The effect of delivery ball and warm shower on the childbirth experience of nulliparous women: A randomized controlled clinical trial

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Research Article

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Abstract

Background

Childbirth is a unique experience that affects women's life. Therefore, this study was performed to determine the effect of delivery ball and warm shower on the childbirth experience of primiparous women.

Methods

This study is a clinical trial that was carried out on primiparous pregnant women referred to Motazedi Hospital in Kermanshah, Iran. Sampling was done by continuous method and pregnant women were divided into three groups of delivery ball-warm shower (n = 33), delivery ball (n = 33) and control (n = 33). Exercise with ball at the dilation of 4 cm was similar in the two groups of delivery ball-warm shower and delivery ball, but the first group also used warm shower at the dilatation of 7 cm. The control group only received the routine delivery care. Demographic information form consisting of pregnancy history and information about the mother and infant were completed and the childbirth experience questionnaire (CEQ) were completed by the women two hours after the childbirth.

Results

There was a statistically significant difference in the mean score of childbirth experience after the intervention between the two groups of delivery ball-warm shower and control (P = 0.001), and also between the delivery ball and control groups (P = 0.001). There was a statistically significant difference in the mean scores of professional support between the two groups of delivery ball-warm shower and control (P = 0.02) and also between the delivery ball and control groups (p = 0.02). There was a statistically significant difference in the mean scores of participation between the two groups of delivery ball-warm shower and control (P = 0.003) and also between the delivery ball and control groups (P = 0.01). There was also a statistically significant difference in the mean scores of sense of security between the two groups of delivery ball-warm shower and control (P = 0.01).

Conclusion

Delivery ball and warm shower were effective interventions to create a positive childbirth experience. This method was more effective than using delivery ball alone in childbirth experience. To achieve a positive experience of childbirth in mothers, the use of both intervention (delivery ball and warm shower) is recommended.

Background

Childbirth is one of the most memorable [1] and special life experiences in women and as a common obstetric emergency [2], it is one of the most painful events that women endure during their lifetime [3]. Some studies have shown that 33% of women have a negative experience of childbirth [4]. Among the factors that create negative childbirth experience in women, we can point to labor pain [5] and most importantly sense of helplessness and lack of control during labor [6]. Negative birth experience is associated with complications such as miscarriage [7], sexual reconnection disorder [8], post-traumatic stress disorder (PTSD), lack of interpersonal relationships, poor mother-infant bond, inappropriate use of mother/infant care services [9], increased intention towards cesarean section in next pregnancies, and increased fear of childbirth [10].

Effective strategies for creating a positive childbirth experience include; supporting women during childbirth, relieving labor pain, minimizing drug interventions during labor, and preparing women for childbirth [11]. The midwife's supportive role is also one of the strong predictors of women's perception-satisfaction of the birth experience [12]. Midwives can reduce the severity of pain and anxiety in women during childbirth and create a positive experience of childbirth for them by providing a dedicated environment and maintaining privacy [13], using non-pharmacological and supportive methods and improving the psychological and emotional health of them [14]. One of the midwife-centered interventions during labor process is to perform special movements using delivery ball in different positions, especially the vertical position [15]. This intervention improves balance, coordination, alertness and control of women and leads to satisfaction and improvement by increasing self-confidence [16].

A warm shower is another midwife-centered intervention that creates a positive childbirth experience, and can be used in most hospitals. It is also more welcomed by clients due to its simplicity and high emotional support that brings to women through their caregiver [17]. This intervention also increases the client's comfort by relieving labor pain, especially in the first stage and also at the beginning of the second stage of labor [18]. Sitting in a warm bathtub during the first stage of labor provides a better delivery experience [19]. Users of this method have reported a better delivery experience [20]. These interventions reduce the need for epidural anesthesia, episiotomy, and instrumental delivery, and no side effects have been reported for mother and infant [21]. Comparison of the effect of warm shower and intravenous injection of hyoscine on pleasant childbirth experience shows the effectiveness of warm shower [18], which has also been introduced as effective measure in reducing labor pain [22].

