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Efficacy of Nifedipine in Preterm Labor for Prolongation of Pregnancy for at Least 48 Hours

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ABSTRACT

Introduction: The occurrence of preterm labor during the first 37 weeks of pregnancy creates substantial risks to newborns, which requires effective tocolytic treatments. The calcium channel-blocking drug Nifedipine serves as a common medication for pregnancy delay to enable corticosteroid administration as well as maternal transfer to advanced care centers (1). **Objective**: This study determines how nifedipine affects maternal-neonatal outcomes while measuring its ability to extend pregnancy more than 48 hours in women experiencing preterm labor. **Materials and Method**: The study was conducted from 1st August, 2024 to 31st January, 2025 in Unit 2 of Services Hospital, Lahore and accepted 78 women from 15 to 40 years' old who were carrying single baby fetuses between 28–34 weeks + 5 days. The patients received nifedipine by mouth, starting with 20 mg as a loading dose, followed by up to 160 mg daily over 48 to 72 hours. Data were analyzed using SPSS 20.0 ($p<0.05$). **Results**: The duration of Nifedipine treatment Treated 64 women during labor for more than 48 hours (82.1%), but age, gestational age, and parity did not create any essential differences ($p>0.05$).

INTRODUCTION

Labor that begins before week 37 of pregnancy constitutes a major obstetric challenge due to its links to fetal complications that result in death or harm. The delay in delivery, even within 48 hours, permits improved neonatal health through corticosteroid administration to improve lung maturity while ensuring maternal transfer to specialized neonatal care units. According to the literature, nifedipine emerges as the preferred pharmacological tocolytic agent because it effectively blocks calcium channels to inhibit uterine contractions, resulting in pregnancy extension. The drug stops calcium from entering smooth muscle cells, reducing activity in the myometrium (1). This introduction reviews the use of nifedipine in managing preterm labor highlighting its effectiveness in delaying delivery of at least 48 hours based on a wide compilation of recent research.

Collectively, preterm birth still places a huge global burden, and with around 15 million preterm births every year, there are over one million neonatal deaths. Preventing preterm labor is important at once, as it reduces immediate neonatal risks, but also at a later time, as severe respiratory distress syndrome, intraventricular hemorrhage and developmental delays are prevented. Since its oral administration and favorable safety profile, nifedipine has emerged as a preferred tocolytic compared to beta mimetics or oxytocin receptor antagonists (2). Nifedipine studies have shown that it prolongs pregnancy well, and some have shown a reduction in delivery rate greater than 48 hours when compared with placebo or other tocolytics (3). The medication proves exceptionally beneficial in regions with minimal access to sophisticated neonatal care because it provides every extra hour of pregnancy as an essential (4).

The effectiveness of nifedipine in preterm labor management has been clarified through examinations that investigated its use comparatively. Clinical data reveals that nifedipine produces pregnancy prolongation results similar to or better than transdermal nitroglycerine patches yet generate fewer side effects, which include hypotension (5). Acute tocolysis studies confirm that nifedipine provides equivalent or better results than progesterone for delaying delivery (6). Experimental studies show that nifedipine treatment

with sildenafil citrate produces amplified tocolytic results from the combined mechanisms that improve blood flow to the uterus and prevent contractions (7). However, the optimal regime, whether nifedipine alone or in combination, remains a subject of ongoing research (8).

Medical professionals utilize nifedipine across different patient situations, especially in preterm prelabour rupture of membranes when tocolytic treatment entails infection-related drawbacks. The multi-site trial experiment using nifedipine for PPROM cases shows positive evidence that it might provide a safe delivery delay without raising healthcare risks for mothers or their children (9). Research shows that nifedipine demonstrates equivalent results to indomethacin in delivery delay duration among pregnancies under 32 weeks gestation (10). The broad applicability of nifedipine, as recorded in research, is limited by gestational timing and maternal health status alongside severe preeclampsia status (11).

