

Effect of Centering Pregnancy Model Implementation on Prenatal Health Behaviors and Pregnancy Related Empowerment

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Abstract: Background: Centering pregnancy model has been associated with motivating behavior change, increasing women's empowerment and satisfaction in comparison to standard, individual prenatal care. Aim of the present study was to evaluate the effect of centering pregnancy model implementation on prenatal health behaviors and pregnancy related empowerment. Research design: A quasi-experimental (pre-posttest comparison group). Sample: A purposive sample of 151 pregnant women was recruited for the study and divided into centering pregnancy group was (75 women) and individual prenatal care group was (76 women). Setting: The study was conducted at Obstetrics and Gynecology Outpatient Clinic along with meeting room at Outpatient Clinics' floor affiliated to Benha University Hospital. Tools used for data collection were a structured self-administrating questionnaire, prenatal health behaviors scale, pregnancy-related empowerment scale, and women's satisfaction visual analogue scale. Results: post intervention, the total mean self-reported health behaviors score in the centering pregnancy group was higher than individual prenatal care group (18.13 versus 13.11) respectively. The mean pregnancy related empowerment score centering pregnancy group was significantly higher than individual prenatal care group (54.32 ± 3.28 versus 40.13 ± 7.74 , $p \leq 0.0001$) respectively. Two-thirds of the centering pregnancy group reported high satisfaction level compared to one-tenth of individual prenatal care group. Conclusion: A positive effect of centering pregnancy model, including a greater engagement in favorable health behaviors, a higher pregnancy-related empowerment, and higher satisfaction compared to individual prenatal care. Recommendation: Implementing centering pregnancy model of care more widely for promoting healthy behaviors and empowering pregnant women.

Keywords: Centering Pregnancy, Empowerment, Prenatal Health Behaviors

1. Introduction

Prenatal care is vital to positively impact maternal and infant health outcomes. Prenatal care has become the focus of health care providers global, as providing opportunities in which woman relationships can be utilized to improve woman care and health outcomes. Specifically, Healthy People 2020 has maternal, infant, and child health goals which include an increasing number of women receiving prenatal care, reducing maternal complications related to pregnancy, decreasing preterm birth rate, and reducing the number of low birth weight babies [1].

Group care is receiving increasing attention as an efficient and effective way to provide prenatal care. The most widely known model of group prenatal care is centering pregnancy, which is a client-centered model of group prenatal care that brings women together into small groups [2]. In this model, groups of 8-12 women of similar gestational ages meet in 10 sessions which lasts approximately 60-90 minutes. This format capitalizes on pregnant women's need to share concerns, reactions, experiences with others, and openness to learning about childbirth [3].

Centering Pregnancy is an innovative model of group prenatal care that combines three basic components

assessment, education, and support. Centering pregnancy replaces the individual prenatal care visit with a group model for obstetrical low-risk women, and this model provides substantially more health promotion content than the traditional one-on-one prenatal care model [4, 5].

The centering pregnancy model thus incorporates several 13 elements that structure all groups; 1) health assessment occurs within the group space, 2) participants are involved in self-care activities, 3) a facilitative leadership style is used, 4) the group is conducted in a circle, 5) each session has an overall plan, 6) attention is given to the core content, although emphasis may vary, 7) there is stability of group leadership, 8) group conduct honors the contribution of each member, 9) the composition of the group is stable, not rigid, 10) group size is optimal to promote the process, 11) involvement of support people is optional, 12) opportunity for socializing with the group is provided, and 13) there is ongoing evaluation of outcomes [6].

Centering pregnancy model focuses on nutrition, exercise, social support, health self-awareness, and relaxation techniques. Compared with individual care, group prenatal care has been associated with a reduction in preterm birth, increased birth weight in preterm neonates, increased initiation of breastfeeding, increased utilization of postpartum family planning services, reduction in emergency department visits in the third trimester, and varying degrees of improved satisfaction and increased knowledge [7].

The centering pregnancy model focuses on women assessment and knowledge/education, similar to the traditional prenatal care, but add a unique focus of women support that addresses the physical, social, and emotional stresses of pregnancy through a group approach. This innovative model offers prenatal care designed to enhance learning, promote healthy behaviors change, offer comprehensive health care, build women's sense of control over own health, empower women, develops a supportive network, and create a collaborative midwife-woman relationship through continuity of care [8, 9].

Pregnancy related empowerment is defined as a process whereby there is a progressively increased sense of power resulting from a sharing or redistribution of power. The empowering aspect of CP comes from the sharing of information which changes the woman provider relationship to one that is non-hierarchical and reduce the power differential to allow for equitability [10].

Additionally, empowerment during pregnancy is defined as a sense of self- fulfillment and increased independence, promotion of interaction with women and environment leading to an increase in the spontaneous psychological energy to achieve successful pregnancy and childbirth. Education during pregnancy empowers women for better adjustment confronting physical and emotional changes associated with pregnancy and experiencing a satisfying delivery [11]. Empowerment during pregnancy helps women attain the necessary skills to correctly approach problems that may emerge. These skills would be useful in improving gestational health [12].

Understanding health behaviors during pregnancy and what predicts them is vital because the consequences of these behaviors can be direct, relatively immediate, and affect the health and even survival of a developing fetus [13]. Dealing with healthy behaviors such as regular pregnancy care, receiving proper nutrition, regular physical activity, and receiving adequate social support can have positive effects on pregnancy and childbirth's outcome [14].

