The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 2, 2025

COMPARISON OF SALBUTAMOL AND NIFEDIPINE IN TREATMENT OF PRETERM LABOUR

Dr. Lareb Gulzar[*1], Dr. Nasreen Fatima[2], Dr. Yasmeen Yousuf[3], Dr. Komal Soni[4], Dr. Sidra Ali[5], Dr. Hira Naz[6]

*[*1]Postgraduate Trainee, Department of Gynaecology and Obstetrics, JPMC Karachi, Pakistan*
[2]Professor and Head of Department, Gyne and Obs Ward 9A, JPMC Karachi, Pakistan
[3,4,5,6]Postgraduate Trainee, Department of Gynaecology and Obstetrics, JPMC Karachi, Pakistan

DOI: https://doi.org/10.5281/zenodo.20338131

Keywords
tocolysis, nifedipine, salbutamol, premature labor, BMI, JPMC Karachi

Article History
Received: 10 January 2025
Accepted: 20 January 2025
Published: 10 February 2025

Corresponding Author: *
Dr. Lareb Gulzar

Abstract

Introduction: *Approximately 5–10% of pregnant women experience preterm labor (PTL), which is one of the leading causes of infant morbidity and mortality globally. Delaying delivery for at least 48 hours in order to provide prenatal corticosteroids is known as tocolysis. Salbutamol and nifedipine are two often given tocolytics, but there is currently a paucity of comparison data from Pakistan. Objective: Using subgroup analysis based on BMI, compare the safety and efficacy of intravenous salbutamol with oral nifedipine in preventing premature labor.*

Method: *Prospective comparative analysis at JPMC Karachi's gynecology ward. A total of 200 women experiencing preterm labor between 28 and 36+6 weeks of pregnancy were included in the trial; 100 participants were assigned to the nifedipine and salbutamol groups, respectively. The success rate of halting work for at least 48 hours was the main goal.*

Result: Both tocolytic agents proved efficacious, with nifedipine demonstrating a successful response in 80% of cases, while salbutamol showed efficacy in 84% (p=0.721). The superiority of nifedipine in prolonging pregnancy duration up to a week beyond 48 hours is statistically significant (37.5% compared to 20.6%, p=0.03). Salbutamol-induced maternal adverse effects were found to be significantly more common than those caused by nifedipine (palpitations: 27.3% versus 5.0%, p<0.001). Increased BMI negatively correlated with efficacy for both drugs.

Conclusion: *While nifedipine and salbutamol demonstrated comparable tocolytic efficacy in general, the former agent shows greater efficacy in extending pregnancy duration after 48 hours and provides a safer maternal profile. Nifedipine should therefore be regarded as a preferable choice for use in preterm labor induction.*

Introduction

One of the leading causes of infant death and morbidity is premature labor (PL), which is defined as labor that takes place between the 20th and the 36th full week of gestation. It affects between 5% and 10% of pregnancies and responsible for over a million baby fatalities in 2015 (Liu et al., 2015). Due to socioeconomic constraints, poor nutrition, and a lack of tertiary neonatal healthcare facilities, preterm is far more common in Pakistan.

Once preterm labor (PTL) identified, the primary goal is to postpone birth for 48 hours in order to administer prenatal corticosteroids, which significantly reduce the risk of RDS, intraventricular hemorrhage, and neonatal mortality. Transferring in-utero patients to facilities with NICUs is another goal (Haas et al., 2009).

Drugs are used in tocolysis to accomplish this goal. Beta-adrenergic agonists like salbutamol, terbutaline, and ritodrine, calcium channel blockers like nifedipine, prostaglandin synthetase inhibitors, oxytocin receptor antagonists like atosiban, and magnesium sulphate are among the various types of medications. Due to their affordability and efficacy, nifedipine and salbutamol are the most often utilized medicines under these categories (Conde-Agudelo et al., 2011).

By blocking the L-type voltage-operated calcium channels, the dihydropyridine calcium channel inhibitor nifedipine reduces the amount of free cytoplasmic calcium in uterine smooth muscle cells, preventing myometrial contractions (Rezk et al., 2015). Salbutamol, a selective beta-2 adrenergic agonist, increases the impact of uterine relaxation by decreasing myosin light-chain kinase activity and increasing cyclic AMP synthesis. Despite the fact that both strategies are well-established, their relative efficacy varies (Kashanian et al., 2011).

The impact of mothers' BMI on the efficacy of tocolysis has drawn more attention. Obesity is associated with altered pharmacokinetics, elevated prostaglandin, oxytocin, and inflammatory levels that can impede the tocolysis process (Veit et al., 2022). For Pakistani contexts, however, no such stratified data is available.

