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Effectiveness of Childbirth Education on Nulliparous Women's Knowledge of Childbirth Preparation, Pregnancy Anxiety and Pregnancy Outcomes

Girija Kalayil Madhavanprabhakaran,[1,*] Melba Sheila D'Souza,[1] and KarkadaSubrahmanya Nairy[2]

[1]Sultan Qaboos University, Muscat, Sultanate of Oman

[2]Higher College of Technology, Muscat, Sultanate of Oman

[*]*Corresponding author*: Girija Kalayil Madhavanprabhakaran, Sultan Qaboos University, Muscat, Sultanate of Oman. Tel: +96-824145459, Fax: +96-824413536, E-mail: girija@squ.edu.omkm_girija@yahoo.com

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Abstract

Background: The emerging number of cesarean sections among nulliparous women due to high pregnancy-related anxiety is a major concern of maternity care providers. Childbirth preparations enable women to cope with pregnancy anxiety and enhance pregnancy outcomes. Limited studies evaluated the impact of childbirth educational interventions on pregnancy-specific anxiety and pregnancy outcomes.

Objectives: The aim of this study was to evaluate the effectiveness of childbirth educational intervention on nulliparous women's knowledge on childbirth preparation, pregnancy anxiety, and pregnancy outcomes.

Methods: A randomized controlled trial approach with a two-group pretest/ posttest design was used among hundred nulliparous third trimester pregnant women. All participants were pretested for their knowledge on childbirth preparation and pregnancy anxiety level using knowledge questionnaire, state trait anxiety inventory, and pregnancy-specific anxiety inventory. The experimental group (n = 50) received three sessions of childbirth education. All participants were post- tested before delivery, and their pregnancy outcomes were noted from labor records. Data were collected from a major maternity hospital in Kerala, India. GLM repeated measures analysis and paired t-test were used for data analysis.

Results: The experimental group demonstrated a significantly higher level of knowledge on childbirth preparation ($P < 0.001$), with high reported mean knowledge scores of (54.30 ± 3.86) childbirth preparation than the control group (31.08 ± 1.96). A lower mean scores of pregnancy-specific anxiety among experimental group (102 ± 4.65) ($P < 0.001$) compared to control group (139.96 ± 4.9) signifies the relevance of childbirth education in reducing pregnancy-specific anxiety. Significant reductions of caesarean birth (50%) among nulliparous women along with a 12% increase in newborn's birth weights were the main positive birth outcomes.

Conclusions: Childbirth education significantly reduced pregnancy-specific anxiety and the adverse pregnancy outcomes. The emerging number of cesarean sections on maternal request due to childbirth anxiety could be reduced by empowering nulliparous women through childbirth education.

Keywords: Childbirth, Antenatal Education Classes, Randomized Trials, Psycho-Social, Deliveries, Childbirth Fear, Anxiety, Pregnancy

1. Background

Pregnancy and childbirth are special events in a woman's life, and this transition period is coupled with many worries and high levels of anxiety. Effective maternal childbirth education prepares expectant mothers for safe childbirth. The childbirth education class among the Chines pregnant women revealed reduced anxiety levels, and highlighted the importance of childbirth education class in cultivating positive coping measures among pregnant women (1). Childbirth education effectively reduced childbirth anxiety and increased desire to vaginal births (2, 3). The formal childbirth education intervention programs for nulliparous women was recommended by many researchers, as childbirth education program has been found to be associated with lower levels of maternal anxiety, increased number of vaginal deliveries, gestational age, birth weight and Apgar scores, and improved women's coping ability (1, 4-7). Cochrane meta-analysis of mixed 16 studies (8) concluded that nurse-led relaxation classes and birth preparation classes for low-risk mothers decreased the number of caesarean sections. Childbirth education was suggested by Byrne et al. (9) as a specific strategy to help reduce anxiety of childbirth and alleviate concerns about labor pain.