By using these low-cost and simple methods, while reducing and preventing the side effects of pharmacological methods, including decreased consciousness and contraction, and reduced function of mother and infant's respiratory system [23], we can provide comfort to women during childbirth and create a positive childbirth experience for mothers. Due to the positive results of non-pharmacological and midwife-centered interventions in helping women during childbirth to have a normal physiological delivery with minimal pain and complications, and also creating a positive childbirth experience, this issue is still associated with many challenges in Iran in terms of awareness, acceptance and implementation. The present study was designed to compare the effect of delivery ball and warm shower on the childbirth experience of nulliparous women.

Methods

3.1 | Design

This study is a randomized clinical trial with three groups of delivery ball-warm shower, delivery ball, and control. Data collection lasted from May to December 2020. This research was funded in April 2020 by Iran University of Medical Sciences with the research grant No: IR.IUMS.REC.1399.166. It was also registered in the Thai Clinical Trials Registry (TCTR) center with No: TCTR20200408002.

The study population consisted of primiparous women referred to Motazedi teaching hospital affiliated to Kermanshah University of Medical Sciences. In the delivery ball-warm shower group, in addition to the routine labor care, he first intervention was implemented at dilation of 4 cm, in which special pelvic movements on the ball in a sitting position with a vertical angle of the legs and moving back and forth, sides, up and down and Scott were simulated for an average of 30 minutes. Also, at the dilation of 7 cm, the second intervention was performed by taking a warm shower using a plastic cap. For the first 5 minutes, women could wash full body and the next 15 minutes, they could wash any part of the body they wished. In the ball delivery group, in addition to routine labor care, the intervention with the delivery ball was performed as in the first group. The control group only received the routine labor care. The personal and obstetric information form was initially completed by the researcher. Birth Experience Questionnaire (CEQ) was completed by women 2 hours after the delivery.

3.2 | Participants

Inclusion criteria for women included; primiparous women, gestational age of at least 37 weeks, fetus with single cephalic presentation, spontaneous onset of labor, cervical dilatation of between 4-5 cm, no contraindications for normal delivery, no high-risk pregnancy, no history of mental disorder according to self-report, having at least minimum literacy, estimated fetal weight of less than 4000 g based on ultrasound and clinical examination, and normal pelvic diameter based on vaginal examination. The exclusion criteria included; not willing to continue participating in the study and performing cesarean section as an emergency.

3.3 | Assessment of trial variables

The variables of this study were measured as follows:

3.3.1 | Demographic and obstetric information form

This researcher-made questionnaire was designed in two parts. The first part was related to women's personal characteristics (age, education, employment status, place of residence, economic status, duration of marriage) and the second part was dedicated to obstetric characteristics (number of pregnancies, number of abortions, gestational age, wanted pregnancy, having accompany, and participating in maternity preparation classes).

3.3.2 | Mother and infant information form

This researcher-made questionnaire consisted of two maternal and neonatal parts. A) Maternal part included the duration of active phase of labor, the duration of second phase of labor and the duration of third phase of labor. B) The neonatal part included sex, weight, height and Apgar score of infant at birth.

3.3.3 | Childbirth Experience Questionnaire (CEQ)

The Childbirth Experience Questionnaire (CEQ) designed by Dencker (2010) has 22 items in 4 areas. In the Iranian version of the questionnaire, one item from the area of professional support has been removed, so this questionnaire has 21 items in 4 areas of individual ability (8 items), professional support (4 items), sense of security (6 items) and childbirth participation (3 items). This questionnaire in based on 4-option Likert scale, ranging from it is not correct at all (score 1), it is somehow not correct (score 2), it is somehow correct (score 3) and it is totally correct (score 4). The score range in area of individual ability ranges from 8 to 32, in area of professional support ranges from 4 to 16, in area of sense of security ranges from 6 to 24, in area of childbirth participation ranges from 3 to 12, and the total score of childbirth experience ranges from 21 to 84, with higher score indicating more positive experience. The reliability of this questionnaire with Cronbach's alpha of 0.70 has been confirmed [24]. The translation of this tool in Iran was done by Abbaspoor and colleagues. Reliability of this tool was confirmed by internal consistency method with Cronbach's alpha of 0.82 for the whole questionnaire, 0.71 for the area of individual ability, 0.78 for the area of professional support, 0.69 for the area of sense of security, and 0.58 for the area of participation [25].