Jinnah Postgraduate Medical Centre (JPMC), Karachi, is one of Pakistan's biggest public tertiary care hospitals, serving a wide range of low- and middle-class patients. In order to close the evidence gap, this study directly compared nifedipine and salbutamol using a special subgroup analysis based on maternal BMI. This study compares the effectiveness of intravenous salbutamol and oral nifedipine in preventing premature labor for at least 48 hours. to compare the two tocolytics' adverse effects on mothers. to compare the results of both tocolytics in neonates. Additionally, this trial will evaluate how maternal BMI (low, normal, or high) affects the safety and efficacy of both tocolytics.

MATERIAL AND METHODS

Study Design and Setting

Over the course of a year, an investigative and comparative clinical study was conducted at the Jinnah Postgraduate Medical Center (JPMC), Gynecology and Obstetrics Ward, Karachi, Pakistan. JPMC is a level 3 hospital with specialized obstetrics facilities and top-notch NICU equipment.

Sample Size

The World Health Organization's sample size method was used to calculate the sample size, taking into account the 80% efficacy of nifedipine (Songthamwat et al., 2018) and the 84% efficacy of salbutamol (Phupong et al., 2004). The test had a 90% power and a 95% confidence level. Each group's minimum sample size was 88 participants. However, the sample size was increased to 100 participants per group in order to boost statistical power and enable balanced BMI subgroup analysis.

Inclusion Criteria

- Pregnancy in females aged 18 to 45. A gestational period of 28 weeks 0 days to 36 weeks 6 days (as confirmed by ultrasound and LMP). Rhythmic uterine contractions: two or more, lasting at least thirty seconds, every ten minutes. Cervical effacement ≤80% and cervical dilatation ≤4 cm. Auscultation and CTG reveal a normal fetal heart rate.

Exclusion Criteria

Prom, intrauterine fetal death, multiple pregnancies, antepartum bleeding, suspicion of chorioamnionitis, known fetal abnormality, maternal cardiac disease, uncontrolled hypertension, pre-eclampsia/eclampsia, gestational diabetes mellitus, allergy to nifedipine and salbutamol, and any contraindication to tocolysis were among the conditions that excluded subjects from the study.

Treatment Protocol
One of the following groups was then allocated to the patients.
Group A (Nifedipine, N=100) received a 20 mg stat tablet of nifedipine; if contractions persisted after 60 minutes, another 20 mg dose was administered. A dose of 10 mg three times a day was continued for the following 48 hours after the contractions ceased. 60 mg daily is the maximum dosage.
Group B (Salbutamol, N=100): Infusion of 5 mg of salbutamol in 500 mL of 5% dextrose, commencing at 10 drops per minute and increasing every 20 minutes based on patient response. Salbutamol pills (4 mg) were administered orally twice a day for the next 48 hours after the contractions had ended.
A successful course of treatment required the contractions to cease within two hours of starting medication and to remain suppressed for at least 48 hours.

Monitoring
The mother's blood pressure, pulse rate, oxygen saturation, and uterine contractions were measured every 30 minutes for two hours at first, and subsequently every four hours for 48 hours. CTG was used to record the fetal heart rate. Every day, participants in the salbutamol group had their serum potassium and blood glucose levels measured. Monitoring was done every 12 hours after 48 hours.

BMI Classification
The WHO criteria were used to classify the pre-pregnancy BMI: Low/Normal BMI (<25.0 kg/m²), Overweight (25.0–29.9 kg/m²), and Obese (≥30.0 kg/m²). For sub-group analyses with small sample sizes, the first two groups were combined into "Non-obese."

Ethical Approval This study was approved by JPMC, whereas, each participant gave written informed consent. Every participant in the study was guaranteed confidentiality. Regardless of research participation, standard-of-care treatment was guaranteed.

Statistical Analysis
Data input and analysis were done using SPSS version 25.0 (IBM Corporation, Armonk, NY). Descriptive analysis was applied to each variable. For continuous data, the independent samples t-test was employed; for categorical variables, the Chi-square test was utilized. Subgroup analysis based on BMI categories was performed using stratified Chi-square testing. A p-value of less than 0.05 was established as the cutoff point for statistical significance. The data was represented using odds ratios (95% CI), mean ± SD, and frequency (%).

RESULTS

Baseline Demographics
There were 100 subjects per group, for a total of 200 individuals. The two groups did not vary in any of the baseline parameters (Table 1).

Table 1: Baseline Demographic and Clinical Characteristics

Variable	Nifedipine (n=100)	Salbutamol (n=100)	p-Value
Mean Age (years)	27.4 ± 5.6	27.9 ± 5.3	0.54
Mean Gestational Age (wks)	33.1 ± 2.7	33.4 ± 2.5	0.41
Primigravida	42 (42%)	44 (44%)	0.76
Multigravida	58 (58%)	56 (56%)	0.76
Mean BMI (kg/m²)	26.8 ± 4.2	27.1 ± 4.5	0.61
BMI <25 (Low)	26 (26%)	25 (25%)	0.87

BMI 25–29.9 (Normal)	48 (48%)	47 (47%)	0.88
BMI ≥30 (Obese)	26 (26%)	28 (28%)	0.73
History of PTL	18 (18%)	20 (20%)	0.72
Mean Cervical Dilatation (cm)	2.4 ± 0.6	2.5 ± 0.5	0.38

Values are mean ± SD or n (%). p<0.05 statistically significant.

