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A Comparative Study of Maternal and Neonatal Outcomes of Physiological and Non-physiological Delivery in Nulliparous Women and their Infants, Admitted to Motazedi Hospital of Kermanshah, Iran in 2011-2012

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Abstract: Labor pain is arguably one of the most severe types of pain experienced by women. Use of pain relief medications might lead to various complications in both mothers and infants. As a result, use of non-pharmacological methods for pain relief during labor has gained increasing popularity over the past years. In this retrospective, analytical, cohort study, 397 nulliparous women, giving birth at Motazedi Hospital of Kermanshah were evaluated during 2011-2012. The subjects were categorized into two groups: physiological (n = 119) and non-physiological delivery (n = 287). A researcher-made questionnaire was applied for data collection. The content validity of the questionnaire was confirmed by 15 faculty members at the Department of Obstetrics and Gynecology. The required data including the early outcomes of delivery were extracted from mothers' medical records. For data analysis, t-test, Levene's test, Mann-Whitney U test and Chi-square were performed using SPSS Version 16. Regarding maternal variables, there was no significant difference between the two groups in terms of prolonged labor, laceration, depth of laceration, rupture site, uterine inertia, shoulder dystocia, need for vacuum-assisted delivery (or cesarean section), postpartum anemia or episiotomy. On the other hand, there was a significant difference between the two groups in terms of prolonged second stage of labor, anemia before delivery and type of placental abruption. Despite our speculations, the results did not indicate a significant difference between the two groups regarding the majority of variables; however, the frequencies seemed to differ between the groups. In fact, if the number of samples was equal in the two groups, different results might have been obtained. The unequal number of samples between the groups is due to the fact that researchers only aimed to study childbirth in the specified years.

Key words: Maternal outcomes, physiological delivery, non-physiological delivery, postpartum anemia, episiotomy

INTRODUCTION

Each year, over 150 million women become pregnant in developed countries. For some women, pregnancy is regarded as a pleasant experience whereas for some it is associated with pain, fear and even death (Azarkish *et al*., 2007). Labor pain is known as one of the most severe types of pain, experienced by women (Masoudi *et al*., 2008). Persistence of pain and the associated fear during labor can affect mothers' respiratory system, endocrine system, circulatory processes and other mechanisms in the body.

Labor pain by stimulating the sympathetic nervous system induces abnormal heart rate patterns in the fetus, reduces uterine contractility and thus, leads to prolonged labor, neonatal resuscitation and a significant need for assisted delivery (either forceps or vacuum) or cesarean section (Shahpourian *et al*., 2007). Moreover, interference in the process of delivery may cause various problems such as increased rate of cesarean section, mother-infant separation following birth, inadequate spiritual/psychological support for mothers and complications associated with medical interventions and medications such as pain killers and oxytocin.

The mentioned problems have promoted the physiological study of childbirth and pregnancy. Generally, physiological delivery refers to a secure, natural childbirth, associated with low pain and no medical interventions. In this type of delivery, privacy of the mother and her partner is respected and a secure and relaxing environment where inactivity and food consumption are prohibited is provided for the mother.

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Pharmacological methods for pain management exert major adverse effects on the health of mothers and infants. Therefore, labor pain relief by using non-pharmacological methods is the main purpose of physiological delivery (Taavon *et al*., 2010). In this type of delivery, non-pharmacological methods of pain relief such as relaxation, breathing skills, heat/cold therapy and water therapy are employed. Techniques such as breathing skills and relaxation are trained in childbirth educational classes for pregnant women who are willing to use physiological methods for labor pain management. Considering the severity of labor pain for nulliparous women, physiological delivery has become accessible for these mothers in Kermanshah province, Iran. Physiological delivery is expected to significantly reduce labor pain, childbirth complications and the required interventions. Therefore, in this study, we aimed to compare maternal and neonatal outcomes following the application of physiological and non-physiological methods.

MATERIALS AND METHODS

In this retrospective, analytical, cohort study, 397 nulliparous women, referring to Motazedi Hospital for childbirth were evaluated from April 2011 to March 2012. In this study, all pregnant women who had attended childbirth classes were allocated to the physiological delivery group whereas pregnant women, undergoing vaginal delivery via routine hospital procedures were classified in the non-physiological delivery group. Maternal outcomes were compared between the two groups.

The inclusion criteria were as follows: Maternal age of 35-18 years; gestational age of 37-42 weeks; cephalic presentation and singleton pregnancy; primiparity; normal fetal position; normal pelvic diameter, based on the mother's medical record and normal fetal weight (2500-4000 g). Given the retrospective design of the study, the recorded weight of the neonates was selected as a criterion. On the other hand, the exclusion criteria were as follows: Need for emergency interventions for either the mother or the fetus in cases such as bleeding due to placental abruption and emergency cesarean section; bleeding or abnormalities in pregnant woman at the time of hospital admission and chronic diseases such as cardiovascular diseases, hypertension, pulmonary diseases, diabetes, anemia, urinary tract infections, thyroid diseases and epilepsy.