3.4 | Sample size

The required sample size at 95% confidence level and 80% test power, assuming that the effect size of intervention should be at least ES = 0.5 (22) to be considered statistically significant, was determined to be N=32 in each group using the following formula:

$$n = \frac{\left(Z_{1-\alpha/2} + Z_{1-\beta}\right)^2}{ES^2} = \frac{(1.96+0.84)^2}{0.5^2}$$

In addition, by taking into account the possibility of 10% sample drop, the final sample size in each group was N=35 and the total number of samples was N=105.

3.5 | Statistical analysis

For inter- group comparison of the quantitative variables of age, duration of marriage, gestational age at delivery, and weight/height of the infant, one-way ANOVA test was used, and for inter-group comparison of the qualitative variables of education level, place of residence, economic status, number of abortions, number of pregnancies, participation in childbirth preparation classes, receiving regular prenatal care and neonatal sex, chi-square test was used. The Fisher's exact test was also used for inter-group comparison

of the qualitative variables of pregnancy status, job and Apgar score of the first minute. One-way ANOVA test was used to compare the childbirth experience, and Tukey post hoc test was used to compare the childbirth experience in pairs. Data were analyzed by SPSS software version 21, and significance level of less than 0.05 was considered.

Result

A total of 135 women were evaluated for their eligibility to participate in the study and finally, 105 eligible women (33 in the delivery ball-warm shower group, 33 in the delivery ball group and 33 in the control group) were included in the study. Details of women who were excluded from the study during follow-up and the final number of women who were statistically analyzed are given in Fig. 1.

Table 1
Demographics and baseline characteristics of the study participants and comparison of the three study groups

Variables	Delivery ball and warm shower group (n = 33)	Delivery ball group (n = 33)	Control group (n = 33)	P - value
Women's age (year) (M ± SD)	4.40± 24.27	4. 90 ± 26.03	5.6 ± 24.88	**0.35**
Women's education n (%)				
High school	13 (39.4)	7 (21.2)	14 (42.4)	**0.4**
Diploma	14 (42.4)	19 (57.6)	13 (39.4)	
University	6 (18.2)	7 (21.2)	6 (18.2)	
Place of residence N (%)				
City	23 (69.7)	27 (81.8)	22 (66.7)	**0.45**
Village	10 (30.3)	6 (18.2)	11 (33.3)	
Economic status n (%)				
Good	7 (21.2)	7 (21.2)	3 (9.1)	**0.21**
Moderate	22 (66.7)	23 (69.7)	21 (63.6)	
Weak	4 (12.1)	3 (9.1)	9 (27.3)	
Women's occupation, n (%)				
Housewife	30 (90.9)	31 (93.9)	31 (93.9)	**0.98**
Employed	3 (9.1)	2 (6.1)	2 (6.1)	
Duration of marriage (year), (M ± SD)	1.24± 2.39	1.47± 2.33	1.49 ± 2.39	**0.98**
Gravida, n (%)				
1	27 (81.8)	26 (78.8)	27 (81.8)	**0.93**

Variables	Delivery ball and warm shower group (n = 33)	Delivery ball group (n = 33)	Control group (n = 33)	P - value
2	6 (18.2)	7 (21.2)	6 (18.2)	
Number of abortions, n (%)				
0	27 (81.8)	26 (78.8)	27 (81.8)	**0.93**
1	6 (18.2)	7 (21.2)	6 (18.2)	
Gestational age at delivery, (X ± SD)	0.97 ± 39.15	0.91 ± 39.03	0.85 ± 39.21	**0.71**
Participation in childbirth preparation classes, n (%)				
Yes	5(15.2)	6(18.2)	6(18.2)	**0.99**
No	28(84.8)	27(81.8)	27(81.8)	
Receive regular prenatal care, n (%)				
Yes	30(90.9)	30(90.9)	29(87.9)	**0.89**
No	3(9.1)	3(9.1)	4(12.1)	
Pregnancy status, n (%)				
Wanted	31 (93.9)	30 (90.9)	26 (78.8)	**0.22**
Unwanted	2 (6.1)	3 (9.1)	7 (21.2)	
Baby's gender, n (%)				
Female	16 (48.5)	19 (57.6)	18 (54.5)	**0.82**
Male	17 (51.5)	14 (42.4)	15 (45.5)	
Apgar score at First minute, n (%)				
9–10	30(90.9)	28(84.8)	30(90.9)	**0.78**
7–8	3(9.1)	5(15.2)	3(9.1)	
Baby's weight, (M ± SD)	375 ± 3190	315 ± 3256	373 ± 3300	**0.45**
Baby's height, (M ± SD)	1.52 ± 50	2.35 ± 49.93	1.67 ± 50.36	**0.61**