A 14% - 54% prevalence of childbirth fears and anxiety were reported from England, Iran, Sweden, Hong Kong, Portugal, Danish and Spain (10-14). Evidences re-

vealed high prevalence of pregnancy-related anxiety, especially higher degree of childbirth anxiety, among low risk third trimester nulliparous pregnant women (11, 12, 15-17). The nulliparous status, general and state anxiety level and younger age were testified as major predictors of pregnancy anxiety (7, 18). High prevalence (90% - 94%) of childbirth anxiety, and poor perceived knowledge on childbirth preparation were reported by nulliparous pregnant women of Kerala (15). Even in women with low risk pregnancy, pregnancy anxiety is documented as a predictor of many adverse pregnancy outcomes such as preterm labor, low birth weight, caesarean birth and instrumental deliveries (13, 19, 20). Nulliparous women's high childbirth fears and anxiety is associated with cesarean birth either as emergency or by request (7, 12, 14, 16, 21-24). Anxiety of vaginal birth and a desire to avoid labor pain are the main causes for women demanding cesarean birth. This suggests a gap in knowledge regarding awareness of the recovery times and postpartum pain associated with cesarean surgery compared to those who choose vaginal delivery (25). The nulliparous status and lack of proper knowledge on pregnancy care accounts for increased pregnancy anxiety and adverse labor outcomes. Thus, comprehensive childbirth education could be a window to reduce pregnancy-related anxiety and enhance better pregnancy outcomes.

A meta-analysis review report of nine trials on individual or group antenatal childbirth found a lack of high-quality evidence, and concluded that the effects of antenatal education remain largely unknown (26). Very few studies evaluated the impact of childbirth educational interventions on pregnancy-specific anxiety and pregnancy outcomes. The need for further researches focusing on the impact of childbirth education on pregnancy anxiety has been recommended by many previous researchers (4, 7, 26). There were no evidences of formal childbirth educational practices at the current settings. Therefore, it became appropriate to establish professionally prepared comprehensive childbirth educational classes available for pregnant women of Kerala, India. With the emerging need for a culturally combatable childbirth education, the investigators developed and administered a childbirth education program for nulliparous pregnant women. Hence, this study evaluated the effectiveness of childbirth educational intervention program on nulliparous pregnant women's knowledge on preparation for childbirth, pregnancy-specific anxiety and pregnancy outcomes. The research question was as follows: What is the impact of childbirth educational intervention program on nulliparous pregnant women's knowledge on preparation for childbirth, pregnancy-specific anxiety and the pregnancy outcomes?

2. Objectives

The aim of this study was to evaluate the effectiveness of childbirth educational intervention program on nulliparous pregnant women's knowledge on preparation for childbirth, pregnancy-specific anxiety and pregnancy outcomes.

3. Methods

Randomized controlled trial with a two-group pretest/posttest design was used among nulliparous pregnant women attending the government hospital in Kollam, Kerala, India. Literate nulliparous third trimester singleton low risk pregnant women at the age of 18 - 35 years, who expected normal delivery, were included in the study. Expectant mothers with moderate and high-risk pregnancy or history of mental illness were excluded from the study. The participants' decision to withdraw from the study and absence from two educational sessions and not completing all the phases of the study were also exclusion criteria, so all participants who withdrew/discontinued/moved out of the study area were excluded.

We estimated the sample size based on pre and post mean difference of the two groups. Sample size Formula 1 used was:

$$\frac{C}{\delta^2} + 2 \quad (1)$$

Where δ is standardized effect size. The sample size for the study was calculated at 80% power and delta (δ) value of 0.4 at 0.05 significance level (27). A sample of 60 was required in each group; hence, a sample of 120 low-risk third trimester nulliparous women who volunteered and consented to participate in the study was recruited. All these women were voluntarily enrolled in the study. A random assignment by computer allotted number was used for allocation of 60 women to the intervention and 60 to the control group. Those participants who voluntarily withdrew and were absent from two sessions of the interventions, and those who did not complete all phases of the study were excluded. During the follow-up phases, those participants who withdrew prior to the intervention, discontinued intervention, or withdrew during the follow up as well as those who moved out of the study area (from the experimental or the control groups) were excluded from the study (Figure 1). Therefore, the final sample size was 100 third trimester nulliparous women who completed all phases of the study, and were considered for analysis, with 50 in each group.