Nurses are at the forefront of the development and implementation of group prenatal care. Centering pregnancy was designed and piloted by a certified nurse-midwife and nurses continue to provide the leadership for group prenatal care programs [15]. The nurses can impact how a woman experiences power and empowerment during pregnancy and birth. Nurses must encourage the woman to accept power and take control through confidence building and reinforcement of decisions, knowledge is shared to support woman's decisions [10]. The provision of information facilitates empowerment and helps to increase the ability of women to make decisions with a sense of autonomy [16].

1.1. Significance of the Study

Maternal mortality is a public health concern worldwide, and especially so in developing countries. Approximately 830 women die of preventable causes related to pregnancy and childbirth every day, with 99% of all these maternal deaths occurring in developing countries [17]. Most clinical sites in Egypt provide antenatal care in individual approach. In this approach, caregivers are pressured to check up large numbers of women in a limited time, dissatisfied with the short time spend in receiving care after long waiting, lack of continuity of caregivers, and social and psychological support [18]. According to the WHO report, 83% of pregnant women received antenatal care at least once in the period 2007–2014 globally. However, in the same report 64% had the recommended four or more antenatal care visits [19].

Prenatal care is often seen as a doorway to women's health through prevention, detection and treatment of maternal-fetal conditions. Individual prenatal care lacks adequate contact between women and health care provider, women's education and satisfaction. Conversely, centering pregnancy is the innovative model of prenatal care, seems to close the gap between what is actually provided and looked for and improve pregnant women' empowerment through increasing knowledge and capacities for health decision making, increasing awareness of rights for health and wellness, strengthening opportunities for social support. Thus, the differences in health behaviors during pregnancy between centering pregnancy and traditional prenatal care have been investigated.

To the best of our knowledge, there have been no studies conducted on the empowerment of pregnant women and explicitly examine the effect of centering pregnancy on health behaviors and women's empowerment during pregnancy. Therefore, the present study was conducted.

1.2. Aim of the Study

The present study was aimed to evaluate the effect of centering pregnancy model implementation on prenatal health behaviors and pregnancy related empowerment.

1.3. Research Hypotheses

Hypothesis 1: Pregnant women who receive centering pregnancy model exhibit greater engagement in favorable health behaviors than those participants receiving individual prenatal care as indicated by mean scores.

Hypothesis 2: Pregnant women who receive centering pregnancy model exhibit higher level of pregnancy-related empowerment than those participants receiving individual prenatal care as indicated by mean scores.

Hypothesis 3: Pregnant women who receive centering pregnancy model report higher satisfaction level than those participants receiving individual prenatal care.

2. Subject and Methods

2.1. Research Design

A quasi-experimental (pre-posttest comparison group) design has been utilized in this study.

2.2. Setting

The study was conducted at Obstetrics and Gynecology Outpatient Clinic along with meeting room at Outpatient Clinics' floor affiliated to Benha University Hospital.

2.3. Sample

A purposive sample of 151 pregnant women was recruited for the study according to the following *inclusion criteria*: primigravida, low-risk women without medical or obstetric complications of pregnancy, a singleton pregnancy with gestational age between the 12th and 16th week, who can read and write, agreed to participate in the study. *Exclusion criteria*: Women did not complete prenatal care with the same clinic for the entire pregnancy, women with complications, such as vaginal bleeding or with planned cervical cerclage were ineligible. The sample size was calculated according to [20] statistical formula

$$n = \frac{N \times p(1-p)}{\left[\left[N - 1 \times (d^2 \div z^2) \right] + p(1-p) \right]}$$

Where: N: Population size =1152 according to [21], Z: standard value of confidence level at 95% = 1.96, d is the minimum acceptable degree of error which is set at 7%, p = 0.50, and n: the required sample size 168 women. Considering exclusion of women in the pilot study, the final sample size consisted of 151 women. Participants were divided into two groups (ratio 1:1), centering pregnancy group (intervention) was 75 women, and individual prenatal care group (control) was 76 women.

2.4. Tools of Data Collection

Four main tools were used for data collection:

2.4.1. Tool I: A Structured Self-Administered Questionnaire

This tool was designed by the researchers after reviewing related literature, it was written in a simple Arabic language and it included demographic characteristics of the studied women as age, educational level, occupation, residence and monthly income, and telephone number, in addition, gestational age at enrollment.

2.4.2. Tool II: Prenatal Health Behaviors Scale

The Prenatal Health Behavior Scale (PHBS) was developed by [22] and adapted by the researchers to assess how often in the past two weeks, participants had engaged in a range of 13 health-related behaviors during pregnancy. Women's self-reported health behaviors included nutrition (6 items), physical activity (4 items), sleep (1 item), prenatal vitamin use (1 item), and caffeine consumption (1 item).

Scoring system

Responses are based on a three-point Likert scale varying between 0 = never, 1 = sometimes, and 2 = often, the score of unhealthful items was reversed. The PHBS was scored by summing all the items; the total scale score ranged from 0 to 26, with a higher score indicated greater engagement in favorable health behaviors.

