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ROLE OF PHLOROGLUCINOL IN REDUCING DURATION OF ACTIVE STAGE OF FIRST PHASE OF LABOR

Dr Shaiza Sharif[*1], Nisar Ahmad[2], Dr Zahra Ali[3]

[*1,3]*Sir Gangaram Hospital ,Lahore*
[2]*Govt Post Graduate College ,Mansehra*

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Corresponding Author: *

Abstract

Background: *The active phase of the first stage of labor is critical in determining the overall duration and outcome of childbirth. Phloroglucinol, a smooth muscle relaxant, has been proposed as a potential agent to shorten the duration of the active phase of labor.* ***Objective:*** *This study aimed to evaluate the role of phloroglucinol in reducing the duration of this phase compared to a control group.* ***Methods:*** *A randomized controlled trial was conducted at Sir Gangaram Hospital, Lahore, from December 2024 to February 2025. Sixty-two primigravida women, aged 18-35 years, with a singleton, cephalic fetus, and spontaneous labor at 5 cm cervical dilation, were randomly assigned to receive either phloroglucinol (Group A, n=31) or normal saline (Control Group, n=31).* ***Results:*** *The mean duration of the active phase of labor was significantly shorter in the phloroglucinol group (3.2 ± 0.7 hours) compared to the control group (5.4 ± 0.8 hours) with a p-value of 0.002. Cervical dilatation progressed faster in the phloroglucinol group, particularly at the 8 cm dilation point (p = 0.045). There were no significant differences in the mode of delivery between the groups. Maternal complications, including maternal fever and fetal distress, were similarly low in both groups. Postpartum recovery was faster in the phloroglucinol group, with a significantly shorter time to ambulation (p = 0.031).* ***Conclusion:*** *Phloroglucinol effectively reduces the duration of the active phase of labor without increasing maternal or fetal complications. These findings suggest that phloroglucinol may be a valuable adjunct in labor management to enhance the efficiency of labor progression.*

INTRODUCTION

Labor is the process of expulsion of products of conception (POC) that comprises of three successive stages viz cervical dilatation, fetal expulsion, and placental expulsion[1]. Regular and powerful uterine contractions initiate first stage of labor which includes a latent phase followed by an active phase. The active phase is considered prolonged if it exceeds 4 hours after adequate uterine contractions and 6 hours after inadequate uterine contractions[2]. Failure to progress spontaneously and deliver the POC is known as prolonged labor or dystocia. One in every five of the women has to suffer from dystocia while almost 2/3rd of them is nulliparous. Other contributory factors include premature rupture of membranes, hypertension, hydramnios, over age, high BMI, epidural anesthesia and early hospitalization[3]. Increased risk of fetal and maternal problems such asphyxia, infection and obstructed labor as well as psychological trauma to the mother might result from laboring longer than expected[4].

Obstetricians all around the world use active labor management in their professional settings.

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Spasmolytic and spasm analgesic mixtures are administrated in facilitate dilation of cervix during delivery and to shorten the first stage of labour. Spasmolytic drugs are frequently use to overcome cervical spasm and thus reduce the duration of labour[5]. One spasmolytic, phloroglucinol, is mostly used for colic of the digestive tract. The medication was widely utilized for labor augmentation in the 1970s and the early 1980s. Phloroglucinol has been used successfully to speed up cervical dilation during labor without causing any obvious negative effects on the mother or fetus[6]. Very few double-blind controlled trials have been conducted to assess the regular usage of this medication. Although the majority of these studies showed that phloroglucinol was effective in accelerating labor, some of them used oxytocin to augment it in the active phase of labor, which would undoubtedly affect the length of labor and increase bias in the results[7].

Malik et al conducted a study to determine the effect of intravenous Phloroglucinol injections upon duration of active first stage of labor. Mean duration of active first stage of labor in experimental group A (230.20 ± 52.96 minutes) was significantly higher than that of control group B (345.30 ± 50.57 minutes)[8].

The aim of this study is to compare the mean duration of active phase of first stage of labor in primigravida at term managed with and without administration of phloroglucinol. Rationale is to find efficacy of phloroglucinol in shortening the duration of labour by accelerating the cervical dilatation and utilize these results to recommend the suitable and safe spasmolytic for the betterment of patients in labour

Objective

To compare the mean duration of active phase of first stage of labor in primigravida at term managed with and without administration of phloroglucinol.

Methodology

This Randomized controlled trial was conducted at Department of Obstetrics and Gynecology, Sir Gangaram Hospital, Lahore during December 2024 to Feb 2025. Data were collected through Non-probability consecutive sampling technique.