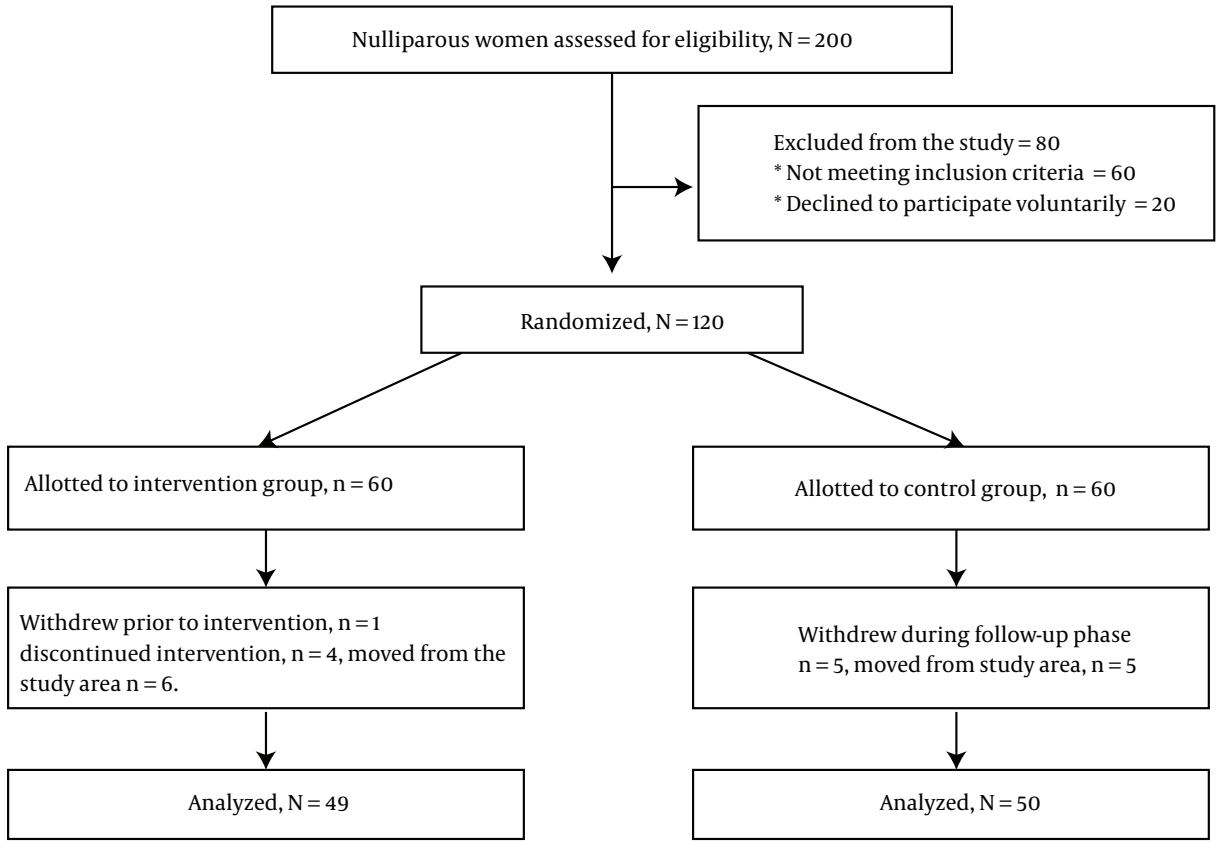

Figure 1. Consort Diagram of the Study

3.1. Instruments: State Trait Anxiety Inventory (STAI)

In this study, general anxiety was measured by a standardized tool state trait anxiety inventory (STAI) (28). The STAI consists of 40 items and comprises separate self-report scales for assessing state and trait anxiety with 20 separate items for each. The total score of STAI ranges from 40 to 160, with a minimum score of 20 to a maximum score of 80 in both State and Trait subscales. This tool has been widely used and validated for assessment during pregnancy. Internal consistency ranged from 0.86 to 0.85 for state and 0.89 to 0.91 for trait subscales (28).