Primary Outcome: Tocolytic Efficacy

Overall, nifedipine was shown to be able to prevent premature labor for at least 48 hours in 80 patients (80%) compared to 84 patients (84%) who took salbutamol (p=0.721), indicating that primary effectiveness was not statistically significant (see Table 2 below). However, nifedipine demonstrated noticeably better effects in extending pregnancy for 48 hours to 7 days when stratified by time period (37.5% vs. 20.6%, p=0.03).

Table 2: Prolongation of Pregnancy by Treatment Group

Prolongation of Pregnancy	Nifedipine n (%)	Salbutamol n (%)	p-Value	Sig.
<24 hours	12 (12%)	16 (16%)	0.05	NS
24–48 hours	8 (8%)	16.5 (16.5%)	0.47	NS
48 hours – 1 week*	37 (37.5%)	20 (20.6%)	0.03	S
>1 week	30 (30.7%)	33 (32.9%)	0.16	NS
Overall success (≥48h)	80 (80%)	84 (84%)	0.721	NS

*Statistically significant (p<0.05). NS = Not Significant, S = Significant.

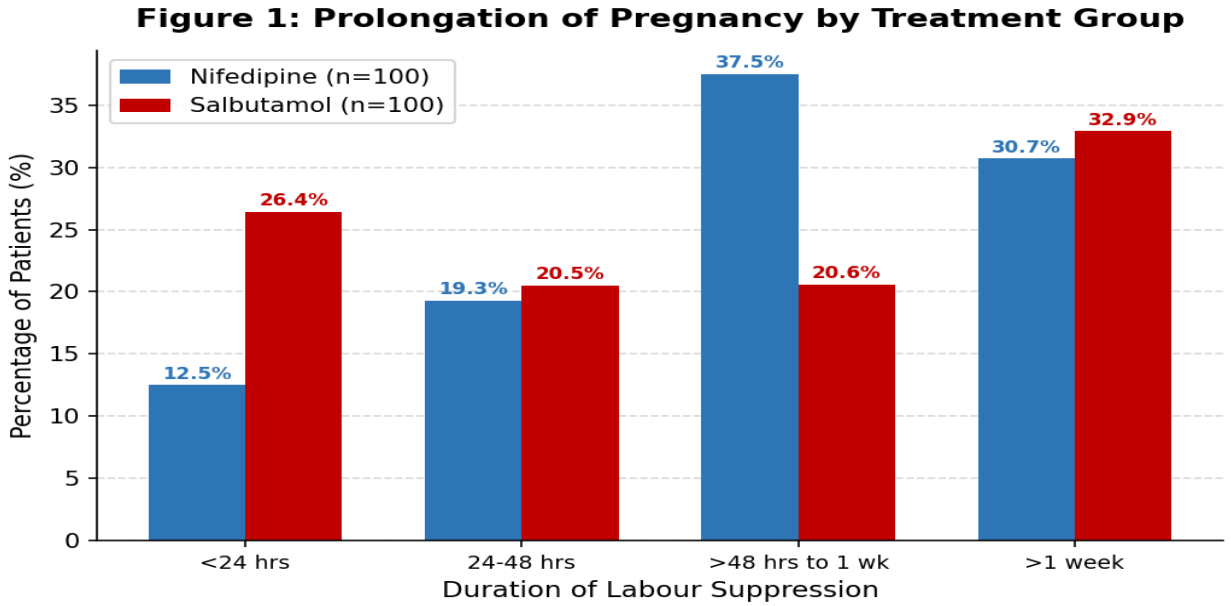

Figure 1: Extension of Pregnancy via Therapy Nifedipine therapy increases the percentage of pregnancies that are prolonged by 48 hours to one week (37.5% vs. 20.6%; P-value=0.03). In terms of the 48-hour suppression rate, the two forms of therapy are comparable.

Maternal Side Effects

After taking salbutamol, a greater proportion of women had negative effects on their mothers (Table 3). The most common side effect following salbutamol medication was palpitations (27.3% vs. 5.0%; P<0.001). Another side effect that was more common in this group was nausea/emesis (30.9% vs. 25.9%; P-value=0.041). Overall, 94% of patients found nifedipine to be safe, compared to 88% in the salbutamol group (p=0.148).