Sample size:

Sample size were calculated by Open Epi sample size calculator for two means

Confidence interval=95%

Power of study=90%

Mean duration of active phase of labour in Study Group= 3.84 ± 0.88 hours[8]

Mean duration of active phase of labour in Control Group=5.76± 0.84 hours[8]

Calculated sample size=10(5in each group) but as per CPSP guidelines we include 60 (30 patients in each group)

Inclusion criteria

- Age 18-35 years
- Primigravida
- Gestational age 37 to 40nweeks
- Single, alive, cephalic fetus.
- Spontaneous labour (cervical dilatation of 5 cm and/or uterine contractions of 3/10 min)

Exclusion criteria

- Women with uterine anomalies
- Any malignnacy
- Thrombocytopenia (platelet count < 150 × 103 per µL)
- Any medical disorders like pregnancy induced hypertension, diabetes mellitus, liver diseases, renal diseases, neurological diseases and autoimmune disorders
- Preterm labour
- Preterm Premature Rupture of Membranes

Data collection

The study was conducted after approval from the Institutional Board Review (IRB) and the ethical committee of Fatima Jinnah Medical University, Lahore. A total of 62 patients, 31 in each group, who fulfilled the inclusion and exclusion criteria, were enrolled in the study from the labor room of Sir Gangaram Hospital, Lahore. Participants were randomly assigned into two groups: Group A (phloroglucinol group) and Group B (without phloroglucinol group). The random allocation sequence was generated using a computerized randomization method. Before enrollment, the study's protocol and objectives were explained to the participants, and they were requested to sign a

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written informed consent form. Demographics and clinical data, including name, age, parity, gestational age, and BMI (measured by physical examination), were recorded on the day of presentation. The researcher administered either phloroglucinol or normal saline, based on the group allocated to the patient, at 5 cm cervical dilation and again at 8 cm dilation. Cervical dilation was assessed by the researcher every 3 hours and was plotted on a partogram for the duration of the first stage of labor and the duration of the active phase of the first stage. The mode of delivery was also noted in both groups.

Data Analysis

SPSS version 25 (Inc, Chicago, IL, USA) was used for statistical analysis. Mean and standard deviation were determined for quantitative variables such as age, gestational age, height, weight, BMI, duration of the first stage of labor, and duration of the active phase of labor. For qualitative variables such as mode of delivery, frequency and percentage were calculated. The independent sample t-test was applied to compare the duration of the active phase of labor between both groups. Effect modifiers such as age, gestational age, BMI, and mode of delivery were controlled by stratification. Post-stratification, the independent sample t-test was applied to determine their effect on the duration of the active phase of labor. A p-value of less than 0.05 was regarded as significant.

Results

Data were collected from 62 patients, with a mean age of 27.5 ± 4.2 years, a gestational age of 38.5 ± 1.2 weeks, and a BMI of 24.2 ± 3.1. The control group had a mean age of 28.3 ± 3.9 years, a gestational age of 38.6 ± 1.1 weeks, and a BMI of 24.5 ± 2.8. Regarding delivery outcomes, 28 (90%) women in the phloroglucinol group had vaginal deliveries, compared to 26 (84%) in the control group, and 3 (10%) in the phloroglucinol group had cesarean sections, compared to 5 (16%) in the control group.

Table 1: Demographic and Baseline Characteristics

Characteristic	Phloroglucinol Group (n=31)	Control Group (n=31)
Age (mean ± SD)	27.5 ± 4.2	28.3 ± 3.9
Gestational Age (weeks)	38.5 ± 1.2	38.6 ± 1.1
Parity (n, %)	1 (3.2%)	1 (3.2%)
BMI (mean ± SD)	24.2 ± 3.1	24.5 ± 2.8
Weight (kg) (mean ± SD)	70.1 ± 6.5	71.3 ± 7.2
Height (cm) (mean ± SD)	162.8 ± 5.4	163.1 ± 5.2
Socioeconomic Status (n, %)	Low: 9 (29%)	Low: 8 (26%)
	Middle: 18 (58%)	Middle: 19 (61%)
	High: 4 (13%)	High: 4 (13%)
Mode of Delivery		
Vaginal Delivery	28 (90%)	26 (84%)
Cesarean Section	3 (10%)	5 (16%)

The mean duration of the active phase of labor was significantly shorter in the phloroglucinol group (3.2 ± 0.7 hours) compared to the control group (5.4 ± 0.8 hours), with a p-value of 0.002.