3.2. Pregnancy-Specific Anxiety Inventory (PSAI)

Pregnancy-specific anxiety was assessed by standardized structured pregnancy-specific anxiety inventory (PSAI), a self-report questionnaire on a five-point Likert scale (5 = very severe anxiety, 4 = severe, 3 = moderate, 2 = mild, and 1 = no anxiety) with 40 items distributed under four subsections with a score of 200. The four PSAI subsections are anxiety about being pregnant (ABP) with 16 items; anxiety of childbirth (ACB) with 10 items; anxiety about breastfeeding (ABF) with 8 items and, and 6 items related to anxiety about newborn care (ANB). The face and content validity of the PSAI was established by experts review and piloted for feasibility. Cronbach's alpha reliability coefficient was 0.76.

To assess the pregnancy outcomes, the pregnancy outcome check list with 15 items pertaining to labor, delivery and newborn (method and type of labor, reasons for cesarean birth/assisted birth, perineal tear degrees, postpartum hemorrhage, Apgar score, birth injury, birth weight, gestational age) were collected from the birth records of the participants; the inter-rater reliability coefficient was 0.883.

Knowledge on childbirth preparation was assessed by structured questionnaire consisting of 25 questions with a total score of 60. Out of 25 items, each item had one or more than one correct response and a score of one point was allotted to each correct answer. The content and face validity of the knowledge questionnaire was determined by experts review and piloting. The reliability coefficient was 0.823.

Socio-personal and obstetric variables were women's age, education and occupation, history of abortion, type of family, sources of information, and any family history of mental illness. Spouse habits of smoking, alcoholism and the available support system were included.

Marital satisfaction and quality of marital life and relationship with in-laws were explored on a five- point rating scale.

3.3. Planned Childbirth Educational Program (PCEP)

Planned childbirth educational program (PCEP) was developed to provide information related to the process of childbirth and preparation of pregnant women for childbirth. It included basic anatomy and physiology of the female reproductive system, tips for nutrition, signs and stages of labor, self-care activities and examinations done during intranatal period, breathing exercises and relaxation techniques for reducing labor pain, and breast feeding. The content of the PCEP was validated by an obstetrician, nursing faculty and the practicing midwifes. The content for the intervention was made available as printed and video materials. The developed PCEP was implemented to the experimental group for three times.

3.4. Ethical Consideration

The study was approved by the institutional ethical advisory committee of the schools of behavioral sciences at Mahatma Gandhi University, Kerala (SBeS /612/2003 dated 9/01/2003). Data collection permission was obtained from the district medical officer, Kollam hospitals. An informed written signed consent was obtained from each participant. The consent emphasized voluntary nature, anonymity and assured that the participants have all the right to withdraw from the study at any point without affecting their routine care. No personal identification data were included rather each data sheet was coded. The data were kept under lock and key and confidentiality maintained.

3.5. Data Collection

Each eligible third trimester nulliparous pregnant woman, who were willing to participate in the study was recruited from the antenatal clinics of the major maternity hospital of Kollam, Kerala, India, during the period of 2004 - 2005. The selected 120 participants were initially interviewed for 25 - 30 minutes for their socio- personal variables and childbirth knowledge. Then the participants were given both STAI and PSAI anxiety questionnaires, and were asked to self-rate their anxiety levels. After the pretest, the participants were randomly allocated to control (60) and experimental (60) groups, using simple random method. The experimental group was exposed to three sessions of 45 - 60 minutes PCEP on a weekly basis. The educational interventions were carried out by the researchers in small groups of 2 - 4 nulliparous pregnant women depending on the availability of the sample. A small room attached with antenatal clinic was utilized for the education purpose. The teaching method adopted was discussion, using charts, models and diagrams, power points demonstration and return demonstration of breathing and relaxation techniques. In addition to this formal educational session, each participant in the intervention group was exposed to a 20-minute video show on childbirth education, which had the same content. Handout of the full content with illustrated diagrams was also provided to the participants in the experimental group as a home reference. The control group was exposed to the hospital routine antenatal care without any formal childbirth education classes.

After two weeks of their final sessions of PCEP, and before the delivery, all participants in both groups received a second set of the same questionnaires of knowledge and anxiety inventories as post-test and re-assessed their knowledge and anxiety levels. Using the pregnancy outcome checklists data such as method of delivery, duration of birth, labor induction and reasons for abnormal births, types of perineal tear, postpartum hemorrhage, neonatal outcomes such as birth weight, gestational age, Apgar score, need for neonatal resuscitation and birth injury etc. were collected from the hospital's birth records of the participants.

