± 4.56, 97.43 ± 9.27 and 144.75 ± 4.36, 95.57 ± 8.81 mmHg, respectively. The mean body mass index of the study and control groups was 31.98 ± 0.37 and 31.27 ± 1.62kg / m^2 respectively. There was no statistically significant difference between both groups concerning systolic and diastolic blood pressure as well as body mass index measurements ($p > 0.05$).

Table 4. Distribution of the women in control and study groups according to health-related behaviors regarding preeclampsia before and after implementation of continuous care model (n=70)

Items \ Groups		Study group n= 35			Control group n= 35			X^2/ FET (P-value)
		Always No. (%)	Sometimes No. (%)	Never No. (%)	Always No. (%)	Sometimes No. (%)	Never No. (%)	
Measuring blood pressure daily	Before implementation of CCM	2 (5.7)	5 (14.3)	28 (80.0)	5 (14.3)	7 (20.0)	23 (65.7)	2.109 € (0.348) ns
	After implementation of CCM	33 (94.3)	2 (5.7)	0 (0.0)	10 (28.6)	14 (40.0)	11(31.4)	32.302 € (0.000) **
Checking and recording weight daily	Before implementation of CCM	0 (0.0)	10 (28.6)	25 (71.4)	1 (2.9)	14 (40.0)	20 (57.1)	2.222 € (0.329) ns
	After implementation of CCM	28 (80.0)	6 (17.1)	1 (2.9)	2 (5.7)	18 (51.4)	15 (42.9)	40.783 € (0.000) **
Checking urine for proteinuria by dipstick daily	Before implementation of CCM	0 (0.0)	9 (25.7)	26 (74.3)	0 (0.0)	5 (14.3)	30 (85.7)	€ 1.429 (0.232) ns
	After implementation of CCM	25 (71.4)	7 (20.0)	3 (8.6)	2 (5.7)	12 (34.3)	21 (60.0)	28.802 € (0.000) **
Consuming the recommended diet	Before implementation of CCM	1 (2.9)	33 (94.2)	1 (2.9)	3 (8.6)	30 (85.7)	2 (5.7)	1.476 € (0.478) ns
	After implementation of CCM	32 (91.4)	3 (8.6)	0 (0.0)	5 (14.3)	29 (882.9)	1 (2.9)	41.828 € (0.000) **
Drinking 8 to 10 glasses of water daily	Before implementation of CCM	13 (37.1)	15 (42.9)	7 (20.0)	18 (51.4)	11 (31.4)	6 (17.2)	1.499 (0.473) ns
	After implementation of CCM	34 (97.1)	1 (2.9)	0 (0.0)	20 (57.1)	10 (28.6)	5 (14.3)	15.993 € (0.000) **
Participating in regular physical activity	Before implementation of CCM	9 (25.7)	11 (31.4)	15 (42.9)	10 (28.6)	12 (34.3)	13 (37.1)	0.239 (0.887) ns
	After implementation of CCM	23 (65.7)	7 (20.0)	5 (14.3)	11 (31.4)	14 (40.0)	10 (28.6)	8.235 (0.016) *
Compliance with prescribed medications	Before implementation of CCM	11 (31.4)	16 (45.7)	8 (22.9)	14 (40.0)	12 (34.3)	9 (25.7)	0.993 (0.609) ns
	After implementation of CCM	27 (77.1)	7 (20.0)	1 (2.9)	17 (48.6)	13 (37.1)	5 (14.3)	6.739 € (0.034) *