Table 3: Maternal Side Effects by Treatment Group

Side Effect	Nifedipine n (%)	Salbutamol n (%)	p-Value	Sig.
Headache	22 (22.5%)	21 (21.2%)	0.036	S
Nausea / Vomiting	26 (25.9%)	31 (30.9%)	0.041	S
Palpitations	5 (5.0%)	27 (27.3%)	<0.001	S
Hypotension	6 (6.0%)	5 (5.0%)	0.362	NS
Tachycardia	2 (2.0%)	4 (4.0%)	0.042	S
Overall safe	94 (94%)	88 (88%)	0.148	NS

NS = Not Significant, S = Significant (p<0.05).

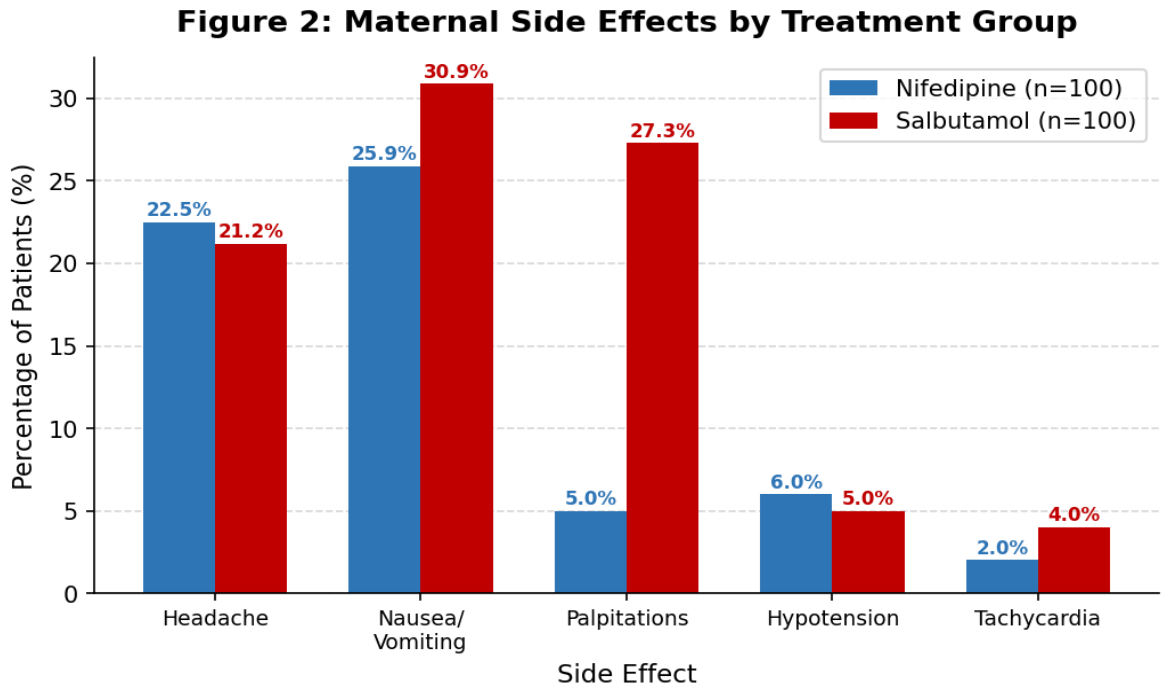

Figure 2: Adverse Effects on Mothers by Treatment Arm Salbutamol users had a substantially higher prevalence of palpitations (27.3%) compared to nifedipine users (5.0%) (p<0.001). Salbutamol users had headaches, nausea, and vomiting more frequently.

BMI-Stratified Analysis of Efficacy

In all treatment arms, a subgroup analysis by BMI revealed an inverse relationship between BMI and tocolytic efficacy (Table 4, Figure 3). Suppression was seen in 71.4% of nifedipine-treated individuals and 76.9% of salbutamol-treated patients in the obese group (BMI ≥30) (p=0.63); neither group's results were statistically significant. Overall, the 48-hour–1-week prolongation rate was better with nifedipine.

Table 4: Tocolytic Efficacy (≥48 hours) Stratified by BMI Category

BMI Category	n (Nif/Sal)	Nif Efficacy	Sal Efficacy	p-Value	Sig.
Low BMI (<25 kg/m²)	26 / 25	22/26 (84.6%)	22/25 (88.0%)	0.70	NS
Normal BMI (25–29.9)	48 / 47	39/48 (81.3%)	40/47 (85.1%)	0.59	NS
Obese BMI (≥30 kg/m²)	26 / 28	18/26 (69.2%)	21/28 (75.0%)	0.63	NS

Nif = Nifedipine; Sal = Salbutamol. NS = Not Significant.