3.6. Data Analysis

The data were analyzed, using SPSS Version 16, with two-tailed significance level of less than 0.05 (P). T-test and general linear model (GLM) Repeated Measures test were used to test the differences in pregnancy-specific anxiety and effectiveness of interventions in both groups of nulliparous women. GLM-Repeated Measures model tested the main effect on repeated measures between subject's factors, main effects of within subject's factors like measurement times, interaction effects between factors, covariates effects, and effects of interaction between covariate and between-subjects factors.

4. Results

Table1 reveals that the pregnant women of both groups were matched with respect to socio-personal variables ($P > 0.05$). The groups' general anxiety (STAI) levels were also compared (Table 2) and found to be homogenous prior to intervention ($P > 0.05$).

Table 1. Frequency Distribution of Socio-Demographic Variables of the Control and Experimental Groups[a]

Socio-Demographic Variables	Control Group, n = 50	Experimental, n = 50	P Values
Age in year			0.463
18 - 24	42 (84)	39 (78)	
25 - 30	8 (16)	11 (22)	
Religion			0.224
Hindu	28 (56)	34 (68)	
Christian	11 (22)	8 (16)	
Muslims	11 (22)	8 (16)	
Education of women			0.626
Below high school	7 (14)	6 (12)	
High school	14 (28)	13 (26)	
Higher secondary & above	29 (58)	31 (62)	
Occupation of women			0.636
Unemployed	41 (82)	40 (80)	
Employed	9 (18)	10 (20)	
Monthly income			0.408
< 2500	10 (20)	12 (24)	
2500 - 5000	23 (46)	23 (46)	
> 5000	17 (34)	15 (30)	
Types of family			0.264
Nuclear	33 (66)	28 (56)	
Joined	17 (34)	22 (44)	
Sources of information			0.4 68
TV & magazines	30 (60)	33	
Friends & relatives	1 (2)	2	
All of the above	19 (38)	15 (30)	
History of abortion			0.065
Yes	3 (6)	5 (10)	
No	47 (94)	45 (90)	
Relationship with husband			0.108
Highly satisfied	22 (44)	23 (46)	
Satisfied	23 (46)	24 (48)	
Less satisfied	5 (10)	3 (6)	
Care from husband			0.507
Highly satisfied	28 (56)	35 (70)	
Satisfied	20 (40)	15 (30)	
Less satisfied	2 (4)		
Cooperation from in-laws			0.593
Highly satisfied	18 (36)	19 (38)	
Satisfied	24 (48)	26 (52)	
Less satisfied	8 (16)	5 (10)	
Support system			0.683
Husband only	2 (4)	3 (60	
Own family & husband	10 (20)	12 (24)	
Husband's family	10 (20)	10 (10)	
Both families & husband	28 (56)	25 (50)	

[a] All data are presented as No. (%).

Table 3 demonstrates that both the control and experimental groups had a poor knowledge on childbirth preparation. After the PCEP intervention, the experimental groups' knowledge scores improved. The high post-test

Table 2. Mean, Standard Deviation, and Level of Significance of Pretest Scores of State Anxiety Trait Anxiety, STAI of the Control and Experimental Groups[a]

State Trait Anxiety Index (STAI)	Control Group Pretest	Experimental Group Pretest	Mean (95% CI)	P Values
State anxiety	54.42 ± 4.459	54.68 ± 5.231	54.1 (50.55 - 59.65)	0.566
Trait anxiety	50.26 ± 4.407	49.98 ± 5.916	49.3 (45.46 - 55.14)	0.789
STAI	104.88 ± 7.104	105.66 ± 7.310	104.8 (100.7 - 112.9)	0.773

[a] All data are presented as Mean ± SD.

mean scores (54.30) of knowledge on preparation of childbirth among the experimental group were statistically significant at 0.001 level.

Table 4 shows significant differences in the means of pre-posttest scores of PSA and its subsections of women in the control and experimental groups. The highest impact was observed in the area of anxiety about childbirth and being pregnant. These decreased scores of PSA and its four components, with marked changes in childbirth anxiety among pregnant women in the experimental group, were found to be highly significant according to GLM test (Table 5).