Items	Groups	Study group n= 35			Control group n= 35			X^2/ FET (P-value)
		Always No. (%)	Sometimes No. (%)	Never No. (%)	Always No. (%)	Sometimes No. (%)	Never No. (%)	
Taking rest and adequate sleep	**Before implementation of CCM**	0 (0.0)	23 (65.7)	12 (34.3)	0 (0.0)	25 (71.4)	10 (28.6)	0.265 € (0.797) ns
	After implementation of CCM	29 (82.8)	5 (14.3)	1 (2.9)	2 (5.7)	27 (77.1)	6 (17.2)	42.213 € (0.000) **
Managing and coping with stress	**Before implementation of CCM**	0 (0.0)	9 (25.7)	26 (74.3)	1 (2.9)	7 (20.0)	27 (77.1)	1.269 € (0.530) ns
	After implementation of CCM	19 (54.3)	12 (34.3)	4 (11.4)	3 (8.6)	10 (28.6)	22 (62.8)	20.265 € (0.000) **
Counting fetal kicks daily	**Before implementation of CCM**	0 (0.0)	10 (28.6)	25 (71.4)	2 (5.7)	15 (42.9)	18 (51.4)	4.140 € (0.126 ns
	After implementation of CCM	31 (88.5)	3 (8.6)	1 (2.9)	6 (17.2)	16 (45.7)	13 (37.1)	36.072 € (0.000) **
Compliance with recommended antenatal visits	**Before implementation of CCM**	0 (0.0)	11 (31.4)	24 (68.6)	2 (5.7)	12 (34.3)	21 (60.0)	2.243 € (0.326) ns
	After implementation of CCM	26 (74.3)	9 (25.7)	0 (0.0)	4 (11.4)	15 (42.9)	16 (45.7)	35.196 € (0.000) **

ns no statistically significant difference ($P > 0.05$) € FET: Fisher Exact Test CCM: Continuous Care Model

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

Table (4) reveals that there was no statistically significant difference between the study and control groups concerning all items of health-related behaviors regarding preeclampsia before implementation of the continuous care model ($p > 0.05$). However, a statistically significant improvement was observed in the study group compared with the control group after implementation of the continuous care model ($p \leq 0.001$and $p \leq 0.05$), the highest percentages (always) were observed in the study group (97.1%,94.3%,91.4%,88.5%,82.8%, and 80.0%) related to drinking 8 to 10 glasses of water daily, measuring blood pressure daily, consuming recommended diet, counting fetal kicks daily, taking rest, and adequate sleep, checking and recording weight daily respectively. While the lowest percentages (always) were observed concerning participating in regular physical activity and managing and coping with stress (65.7%, and 54.3%).

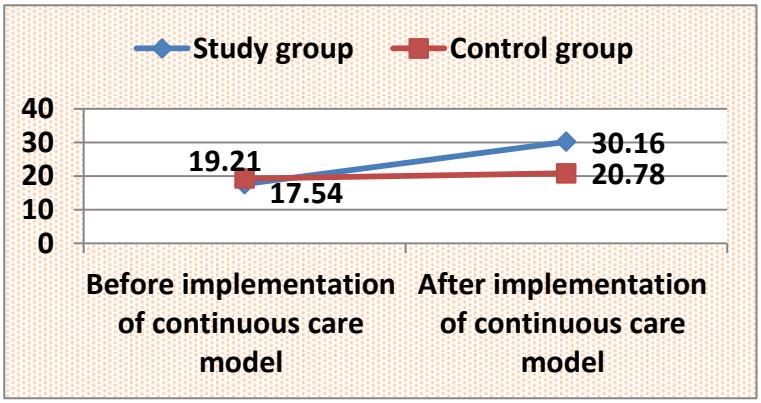

Figure 1. Mean scores of health-related behaviors regarding preeclampsia of study and control groups before and after implementation of continuous care model (n=70)

Figure (1) illustrates that, before implementation of the continuous care model, the mean total scores of health-related behaviors regarding preeclampsia in the study and control groups were 17.54 and 19.21, respectively. However, after implementation of the continuous care model, the mean total scores of health-related behaviors increased significantly in the study group compared to the control group 30.16 versus 20.78, respectively.