Although nifedipine is widely accepted in medical practice, it encounters significant obstacles in its application. The tolerability of nifedipine treatment for some patients is constrained by two common maternal side effects, which manifest as hypotension and tachycardia. The studies investigating nifedipine's effects on uteroplacental blood flow focus on fetal safety to confirm that there are no harmful effects on the fetus (12). Studies comparing vaginal progesterone to nifedipine show conflicting outcomes wherein vaginal progesterone is simpler to use and produces fewer cardiovascular complications, although nifedipine demonstrates better active tocolysis (13). Sildenafil citrate, when combined with nifedipine, exhibits potential benefits for quick delivery during 48 hours, according to studies, but additional extensive trials are necessary (14). According to recent trials, Nifedipine shows superior results to oral dydrogesterone for immediate management of premature labor, but scientists must conduct additional research on its long-term effects (15).

Numerous studies demonstrate that nifedipine is capable of successfully extending preterm pregnancies by 48 hours or longer. Tocolytic therapy relies heavily on nifedipine because of its simple application pattern, affordable pricing structure, and tolerable safety performance. Further research will help determine how to optimize nifedipine treatment protocols while evaluating combination treatments and addressing treatment limitations when using this drug for specific clinical needs. The research method combined with the obtained results and relevant implications will be explained through the following text as it contributes to advancing preterm labor treatment approaches.

Objective: To determine nifedipine's ability to delay pregnancies by 48 hours for preterm labor patients while monitoring the effects on maternal and baby-related results.

MATERIALS AND METHODS

Design: Prospective observational study.

Study setting: Department of Obstetrics and Gynecology (Unit 2), Services Hospital, Lahore Pakistan, a tertiary high-risk obstetric referral center.

Duration: The study was done from 1st August, 2024 to 31st January, 2025, long enough for patient recruitment and follow-up.

Inclusion Criteria

Women in active labor (> 4 cm dilatation), preterm rupture of the membranes, vaginal bleeding, history of chorioamnionitis, placenta previa, multiple pregnancies, fetal distress, and preeclampsia were excluded to ensure safety and the validity of the study.

Exclusion Criteria

To ensure safety and monitor study validity, women with multiple gestations, preterm prelabor rupture of membranes, maternal preeclampsia of the severity, placental abruption, fetal distress, or a contraindication to Nifedipine (hypotension, cardiac disease) were excluded.

Methods

This prospective case series describes 78 pregnant women who enrolled at Services Hospital Lahore Unit 2 from 1st August, 2024 to 31st January, 2025. After obtaining ethical approval from the Institutional Review Board and informed consent, the participants were selected by consecutive, nonprobability sampling. Confirmed preterm labor was 3 or 5 or more uterine contractions per 30 minutes, with each lasting 30–50 seconds, cervical effacement to 50%, and cervical dilatation of 0–4 cm; obstetric ultrasound confirmed gestational age, fetal viability, and cervical length. Orally, Nifedipine is loaded with 20 mg and then 20 mg. If contractions continue, every 30 minutes x 1, then every 3–8 hours x 48–72 hours, up to 160 mg/day. The blood pressure was checked every 30 minutes for the first hour and two hours for the next 24 hours. Delivery delay of patients was assessed for 48 hours, and data were analyzed by SPSS 20.0 ($p<0.05$).

RESULTS

The efficacy of nifedipine in prolonging pregnancy for at least 48 hours in 78 pregnant women with preterm labor at Unit 2 of Services Hospital Lahore, between 1st August, 2024 and 31st January, 2025 was evaluated in a prospective case series. The mean age of the study population was 26.76 ± 3.99 years, and the mean gestational age was 31.81 ± 2.04 weeks, with a range of 15 to 40 years and 28 to 34 weeks gestational, respectively. If necessary, Nifedipine was given a 20 mg oral loading dose, repeated up to 160 mg/day orally for

48–72 h. The outcome was the proportion of women who suppressed labor for greater than 48 hours.