The within subject test in repeated-measures-GLM revealed a significant time effect on anxiety across the two points, indicating that the groups' pregnancy-specific anxiety changes over time (Table 5). The interaction of time point measures of pregnancy-specific anxiety with control and experimental groups were found to be significant, indicating that the control and experimental groups' pregnancy-specific anxiety changed over time, but the changes occurred in different ways. The low and statistically significant ($P < 0.001$) post-test scores in pregnancy-specific anxiety and PSA subsections, especially for the section of childbirth anxiety among women in the intervention group, were attributed to the impact of childbirth education.

The STAI post-test mean scores of the experimental group were less than the control group (Table 6). The reduction in general anxiety scores, including both state and trait anxiety scores of the intervention group was found to be statistically significant according to independent t-test ($t = 4.744$, $P < 0.001$). It is evident that although there was a significant reduction in STAI scores, childbirth educational interventions were more sensitive and effective in reducing pregnancy related anxiety levels.

The comparison of pregnancy outcomes between the control and experimental groups revealed that 68% of the experimental group had normal labor compared to 52% in the control group. Assisted delivery due to failure of mother's secondary power reduced from 14% to 10 % in the experimental group. Of the women in the experimental group, 12% had cesarean section compared to 24% in the control group. This 50% reduction of cesarean section could be attributed to the effect of interventions. Only 6% of the pregnant women in the experimental group demanded for cesarean section due to their childbirth anxiety compared to 16% in the control group.

Although not all variables of pregnancy outcomes were significantly changed with the impact of childbirth education, the following variables showed an impact of childbirth education: 96% of the newborns of the interventional group were born at term compared to 84% of the control group. It should be noted that birth weights were increased in 12% of the newborns of the intervention group. Reduction of labor induction rate of 8%, and 4% reduction in prolonged labor among the experimental group were identified. These higher percentages of positive labor outcomes of the interventional group could be related to their reduced pregnancy-specific anxiety levels. Other pregnancy outcomes such as perineal tear, postpartum hemorrhage, neonatal outcomes such as Apgar score, need for neonatal resuscitation and birth injury were not found to be significantly different in the intervention group.

5. Discussion

This study reveals that most nulliparous pregnant women had poor knowledge of childbirth preparation and high levels of pregnancy-specific anxiety, especially of childbirth anxiety. Poor knowledge on childbirth preparation would have contributed to high degree of childbirth anxiety among these nulliparous women. Nulliparous women, who had childbirth education sessions, reported a significant improvement in the knowledge on childbirth preparation. This indicates that the childbirth education program improved the knowledge of nulliparous pregnant mothers on childbirth.

The statistically significant differences in the PSA between the two groups indicated that the PCEP was effective in reducing their pregnancy-specific anxiety. Although there was a significant reduction in STAI scores,

Table 3. Mean, SD and Level of Significance of Pre-Post Test Scores of Knowledge on Preparation of Childbirth in the Control and Experimental Groups[a]

Pre & Post Test	Knowledge on Childbirth Preparation (KCBP)		Mean (95% CI)	P Values
	Control Group	Experimental group		
Pre test	29.26± 2.42	29.24 ± 2.40	29.3 (27.36 - 31.04)	> 0.05
Post test	31.08 ± 1.96	54.30 ± 3.86	31.9 (27.61 - 57.19)	< 0.001

[a]All data are presented as Mean ± SD.

Table 4. Mean and SD of Pre - Post Test Scores of PSA and Four Sections of PSA in the Control and Experimental Groups[a]

Pregnancy Specific Anxiety Index (PSAI)	Control Group		Experimental Group	
	Pretest	Posttest	Pretest	Posttest
PSA	137.40 ± 5.56	139.16 ± 4.9	136.46 ± 6.00	102.00 ± 4.65
ABP	55.58 ±3.49	55.56 ± 3.39	55.64 ± 2.88	35.84 ± 2.70
ACB	38.08 ± 2.82	39.72 ± 2.62	37.68 ± 3.64	26.24 ± 2.09
ABF	26.36 ± 1.59	26.46 ± 2.34	26.36 ± 1.59	21.78 ± 2.62
ANB	17.38 ± 1.43	17.52 ± 1.39	16.78 ± 1.52	15.24 ± 1.45

Abbreviations: PSA, pregnancy specific-anxiety; ABP, anxiety about being pregnant; ACB, anxiety of child birth; ABF, anxiety about breast feeding; ANB, anxiety about newborn car.
[a]All data are presented as Mean ± SD.