2.4.3. Tool III: Pregnancy Related Empowerment Scale

The Pregnancy-Related Empowerment Scale (PRES) was adopted from [23], and translated into the Arabic language to assess pregnant women's health-related empowerment and sense of control over their pregnancy-related health and health care. The PRES consisted of 16 items covering four subscales; provider connectedness (6 items), skillful decision-making (3 items), peer connectedness (2 items), and gaining a voice (5 items).

Scoring system

The PRES score is a total of the items based on 4- Likert scale rating, from 1 "strongly disagree" to 4 "strongly agree". The total minimum score was 16 and the maximum score was 64. The higher the total score, the higher the pregnancy-related empowerment.

2.4.4. Tool IV: Women's Satisfaction Visual Analogue Scale

A Visual Analogue Scale (VAS) for satisfaction was adapted from [24], and modified by the researchers to assess women's satisfaction with the provided prenatal care. VAS is a horizontal line ranging from 0-10 cm. At the beginning and at the end, there are two descriptors representing extremes of satisfaction (0 = dissatisfied, 10 = very satisfied). The exact question was "How satisfied with your provided prenatal care?" The woman rated satisfaction by making a vertical mark on the 10cm line.

Scoring system

This scale ranked as no satisfaction (zero), low satisfaction (1-3), moderate satisfaction (4-7), and high satisfaction (8-10).

2.5. Tools Validity and Reliability

The tools were reviewed for content validity by a jury panel of three experts in the field of Obstetrics and Women Health Nursing. According to the experts' judgment on clarity of sentences and the appropriateness of contents, simple modifications were done by rephrasing of some sentences in pregnancy related empowerment scale. The reliability was done by Cronbach's Alpha coefficient test, which indicated a high internal consistency of tools, internal consistency of PHBS equal 0.75, and PRES equal 0.87, and women's satisfaction visual analogue scale equal 0.78.

2.6. Ethical Considerations

An informed oral consent was obtained from every woman recruited in the study after explanation of the nature and the aim of the study. The participants were assured that all data are used only for research purpose. Each woman was informed that participation is voluntary and has the right to refuse or withdraw at any time with no consequences. Participants' anonymity and confidentiality were secured.

2.7. Procedure

The study was carried out from beginning of September 2017 to the end of August 2018, covering a period of twelve months. An official approval to conduct this study was obtained from the Dean of Faculty of Nursing to Director of Benha University Hospital. The researchers visited the previously mentioned setting twice/week (Saturday and Monday) from 9.00 a.m. to 1.00 p.m. The study was executed according to the following phases:

2.7.1. Preparatory Phase

Before beginning the study, the researchers equipped themselves with extensive reviewing the background, components and essential elements of the centering pregnancy model to build and upgrade their knowledge and skills about the model that researchers would carry out. The researchers reviewed required clinical skills and all materials were used during the centering antenatal sessions.

2.7.2. Pilot Study

The pilot study was carried out on 10.0% of the overall sample (17 women) to ascertain the relevance, clarity, and applicability of the tools, estimate the time required to fill the study tools. As well as, detect any problems peculiar to conduct the centering pregnancy model and the process of collecting data. According to the results of the pilot study, some modifications were done as an omission item of smoking from prenatal health behaviors scale. Also, the model was adapted by way of groups modified 6-8 women per group instead of 8-12 women per group. Women within the pilot study excluded from the main study sample.

2.7.3. Implementation Phase

After the initial obstetrics exam and physical assessment performed by the obstetrician at the Outpatient Clinic. The

researchers interviewed, introduced themselves to each woman included in the study, explained all information about the study aim, duration, and activities then oral consent was obtained. Tools were completed by the participants in both groups. The data obtained constituted the baseline for further comparison to evaluate the effect of centering pregnancy model. The average time for completion tools was around 25-30 minutes, divided as (5 minutes) for tool I, (10-15 minutes) for tool II, and (10-15 minutes) for tool III.

Centering pregnancy model group, women eligible in the centering pregnancy were allocated into 12 subgroups based on gestational age, each group consisted of 6 to 8 women with similar gestational age. Each group attended 10 structured sessions during the pregnancy for 90 minutes per session. The researchers scheduled group appointments into the antenatal clinic appointment system according the usual prenatal schedule; monthly visits until 28 weeks, then twice a month to 36 weeks, followed by weekly visits until the last session. The schedule of each group' visits was prepared by the researchers and available at the first session. Total researcher/participant time throughout the study was approximately 15 hours, the researchers telephoned women to remind them of the group appointment.

In the first session for each group, women are trained by the researchers to measure blood pressure and weight, fundal height, auscultate fetal heart tones and check urine for glucose and ketones, as well as record these findings with gestational age of the self-assessment record that designed by the researchers. Each woman has individual time with the researchers to share particular concerns. Thereafter, at the beginning of 20-30 minutes of subsequent sessions, the women performed these self-care activities in a private area (corner) within the group space and recorded it. After completion of each woman's physical examination, group discussions focused sequentially on education and skills-building.

Each session has a plan that comprised pregnancy-related health topics. Educational topics included nutrition, fetal development, physiological changes and minor discomforts during pregnancy, danger signs, physical activity during pregnancy, relaxation/stress reduction techniques, sexuality, labor and childbirth preparation, breastfeeding, newborn care, early postpartum care, and contraception. All topics were covered during group sessions emphasis on a particular topic was determined by the group needs.

