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Article

A Comparative Study of Oral Nifedipine Versus Parenteral Isoxsuprine In Suppression Of Preterm Labour

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Abstract: ***Introduction*:** Preterm labour and delivery remain among the most pressing challenges in modern obstetrics, while preterm infants pose equally significant concerns for paediatric care. ***Aim*:** To compare the efficacy of oral nifedipine and parenteral isoxsuprine in suppression of preterm labour. ***Methodology*:** This hospital-based cross-sectional study was conducted over a period of one year following ethical approval, in the labour room of the Department of Obstetrics and Gynaecology at Sardar Patel Medical College and A.G. of Hospital, Bikaner. ***Result*:** In this study, both isoxsuprine and nifedipine were effective in arresting preterm labor, with no statistically significant difference in cervical dilation, effacement, or uterine contractions between the groups. Nifedipine showed a significantly higher post-treatment fetal heart rate and fewer maternal side effects like hypotension and palpitations compared to isoxsuprine. Overall, nifedipine was found to be a better tolerated and more hemodynamically stable tocolytic agent. ***Conclusion*:** Nifedipine, with its proven efficacy, safety, and minimal side effects, emerges as a superior tocolytic compared to isoxsuprine. It is likely to play an expanded role in the management of preterm labor.

Keywords: Isoxspurine, nifedipine, preterm labour.

INTRODUCTION

Preterm labour and delivery remain among the most pressing challenges in modern obstetrics, while preterm infants pose equally significant concerns for paediatric care. Globally, preterm labour is recognized as a major threat to maternal and fetal health, contributing to a substantial portion of neonatal morbidity and mortality. In the United States, the prevalence of preterm birth is approximately 11%, whereas in developing nations such as India, it can reach as high as 23.3%, accounting for 40–75% of neonatal deaths.[1] According to the American College of Obstetricians and Gynecologists (ACOG), preterm labour is defined as labour occurring before 37 completed weeks of gestation, typically between 20 weeks 0 days and 36 weeks 6 days.[2] It is important to note that not all cases of preterm labour result in preterm birth. The classification includes early preterm births (20 to <33 weeks) and late preterm births (34 to 36 weeks). A multitude of risk factors—spanning social, behavioural, clinical, and biological domains—contribute to preterm delivery.[3] These include extremes of maternal age, prior history of preterm births, multiple gestations, obstetric complications (e.g., placental abruption), and medical conditions such as thyroid disorders, hypertension, obesity, and diabetes. Infections, particularly intrauterine and periodontal diseases, along with elevated cervical-vaginal fetal fibronectin levels, short cervix, and inflammatory markers, are considered strong predictors of spontaneous preterm birth.To address this issue, the United Nations established the Sustainable Development Goals (SDGs) in 2015, with Goal 3 specifically targeting reductions in maternal and neonatal mortality[4]. The aim is to lower neonatal deaths to below 12 per 1,000 live births and maternal mortality to fewer than 70 per 100,000 live births by 2030.Preterm premature rupture of membranes (PPROM) further complicates pregnancy by increasing the risk of prematurity-related complications[5]. Preterm labour itself is driven by three primary physiological changes: cervical ripening, uterine contractions, and activation of decidual and membrane tissues. A central pathological mechanism involves the fetal inflammatory

response syndrome (FIRS), characterized by elevated fetal plasma interleukin-6 levels due to triggers such as chorioamnionitis. This systemic inflammation leads to the hypothalamic-pituitary-adrenal axis activation, ultimately triggering labour. Simultaneously, inflammatory mediators such as cytokines and prostaglandins alter cervical connective tissue, leading to ripening.[6] Hormonal changes also play key roles—estrogen promotes collagen breakdown, while progesterone helps maintain cervical integrity and suppresses contractions. Coordinated uterine contractions—modulated by oxytocin and neural inputs—mark the transition into active labour. Management of preterm labour depends largely on gestational age at presentation. A cornerstone of preterm labour management is tocolysis, which involves the use of medications to suppress uterine contractions, thereby delaying delivery. This delay provides a critical window for administering antenatal corticosteroids that promote fetal lung maturity, significantly improving neonatal outcomes[7]. Tocolytic agents include beta-adrenergic agonists , calcium channel blockers, cyclooxygenase inhibitors, magnesium sulfate, and oxytocin receptor antagonists like atosiban.[6]Nifedipine, commonly administered orally or sublingually, is considered effective with minimal maternal and fetal side effects.Although both isoxsuprine and nifedipine have demonstrated efficacy in arresting preterm labour,[8] the literature lacks adequate comparative studies to conclusively establish which drug is superior in efficacy and safety.