Table 5. Comparison of mean scores of quality of life between study and control groups before and after implementation of continuous care model (n=70)

Domains \ Groups		Study group n= 35	Control group n= 35	Independent t-test	P value
		Mean ± SD	Mean ± SD		
Physical health	Before implementation of CCM	51.17 ± 3.12	52.23 ± 3.58	1.317	0.192^{ns}
	After implementation of CCM	74.61 ± 8.80	53.16 ± 3.58	13.607	0.000**
Psychological health	Before implementation of CCM	54.86 ± 3.12	53.69 ± 3.78	1.413	0.162^{ns}
	After implementation of CCM	74.86 ± 9.76	54.06 ± 3.64	11.812	0.000**
Social relationships	Before implementation of CCM	59.46 ± 6.39	58.69 ± 6.76	0.491	0.625^{ns}
	After implementation of CCM	7٧.92± 10.03	59.48 ± 7.12	9.387	0.000**
Environmental health	Before implementation of CCM	59.94 ± 5.92	58.91 ± 6.59	0.687	0.495^{ns}
	After implementation of CCM	75.43 ± 7.92	60.14 ± 7.14	8.480	0.000**
Overall quality of life	Before implementation of CCM	55.31 ± 2.94	56.37 ± 2.86	1.525	0.132^{ns}
	After implementation of CCM	79.77 ± 11.09	57.37 ± 4.71	10.998	0.000**
General health	Before implementation of CCM	55.61 ± 2.43	55.11 ± 3.77	0.640	0.524^{ns}
	After implementation of CCM	79.80 ± 11.01	56.74 ± 5.72	11.000	0.000**
Total score	Before implementation of CCM	56.35 ± 3.27	55.89 ± 3.65	0.578	0.565^{ns}
	After implementation of CCM	76.13 ± 8.36	56.68 ± 3.92	12.390	0.000**

^{ns} no statistically significant difference (P > 0.05) CCM: Continuous Care Model

*A statistically significant difference (P ≤ 0.05) **A high statistically significant difference (P ≤ 0.001)

Table (5) elaborates that, before implementation of the continuous care model, the mean scores of total quality of life showed the impaired quality of life in the study and control groups (56.35 ± 3.27 and 55.89 ± 3.65) respectively, with no statistically significant difference ($p > 0.05$). However, after implementation of the continuous care model, the mean difference score for total quality of life in the study group was higher than the score in 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 all domains of quality of life, including physical health, psychological, social relationships, and environment, as well as two items concerning the overall quality of life and general health ($p \leq 0.001$).

Table 6. Correlation coefficient between total health-related behaviors regarding preeclampsia and quality of life scores in the study and control groups before and after implementation of continuous care model (n=70)

Variables		Total health-related behaviors score			
		Study group		Control group	
		r	p	r	p
Total quality of life score	Before implementation of CCM	0.478	0.002**	0.490	0.003**
	After implementation of CCM	0.864	0.000**	0.519	0.001**

**A high statistically significant difference ($P \leq 0.001$) CCM: Continuous Care Model

Table (6) displays a significant positive correlation between total scores of health-related behaviors regarding preeclampsia and quality of life in both groups before and after implementation of continuous care model ($p \leq 0.001$).

Discussion

The most successful programs without ongoing management will eventually lose effectiveness. Therefore, attendance of participants during management, effective follow-up, and continuance of weekly care counseling sessions through phone contacts or/and face-to-face meeting pertinent to woman' care needs, are among fundamental requirements for achieving continuous care model goals **(Sahebalzamani et al., 2016).** From this perspective, the aim of this study was to investigate the effect of implementing a continuous care model on health-related behaviors and quality of life among women with preeclampsia.

As regards demographic characteristics of women, the findings of the present study showed that the mean age of the study and control groups was 28.63 ± 1.78 and 29.41 ± 1.93 years, respectively. Less than half of the study group had a secondary education, whereas more than half of the control group had a university education. More than half of both groups were housewives. Concerning residence more than two-thirds and more than three-quarters of study and control groups, respectively, living in rural areas. More than two-thirds of both groups had not enough monthly income. There was no statistically significant difference between both groups regarding demographic characteristics. This means that the participant groups were homogenous and there was no confounding impact on the intervention.