In addition, skill building of participants through demonstrating and re demonstrating women about certain skills included perineal care, newborn care, and breastfeeding technique and positions. Educational materials used a designed handout, self-assessment records, a standard gestational age wheel, and videos about (fetal development, relaxation technique, and birth). As well as, bath scale, newborn manikin and perineum model, a reclining chair, urinalysis strips, measuring tape, and manometer.

During sessions, the women and researchers sit together in a circle and take turns sharing. The group's leader makes sure that every woman has an opportunity to talk about their

feelings, ask questions and share information with each other. Group sessions were not didactic lectures, but rather an integrated discussion with researchers and women.

Individual prenatal group received the traditional individual prenatal care, the researchers interviewed 3-4 women per day. There was no structured plan for the education or skill building topics. Otherwise, answered any women's questions about the educational topics as needed.

2.7.4. Evaluation Phase

During the third trimester of pregnancy (mean of 36 weeks of pregnancy), prenatal health behaviors and pregnancy-related empowerment tools were collected from both groups to evaluate the effect of the centering pregnancy model. The individual prenatal group (control group) assessed first to avoid bias. Satisfaction visual analogue scale took about 5-10 minutes to assess both groups' satisfaction with the care provided.

2.8. Statistical Analysis

Data were verified prior to computer entry. Statistical Package for Social Sciences (SPSS version 20.0) was used, followed by data analysis and tabulation. Descriptive statistics applied (mean, standard deviation, frequency and percentages). Tests of significance (Chi-square, Fisher Exact Test used when the cells have expected count less than 5 and independent t test) were used for comparison between the groups and to test the study hypotheses. Pearson correlation coefficient used to test the association between variables. A statistically significant difference was considered at p -value ≤ 0.05 , a highly statistically significant difference was considered at p -value ≤ 0.001 . And no statistically significant difference was considered at p -value > 0.05 .

2.9. Limitations of the Study

Firstly, the lack of national researches that study the current research topic. Secondly, all centering pregnancy group' sessions need the presences of both researchers, which required more efforts. Thirdly, some women were shamed for being assessed in a group setting, and lastly, challenging to facilitate group place and sessions.

3. Results

Table 1 shows that 62.7% and 53.9% of the centering pregnancy and individual prenatal care groups aged < 25 years with a mean age 23.65 ± 2.32 and 24.22 ± 1.46 years old respectively. As regards educational level, more than two-thirds of both groups attained secondary education. As regards occupation, 76.0% and 69.7% of the centering pregnancy and individual prenatal care groups were

housewives respectively. More than three-quarters of both groups live in urban areas and reported that their monthly income was not enough. In addition, gestational age at enrollment was 14.12 ± 1.19 and 13.82 ± 1.34 weeks of the centering pregnancy and individual prenatal care groups respectively. No statistically significant differences between both groups in relation to age, educational level, occupation, residence, monthly income and gestational age at enrollment ($p > 0.05$).

Table 2 displays that there was no statistically significant difference regarding all self-reported prenatal health behaviors in a centering pregnancy group and individual prenatal care group pre intervention ($p > 0.05$). On the other hand, there was highly statistically significant difference post intervention between both groups regarding all items related to self-reported prenatal health behaviors; nutrition, physical activity, sleep, and caffeine consumption ($p \leq 0.0001$), except prenatal vitamins use ($p > 0.05$).

Figure 1 reveals that total mean self-reported health behaviors score were relatively similar between both groups pre intervention. Meanwhile post intervention, the total mean self-reported health behaviors score for those participating in the centering pregnancy model was higher than those participating in the individual prenatal care (18.13 versus 13.11) respectively.

Table 3 portrays that mean total pregnancy-related empowerment score was 38.21 ± 4.06 in centering pregnancy group and 37.28 ± 3.81 individual prenatal care group, with no statistically significant difference ($p > 0.05$) pre intervention. Meanwhile post intervention, the mean pregnancy-related empowerment score for those participating in the centering pregnancy group increased compared with those participating in the individual prenatal care group (54.32 ± 3.28 versus 40.13 ± 7.74) respectively. In addition, the mean scores of all pregnancy-related empowerment subscales; provider connectedness, skillful decision-making, peer connectedness, and gaining a voice for those participating in the centering pregnancy group increased compared with those participating in the individual prenatal care groups, with a highly statistically significant difference ($p \leq 0.0001$).

Table 4 elaborates a highly statistically significant positive correlation between total prenatal health behaviors and pregnancy-related empowerment scores between the centering pregnancy and individual prenatal care groups pre and after intervention ($P \leq 0.001$).

Figure 2 illustrates that two-thirds 66.7% of centering pregnancy group exhibit high satisfaction level towards the prenatal care provided compared to 10.5 % of the individual prenatal care group.

Table 1. Distribution of the pregnant women in both groups according to demographic characteristics (n= 151).