AIM

To compare the efficacy of oral nifedipine and parenteral isoxsuprine in suppression of preterm labour.

METHODOLOGY

This hospital-based cross-sectional study was conducted over a period of one year following ethical approval, in the labour room of the Department of Obstetrics and Gynaecology at Sardar Patel Medical College and A.G. of Hospital, Bikaner. The study population comprised pregnant women in preterm labour, between 24 and 34 weeks of gestation, attending the labour room of P.B.M. Hospital, Bikaner. Inclusion criteria were pregnant women aged 18–40 years, with gestational age between 24–34 weeks, presenting with regular uterine contractions and cervical changes as per ACOG criteria, without rupture of membranes, and who had not received tocolytics in the past 7 days and gave informed consent. Women were excluded if they refused consent, had cervical dilatation ≥4 cm with strong contractions and PPROM, multiple gestation, antepartum hemorrhage, fetal malformations, or medical illnesses like heart disease, COPD, or bronchial asthma.

RESULT

TABLE 1: Distribution of cases according to their Age

Age Distribution (Years)	**Group A**		**Group B**	
	N	**(%)**	**N**	**(%)**
18-25	68	68	62	62
26-30	20	20	30	30
31- 35	12	12	8	8
Total	100		100	
Mean ± Sd	24.22 ± 3.90		25.16 ± 4.04	
p value	0.0		96	

Majority of the subjects were of 18-25 years age in group A (68%) and group B 62% whereas minimum were of 31-35 years age in group A (12%) and group B (8%). The mean age in group A was 24.22 ± 3.90 yrs and in group B, it was 25.16 ± 4.04 years. In the present study, the two groups were comparable with regard to age distribution. (p=0.096)

TABLE 2: Distribution of cases according to their Parity

Parity	**Group A**		**Group B**	
	N	(%)	N	(%)
Primi gravida	82	82.00	81	81.00
Multi gravid	18	18.00	19	19.00
Total	100	100.00	100	100.00
P value	1.0		00	

82% subjects in group A were primi garvida and 18% were multigravida whereas in group B, 81% were primi garvida and 19% were multigravida and the difference between the two groups was found statistically insignificant. (p=1.000)

TABLE 3: Distribution of cases according to Risk factors and regular uterine contraction (after treatment)

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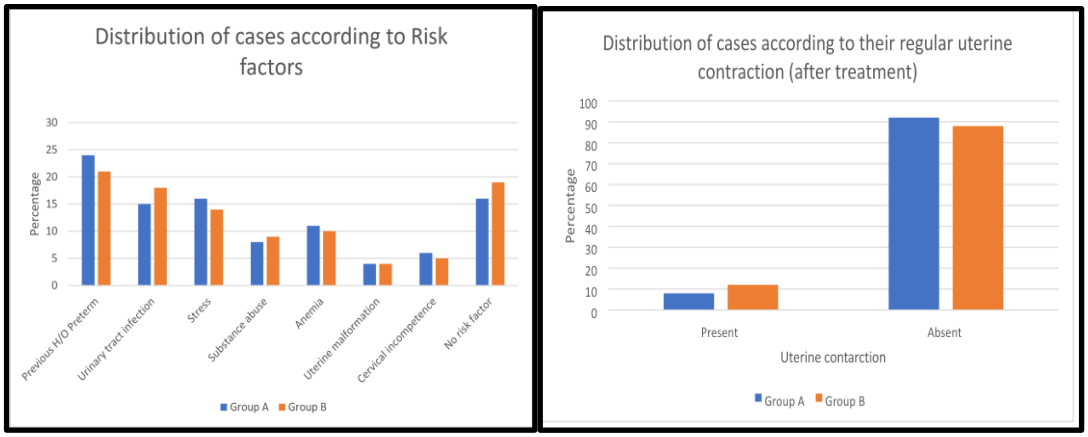

In Group A, the most common risk factor was previous preterm history (24%), followed by stress (16%), UTI (15%), cervical incompetence (6%), and uterine malformation (4%); similar trends were seen in Group B with 21% previous preterm, 18% UTI, 14% stress, 5% cervical incompetence, and 4% uterine malformation, showing no significant difference (p=0.986). Regular uterine contractions were absent in 92% of Group A and 88% of Group B, with no significant difference between groups (p=0.482).