The study population consisted of all nulliparous women who were admitted to Motazedi Hospital in 2011-2012. Childbirth was performed physiologically or non-physiologically. Mothers' medical records were available at the hospital. After reviewing the medical records, mothers who met the inclusion criteria were enrolled in the study. The subjects were selected via census sampling.

Physiological delivery group: In this group, women who had attended childbirth educational classes during their pregnancy were asked not to remain in bed during labor. These women concomitantly performed breathing techniques and benefited from non-pharmacological methods, such as massage therapy for pain management. The subjects finally gave birth without manipulation or use of oxytocin or serums.

Non-physiological delivery group: In this group, women who had not attended prenatal classes were asked to remain in bed during labor. Labor induction and manipulative strategies were applied for these women. The medical records of the subjects were reviewed and their demographic information (e.g., age and gestational age), as well as maternal outcomes (e.g., duration of labor and stages of labor, need for episiotomy, vaginal tears and need for assisted delivery or cesarean section) was extracted and recorded in the data collection checklist. The groups were categorized according to the type of delivery.

The groups were selected based on demographic factors such as age. The subjects in the two groups were matched and the inclusion and exclusion criteria were mutual between the groups. A researcher-made questionnaire which was developed based on the literature review was applied. To ensure its validity, the questionnaire was reviewed by five faculty members at the Department of Midwifery and 10 gynecologists, obstetricians and neonatologists. The questionnaire was revised, based on expert opinion. The obtained data were summarized, using SPSS Version 16.0. To compare the quantitative variables between the two groups, Kolmogorov-Smirnov test was applied while t-test was used for qualitative variables. In case, the data were ordinal or not normally distributed, Mann-Whitney U test was applied. The χ^2-test was used for nominal qualitative data. The Relative Risk (RR) was also calculated to evaluate the outcomes of the type of delivery.

RESULTS AND DISCUSSION

In total, 119 mothers, who met the inclusion criteria, were included in the physiological group while 278 mothers were enrolled in the non-physiological group. Overall, the mean age of mothers was 23.5±4.4 years. Also, the mean age of subjects in the physiological and

Table 1: The age range of mothers in the study groups

	Mode of delivery		
Age	Physiological group (n = 119)	Non-physiological group (n = 278)	p-value
Maternal age (years)			
≤20	37 (31.1%)	87 (31.3%)	p = 0.934
21-25	52 (43.7%)	129 (46.4%)	
26-30	22 (18.5%)	42 (15.2%)	
31-35	6 (5%)	16 (5.8%)	
36-40	1 (0.8%)	2 (0.7%)	
41-45	1 (0.8%)	2 (0.7%)	

non-physiological groups was 23.03±4.3 and 23.06±4.5 years, respectively. The minimum and maximum age of mothers in the physiological group was 18 and 42 years, respectively. In the non-physiological group, the minimum and maximum age was 15 and 45 years, respectively. The median of gestational age was 39 weeks, based on t-test results; the groups were similar in terms of age (Table 1).

Prolonged first stage of labor was reported in none of women in the physiological group while one case (0.4%) was reported in the non-physiological group. The second stage of labor lasted for 20 min in 79% of mothers in the physiological group while it lasted for about 20-50 minutes in 21% of subjects in this group. On the other hand in 71.5, 24.5 and 0.4% of subjects in the physiological group, the second stage of labor lasted for <20 min, 20-50 min and >50 min, respectively. However, the difference between the groups was statistically significant (p = 0.003). Spontaneous placental abruption occurred in 96 (80.7%) and 245 (89.4%) cases in the physiological and non-physiological groups, respectively. The need for manual placental removal in the physiological group (19.3%) was more significant than the non-physiological group (10.6%); this difference was statistically significant (p = 0.019). Additionally, among 159 cases of perineal and vaginal tears, 37 and 41.4% of subjects belonged to the physiological and non-physiological groups, respectively. Also, the rate of rupture was higher in the non-physiological group, although the difference was not statistically significant (p = 0.413).

First-degree laceration was the most common type of rupture in the physiological delivery group (23.5%) while third-degree laceration was not reported in this group. On the other hand, in the non-physiological group, prevalence of first-degree laceration was estimated at 25.5% while third-degree laceration was reported in only one case (0.4%); however, no significant difference was observed between the two groups (p = 0.787). The vagina was the most common site of tear in the physiological delivery group (19.3%) whereas the perineum was the most common site in the non-physiological group (21.2%); the observed difference was not statistically significant (p = 0.662). The incidence rate of childbirth complications including postpartum uterine inertia, shoulder dystocia and need for vacuum-assisted delivery (or cesarean section) was higher in the non-physiological delivery group, compared to the physiological delivery group.