Variable	Centering pregnancy Group n= 75	Individual prenatal care group n= 76	X ² /FET	P-value
	No. (%)	No. (%)		
Age (years)				
< 25	47 (62.7)	41 (53.9)	1.180	0.277 ^{ns}
≥ 25	28 (37.3)	35 (46.1)		
Range	20 – 27	21 - 26		
Mean ± SD	23.65 ± 2.32	24.22 ± 1.46	t= 1.810	0.072 ^{ns}
Educational level				
Basic education	3 (4.0)	4 (5.3)		
Secondary education	58 (77.3)	52 (68.4)	1.522 [£]	0.467 ^{ns}
University education	14 (18.7)	20 (26.3)		
Occupation				
Working	18 (24.0)	23 (30.3)	0.749	0.387 ^{ns}
Housewife	57 (76.0)	53 (69.7)		
Residence				
Rural	13 (17.3)	17 (22.4)	0.601	0.438 ^{ns}
Urban	62 (82.7)	59 (77.6)		
Monthly income				
Enough	14 (18.7)	9 (11.8)	1.362	0.243 ^{ns}
Not enough	61 (81.3)	67 (88.2)		
Gestational age at enrollment (weeks)				
Mean ± SD	14.12 ± 1.19	13.82 ± 1.34	t= 1.469	0.144 ^{ns}

^{ns} no statistically significant difference (p > 0.05) t= independent t test [£] =Fisher Exact Test

Table 2. Distribution of the studied pregnant women in both groups according to self- reported prenatal health behaviors (n= 151).

Items		Pre intervention		X ² /FET (P-value)	Post intervention		X ² /FET (P-value)
		Centering pregnancy group n= 75	Individual prenatal care group n= 76		Centering pregnancy group n= 75	Individual prenatal care group n= 76	
		No (%)	No (%)		No (%)	No (%)	
Nutrition	Always	13 (17.3)	11(14.5)	4.803	52 (69.3)	14 (18.4)	43.860 [£]
Drink milk or eat dairy products rich with calcium.	Sometimes	55 (73.4)	48 (63.1)	(0.091) ^{ns}	23 (30.7)	50 (65.8)	(0.000)**
	Never	7 (9.3)	17 (22.4)		0 (0.0)	12 (15.8)	
Eat high fiber foods such as whole grain breads or cereals.	Always	10 (13.3)	8 (10.5)	3.135	46 (61.3)	18 (23.7)	33.454 [£]
	Sometimes	49 (65.4)	42 (55.3)	(0.209) ^{ns}	29 (38.7)	38 (50.0)	(0.000)**
	Never	16 (21.3)	26 (34.2)		0 (0.0)	20 (26.3)	
Eat a balanced meal, including fruits or vegetables.	Always	24 (32.0)	19 (25.0)	3.012	56 (74.7)	25 (32.9)	28.611 [£]
	Sometimes	38 (50.7)	35 (46.1)	(0.222) ^{ns}	17 (22.7)	36 (47.4)	(0.000)**
	Never	13 (17.3)	22 (28.9)		2 (2.6)	15 (19.7)	
Drink enough fluids.	Always	37 (49.3)	32 (42.1)	0.874	63 (84.0)	36 (47.4)	24.753 [£]
	Sometimes	27 (36.0)	30 (39.5)	(0.646) ^{ns}	12 (16.0)	31 (40.8)	(0.000)**
	Never	11 (14.7)	14 (18.4)		0 (0.0)	9 (11.8)	
Eat snack foods instead of a regular meal.	Always	12 (16.0)	9 (11.8)	0.545	7 (9.3)	13 (17.1)	23.460 [£]
	Sometimes	48 (64.0)	51 (67.1)	(0.761) ^{ns}	21 (28.0)	45 (59.2)	(0.000)**
	Never	15 (20.0)	16 (21.1)		47 (62.7)	18 (23.7)	
Eating fatty or oily foods.	Always	22 (29.3)	28 (36.8)	3.123	19 (25.3)	16 (21.1)	15.651 [£]
	Sometimes	35 (46.7)	38 (50.0)	(0.210) ^{ns}	17 (22.7)	40 (52.6)	(0.000)**
	Never	18 (24.0)	10 (13.2)		39 (52.0)	20 (26.3)	
Physical activity	Always	1 (1.3)	3 (3.9)	2.329 [£]	21 (28.0)	6 (7.9)	14.859 [£]
Exercise for at least 15 minutes.	Sometimes	29 (38.7)	22 (28.9)	(0.312) ^{ns}	28 (37.3)	23 (30.3)	(0.001)*
	Never	45 (60.0)	51 (67.2)		26 (34.7)	47 (61.8)	
Stretch muscles.	Always	0 (0.0)	0(0.0)	1.571 [£]	11 (14.7)	2 (2.6)	12.518 [£]
	Sometimes	16 (21.3)	23 (30.3)	(0.210) ^{ns}	38 (50.6)	29 (38.2)	(0.002)*
	Never	59 (78.7)	53 (69.7)		26 (34.7)	45 (59.2)	
Lifting heavy objects	Always	0 (0.0)	0 (0.0)	1.911 [£]	0 (0.0)	0 (0.0)	9.550 [£]
	Sometimes	37 (49.3)	46 (60.5)	(0.167) ^{ns}	15(20.0)	33 (43.4)	(0.002)*
	Never	38 (50.7)	30 (39.5)		60 (80.0)	43 (56.6)	
Standing on feet for long periods of time	Always	12 (16.0)	17 (22.4)	2.18	4 (5.3)	6 (7.9)	6.786 [£]
	Sometimes	34 (45.3)	26 (34.2)	(0.336) ^{ns}	18 (24.0)	32 (42.1)	(0.034)*
	Never	29 (38.7)	33 (43.4)		53 (70.7)	38 (50.0)	
Getting sufficient sleep and taking a nap.	Always	31 (41.3)	37 (48.7)	1.546	62 (82.7)	44 (57.9)	12.146 [£]
	Sometimes	39 (52.0)	32 (42.1)	(0.462) ^{ns}	13 (17.3)	29 (38.2)	(0.002)*
	Never	5 (6.7)	7 (9.2)		0 (0.0)	3 (3.9)	
Prenatal vitamins use	Always	41 (54.7)	47 (61.8)	0.799	68 (90.7)	61 (80.3)	3.282 [£]
	Sometimes	34 (45.3)	29 (38.2)	(0.371) ^{ns}	7 (9.3)	15 (19.7)	(0.070) ^{ns}