TABLE 4: Distribution of cases according to their maternal pulse rate

maternal pulse rate	**Group A**	**Group B**	**P value**
Before drug	78.56 ± 5.34	78.62 ± 5.37	0.960
After drug	70.68 ± 6.87	82.98 ± 10.57	0.0001
P value	0.0001	0.0001	

All patients in group A had mean pulse rate of 78.56 ± 5.34 before drug and 70.68 ± 6.87 after drug whereas in group B mean pulse rate was 78.62 ± 5.37 and 82.98 ± 10.57. the difference was found to be statistically significant (p<0.05)

Table 5: Distribution of cases according to their fetal heart rate

Fetal heart rate	**Group A**	**Group B**	**P value**
Before drug	144.56 ± 8.2	143.97 ± 6.67	0.577
After drug	134.92 ± 6.82	152.5 ± 10.5	0.0001
P value	0.0001	0.0001	

In group A mean fetal heart rate was 144.56 ± 8.2 before drug and 134.92 ± 6.82 after drug whereas in group B mean fetal heart rate was 143.97 ± 6.67 and 152.5 ± 10.5 the difference was found to be statistically significant (p<0.05)

TABLE 6: Distribution of cases according to PV dilatation and Effacement of cervix

PV dilatation	**Group A**		**Group B**		P value
	N	(%)	N	(%)	
2 – <3 cm	88	88.00	89	89.00	1.000
3 - <4 cm	12	12.00	11	11.00	
Total	100	100.00	100	100.00	
Effacement of cervix	**Group A**		**Group B**		P value
	N	(%)	N	(%)	1.000
<30%	78	78.00	77	77.00	
>30%	22	22.00	23	23.00	
Total	100	100.00	100	100.00	

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In Group A, 88% of women had PV dilatation of 2–<3 cm and 12% had 3–<4 cm, while in Group B, 89% had 2–<3 cm and 11% had 3–<4 cm dilatation; the difference was statistically insignificant (p>0.05). Similarly, cervical effacement <30% was seen in 78% (Group A) and 77% (Group B), and >30% in 22% and 23% respectively, with no significant difference (p>0.05).

Table 7: Distribution of cases according to Prolongation of delivery

Prolongation of delivery (3 days)	**Group A**		**Group B**	
	N	(%)	N	(%)
Yes	92	92.00	88	88.00
No	8	8.00	12	12.00
Total	100	100.00	100	100.00
P value			0.258	

In group A complete prolongation of delivery (3 days) was in 92% women whereas 88% in group B and the difference between two groups was found to be statistically insignificant (p>0.05)

TABLE 8: Distribution of cases according to maternal complication

Maternal complication	**Group A**		**Group B**	
	N	(%)	N	(%)
Headache	5	5.00	2	2.00
Palpitation	0	0.00	8	8.00
Hypotension	5	5.00	9	9.00
Skin Rashes	0	0.00	0	0.00
Nausea	2	2.00	4	4.00
P value	0.0		48*	

In group A most common maternal complication was headache and hypotension (5% each) followed by 2% had nausea whereas in group B most common complication was hypotension (9%) and palpitation (8%) followed by nausea (4%) and the difference between two groups was found to be statistically significant (p>0.05)

DISCUSSION

Isoxsuprine was the first beta sympathomimetic drug used to inhibit preterm labour in 1961. Many studies have shown it to have limited therapeutic value in light of unpleasant side effects and efficacy.Randomised controlled trials comparing Nifedipine with ritodrine (another betamimetic agent) found it a superior tocolytic both in terms of efficacy and safety. It was also found to compare favourably to other betamimetic agents, terbutaline and Isoxsuprine.