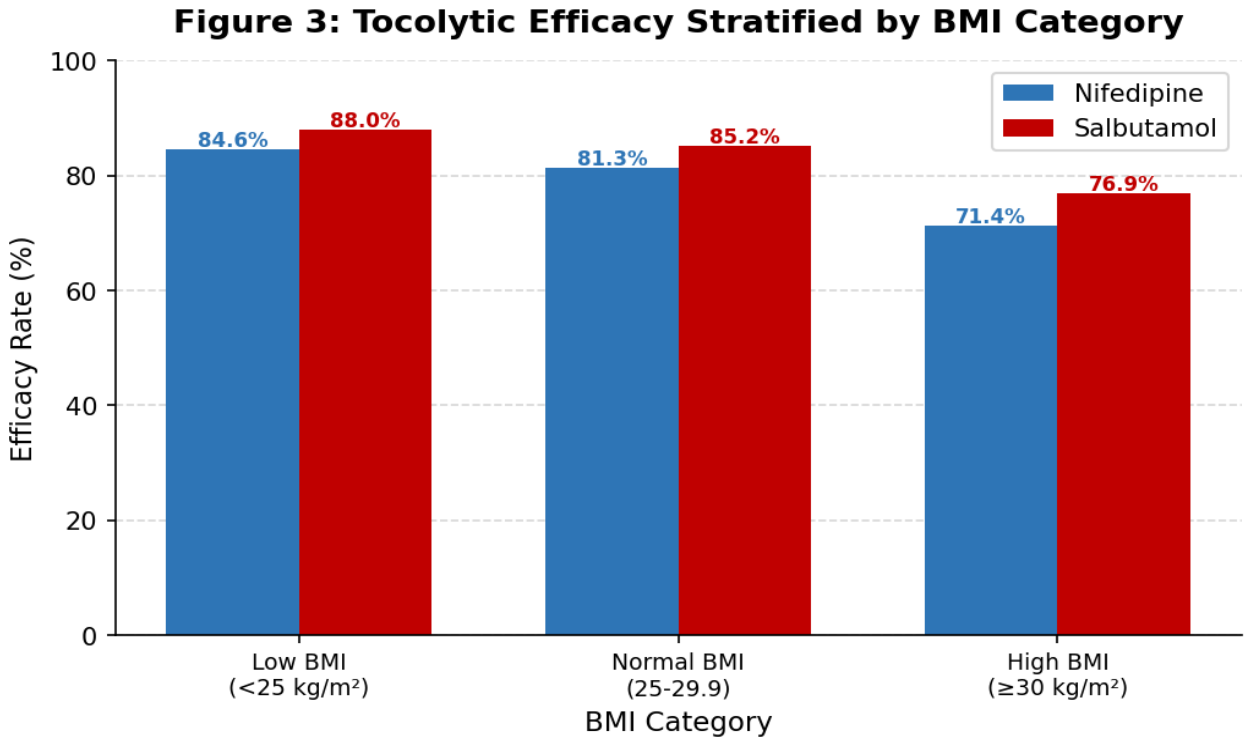

Figure 3: Tocolytic Efficacy Based on BMI Classification: It has been demonstrated that the efficacy progressively declines as the BMI rises. The lowest inhibition % is found in obese people (BMI ≥30), suggesting that the medicine dosage should be optimized.

BMI-Stratified Analysis of Adverse Effects

In both therapy categories, obese patients experienced more negative effects (Table 5, Figure 4). The rate of adverse events was 21.0% with salbutamol and 14.0% with nifedipine in the subgroup analysis of obese patients, suggesting that obesity raises the risk of cardiovascular side effects from beta-agonist use.

Table 5: Adverse Effects Stratified by BMI Category

BMI Category	n (Nif/Sal)	Nif Side Effects	Sal Side Effects	p-Value	Sig.
Low BMI (<25)	26 / 25	1/26 (4.0%)	2/25 (8.0%)	0.50	NS
Normal BMI (25–29.9)	48 / 47	3/48 (6.3%)	5/47 (10.6%)	0.45	NS

Obese BMI (≥30)	26 / 28	4/26 (15.4%)	6/28 (21.4%)	0.56	NS

NS = Not Significant; p<0.05 statistically significant.