Items		Pre intervention		X ² /FET (P-value)	Post intervention		X ² /FET (P-value)
		Centering pregnancy group n= 75	Individual prenatal care group n= 76		Centering pregnancy group n= 75	Individual prenatal care group n= 76	
		No (%)	No (%)		No (%)	No (%)	
Caffeine consumption (drinks with caffeine such as coffee, sodas.	Always	28 (37.3)	22 (28.9)	1.53	10 (13.3)	25 (32.9)	18.986
	Sometimes	33 (44.0)	35 (46.1)	(0.465) ^{ns}	15 (20.0)	27 (35.5)	(0.000)**
	Never	14 (18.7)	19 (25.0)		50 (66.7)	24 (31.6)	

^{ns} no statistically significant difference ($p > 0.05$) *A statistically significant difference ($P \leq 0.05$) [£] =Fisher Exact Test

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

Table 3. Comparison of mean pregnancy-related empowerment scores between the studied pregnant women in both groups (n= 151).

Items	Pre intervention		Independent t test (p value)	Post intervention		Independent t test (p value)
	Centering pregnancy group n= 75	Individual prenatal care group n= 76		Centering pregnancy group n= 75	Individual prenatal care group n= 76	
	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
Provider connectedness						
Can ask a health care provider about pregnancy.	2.21 ± 0.62	2.36 ± 0.60	1.422 ^{ns}	3.72 ± 0.53	2.50 ± 0.08	11.086**
Have enough time with health care provider to discuss about pregnancy.	2.29 ± 0.51	2.16 ± 0.52	1.613 ^{ns}	3.83 ± 0.48	2.26 ± 0.75	15.204**
Health care provider listens to pregnant women.	2.61 ± 0.49	2.46 ± 0.50	1.893 ^{ns}	3.85 ± 0.36	2.57 ± 0.84	12.258**
Health care provider respects woman.	2.27 ± 0.69	2.12 ± 0.75	1.490 ^{ns}	3.77 ± 0.42	2.32 ± 0.87	12.954**
Health care provider respects decisions about my pregnancy.	2.05 ± 0.46	2.17 ± 0.44	1.597 ^{ns}	3.68 ± 0.46	2.36 ± 0.81	12.558**
Health care provider respects decision, even if it is different than her recommendation	2.23 ± 0.58	2.14 ± 0.45	0.965 ^{ns}	3.78 ± 0.41	2.19 ± 0.65	17.842**
Total score = 24	13.69± 1.84	13.41 ± 2.43	812 ^{ns} .0	20.87 ± 1.66	14.25 ± 3.95	13.383**
Skillful decision-making						
Take the responsibility for the decisions make about pregnancy like eating healthy food	3.11 ± 0.51	3.19 ± 0.40	1.218 ^{ns}	3.75 ± 0.43	3.24 ± 0.58	6.051**
Can tell when have made a good health choice	2.44 ± 0.81	2.31 ± 0.54	1.106 ^{ns}	3.34 ± 0.58	2.47 ± 0.84	7.416**
Since, began prenatal care, have been making more decisions about health.	2.12 ± 0.46	2.24 ± 0.43	1.609 ^{ns}	3.43 ± 0.59	2.29 ± 0.68	10.833**
Total score = 12	7.67 ± 1.35	7.45 ± 1.04	1.115 ^{ns}	10.24 ± 0.93	7.69 ± 1.69	11.402**
Peer connectedness						
Women need to share experiences with other women when are pregnant	2.41 ± 0.62	2.30 ± 0.46	1.248 ^{ns}	3.51 ± 0.60	2.58 ± 0.64	9.194**
Share feelings and experiences with other women.	2.27 ± 0.55	2.39 ± 0.49	1.503 ^{ns}	3.45 ± 0.59	2.47 ± 0.64	9.686**
Total score = 8	4.47 ± 1.36	4.69 ± 0.89	1.227 ^{ns}	6.80±1.41	4.96 ± 1.20	8.607**
Gaining a voice						
Know if woman gaining the right amount of weight during pregnancy.	2.12 ± 0.46	2.18 ± 0.39	0.921 ^{ns}	3.49 ± 0.53	2.32 ± 0.61	12.409**
Have a right to ask questions when a woman doesn't understand something about pregnancy.	2.28 ± 0.69	2.16 ± 0.83	0.981 ^{ns}	2.97 ± 0.68	2.21 ± 0.65	7.011**
Able to change things in life that are not healthy for women.	2.81 ± 0.43	2.69 ± 0.54	1.461 ^{ns}	3.42 ± 0.47	2.85 ± 0.82	6.014**
Doing what woman can to have a healthy baby.	2.78 ± 0.55	2.88 ± 0.36	1.248 ^{ns}	3.61± 0.49	2.94 ± 0.86	5.587**
If something is going wrong in pregnancy, know who to talk to.	2.59 ± 0.57	2.64 ± 0.46	1.309 ^{ns}	3.37 ± 0.38	2.79 ± 0.83	5.227**
Total score = 20	12.38± 1.84	11.96 ±1.66	1.492 ^{ns}	16.44 ± 2.01	13.01 ± 2.75	8.716**
Total scale score = 64	38.21± 4.06	37.28 ± 3.81	1.469 ^{ns}	54.32 ± 3.28	40.13 ± 7.74	14.623**

^{ns} no statistically significant difference ($p > 0.05$) ** A highly statistically significant difference ($P \leq 0.001$).