There was a statistically significant difference in the mean scores of childbirth experience after the intervention between the two groups of delivery ball-warm shower and control (p = 0.001), and the two groups of delivery ball and control (p = 0.001). There was a statistically significant difference in the mean scores of professional support between the two groups of delivery ball–warm shower and control (p = 0.02) and the two groups of delivery ball and control (p = 0.02). There was a statistically significant difference between the mean scores of sense of security between the two groups of delivery ball-warm shower and control (p = 0.01). There was also a statistically significant difference in the mean scores of participation between the two groups of delivery ball-warm shower and control (p = 0.003) and the two groups of delivery ball and control (p = 0.01), (Table 2).

Table 2
Numerical indicators of childbirth experience and its areas in the three groups

Group **Variable**	**Delivery ball – warm shower group** **(n = 33)**	**Delivery ball group** **(n = 33)**	**Control group** **(n = 33)**	**p-value (between groups)**	****p-value (1–3)**	****p-value (2–3)**	****p-value (1–2)**
Childbirth experience (M ± SD)	70.24 ± 6.95	67.8 ± 6.70	63.06 ± 7.07	0.001*	0.001	0.01	0.35
Childbirth experience (X ± SD) on the basis of 4	17.56 ± 1.73	16.96 ± 1.67	15.76 ± 1.76	0.001*	0.001	0.01	0.35
Individual ability (M ± SD)	3.25 ± 0.39	3.15 ± 0.44	3.05 ± 0.4	0.14*			
Professional support (M ± SD)	3.58 ± 0.64	3.58 ± 0.47	3.17 ± 0.7	0.01*	0.02	0.02	0.99
Sense of security (M ± SD)	3.35 ± 0.46	3.13 ± 0.47	3.02 ± 0.45	0.01*	0.01	0.59	0.14
Participation (M ± SD)	3.24 ± 0.7	3.17 ± 0.71	2.62 ± 0.81	0.002*	0.003	0.01	0.92
*One-way ANOVA **Tukey Post Hoc Test							

Discussion

Regarding the study objective, comparing the three groups after the intervention showed a statistically significant difference in the mean score of childbirth experience between the three groups, so that primiparous women who used the two methods of delivery ball and warm shower had a better childbirth experience compared to the control group. There was no difference in the three groups in terms of individual ability, and no significant difference was observed between the two groups of intervention in terms of the three areas of professional support, participation and sense of security. However, there was a significant difference between the two intervention groups and the control group in terms of the areas of professional support and participation, so that the scores of these areas in intervention groups were higher than those of control group. In terms of sense of security, the difference between the three groups was significant (P = 0.01) and women in the delivery ball-warm shower group felt significantly more secured (3.35) than the control group (3.02) and had a more positive childbirth experience. In the present study, the mean score of birth experience in the three groups was higher than 15, which indicates that women had a positive experience of a normal physiological delivery [19].

Having a positive childbirth experience depends on factors, such as attending delivery preparation classes, receiving support during labor and delivery, having ongoing midwifery care, and having non-pharmacological interventions [26]. The results of a study by Mclachlan et al., showed that women who received ongoing midwifery care during childbirth obtained higher overall childbirth experience scores [27]. A cochrane study of 26 studies conducted on 17,858 pregnant women from 17 countries found that women who received support from midwives, nurses or both did not report a negative childbirth experience [28]. Non-pharmacological interventions such as use of delivery ball promote women's mental health, help them better understand their active role in during labor care and stimulate a sense of participation in them [29]. Full presence of midwife with the mother during ball exercises strengthens the mother's sense of support and security [15]. The presence of a therapist in direct contact with women is just like the presence of a companion with the same beneficial effects, which causes women to be satisfied with childbirth [22]. It also shows the positive effect of support during labor and delivery on the childbirth experience, which is in line with the present study.