Unlike common belief, in this study, the need for episiotomy in women with physiological delivery was more significant than the non-physiological group (58.6 vs. 56.7%), although this difference was not statistically significant (p = 0.730). No case of maternal mortality was observed after delivery in this statistical population. The rate of anemia in mothers with physiological delivery was higher before delivery while this rate was higher in the non-physiological group after delivery. In fact, decreased hemoglobin level was more common in the non-physiological delivery group (Table 2).

In the present study, 397 nulliparous women were assessed, among whom 119 and 278 cases gave birth via physiological and non-physiological methods, respectively. The majority of women in the two groups were within the age range of 21-25 years with a gestational age of >28 weeks. As the evaluation of maternal outcomes indicated, duration of the first stage of labor was normal in both groups. Only one case in the non-physiological group (0.4%) experienced prolonged first stage of labor which was not significantly different between the two groups. A study by Taavoni *et al*. (2010) which evaluated the use of birth ball as one of the methods of physiological delivery, reported similar findings. In terms of the duration of the second stage of labor, a significant difference was observed between the two groups. Therefore, the duration of this stage in both groups was within the normal range. However, in 79 and 71.5% of subjects in the physiological and non-physiological groups, the second stage of labor continued for <20 min, respectively the difference between the two groups was statistically significant.

Additionally, Kyrandyp in a study on the effects of breathing exercises during labor on labor pain intensity and duration of labor reported similar findings (Kaur *et al*., 2013). Moreover, based on a study by Azarkish *et al*. (2007), duration of the second stage of labor was

Table 2: Maternal outcomes

Maternal outcomes	Mode of delivery: Physiological group (n = 119)	Mode of delivery: Non-physiological group (n = 278)	p-values
Prolonged first stage of labor			
Yes	0 (0%)	1 (0.4%)	p = 0.512
No	119 (100%)	276 (99.6%)	
Duration of the second stage of labor (min)			
<20	94 (79%)	199 (71.5%)	p = 0.003
20-50	25 (21%)	68 (24.5%)	
>50	0 (0%)	11 (4%)	
Type of placental delivery			
Spontaneous	96 (80.7%)	245 (89.4%)	p = 0.019
Manual	23 (19.3%)	29 (10.6%)	
Episiotomy	68 (58.6%)	156 (56.7%)	p = 0.730
Shoulder dystocia	0 (0%)	0 (0%)	p = 0.512
Need for vacuum-assisted delivery	4 (3.4%)	6 (2.2%)	p = 0.487
Cesarean section	0 (0%)	1(0.4%)	p = 0.512
Presence of tear			
Yes	44 (37%)	115 (41.4%)	p = 0.413
No	75 (63%)	163 (58.6%)	
Degree of laceration			
First-degree laceration	28 (23.5%)	71 (25.5%)	p = 0.787
Second-degree laceration	16 (13.4%)	43 (15.5%)	
Third-degree laceration	0 (0%)	1 (0.4%)	
Site of tear			
Perineum	21 (17.6%)	59 (21.2%)	p = 0.662
Vagina	23 (19.3%)	56 (20.1%)	
Uterine inertia			
Yes	3 (2.5%)	6 (2.2%)	p = 0.831
No	115 (97.5%)	268 (97.8%)	
Anemia status before delivery			
Anemia	16 (13.4%)	29 (10.6%)	p = 0.413
Normal	103 (86.6%)	245 (89.4%)	
Anemia status after delivery			
Anemia	51 (42.9%)	125 (45.1%)	p = 0.677
Normal	68 (57.1%)	152 (54.9%)	

significantly lower in women who walked during labor. In the majority of cases in both groups, the placenta was excised spontaneously. In total, the placenta was manually excised in 19.3% of cases in the physiological delivery group whereas manual placental removal was conducted in 10.6% of subjects in the non-physiological group as the results indicated, the difference between the groups was statistically significant.

Dixon *et al*. (2013) in a study on the third stage of labor compared physiological and active delivery groups and reported inconsistent findings. In this study, 0.9% of cases in the physiological group and 1.3% of cases in the active delivery group required manual placental removal. The observed difference may be due to the use of one uterotonic drug dose in the physiological group before placental removal and use of two doses in the active group. However, in our study, the prescription of uterotonic drugs before placental removal was not recorded. With respect to perineal rupture during labor, although a lower rate of rupture was reported in the physiological delivery group, compared to the non-physiological group (37 vs. 41.4%), no statistically significant difference was observed. Attarha *et al*. (2005) compared the effects of perineal massage using lavender extracts on perineal laceration in two groups. They found that the incidence of perineal tear and episiotomy was significantly lower in the intervention group; these results were inconsistent with the present findings.