Table 4. Correlation coefficient between total prenatal health behaviors and pregnancy related empowerment scores for centering pregnancy and individual prenatal care groups (n=151).

Variables		Total prenatal health behaviors score			
		Centering pregnancy group n= 75		Individual prenatal care group n= 76	
		r	p	r	p
Total pregnancy related empowerment score	Pre intervention	0.637	0.000**	0.542	0.000**
	Post intervention	0.597	0.000**	0.511	0.000**

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

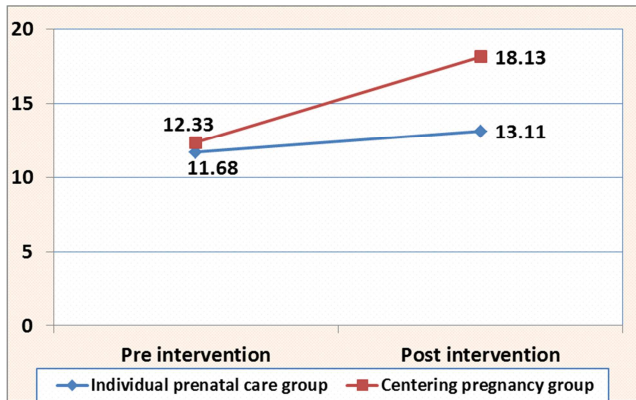


Figure 1. Mean self-reported prenatal health behaviors score of the studied pregnant women in both groups pre and post intervention (n= 151).

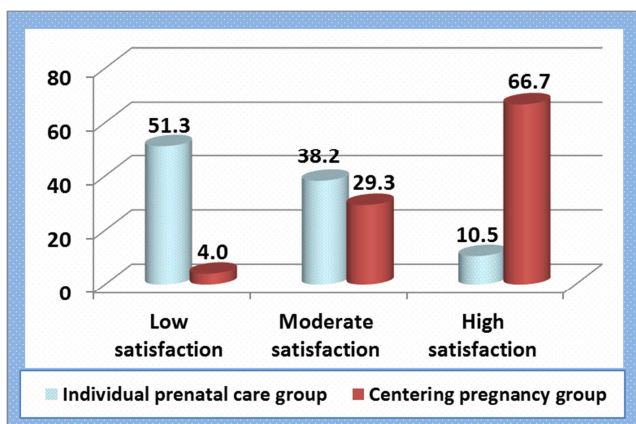


Figure 2. Distribution of the studied pregnant women in both groups according to their satisfaction regarding the provided prenatal care (n=151).

4. Discussion

Centering pregnancy provides greater health promotion education, group peer support, a collaborative woman-provider relationship; and self-management training and activities, all of which should contribute to empowerment [23]. Promoting empowerment can play an important role in improving prenatal care and pregnant women's health. Empowerment in pregnancy allows mothers help themselves, especially at times of hardship, which can be beneficial in future events, as well. Empowerment is associated with improving maternal health and pregnancy outcomes and reducing maternal mortality [25, 26]. Therefore, the present study was aimed to evaluate the effect of centering pregnancy model implementation on prenatal health behaviors and pregnancy related empowerment. Overall, the findings of this study supported the above mentioned stated hypotheses.

The findings of the current study showed no statistically significant differences between the centering pregnancy group and individual prenatal care group in relation to age, educational level, occupation, residence, monthly income and gestational age at enrollment which means the both groups were homogenous. These findings were contradicted with the result of Trudnak [27] who found some differences between

women who participate in centering pregnancy and women who participate individual prenatal care. On average, women in centering pregnancy tended to be younger (average 24.6 versus 26.0 years, respectively; $t = -2.67$, $p = 0.01$), were have graduated from high school ($\chi^2 = 25.7$, $p = 0.001$), and were more likely to be primiparous ($t = -5.14$, $p = 0.001$) compared with women in individual care. This may be due to differences in subjects' culture and health care system.

Regarding self-reported prenatal health behaviors, the findings of the current study revealed total mean self-reported health behaviors score were relatively similar between groups with no statistically significant difference between centering pregnancy group and individual prenatal care group pre intervention.

On the other hand, there was a highly statistically significant difference post intervention between both groups regarding all items related to self-reported prenatal health behaviors; nutrition, physical activity, sleep, and caffeine consumption. Additionally, the total mean self-reported health behaviors score for those participating in the centering pregnancy model was higher and indicated greater engagement in favorable health behaviors than those participating in the individual prenatal care. This was supported by Lathrop [28] who found that women participating in group prenatal care experience improvements in both health outcomes and health behaviors. Benediktsson et al. [29] concluded that centering pregnancy increased positive health behaviors. Also, Hale et al. [30] who reported that centering pregnancy group promotes maternal health behaviors and improves health literacy. This is could be due to centering pregnancy provide more time for visits, increasing woman education, motivation, and skills for self-care. The increased education and social support lead to improved health behaviors. Furthermore, centering pregnancy sessions allowed for deeper discussion of certain health behaviors that would otherwise be unmanageable in one-on-one standard care.