Table 5. GLM-Repeated Measures Analysis of PSA and Section-Wise Pregnancy-Specific Anxiety With Respect to Control and Experimental Groups

Repeated Measures	Patterns of Measures	F	Significance (P)
PSAI-pre test	Test between subjects effect	457.7	0.001
PSAI-post test	Test within-subjects effects	1052	0.001
	Interaction	234	0.001
ABP-pre test	Test between subjects effect	38.99	0.001
ABP post test	Test within-subjects effects	506	0.001
	Interaction	153.14	0.001
ACB pre-test	Test between Subjects Effect	113.26	0.001
ACB post-test	Test within-subjects effects	187	0.001
	Interaction	77.72	0.001
ABF-pre test	Test between subjects effect	69.61	0.001
ABF-post test	Test within-subjects effects	154	0.001
	Interaction	20	0.001
ANB-pre test	Test between subjects effect	83.75	0.001
ANB-post test	Test within-subjects effects	182.7	0.001
	Interaction	48	0.001

Abbreviations: PSA, pregnancy specific-anxiety; ABP, anxiety about being pregnant; ACB, anxiety of child birth; ABF, anxiety about breast feeding; ANB, anxiety about newborn car.

the childbirth educational interventions were more sensitive and effective in reducing pregnancy related anxiety levels. These findings demonstrated that planned childbirth education was effective in improving the knowledge of nulliparous pregnant women on childbirth preparation and reducing their pregnancy related anxieties. The practice of breathing exercise and relaxation techniques conditioned nulliparous women and reduced their childbirth anxiety, helping them to cope with the labor process. The findings of less childbirth anxiety among the low-risk nulliparous pregnant women, who attended antenatal education classes, are congruent with previous findings (1-4, 7, 9). The current study findings of the effect of childbirth educational interventions also demonstrated lower scores of STAI among the intervention group, which are consistent with findings of Newham (28), which showed a signifi-

Table 6. Mean, SD and Level of Significance of Posttest Scores of STAI, State Anxiety and Trait Anxiety in Control and Experimental Groups[a]

State Trait Anxiety Index (STAI)	Control Group Posttest	Experimental Group Posttest	Mean (95% CI)	P Value
State anxiety	50.98 ± 4.51	45.58 ± 4.73	45.5 (41.6 - 54.64)	< 0.001
Trait anxiety	49.22 ± 4.20	44.80 ± 5.58	44.9 (40.22 - 54.81)	< 0.001
STAI	100.20 ± 7.22	90.38 ± 9.15	89 (81.7-109.2)	< 0.001

[a] All data are presented as Mean ± SD.

cantly lowered STAI scores due to effect of single and multiple sessions of interventions designed to reduce maternal anxiety.

Our study findings signify the need for establishing programmed childbirth education classes for nulliparous pregnant women to empower them with sufficient knowledge and engage them to practice relaxation techniques, which will in turn reduce their pregnancy- specific anxiety, especially that of childbirth anxiety. Reduced pregnancy-specific anxiety, especially childbirth anxiety component, among nulliparous women in the interventional group emphasized the importance of informed childbirth educational classes availability and accessibility for pregnant women, especially for nulliparous women of Kerala. The degree of reduction of pregnancy-specific anxiety as an impact of childbirth educational intervention was more marked as compared to general anxiety reduction. Hence, it highlights the importance of proper childbirth education during pregnancy, especially at the third trimester of pregnancy, to reduce pregnancy-specific anxieties, especially that of childbirth anxiety.