Table 1
Demographic Characteristics (n=78)

Variable	Value
Mean Age (years)	26.76 ± 3.99
Mean Gestational Age (weeks)	31.81 ± 2.04
Parity	
Primigravida	16 (25.5%)
Gravida 2	49 (62.8%)
Gravida 3	13 (16.7%)

The demographic distribution was predominantly of a multiparous population, with 62.8% of participants gravida 2. The distribution of parity groups was in balance with 25.5% primigravida and 16.7% gravida 3.
In 64 subjects (82.1%), nifedipine successfully prolonged labor for more than 48 hours; 14 (17.9%) delivered within 48 hours. This fits in with previous studies reporting 75–85% success rates. Nifedipine appeared safe, as it was associated with no serious maternal adverse effects, including severe hypotension.

Table 2
Efficacy of Nifedipine in Prolonging Pregnancy (n=78)

Outcome	Frequency (%)
Labor Prolonged >48 Hours	64 (82.1%)
Delivery Within 48 Hours	14 (17.9%)

Age, gestational age, and parity stratification were performed to see if there was variation in efficacy. Women in the age group of 27–40 years were found to be more efficacious compared to those in the age group of 15–26 years (89.4% vs. 70.9%). Likewise, outcomes were better (85.5%) in 31–34 weeks than in 28–30 weeks (73.9%). Statistically, this difference was insignificant (p>0.05); however, efficacy remained consistent across all subgroups.

Table 3
Efficacy Stratified by Age, Gestational Age, and Parity

Variable		Prolonged >48 Hours (%)	p-value
Age Group	15–26 years	70.9%	0.07
	27–40 years	89.4%	
Gestational Age	28–30 weeks	73.9%	0.12
	31–34 weeks	85.5%	
Parity	Primigravida	81.3%	0.89
	Gravida 2	83.7%	
	Gravida 3	76.9%	

Using SPSS 20.0 and Chi-square tests, data analysis confirmed no significant age, gestational age, or parity differences in efficacy (p>0.05). These findings indicate the effectiveness of nifedipine as a tocolytic agent that delays preterm delivery in most cases, giving time to administer corticosteroids to improve neonatal outcomes.

DISCUSSION

Despite considerable research efforts, preterm labor remains a defensible obstetric problem accounting for substantial preterm morbidity and mortality worldwide. Corticosteroid administration to increase fetal lung maturity and transfer the patient to a facility with a neonatal intensive care unit require at least 48 hours to delay delivery. Services Hospital Lahore (Unit 2) was the location of the prospective case series, completed from March 2024 to August 2024, which investigated the utility of nifedipine to prolong pregnancy in 78 women with preterm labor, achieving an 82.1% postponing delivery to more than 48 hours. These findings are consistent with a large body of literature consistent with nifedipine as a first-line tocolytic agent because of its safety, efficacy, and ease of administration (1).
Between 71.7% and 83% of cases have been reported to have success rates for nifedipine in acute tocolysis, consistent with the 82.1% efficacy rate observed in this study. For example, Aslam et al. recorded an 80% success rate in repressing preterm labor, with nifedipine proving to be a handy drug across various clinical stages (1). Possible causes for the slight variation in efficacy rates in the literature may be differences in patient population, gestational age at presentation, or dosing protocols. In another study, a standardized regimen for usage included a 20mg oral loading dose plus maintenance doses up to 160mg/day. These were well tolerated, without any serious side effects in mothers, such as hypotension or tachycardia, similar to findings reported by Nasrolahei et al. that nifedipine has a favorable safety profile for both mother and fetus (2).
Age stratification showed the efficacy to be higher among 27 to 40 years (89.4%) than in 15 to 26 years (70.9%) women, but the difference was not statistically significant (p=0.07). Physiological differences, for instance, as one approaches maternal age, uterine sensitivity following the administration of calcium channel blockers may be different. Furthermore, efficacy at 31–34 weeks gestation (85.5%) was better than at 28–30 weeks gestation (73.9%), as seen earlier with Dağdeviren et al.'s tocolytics performing worse in earlier preterm gestations (3). However, this was not statistically significant (p = 0.12), indicating that nifedipine is active across most gestational ages, as confirmed by the comparative study with transdermal nitroglycerine (4). Efficacy was similar for parity, 81.3%, 83.7%, and 76.9% for primigravida, gravida 2, and gravida 3, respectively (p=0.89). The finding is opposite to some studies indicating that multiparous women could react differently to nifedipine due to changed uterine dynamics and is consistent with El-Sayed et al.'s observation of nifedipine's consistent efficacy across parity groups (5). This homogeneity in response underscores the ability of nifedipine to provide good management of preterm labor in the presence or absence of obstetric history.
These results are given further context in comparative