On contrary, Shakespear et al. found that women in traditional care had significantly higher scores in health promoting behaviors during pregnancy. This difference may be due to the researchers investigate differences in health behaviors among women in centering pregnancy and traditional care between 28 and 42 weeks gestation, meanwhile the current study between 12 and 16 weeks gestation [31].

However, no statistically significant difference was observed between both groups regarding prenatal vitamin use post intervention. This may be due to the women in both groups were primigravids aware to take prenatal vitamins for maternal, and fetal wellbeing.

Concerning pregnancy related empowerment, the findings of the current study displayed that the mean total pregnancy related empowerment score was relatively identical between both groups pre intervention. Meanwhile post intervention, the mean pregnancy related empowerment score for those participating in the centering pregnancy model was higher

than those participating in individual prenatal care. In addition, the mean scores of all pregnancy related empowerment subscales; provider connectedness, skillful decision-making, peer connectedness, and gaining voice were higher for those participating in the centering pregnancy model than those participating in individual prenatal care. This was consistent with Jafari et al. [32] reported that involvement in centering pregnancy model activities can be empowering, allowing the participants to take more control of health and lives. Trudnak [33] concluded that women in centering pregnancy received more education and support and were more empowered to make decisions than women who used individual care. Fereshte et al. [25] found that there was a significant difference in relation to empowerment score between the control (individual prenatal care) and experimental (group prenatal care) groups ($p=0.013$) and confirmed that group prenatal care was effective in improving empowerment in pregnant women. Also, Weber Yorga and Sheeder, [34] revealed that increased connections made between group members during centering sessions with the opportunity to experience and learn about pregnancy together. Furthermore, this aligns with findings from Heberlein et al. [35] pointed out that group prenatal care has been associated with improvements in confidence, decision making skills, engagement, and support.

This may be attributed to the centering pregnancy model is focused on women centered and empowered group care. This involvement in self-care activities allows women to exert more control over pregnancy care and increases communication and learning among a peer group. Also, centering pregnancy helps the woman to accept power and take control through confidence building and reinforcement of decisions making than the standard of care.

When empowering women to choose health-promoting behaviors, this may be helpful to consider a relatively new, innovative model for prenatal care called centering pregnancy [36]. On the same line, the results of the current study showed there was a highly statistically significant positive correlation between total prenatal health behaviors and pregnancy-related empowerment between centering pregnancy and individual prenatal care groups pre and after intervention. This was congruent with Picklesimer et al. [37] who found that women empowerment was positively associated with health-behaviors during pregnancy. Also, Gaudion et al. [38] reported that women empowerment increases with centering pregnancy, thereby decreasing negative experiences with pregnancy and birth and improving health behaviors. This may be due to women participating in the centering pregnancy model empower themselves by engaging in the decision making process of health care through active participation.

Pertaining to women's satisfaction with the provided prenatal care, the finding of the current study illustrated two-thirds of the centering pregnancy group exhibit higher satisfaction level regarding the provided prenatal care compared to one-tenth of individual prenatal care group. This finding was supported by Jafari et al. [39] who pointed out

the differences in satisfaction between the group and individual prenatal care groups, group care permits substantially more time compared to individual prenatal care (e.g., 120 minutes versus 15 minutes for each visit, or 20 hours versus 1.5 hours throughout the prenatal period, respectively). This provides important opportunities to truly gain the experience, knowledge, and skills necessary for a healthy pregnancy and childbirth. Numerous previous studies have demonstrated group prenatal care has been associated with improved satisfaction compared with individual prenatal care participants [40, 41, 42].

Also, this finding was consistent with a qualitative study done by Cardelli et al. [43] who stressed that women's experience of traditional prenatal care reported low satisfaction, emphasizing poor communication and a sense of disempowerment. Moreover, Cunningham et al. [44] found mean levels of care satisfaction was significantly higher among women who received prenatal care in a group context compared to those who had individual prenatal care ($t=-2.97$; $p=0.003$). This may be attributed to women's dissatisfaction with individual prenatal care related to limited time of supporting education, and explanation about healthy behaviors during pregnancy in the opposite of centering pregnancy.

5. Conclusion

The findings of the current study have shown a positive effect of centering pregnancy model, including a greater engagement in favorable health behaviors, a higher pregnancy-related empowerment, and prenatal care satisfaction compared to individual prenatal care. In addition, a highly statistically significant positive correlation between total prenatal health behaviors and pregnancy related empowerment scores between both groups pre and after intervention. Therefore, the study hypotheses are supported.

6. Recommendations

Based on the findings of the current study, the following recommendations can be suggested:

1. Implementing centering pregnancy model of care more widely for promoting healthy behaviors and empowering pregnant women.
2. Investigate prenatal health behaviors of women receiving centering pregnancy model to determine behaviors change and active engagement in self-care.

Further Researches

1. Repetition of the current study with a qualitative methodology.
2. Assess health care provider perception regarding barriers to implement a centering pregnancy model of care.
3. Investigating the effect of centering pregnancy model of care on maternal and neonatal outcomes.

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