In the present study, the group that used warm shower and delivery ball showed a decrease in pain intensity and a high childbirth experience score in the areas of individual ability, sense of security and participation compared to the other two groups. Today, the use of warm water, as a non-pharmacological method with positive physiological and psychological effects, is expanding. Madady et al., who compared the effect of warm shower with intravenous injection of hyoscine, showed a significant reduction in pain intensity and increased delivery satisfaction in both intervention groups [30]. In the study of Ganji et al., who used warm and cold packs during the active and second phases of labor, a significant reduction was observed in labor pain of mothers [31], which is consistent with the findings of present study.

In the study of Lathrap et al., mothers with experience of water birth obtained significantly higher scores of childbirth experience, individual ability, and participation, but no differences were reported in the areas of sense of security and professional support [19]. The overall score of childbirth experience in this study

is consistent with our study, but the results differ in some areas. Perhaps the differences in parity and sample size, especially the number of primiparous women and intervention methods are the reasons for the different results in the two studies. Another study in Sweden examined the effect of water birth on the experience of childbirth in nulliparous and multiparous women and concluded that, the scores of childbirth experience and sense of security were higher in nulliparous women who sat in the water during the first stage of labor using a tube and free position and got off the water with the beginning of the second stage. However, this increase in score was not statistically significant. Also, the score of individual ability was significantly higher, but the scores of participation and professional support, although not statistically significant, were lower in nulliparous women. The results of this study are different from the present study. Perhaps these women felt less in need of professional support than the primiparous women in the conventional (control) delivery group due to their high individual ability. Also, the childbirth experience in the above study was measured 6 weeks after the delivery, which according to the study of Turkmen et al. (2018), the scores of participation and professional support significantly decrease after 3 months of childbirth [32].

Given the long-term effects of childbirth experience on women's physical and mental health, and taking into account the Oxford Summit's emphasis on the prevention of psychological birth trauma (PBT) that negatively affects childbirth experience [33], studies and interventions that try to create a positive childbirth experience are considered as alternative and effective solutions [34]. In the use of warm shower method, the effect of heat on the sacrum region through various mechanisms leads to a reduction in pain intensity and feelings of pleasure and comfort in women [35]; [36]. On the other hand, hydrotherapy reduces the use of drugs and interventions, which have side effects such as fever [37], infection caused by bladder catheterization [38], delivery with spinal anesthesia [39], and uterine tachysystole [40], and leads to normal physiological labor and delivery. Studies have also reported the safety of hydrotherapy for mother, fetus and infant. Warm shower, as a method of using humid heat, has the same benefits as hydrotherapy and heat therapy, which reduce labor pain, makes labor easier and as a result create feelings of comfort, security, support and participation. With the aforementioned benefits of the delivery ball, warm shower also creates a positive childbirth experience in primiparous women.

Limitation And Future Research

One of the limitations of present study was the condition caused by the COVID-19 pandemic at the time of study, which was associated with more fear and anxiety about childbirth in women. Also, the closure of childbirth preparation classes had made it difficult for the women to obtained required knowledge and information, especially about the pain of virginal childbirth. Considering that in the present study, the effect of midwife-centered interventions on multiparous women was not investigated, in future studies, multiparous women are suggested to be examined.

Conclusion

The results of present study showed that, the mean scores of childbirth experience and areas of professional support and participation in both intervention groups were significantly higher than the control group and the score of sense of security in the delivery ball-warm shower group was significantly higher than the control group. Considering that the use of delivery ball and warm shower resulted in better childbirth experience compared to delivery ball alone, it is suggested to use both interventions during delivery in order to achieve a more positive childbirth experience in women.

Declarations

Ethics approval and consent to participate

The present study has been approved by the Ethics Committee of Iran University of Medical Sciences with the ethics code: IR.IUMS.REC.1399.166. It has also been registered in the Clinical Trial Registration Center of Thailand (TCTR) with the code: TCTR20200408002.

Consent for publication

This manuscript does not include any individual person’s data. Upon reasonable request of the corresponding author, qualified investigators will have access to a model consent form.

