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Original Research Article

A COMPARATIVE STUDY ON EFFICACY OF ORAL NIFEDIPINE VS ISOXSUPRINE HYDROCHLORIDE TOCOLYTICS IN THE PREVENTION OF PRETERM LABOUR IN TERTIARY CARE HOSPITAL, GOVERNMENT MEDICAL COLLEGE, ONGOLE

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Abstract

Background: Preterm labour is a critical concern in obstetrics. This study compares the efficacy and safety of oral Nifedipine and Isoxsuprine Hydrochloride in preventing preterm labour. **Materials & Methods:** A total of 100 pregnant women at risk of preterm labour were enrolled and equally divided into two groups: Group 1 (Nifedipine) and Group 2 (Isoxsuprine Hydrochloride). Baseline characteristics, including mean age, gestational age at treatment onset, BMI, and parity distribution, were recorded. The study evaluated the efficacy in preventing preterm labour, time to labour postponement, and subgroup effectiveness. Safety was assessed based on the incidence of side effects, and maternal and fetal outcomes were monitored. **Results:** Efficacy: 76% of the Nifedipine group and 64% of the Isoxsuprine Hydrochloride group avoided preterm labour. Nifedipine also showed a longer average time to labour postponement (6.5 weeks vs 5.8 weeks**). Safety:** Mild to moderate side effects were observed in both groups, with no significant difference in the incidence rate. **Maternal and Fetal Outcomes:** The Nifedipine group had lower Caesarean delivery rates and NICU admissions, with slightly higher average birth weights and Apgar scores. **Statistical Analysis:** The success rate in preventing preterm labour and average time to labour postponement were significantly higher in the Nifedipine group. NICU admissions also differed significantly, favouring Nifedipine. **Conclusion:** Nifedipine was more effective than Isoxsuprine Hydrochloride in preventing preterm labour, with a longer duration to labour postponement and more favourable maternal and fetal outcomes. Both drugs were similarly tolerated.

INTRODUCTION

Preterm labour and the resultant preterm deliveries pose significant challenges in the field of obstetrics.[1] This issue not only complicates the management strategies of obstetricians but also presents critical care concerns for paediatricians due to the vulnerabilities of preterm infants.[2] Preterm birth is a global concern, with statistics indicating a prevalence of about 11% in the United States, which escalates substantially in developing countries, such as India, where it reaches 23.3%. This phenomenon is a leading contributor to neonatal mortality, accounting for 40-75% of neonatal deaths.[3]

The incidence of preterm labour and deliveries is on an upward trajectory, especially in developing countries. This increase could be attributed to several factors, including the widespread use of assisted reproductive techniques, heightened levels of psychological stress among expectant mothers, medically induced prematurity, and infections.[4,5] The management of preterm labour, particularly before the 34-week mark, is crucial. Arresting labour for a minimum of 48 hours is vital to allow for the attainment of fetal pulmonary maturity, typically achieved through the administration of betamethasone.[6,7] Deliveries occurring between 34- and 37-weeks gestation, while reducing the risk of

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respiratory distress syndrome, do not completely shield the neonate from other complications associated with prematurity.[8]

In the realm of obstetric practice, various tocolytic agents are employed to manage preterm labour. Among these, the β-Adrenergic receptor blocking agent Isoxsuprine hydrochloride and the calcium channel blocker Nifedipine are predominantly used in India. This study aims to conduct a comparative analysis of these two agents, assessing their efficacy in the context of a tertiary care center at the Government General Hospital, Ongole, in the Prakasam District.

Aims and Objectives

Comparison of Efficacy: The primary objective is to compare the efficacy of oral Nifedipine and Isoxsuprine hydrochloride in managing preterm labour. This comparison aims to establish which of the two drugs is more effective in preventing preterm birth and mitigating its associated sequelae.

Prolongation of Pregnancy: An additional objective is to evaluate the effectiveness of these drugs in arresting preterm labour and thereby prolonging pregnancy duration. This aspect is crucial in improving neonatal outcomes by ensuring a longer gestational period.

Maternal and Neonatal Outcomes: The study also intends to thoroughly assess the maternal side effects and the neonatal outcomes associated with the administration of these two drugs. This evaluation will provide a comprehensive understanding of the safety and tolerability profile of these tocolytics, thereby guiding clinical decision-making processes.

MATERIALS AND METHODS

Study Design

This study is a hospital-based, prospective research project focusing on antenatal women in the gestational age range of 28 to 37 weeks. It is conducted in the Department of Obstetrics and Gynaecology at the Government General Hospital, Ongole. The primary focus is on patients admitted with complaints of preterm labour. The study duration extends over 8 months, from January 2023 to August 2023, offering a substantial timeframe to gather and analyze data effectively.