studies. Support for the use of nifedipine rather than indomethacin in early preterm labor was found in Gholami et al. (6), where nifedipine was equal to indomethacin in delaying the delivery and was associated with fewer fetal side effects, similarly as in Dr. Singh et al. who used sildenafil citrate alone and did not look at therapy combination (7). Whereas in the comparison of nifedipine to vaginal progesterone, the same efficacy was found, but nifedipine is advantageous to oral-based administration in resource-poor settings such as Pakistan (8). As in Olda et al.'s meta-analysis, these findings are consistent with nifedipine's value in reducing neonatal mortality due to effective tocolysis (9).

This study also corresponds to Lorthe and Kayem's protocol for nifedipine in preterm prelabor rupture of membranes (PPROM). However, this study did not include PPROM as they wanted to minimize confounding factors (10). These findings add support to the efficacy of nifedipine in acute tocolysis, as Alloush et al. compared to vaginal progesterone, but long-term maintenance was not examined here (11). Kaur et al.'s study comparing nitroglycerine patches with nifedipine found nifedipine to have a superior maternal side effect profile and had clinical utility (12, 13). There is promise in combination therapies, namely nifedipine and sildenafil citrate of Abd El-Aziz et al., where the combination reduced delivery by less than 48 hours when compared to nifedipine (13). This study conducted nifedipine monotherapy to determine the efficacy baseline, as Hafeez et al. found nifedipine superior to vaginal progesterone in the acute setting (14). By comparison with oral dydrogesterone, nifedipine also has an advantage for rapid tocolysis, although dydrogesterone may have a placental role in maintenance therapy (15).

This study's limitations include its small sample size, which may not provide sufficient statistical power for subgroup analysis. The full potential of confounding by such as prior medical conditions or patient adherence was not explored. The study also did not evaluate long-term tenant newborn outcomes that would better determine the clinical significance of nifedipine. These findings should be validated in future research with larger, multicenter trials to determine whether these findings are reproducible and to examine whether nebulized nifedipine would serve as an alternative combination therapy or serve as an alternative route of administration, such as sublingual nifedipine, which would have a more rapid onset of action. Tocolytic nifedipine has an 82.1% efficacy in prolonging pregnancy for more than 48 hours with comparable performance across age, gestational age, and parity, and confirms its usefulness as a tocolytic.

CONCLUSION

In 82.1% (63) of 76 women with preterm labor, nifedipine effectively prolonged pregnancy for over 48 hours from March 2024 to August 2024 at Services Hospital Lahore (Unit 2). Nifedipine is a reliable tocolytic agent, as evidenced by its consistent efficacy in all age groups, gestational age, and parity groups, with no significant differences. Its safety was reinforced as no notable maternal adverse effects were observed. Nifedipine is particularly suited for resource-limited settings like Pakistan regarding patient administration, affordability, and safety profile, as it can be given orally, and maternal transfer to neonatal intensive care facilities can be facilitated with corticosteroids. Despite limitations such as a modest sample size and the absence of long-term neonatal outcome data, these findings affirm nifedipine's role as a first-line tocolytic. The optimization of preterm labor management requires future research to utilize combination therapies while working with increased population samples to enhance perinatal outcomes.

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