These findings agreed with **Sailaja et al., (2018)** who found that the mean age of women with preeclampsia was 28 ± 4.3 years. Also, the results by **El Sayed and Desoky, (2019)** revealed that half of pregnant women with preeclampsia had a secondary education, did not have enough income. As well as majority of them were housewives from rural areas. According to **Youssef et al., (2018)** preeclampsia is more prevalent in low-income women, and the severity of preeclampsia raises with lower income.

Conversely, a study **Logan et al., (2020)** found that women with preeclampsia were 35-49 years old. As compared to counterparts, women 20-34 years old were 1.5 times more likely to suffer preeclampsia (OR=1.5, 95% CI=0.5-4.7, p=0.451), whereas women aged 35-49 years were 2.5 times more likely than women aged less than 20 years to develop

preeclampsia (OR=2.5, 95% CI=0.7-8.8, p=0.163).

Furthermore, the study findings demonstrated that more than two-thirds of both groups were primigravida and majority in two groups had no history of abortion, indicating the homogeneity of the groups in terms of previous and current obstetric history. These findings are supported **El Nakhal, (2015**) who confirmed that the rate of preeclampsia is higher in primigravida than in multipara. Also, **Itoh et al., (2017)** reported that preeclampsia affects a 1.5 to 2 folds higher incidence among primigravida women. On contrary, the study conducted by **Muti et al., (2015),** who found that preeclampsia is common in women with multiparty. This difference in the current study result may be due to a discrepancy in sample characteristics.

In addition, more than half of women in both groups attended three antenatal care visits during the current pregnancy. This finding is concurrent with **Logan et al., (2020)** found that women who had fewer than four antenatal care visits were 1.8 times more likely to have preeclampsia. According to **Sripad et al., (2019),** most pregnant women (92.9%) attended antenatal care for at least one of their pregnancies.

The current study found no statistically significant difference in mean blood pressure and body mass index measurements, indicating that the women between both groups were obese (BMI ≥30) and had mild preeclampsia. **Endeshaw et al., (2016) supported** these results, confirming that obese women are more likely to experience preeclampsia.

The key goal of the delivering continuous care model is to improve client's acceptance, attitude, and appropriate care practices that are effective in managing disease progression, preventing complications, and enhancing quality of life **(Rahmani et al., 2017).**

On investigating women' health-related behaviors regarding preeclampsia, the study results showed that there was no statistically significant difference between the both groups regarding all items of preeclampsia-related health behaviors, and the mean scores of total health-related behaviors in both groups were low before implementation of continuous care model. This may be attributed to a lack of knowledge among pregnant women about managing preeclampsia because of inadequate antenatal visits in both groups.

On the other hand, after implementation of the continuous care model, the mean total score of health-related behaviors in the study group was significantly higher than in the control group. This may be due to the continuing sensitization process that motivated, encouraged, and empowered these women to adhere to healthy behaviors to control and reduce the complications of preeclampsia. In addition, the effect of regular attendance at sessions followed by weekly follow-up care organized by phone calls.

These results are consistent with other studies. In the study of **Wilkinson and Cole, (2017)** found that obtaining preeclampsia information from a health care provider was linked to improved compliance with health behaviors and treatment. All pregnant women should be advised on the importance of adhering to recommended health practices such as self-monitoring of blood pressure, proteinuria checking, attending regular antenatal visits, bed rest, and seeking medical care that may help ensure better pregnancy outcomes. The study of **Tucker et al., (2018)** and **US Preventive Services Task Force et al., (2017)** emphasized that self-monitoring of proteinuria utilizing urine dipsticks and self-monitoring of blood pressure at home were recommended as beneficial methods for early detection of preeclampsia.