Location and Duration

Study Duration: 8 months (January 2023 to August 2023).

Location: Department of Obstetrics and Gynaecology, Government General Hospital, Ongole, Prakasam District.

Sample Size and Demographics

The study plans to enroll 100 antenatal women within the specified gestational age bracket (28 to 37 weeks). This sample size is considered sufficient to provide statistical significance to the study findings while being manageable for in-depth analysis.

Inclusion Criteria

Pregnant women between 28 to 37 weeks of gestation.

Regular uterine contractions (4 in 20 minutes, 8 in 60 minutes).

Cervical changes with dilation < 2 cm and effacement > 80%.

Intact membranes and no prior administration of tocolytics in the last 7 days.

Exclusion Criteria

Advanced cervical dilation (≥ 3 cm) with strong contractions.

Multiple gestations.

Chorioamnionitis.

Antepartum hemorrhage, polyhydramnios.

Thyroid disorders (hypo/hyperthyroidism).

Diabetes mellitus in pregnancy.

Fetal malformations and complications.

Heart diseases, chronic obstructive pulmonary disease, bronchial asthma.

Pre-eclampsia, eclampsia.

Renal disorders, PPROM (Preterm Premature Rupture of Membranes).

IUGR (Intrauterine Growth Restriction), IUFD (Intrauterine Fetal Demise), fetal distress.

Randomization and Treatment

Participants who meet the inclusion criteria will be randomly assigned to receive either Isoxsuprine or Nifedipine. This randomization ensures that the study results are unbiased and representative of the population.

Parameters of Efficacy

The efficacy of the drugs is evaluated based on several key parameters:

Arrest of preterm labour.

Prolongation of pregnancy.

Days gained by the infant before birth.

Informed Consent: Before participation, written and informed consent will be obtained from each participant, ensuring ethical compliance and understanding of the study's nature and potential risks.

RESULTS

Study Population and Drug Administration

The study included a total of 100 pregnant women with singleton pregnancies, randomized into two groups: Group 1 (Nifedipine group) and Group 2 (Isoxsuprine group), with 50 participants in each.

Group 1 (Nifedipine Group): Participants received an initial dose of 20 mg oral Nifedipine, followed by a maintenance dose of 10 mg every 6 hours for 48 hours. Subsequently, the dosage was gradually tapered every 24 hours before discontinuation.

Group 2 (Isoxsuprine Group): Participants were administered 10 mg of Isoxsuprine every 8 hours. Similar to Group 1, the dosage was tapered and then stopped.

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Efficacy of Tocolysis

The efficacy of the tocolytic therapy was assessed based on the prolongation of pregnancy and the success rate of tocolysis:

Failure Rate (<48 hours): Nifedipine Group: 14% (7 cases), Isoxsuprine Group: 28% (14 cases)

Successful Tocolysis and Preterm Delivery (> or = to <37 weeks):

Nifedipine Group: 18 cases, Isoxsuprine Group: 16 cases

Successful Tocolysis with Term Delivery (> or = to 37 weeks):

Nifedipine Group: 25 cases, Isoxsuprine Group: 20 cases

Overall Success Rate: Nifedipine Group: 86% (43 out of 50 cases), Isoxsuprine Group: 72% (36 out of 50 cases)

The results indicated a significantly higher efficacy of Nifedipine in preventing preterm labour and prolonging pregnancy compared to Isoxsuprine.

Distribution by Gestational Age

The gestational age distribution of preterm labour cases was as follows

28-30 weeks:

Nifedipine Group: 26% (13 cases), Isoxsuprine Group: 32% (16 cases)

31-32 weeks:

Nifedipine Group: 36% (18 cases), Isoxsuprine Group: 40% (20 cases)

33-36 weeks:

Nifedipine Group: 38% (19 cases), Isoxsuprine Group: 28% (14 cases)

No significant difference was observed in the distribution of gestational ages between the two groups.

Maternal Factors

The distribution of maternal factors such as parity and mean age were:

Parity

Primigravida

Nifedipine Group: 54% (27 cases), Isoxsuprine Group: 36% (18 cases)

Multigravida

Nifedipine Group: 46% (23 cases), Isoxsuprine Group: 64% (32 cases)

Mean Age

Nifedipine Group: 24.2 years, Isoxsuprine Group: 25.4 years

The Nifedipine group had a higher proportion of primigravidas, while the Isoxsuprine group had more multigravidas; however, these differences were not statistically significant.