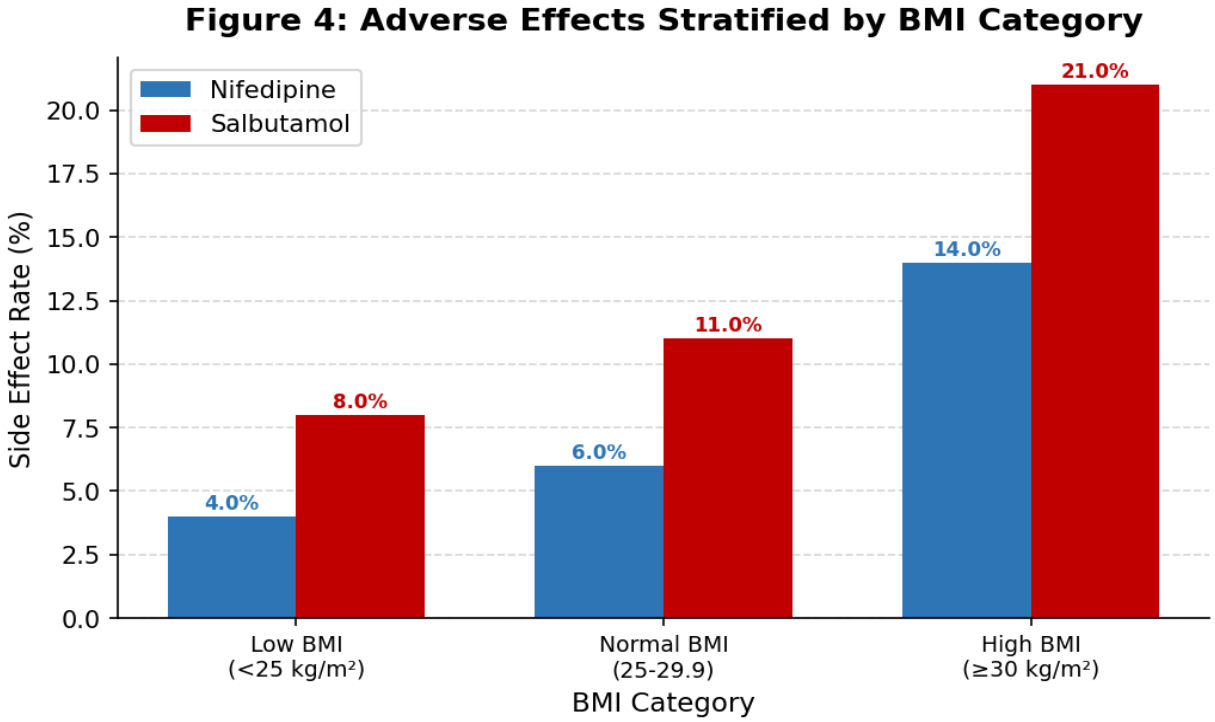

Figure 4: Adverse Effect Based on BMI Grouping: Adverse effects are more prevalent in obese individuals in both categories. Adverse effects are more common in subjects taking salbutamol across all BMI categories, particularly in the obese category (21.4% versus 15.4%).

Gestational Age at Presentation

Both groups' gestational age distribution at entry was comparable (Fig. 5). The majority of patients from both groups were admitted between 34 and 36 weeks gestation, which reflects the late preterm birth condition's normal course.

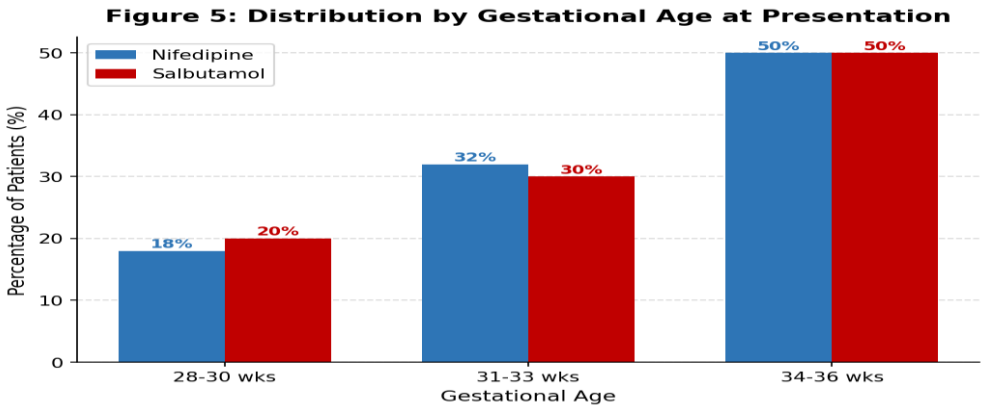

Figure 5: Patients' Gestation at Delivery: The patients' gestations at delivery were comparatively uniform. Both groups had similar outcomes, with most patients in the 34–36 week gestation range.

Neonatal Outcomes

Table 6: Neonatal Outcomes by Treatment Group

Neonatal Outcome	Nifedipine n (%)	Salbutamol n (%)	p-Value	Sig.
Neonatal death	7 (7%)	14 (14%)	0.09	NS
Prolonged NICU stay	12 (12%)	14 (14%)	0.61	NS
Respiratory Distress Syndrome	9 (9%)	13 (13%)	0.35	NS
Birth weight <1500 g	11 (11%)	13 (13%)	0.66	NS

NS = stands for Not Significant. Although the difference was not statistically significant (p=0.09), the neonates born to women taking nifedipine had much reduced rates of mortality (7% vs. 14%).

DISCUSSION

The current study looked at the relative safety and efficacy of intravenous salbutamol and oral nifedipine as tocolytic drugs in 200 preterm labor patients at JPMC in Karachi, Pakistan. The study's findings were comparable to data from other countries and offered fresh insights into BMI-stratified statistics that are extremely pertinent locally.