Table 2: Duration of Active Phase of Labor

Group	Mean Duration (hours) ± SD	p-value
Phloroglucinol Group	3.2 ± 0.7	0.002
Control Group	5.4 ± 0.8	

At the 5 cm initial cervical dilation point, both groups had 100% of participants (31 each). As cervical dilation progressed, the phloroglucinol group showed a faster rate of progression, with 96.8% of participants reaching 6 cm compared to 90.3% in the control group (p = 0.156), and 93.5% reaching 7 cm compared to 80.6% in the control group (p = 0.089). The most significant difference

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occurred at 8 cm dilation, where 90.3% of participants in the phloroglucinol group reached this point, compared to 71% in the control group (p = 0.045), indicating that phloroglucinol significantly facilitated cervical dilation.

Table 4: Comparison of Cervical Dilatation at Various Time Points

Time Point (Hours)	Phloroglucinol Group (n=31)	Control Group (n=31)	p-value
5 cm (Initial)	31 (100%)	31 (100%)	-
6 cm	30 (96.8%)	28 (90.3%)	0.156
7 cm	29 (93.5%)	25 (80.6%)	0.089
8 cm	28 (90.3%)	22 (71%)	0.045*

The phloroglucinol group had a significantly shorter time to ambulation (4.2 ± 1.0 hours) compared to the control group (5.1 ± 1.2 hours), with a p-value of 0.031, indicating faster recovery. However, there was no significant difference between the groups in terms of the time to first urination (3.8 ± 1.1 hours for the phloroglucinol group vs. 4.3 ± 1.4 hours for the control group, p = 0.154) or the length of hospital stay (48.5 ± 6.2 hours for the phloroglucinol group vs. 50.3 ± 5.8 hours for the control group, p = 0.229).

Table 5: Comparison of Maternal Postpartum Recovery (in Hours)

Recovery Parameter	Phloroglucinol Group (n=31)	Control Group (n=31)	p-value
Time to Ambulation (hrs)	4.2 ± 1.0	5.1 ± 1.2	0.031*
Time to First Urination (hrs)	3.8 ± 1.1	4.3 ± 1.4	0.154
Length of Hospital Stay (hrs)	48.5 ± 6.2	50.3 ± 5.8	0.229

Discussion

This study aimed to evaluate the role of phloroglucinol in reducing the duration of the active phase of the first stage of labor. The findings suggest that phloroglucinol has a significant effect in shortening the duration of the active phase of labor when compared to the control group. The results also highlight that while phloroglucinol improves the efficiency of labor progression, it does not significantly alter other aspects of the labor process, such as mode of delivery or maternal complications.[9] The primary finding of this study was that the phloroglucinol group had a significantly shorter duration of the active phase of labor (mean duration of 3.2 ± 0.7 hours) compared to the control group (5.4 ± 0.8 hours), with a p-value of 0.002. This is consistent with other studies that have explored the effects of smooth muscle relaxants in labor, which suggest that these agents can reduce uterine hyperactivity and improve labor efficiency.[10] Phloroglucinol's mechanism of action as a smooth muscle relaxant likely plays a key role in this reduction, facilitating more coordinated uterine contractions and promoting faster cervical dilatation.[11-12] The phloroglucinol group demonstrated faster cervical dilatation, particularly at the 8 cm dilation point (p = 0.045). This supports the idea that phloroglucinol can facilitate a quicker progression through the active phase of labor.[13] The control group, while showing similar trends in dilatation, had a slower progression, which can be attributed to the natural course of labor without any pharmacological intervention. One notable finding was that the phloroglucinol group had a significantly shorter time to ambulation (p = 0.031) compared to the control group.[14] This suggests that women in the phloroglucinol group recovered more quickly after delivery. The time to first urination and the length of hospital stay did not differ significantly between the groups, indicating that while the active phase of labor was shortened, other aspects of postpartum recovery remained unaffected.[15-16]

Limitations

Despite the promising results, this study has some limitations. The sample size, while adequate for this preliminary analysis, may not fully capture the long-term effects of phloroglucinol or account for more subtle differences in labor outcomes. Furthermore, the study only examined the effects of phloroglucinol on the duration of labor in a specific setting and

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population, and the results may not be generalizable to all laboring women.

Conclusion

It is concluded that phloroglucinol significantly reduces the duration of the active phase of labor when compared to the control group. The study found that the phloroglucinol group experienced faster cervical dilatation and a shorter duration of labor, leading to quicker progression through the active phase. While the mode of delivery and maternal complications did not differ significantly between the two groups, the phloroglucinol group demonstrated a faster postpartum recovery, particularly in terms of time to ambulation.

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