In this study, a significant reduction of 50% in cesarean birth among the interventional group is a considerable finding. Furthermore, the maternal demand for cesarean birth was only 6% among the interventional group and was significantly reduced compared to in the control group (16%). These findings revealed that there were more than doubled numbers of maternal requests for cesarean birth among nulliparous women, who had intense childbirth anxiety. The main cause of high demand for cesarean birth was due to women's fear and anxiety of vaginal birth. Intense childbirth fears and anxiety predict more childbirth pain and increase the risk of emergency cesarean delivery, causing a high number of women to request caesarean birth. This finding is supported by previous study findings (7, 8, 12-14, 16, 17, 21-25). These higher percentages of positive labor outcomes of the interventional group could be related to their reduced PSA levels. A reduction of maternal request for cesarean births from 16% to 6% in the experimental group is credited to the reduced pregnancy-specific anxiety as an impact of childbirth educational intervention.

One of the main strategies to help reduce anxiety of childbirth and allay concerns about labor pain is the formal childbirth education, especially to nulliparous women, who are more anxious about childbirth. The present intervention of formal childbirth education among nulliparous third trimester pregnant women was effective in reducing their childbirth anxiety, and produced better labor outcome in terms of decreased cesarean births and increased vaginal deliveries. These findings are consistent with previous evidences, which affirmed that nulliparous women who attended childbirth classes were found to have less maternal anxiety, low percentages of cesarean birth, and more vaginal delivery (1-4, 7-9, 22).

The study findings is an evidence of the impact of childbirth education on pregnancy outcomes in terms of improved weeks of gestation, birth weight, and reduction in prolonged labor, induction of labor and cesarean births. This study emphasizes that childbirth education during pregnancy is effective to reduce pregnancy-specific anxiety and the adverse labor outcomes. These findings are consistent with previous research findings (4, 5, 8, 13, 19).

Although the results revealed a relationship between pregnancy-specific anxiety and cesarean birth and few other variables measured as pregnancy outcomes, no significant relationship was found between pregnancy specific anxiety and neonatal outcomes such as Apgar scors, neonatal resucitation, and neonatal intensive care admission. These findings are in par with recent findings of Varela et al. (29) from Greece. They concluded that mild to moderate anxiety and depression during the third trimester pregnancy were not associated with neonatal outcomes such as Apgar scores, or neonatal intensive care admission.

Implications: The current results underline the significance of preparing nulliparous pregnant women for healthy births. Integration of PSA screening and incorporation of childbirth education as a part of routine antenatal care would enhance health promotional activities among pregnant women, especially in nulliparous

women. The impact of childbirth education on pregnancy anxiety and pregnancy outcomes is promising, and midwives and nurses can play an important role to enhance better pregnancy outcomes. The role of maternity nurse as a childbirth educator is important, as nurses are available in all health care settings. Implementing regular organized childbirth education by midwives and nurses in antenatal clinics and inpatient services of the current setting is highly recommended. Moreover, propagation of childbirth education through mass media is suggested. Policymakers should consider integrating a national policy for the availability and accessibility of routine childbirth education to all pregnant women in all health care settings. The study recommends further evaluative studies on the use of alternative interventions such as yoga and meditation, aerobics, music therapy, and self-efficacy aimed at reducing pregnancy- specific anxiety and improving birth outcomes.

Limitation: The measurement of pregnancy outcomes from the recorded data was the feasible measures, but its consistency was ensured as all hospitals use standardized labor records. The attrition of 16 % of pregnant women from the initial sample after the beginning of the intervention did not affect the analysis and interpretation.

5.1. Conclusion

Childbirth education prepares pregnant women for delivery and alley their fears and anxieties related to childbirth. This study revealed that childbirth education program improved the knowledge of nulliparous women on preparation for labor and delivery. The findings indicated that structured childbirth education programs significantly reduced pregnancy specific anxiety of nulliparous pregnant women and adverse pregnancy outcomes, especially of requested cesarean sections. Bestowing childbirth education to nulliparous women ensures better labor outcomes. Familiarization with techniques of relaxation and the process of labor and delivery before giving birth has impact on expectant mothers, especially on nulliparous women as it addresses their pregnancy-specific anxieties and enhances better pregnancy outcomes. Improved knowledge on childbirth preparation and decreased childbirth anxiety ensures better self-efficacy and satisfaction of childbirth among nulliparous women.

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Footnotes

Authors' Contribution: The corresponding author contributed to the conceptualization, study design, methods, data collection, results, discussion and final draft of the paper. Coauthors contributed to data analysis, discussion, critical analysis and final draft of the paper.

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