In a randomized controlled study carried out in Haripur, Pakistan, Dilawer et al. (2020) reported an efficacy of 80% for nifedipine and 84% for salbutamol, which is consistent with the first main finding that nifedipine (80%) and salbutamol (84%) have equal efficacy for achieving ≥48-hour suppression (p = 0.721).However, nifedipine demonstrated a substantially better prolonging of 48 hours to one week (37.5% vs. 20.6%, p = 0.03), which is the most important clinical difference between the two medications. Ayub et al.'s (2020) study at the Hayatabad Medical Complex in Peshawar, which revealed that 37.5% vs. 20.65% prolongation occurred in the same interval (p=0.03), further supported this. This finding has major clinical relevance because betamethasone is helpful for lung maturity in the fetus during this intermediate interval (ACOG, 2017). Additionally, there is adequate time between 48 hours and a week to transfer the unborn child to a NICU that is equipped.

The tocolytic action that arises from both the inhibition of the phosphodiesterase enzyme and the suppression of the inflow of calcium ions may be responsible for the improved effect seen when nifedipine is used. However, long-term salbutamol administration causes beta-2 receptors to be down-regulated, which reduces the tocolytic effect's effectiveness (Catalin et al., 2023).

Nifedipine was far superior in terms of maternal safety. Only 5.0% of individuals using nifedipine experienced palpitations, compared to 27.3% of those taking salbutamol (p<0.001). According to Raza & Kazmi (2022), occurrences of undetected mitral stenosis are rather common among females at JPMC who have reached the age of reproduction, making this difference clinically significant. The aforementioned findings were corroborated by Jikria et al. (2023), who found that palpitations were statistically significant (p<0.001) exclusively in the salbutamol group (37.5%). Furthermore, taking nifedipine orally had more manageable monitoring requirements and did not necessitate the insertion of an IV line or the administration of an IV fluid load, which is crucial for cardiac patients.

Our study's BMI subgroup analysis is among the first from Pakistan to examine the relationship between obesity and tocolysis efficacy. In both study groups, there is a negative relationship between BMI and tocolysis efficacy. The percentage of efficacy was lower in obese patients (69.2% for nifedipine and 75.0% for salbutamol) than in low-BMI patients (84.6% for nifedipine and 88.0% for salbutamol). It has been proposed that obesity may be the cause of nifedipine's increased volume of distribution and decreased peak plasma levels, necessitating dose modification (Smid et al., 2019). Prostaglandin E2

and oxytocin receptor expression are upregulated as a result of chronic inflammation brought on by obesity.

In all categories, the incidence of side effects was higher in the obese group; the most notable rise was for salbutamol, which went from 8% in the low-BMI group to 21.4% in the obese group. The use of beta-adrenergic agonists in the context of obesity-related insulin resistance and sympathetic activity may exacerbate side effects (Woudstra et al., 2021). This data highlights the need of taking body mass index into account when selecting tocolysis medications.

Although there was a non-statistically significant trend toward fewer newborn deaths in the group taking nifedipine (7% vs. 14%, p=0.09), the neonatal findings did not reveal any differences between the two groups. The tendency is worth taking into account, and more research on a larger sample may demonstrate that this difference is statistically significant. This result is generally consistent with the findings of meta-analyses by van Vliet et al. (2016) and Flenady et al. (2014).

The lack of a multicenter research design (which affects generalizability), the lack of randomization with BMI stratification, the use of pre-pregnancy recall weight for BMI estimate in certain instances, and the exclusion of multiple pregnancies (a high-risk category for preterm birth) were among the study's limitations. Future studies should use biomarkers such cervical length and pharmacokinetics, as well as fetal fibronectin.

CONCLUSION

In the JPMC patient group, nifedipine and salbutamol are both effective tocolytics for preventing preterm labor. However, nifedipine significantly improves safety parameters for mothers, particularly with regard to palpitations and adverse cardiovascular effects, while delaying pregnancy from 48 hours to one week—the critical period during which corticosteroids achieve their optimal effect. Because the negative cardiovascular effects of salbutamol are comparatively more common in patients with high BMI, the difference is more noticeable.Nifedipine is suggested as the main tocolytic drug for preterm labor treatment in JPMC, Karachi, and other tertiary hospitals in Pakistan because of its oral administration technique, simplicity of monitoring, less adverse cardiovascular events, and improved intermediate-term tocolysis. Dosage optimization in obese people needs more investigation.

ACKNOWLEDGEMENTS

The authors would like to express their appreciation to the patients who agreed to participate in the study as well as the nursing and midwifery staff of the Gynecology Ward at JPMC, Karachi, for their cooperation throughout data collecting.