In our study the majority of the subjects were of 18-25 years age in group A (68%) and group B 62% whereas minimum were of 31-35 years age in group A (12%) and group B (8%). The mean age in group A was 24.22 ± 3.90 yrs and in group B, it was 25.16 ± 4.04 years. In the present study, the two groups were comparable with regard to age distribution. (p=0.096) Similarly Suhas Shinde et al. (2016)[9] found that mean age was 27.1 years in group A and 25.4 years in group B.

In our study, 82% subjects in group A were primi garvida whereas in group B, 81% were primi garvida and the difference between the two groups was found statistically insignificant. (p=1.000) 70% subjects in group A had 30 – 34 wk gestational age and 30% had 24 – 30 wks whereas in group B, 71% had 30 – 34 wk gestational age and 29% had 24 – 30 wks and the difference between the two groups was found statistically insignificant. (p=1.000) Similarly Ray N et al. (2022)[10] include eighty antenatal women in the gestational age range of 28–37 weeks.

In our study, 24% had previous h/o preterm in group A followed by 16% had stress, 15% had urinary tract infection and minimum 4% had uterine malformation followed by 6% had cervical incompetence whereas in group B 21% had previous h/o preterm followed by 18% had urinary tract infection, 14% had stress, and minimum 4% had uterine malformation followed by 5% had cervical incompetence and the difference was statistically insignificant. (p=0.986) Similarly Jameela Begum Gaggutur et al. (2024)[11] found that The prevalence of preterm labor was found to be 22%, whilst the prevalence of premature delivery was seen to be 20.9%.

In our study, 92% subjects in group A had no regular uterine contraction and only 8% still had regular uterine contraction whereas in group B, 88% had no regular uterine contraction and only 12% still had regular uterine contraction and the difference between the two groups was found statistically insignificant. (p=0.482) Similarly Ray N et al. (2022)[10] found that the overall success rate was better in group B (86.8%) compared to group A (80%).

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In our study in group A maternal mean pulse rate of 78.56 ± 5.34 before drug and 70.68 ± 6.87 after drug whereas in group B mean pulse rate was 78.62 ± 5.37 and 82.98 ± 10.57. ($p<0.05$). In group A mean blood pressure was 82.45 ± 6.5 before drug and 80.45 ± 9.1 after drug whereas in group B mean blood pressure was 83.25 ± 8.2 and 81.78 ± 12.5. The difference was found to be statistically insignificant ($p>0.05$). In group A mean fetal heart rate was 144.56 ± 8.2 before drug and 134.92 ± 6.82 after drug whereas in group B mean fetal heart rate was 143.97 ± 6.67 and 152.5 ± 10.5 the difference was found to be statistically significant ($p<0.05$) also Ray N et al. (2022)[10] found that Isoxsuprine showed increased lowering of systolic blood pressure (SBP), diastolic blood pressure (DBP), and slightly higher maternal pulse rate, but higher fetal pulse rate post-administration in comparison to nifedipine ($P < 0.05$).

In our study group A PV dilatation was 2 - <3cm in 88% women and 3 - <4cm were in 12% whereas in group B PV dilatation was 2 - <3cm in 89% and 11% had 3 - <4cm PV dilatation the difference was found to be statistically insignificant ($p>0.05$). In group A effacement of cervix was <30% in 78% women and >30% in 22% whereas in group B effacement of cervix was <30% in 77% women and >30% in 23% the difference was found to be statistically insignificant ($p>0.05$) India study conducted by Singh S et al,[12] observed that the prolongation of pregnancy was more when the period of gestation was less.

In group A most common maternal complication was headache and hypertension (5% each) followed by 2% had nausea whereas in group B most common complication was hypotension (9%) and palpitation (8%) followed by nausea (4%) and the difference between two groups was found to be statistically significant ($p>0.05$) Similarly Jaju PB et al. (2019)[13] Maternal tachycardia and vomiting (8.0% each) were the commonly reported adverse drug reactions, which were resolved with dose adjustment.

CONCLUSION

Maternal and child health is a vital part of the health system. Since we are striving to achieve a sustainable goal, provision of care during antenatal, intranatal and postnatal is essential. The reported experience with Nifedipine as a tocolytic has been found to be more reassuring than isoxsuprine. In view of the increasing evidence of its efficacy and safety combined with its ease of administration and minimal side effect it appears likely that Nifedipine will play an expanded role in the suppression of preterm labour.

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