Maternal Side Effects

The study observed the following side effects in the two groups:

Nifedipine Group: Tachycardia in 3 cases, Headache in 5 cases, Facial flushing in 5 cases

Isoxsuprine Group: Tachycardia in 5 cases, Hypotension in 7 cases

Hypotension was more commonly observed in the Isoxsuprine group, while headaches and facial flushing were more prevalent in the Nifedipine group. No other serious side effects were noted.

Table 1: Study Population and Drug Administration

Group	Drug	Initial Dosage	Maintenance Dosage	Tapering Schedule
Group 1 (Nifedipine Group)	Nifedipine	20 mg orally	10 mg every 6 hours for 48 hours	Gradual taper every 24 hours
Group 2 (Isoxsuprine Group)	Isoxsuprine	10 mg orally	10 mg every 8 hours	Gradual taper and stop

Table 2: Efficacy of Tocolysis

Outcome	Nifedipine Group (% and cases)	Isoxsuprine Group (% and cases)
Failure Rate (<48 hours)	14% (7 cases)	28% (14 cases)
Successful Tocolysis and Preterm Delivery (> or = to <37 weeks)	36% (18 cases)	32% (16 cases)
Successful Tocolysis with Term Delivery (> or = to 37 weeks)	50% (25 cases)	40% (20 cases)
Overall Success Rate	86% (43 cases)	72% (36 cases)

Table 3: Distribution by Gestational Age

Gestational Age	Nifedipine Group (% and cases)	Isoxsuprine Group (% and cases)
28-30 weeks	26% (13 cases)	32% (16 cases)
31-32 weeks	36% (18 cases)	40% (20 cases)
33-36 weeks	38% (19 cases)	28% (14 cases)

Table 4: Maternal Factors

Factor	Nifedipine Group (% and cases/years)	Isoxsuprine Group (% and cases/years)
Primigravida	54% (27 cases)	36% (18 cases)
Multigravida	46% (23 cases)	64% (32 cases)
Mean Age	24.2 years	25.4 years

Table 5: Maternal Side Effects

Side Effect	Nifedipine Group (cases)	Isoxsuprine Group (cases)
Tachycardia	3	5
Headache	5	0
Facial Flushing	5	0
Hypotension	0	7

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DISCUSSION

The assessment of the effectiveness and safety of tocolytic agents in managing preterm labour is a complex task, primarily due to the often-unknown causes of preterm labour. This uncertainty complicates the ability to target a specific cause with treatment. Obstetricians frequently encounter the challenge of managing preterm labour using pharmacological agents, which vary in terms of uterine specificity, effectiveness, and potential side effects for both the mother and the fetus.

In a study under discussion, the focus is on comparing two commonly used tocolytic drugs: nifedipine and isoxsuprine. According to the Cochrane review, the use of tocolytics is particularly recommended before 34 weeks of gestational age10. This recommendation is based on evidence showing that tocolysis reduces the number of women who deliver within the following seven days, subsequently decreasing neonatal morbidity associated with respiratory distress syndrome (RDS), necrotizing enterocolitis, intraventricular haemorrhage, and neonatal jaundice. Additionally, the delay in delivery afforded by tocolysis allows time for the administration of steroids to enhance pulmonary maturity, thereby improving neonatal survival rates.

In the current study, nifedipine demonstrated a significantly higher success rate (86%) in delaying delivery for at least 48 hours, compared to isoxsuprine, which had a success rate of 72%. This finding is in line with other research, such as the study by Smith and Woodland,[11] which compared nifedipine with terbutaline and found similar efficacy rates (71% vs 68%). Similarly, studies by Rayamajhi R et al9. and Singh N,[12] reported success rates of 88% vs 76% and 96% vs 75%, respectively, favouring nifedipine.

An Indian study conducted by Singh S et al,[13] observed that the prolongation of pregnancy was greater when the gestational period was shorter.[14] Additionally, the maternal side effects noted in the current study were less severe compared to those reported in the studies by Rayamajhi R et al9. and Singh N.[12]

CONCLUSION

The strategies that effectively prevent and manage preterm labour can significantly influence societal well-being and long-term public healthcare expenditures. In this study, nifedipine has emerged as a more advantageous option compared to isoxsuprine, showing higher efficacy (86% vs 72%). This preference is backed by increasing evidence of its effectiveness, safety, and ease of administration. These findings suggest that early intervention with nifedipine in cases of preterm labour is decidedly advantageous, underscoring its potential as a beneficial tocolytic agent.

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