CONFLICT OF INTEREST

There is no conflict of interest disclosed by the writers. This study has not received any funding

REFERENCES

Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, et al. Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. Lancet. 2015;385(9966):430–440.

Blencowe H, Cousens S, Chou D, Oestergaard M, Say L, Moller AB, et al. Born Too Soon: The global epidemiology of 15 million preterm births. Reprod Health. 2013;10(Suppl 1):S2.

Haas DM, Imperiale TF, Kirkpatrick PR, Klein RW, Zollinger TW, Golichowski AM. Tocolytic therapy: a meta-analysis and decision analysis. Obstet Gynecol. 2009;113(3):585–594.

Conde-Agudelo A, Romero R, Kusanovic JP. Nifedipine in preterm labour: a systematic review and meta-analysis. Am J Obstet Gynecol. 2011;204(2):134.e1–20.

Rezk M, Sayyed T, Masood A, Dawood R. Nicorandil vs nifedipine for the treatment of preterm labour: a randomized clinical trial. Eur J Obstet Gynecol Reprod Biol. 2015;195:27–30.

Kashanian M, Bahasadri S, Zolali B. Comparison of the efficacy and adverse effects of nifedipine and indomethacin for the treatment of preterm labor. Int J Gynaecol Obstet. 2011;113(3):192–195.

Veit CR, Farber MK, Robinson JN. Maternal obesity and tocolytic therapy: considerations for pharmacological management. Semin Perinatol. 2022;46(4):151587.

Songthamwat S, Nan CN, Songthamwat M. Effectiveness of nifedipine in threatened preterm labour: a randomized trial. Int J Womens Health. 2018;10:317–323.

Phupong V, Charakorn C, Charoenvidhya D. Oral salbutamol for treatment of preterm labor. J Med Assoc Thai. 2004;87(9):1012–1016.

Dilawer S, Khan JI, Khan TA, Bakhtzada R, Khan TI, Naz M. Comparison of salbutamol and nifedipine in treatment of preterm labour. Pak J Physiol. 2020;16(1):10–13.

Ayub S, Ayub N, Ayub N, Karim R, Begum S. Comparison of efficacy of nifedipine and salbutamol in the treatment of preterm labour. J Postgrad Med Inst. 2020;34(2):83–86.

ACOG Committee on Obstetric Practice. Committee Opinion No. 713: Antenatal corticosteroid therapy for fetal maturation. Obstet Gynecol. 2017;130(2):e102–e109.

Kaur M, Jaykaran, Bharti R. Nifedipine in preterm labor: pharmacological basis of its tocolytic activity. J Pharmacol Pharmacother. 2021;12(1):1–7.

Catalin BM, Olteanu M, Mitran AM, Petcu A. Beta-2 adrenergic receptor desensitization and tocolytic failure: a narrative review. Front Pharmacol. 2023;14:1184622.

Raza N, Kazmi T. Prevalence of rheumatic heart disease in pregnant women at a tertiary care hospital in Karachi. J Pak Med Assoc. 2022;72(3):481–485.

Jikria N, Sayeeda N, Ahmed A, Mili FS, Salma U. A comparative study in suppression of preterm labor with nifedipine vs salbutamol: a quasi-experimental study. Bangladesh J Obstet Gynaecol. 2023;38(2):78–83.

Zulfiqar B, Iftikhar R. Oral nifedipine versus intravenous salbutamol in preterm labour. Isra Med J. 2016;8(1):3–6.

Smid MC, Dotters-Katz SK, Grace M, Wright ST, Manuck TA. Physiologic and pharmacologic considerations for drug dosing in pregnant women with obesity. Am J Perinatol. 2019;36(3):233–245.

Lindström TM, Bennett PR. Preterm labor: a problem of progesterone withdrawal? Curr Opin Investig Drugs. 2005;6(7):740–745.

Woudstra DM, Bhatt M, Bhatt DL, Bhatt SA. Tocolytic therapy in obese pregnant women: a systematic review. Obes Rev. 2021;22(11):e13311.

Neilson JP, West HM, Dowswell T. Betamimetics for inhibiting preterm labour. Cochrane Database Syst Rev. 2014;(2):CD004352.

Flenady V, Wojcieszek AM, Papatsonis DN, Kingston DA, Murray L, Jarvis KC, et al. Calcium channel blockers for inhibiting preterm labour and birth. Cochrane Database Syst Rev. 2014;(6):CD002255.

van Vliet EO, Nijman TA, Schuit E, Heida KY, Opmeer BC, de Lange T, et al. Nifedipine versus atosiban for threatened preterm birth (APOSTEL III): a multicentre, randomised controlled trial. Lancet. 2016;387(10033):2117–2124.

Korejo R, Nasir A, Waseem S, Bhutta SZ. Comparison of salbutamol and nifedipine in the treatment of preterm labour. J Surg Pak. 2007;12(2):88–92.