Availability of data and material

Upon reasonable request of the corresponding author, qualified investigators will have access to the dataset under a Data Use Agreement

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Study concept and design: P S, M K, M R and H H. Acquisition, analysis and interpretation of data: P S. Drafting of the manuscript: M R, H H and M K. Critical revision of the manuscript for important intellectual content: All authors. Obtained funding: P S and M K. All authors read and approved the final manuscript.

Authors' information

Not applicable

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Figures

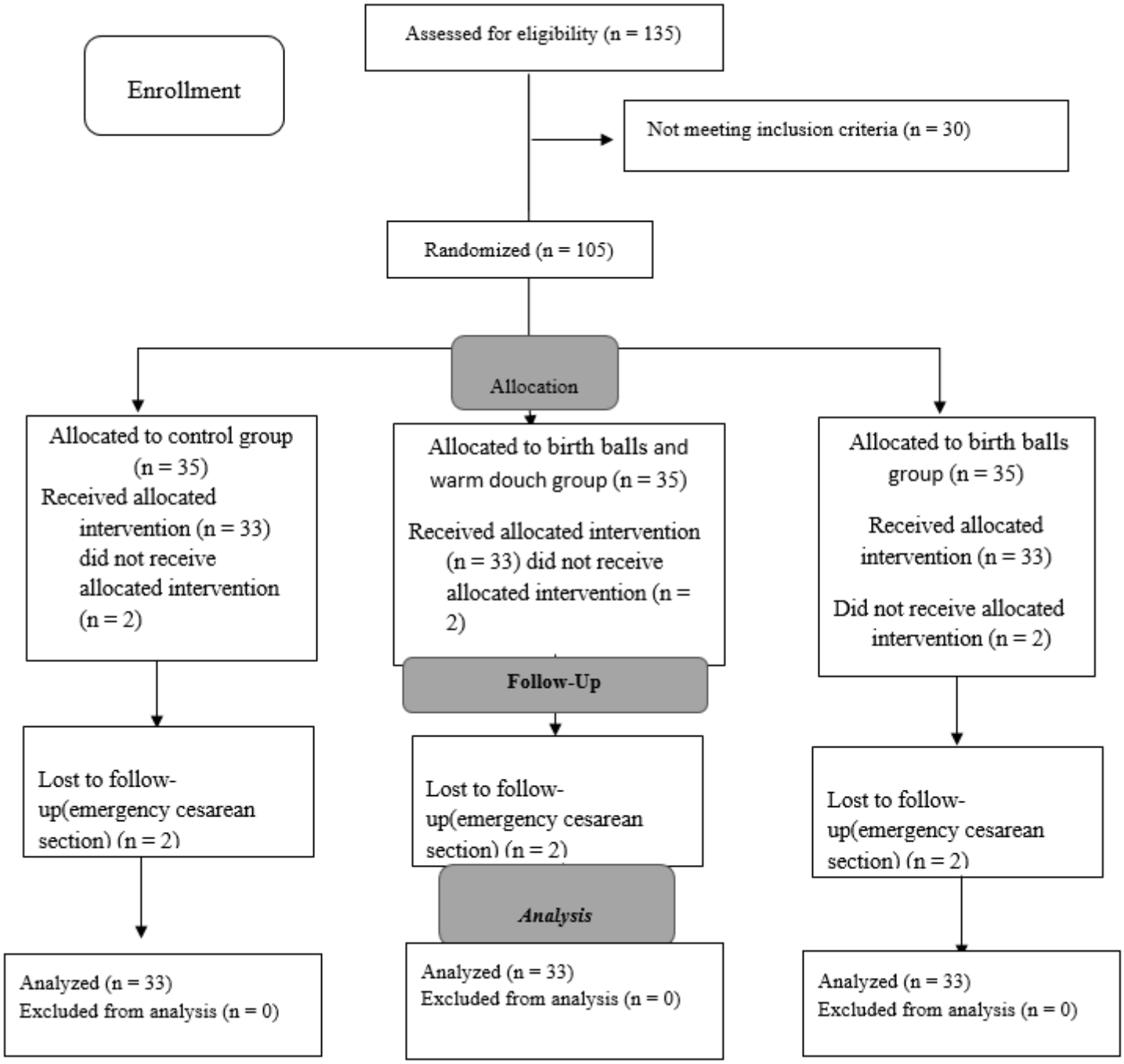

Figure 1

Allocation of participants into the study three groups

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