Also, **Rasouli et al., (2019)** indicated that sedentary lifestyle modifications, physical activities, and walking are the other measures recommended for monitoring and preventing preeclampsia. The study of **Kordi et al., (2017)** pointed out that stress management, proper nutrition, physical activity, and regular antenatal care are the practices that have a significant impact on reducing pregnancy-related complications. Additionally, these findings are supported by **Afefy and Kamel (2019**) found that after applying the educational module, there was a significant improvement in self-care practices about preeclampsia among women suffering from

preeclampsia. The mean score of self-care practice was 23.88±3.02 post-test, and 23.59±3.29 at 4 weeks follow up compared to pre-test 20.97±2.25 ($p<0.001$, $p<0.016$ respectively).

Quality of life is one of the major issues for health care providers and plays an important role in assessing health status. Individuals' awareness toward quality of life can lead to more successful interventions. Quality of life assessment is crucial to prevention and treatment programs during pregnancy **(Mirghafourvand et al., 2016).** The significance of quality of life is recognized as one of the leading health challenges facing scientists in the twenty-first century, as a better quality of life **(Estebsari et al., 2020*)***.

Regarding the quality of life of women with preeclampsia, the findings of the current study revealed low mean scores in all domains, indicating that preeclampsia is associated with worse quality of life in pregnant women in the study and control groups, with no statistically significant difference before implementation of continuous care model. These results are in the same line with **Patricia Medeiros Falcao et al., (2016)** who found that hypertensive pregnant women had lower scores in all domains of quality of life, primarily health, physical, and psycho-emotional aspects, as compared to the control group. A significant difference was noted in the total quality of life score ($p = 0.003$). Also, the findings of **Stern et al., (2014)** showed worse quality of life among women with preeclampsia.

On the other hand, the results of the present study indicated that mean scores of the quality of life in the study group were significantly higher than that in the control group after the implementation of the continuous care model. Also, such significant increased occurred in all domains namely, physical health, psychological health, social relationships, and environment besides two items concerning the overall quality of life and general health. This may be attributed to the effective implementation of CCM that assists in recognizing the preeclampsia women's problems and needs and providing relevant knowledge and skills, which consequently helps in promoting health-related behaviors to monitor and prevent complications of preeclampsia and ultimately improve the quality of life.

These findings are in accordance with **Kehler et al., (2016)** who pointed out that care of women with preeclampsia could be improved by assessing and managing psychosocial well-being and ensuring effective communication and information sharing between the women and health care providers. In this regard, the findings of a study by **Keshavarz and Asghari, (2015)** showed that education based on the continuous care model improved the quality of life of women after delivery, and it was suggested that this model be used as a supporting program for women during crucial periods of lives. In agreement with the current results, a study by **Baghaei et al., (2015)** reported that quality of life in heart failure patients was significantly increased in all dimensions by implementing the continuous care model over three months ($P<0.001$). 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.

Moreover, the study finding demonstrated a significant positive correlation between the total scores of health-related behaviors regarding preeclampsia and quality of life in both groups before and after continuous care model implementation. This may be attributed to the fact that promoting with preeclampsia appropriate healthy behaviors contributes to an improved quality of life. This finding is congruent with **Zhianian et al., (2015)** stated that pregnant woman's ability to perform self-care activities would improve quality of life.

Conclusion

Based on the results of the study, it can be concluded that implementing the continuous care model had a positive effect on improving preeclampsia-related health behaviors and the quality of life of women with preeclampsia. Hence, the study aim was achieved, and the research hypothesis was supported.

Recommendations

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

- The continuous care model should be incorporated as a nursing intervention for promoting women's health behaviors and improving quality of life within preeclampsia care.

- Encouraging routine prenatal follow-up for early detection and management of preeclampsia.

Further studies are suggested to:

- Examine the effect of the continuous care model on quality of life in other pregnancy-related complications.

- Apply educational programs for maternity' nurses about the continuous care model for managing such debilitating diseases.

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