Comparison between the two groups regarding rupture during labor indicated that the incidence of first, second and third-degree lacerations was lower in the physiological delivery group, although no significant difference was observed between the two groups. This is probably due to the lower number of subjects in the physiological delivery group, compared to the non-physiological group. In fact, if the number of mothers in the two groups was equal, differences would be more apparent. The relationship between rupture site and mode of delivery was not significant in the two groups. Based on the findings, more lacerations occurred in the physiological group, compared to the non-physiological group. Behmanesh in a similar study reported a significant difference in the type and location of rupture between the groups.

Also, Ivanbagha evaluated the effect of perineal massage with lubricant on the rate of rupture in

nulliparous women and reported first-degree laceration in 41 and 50% of subjects in the case and control groups, respectively second-degree lacerations were reported in 9 and 10% of subjects in the case and control groups, respectively. Although, this difference was not statistically significant, there was a lower rate of rupture in nulliparous women, receiving perineal massage. In line with our study, Soufizadeh *et al.* (2013) compared maternal outcomes between physiological and non-physiological delivery groups. The rate of rupture was estimated at 13.7% in the physiological group and 10.1% in the non-physiological group as the findings indicated, the difference between the groups was not statistically significant. Also, in their study, the two groups were compared in terms of early complications after delivery. Uterine inertia was reported in 2.5 and 2.2% of women with physiological and non-physiological deliveries, respectively however, the difference was not statistically significant.

In the present study, shoulder dystocia was reported in only one case (0.4%) in the non-physiological delivery group. The rest of deliveries were performed with no incidence of dystocia. Statistical tests showed that the difference between the two groups was not statistically significant. Also, vacuum-assisted delivery was assessed in our study. Based on the findings, 3.4 and 2.2% of mothers in the physiological and non-physiological groups needed vacuum-assisted delivery, respectively although no statistically significant difference was observed between the groups. However, the physiological delivery group required vacuum-assisted delivery more than the other group. This may be related to the inclination of the physiological group towards vaginal delivery, unlike the non-physiological group which opted for cesarean section.

Langer *et al.* (1998) evaluated the effects of emotional support during labor and delivery in Mexico City. In their study, no statistically significant difference was observed in the use of assisted delivery (forceps or vacuum) or cesarean section between the groups with and without doula. In our study, 100% of mothers in the physiological delivery group underwent vaginal delivery while 99.6 and 0.4% of mothers in the non-physiological delivery group underwent vaginal delivery and caesarean section, respectively the difference between the groups was not statistically significant. Also, Azarkish *et al.* (2007) investigated the effects of walking during the active phase of labor and concluded that mothers who walked during this phase were less likely to require cesarean section. In the present study, the need for episiotomy was reported in 58.6 and 56.7% of mothers in the physiological and non-physiological delivery groups, respectively however, the observed difference was not statistically significant. The need for episiotomy was expected to be significantly lower in mothers in the physiological delivery group. However, it should be mentioned that mothers did not normally perform pelvic floor exercises during pregnancy and avoided perineal massage with olive oil. Also, midwives hastily cut the perineum due to their fear of major perineal rupture during delivery. Therefore, episiotomy was equally performed in the two groups.

In a study by Soufizadeh *et al.* (2013), 16.4 and 39.1% of women in the physiological and non-physiological groups needed episiotomy, respectively however, the difference between the groups was not statistically significant ($p = 0.002$). The review of anemia before delivery showed that 13.4 and 10.6% of mothers in the physiological and non-physiological delivery groups were anemic, respectively the difference between the groups was statistically significant. During the postpartum period, the non-physiological delivery group lost more blood during delivery. Also, 45.1 and 42.9% of subjects were anemic in the non-physiological and physiological delivery groups, respectively; however, no significant difference was reported between the groups. In the present study, no cases of maternal death were reported in the two groups.

CONCLUSION

As expected, although significant differences were reported between the physiological and non-physiological delivery groups in terms of some variables, statistical tests did not indicate any significant difference between these groups regarding the majority of evaluated variables. It seems that several confounding factors have been involved. One of the most important factors was the difference in the number of subjects between the two groups; in fact, if the subjects were equally distributed, the results would have been different. Another, factor might be exercise and care tips provided in childbirth classes for pregnant mothers; therefore, mothers in the physiological delivery group were not prepared for delivery. Among other factors, we can mention physiological delivery management and refusal of medical interventions. Also, the low number of midwives per shift was disproportionate to the high number of physiological deliveries. Therefore, we should determine whether the requirements for childbirth have been met and whether midwives have provided effective services for the participants.

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