

Sulphate of magnesium and Nifedipine: A Comparative Analysis for Reducing Premature Delivery

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Abstract

Introduction : Premature pregnancies are more likely than full-term pregnancies to result in foetal and neonatal problems. In addition to improving neonatal survival and quality of life, treating preterm labour and delayed delivery lowers the medical expenses associated with caring for premature babies. The purpose of this study was to evaluate the detrimental effects of magnesium sulphate and nifedipine on the arrest of premature labour.

Materials and Procedures : One hundred pregnant patients who were admitted to the hospital due to preterm labour pain participated in this clinical trial study, which was randomised. The study included pregnant participants who were between 28 and 34 weeks along with a single pregnancy and preterm symptoms. They were split into two equal groups at random. When fluid therapy failed to reduce the discomfort, an injection of magnesium sulphate (N=50) was administered to the first group, and oral nifedipine was given to the second. The study analyses test results using descriptive statistical techniques, such as the independent T test and the chi square test, using SPSS software (version 20) statistical software issue 20.

Results : The magnesium sulphate and nifedipine groups did not significantly differ in terms of mean maternal age, gestational age, parity converted, or statistical analysis. In 48% of cases (24 people) in the magnesium sulphate group and 72% of cases (36 people) in the nifedipine group ($p=0.03$), the delivery was postponed for more than 48 hours.

There was a greater statistically significant difference in the Nifedipine group's reaction to treatment.

Conclusion : In summary, the findings indicated that Nifedipine outperforms magnesium sulphate in terms of delivery postponement (more than 48 hours), adverse effect production, cost effectiveness, and ease of administration. Thus, in the treatment of premature labour, nifedipine, a tocolytic, may be a useful option in place of magnesium sulphate.

Keywords : *Preterm Delivery, Nifedipine, Magnesium Sulfate*

Introduction

One of the most astounding physiological events in human history, giving birth can be safe and enjoyable in most cases, but there are some cases where it can result in significant challenges and complications for both the mother and the foetus. Numerous factors can have an impact on pregnancy (Valadbeigi et al., 2017). One of these issues is preterm labour. (Moramezi, Cheraghi, Saadati, & Sokhray, 2014) An early baby's birth difficulties can be extremely expensive to care for and treat each year, and families may suffer irreversible stress from mental and psychological strokes. Actually, the main purpose of a pregnancy is to give birth to a healthy, straightforward baby.

Given the significance of the topic and the rise in preterm birth rates in recent years, Numerous investigations and efforts have been made to diagnose, treat, and prevent premature labour. However, during the past 20 years, affluent countries have made no progress in lowering the prevalence of preterm delivery, and their gains have mostly been in the area of treatment. (Petraglia, Gabbe, Wiess, & Strauss, 2007) Preterm labour is more likely in cases of pyelonephritis, diabetes, a history of abdominal and pelvic surgeries, and genital and urinary tract infections. (Chehre, Eivazi, Borji, Karaallahi, & Safar, 2018) The antenatal care practise informs all pregnant women on the signs of early labour. If women experience regular, painful contractions, they must visit the hospital. If uterine contractions do not occur, they should be self-monitored. for review. Although it cannot be prevented, preterm delivery can be put off for a

few days. This delay can have a significant effect on the results of preterm labour, such as the premature infant's mortality and morbidity (in terms of their physical, mental, and evolutionary needs, as well as the financial load and consequences that occasionally last a lifetime).

The actions of prostaglandins result in uterine contractions. As a class of paracrine hormones, prostaglandins function where they are produced. A crucial parturition event that is followed by the start of the uterine contraction may be the decidua and foetal membranes producing prostaglandin. Preterm uterine contractions appear to be prevented by either suppressing prostaglandin production or preventing their effects.

Bed rest, hydration therapy, sedation, and tocolytic drugs are among the conventional treatments for delaying premature labour; each has pros and cons of its own. Nevertheless, there hasn't been any solid proof offered regarding how beneficial bed rest and hydration are. (Scott, Gibbs, Karlan, & Haney, 2003; Saadati, Moramezi, Cheraghi, & Sokhray, 2014) For uterine contractions, a number of tocolytic medications are utilised. Consequently, prenatal counselling, education, and screening can aid in identifying these risk factors for preterm labour. It has been demonstrated that tocolytics are effective at extending pregnancy in cases of preterm labour with cervical dilation. In 2018, Songthamwat, Nan, and Songthamwat Magnesium sulphate is the most often used tocolytic in our nation. Magnesium functions by either preventing calcium from entering the cell or by fighting with it.

across the membranes of cells when they depolarize. Recent research indicates that this medication has been removed from preterm labour treatment in the majority of prestigious research centres across the world due to conflicting reports on its cost and efficacy, as well as known side effects for both mothers and foetuses, including respiratory depression, hypotonia, and hyporeflexia (W. H. Kim, Y. H. Kim, An, Moon, Noh, & J. W. Kim, 2018) and nausea and vomiting (Kim et al., 2018). Actually, a medication called nifedipine, a member of the calcium channel blocker group, has taken the position of magnesium sulphate. It is less expensive, more effective, and has a faster rate of action. (Dehdar & Taherian, 2007) By preventing calcium from entering smooth muscle cells, nifedipine prevents the contraction of the myometrium.

and by obstructing calcium channels that are voltage-dependent. Tocolytics are currently thought to be the best treatment for preterm labour, according to numerous research. (Leveno, Bloom, Hauth, Gilstrap II, Cunningham, & Wenstrom, 2005)

Nevertheless, Nifedipine should not be used in women who have hypotension, congestive heart failure, or aortic stenosis due to potential adverse effects, which include flushing, headaches, dizziness, and peripheral edoema. (Rashidi, Hashemi, Mobasser, Homam, Rashidi, & Moradi, 2017) Prescription medication for expectant mothers typically has a therapeutic impact (Afiqah Amani et al., 2017). Managing a documented preterm labour with a range of medications that may lack uterospecificity, be ineffective, or have potentially dangerous adverse effects for the mother or the foetus presents a challenge for clinicians frequently.

Therefore, magnesium sulphate and nifedipine were compared in this study in order to assess their ability to postpone premature labour and its repercussions. If Nifedipine proves to be as effective as described in recent publications, with less adverse effects, it may be a good substitute for Magnesium sulphate in the treatment of premature labour.

Method

100 pregnant patients with a gestational age of 28 to 34 weeks who have been admitted to Ahwaz's Imam Khomeini Hospital since 2017 due to a diagnosis of preterm labour are the subjects of this phase 2 randomised clinical research. The procedure was carried out with consent and in compliance with the exclusion (anyone who cannot continue their pregnancy due to contraindications or issues administering magnesium sulphate or if they experience at least three contractions lasting 30 seconds for 20 minutes along with increased dilatation and cervical effacement) and inclusion criteria.

Prior to administering a 500cc Ringer with a quick infusion, all patients in this trial have their vital signs examined. If the uterine contractions persist, The patient was randomised to receive either group B—magnesium sulphate (n = 50) or group A—nifedipine (n = 50). Next, magnesium sulphate is injected intravenously at a rate of 4 mg, then 2g/h for 24 hours, and nifedipine is first given orally at a dose of 20 mg every 6 hours for 24 hours.

The magnesium sulphate recipient group received an oral placebo in addition to an injectable medication in this study for blinding purposes, while the nifedipine group received ringer serum in addition to the oral medication. As a result, the patient, the treating physician, and the treatment team of the study participants are unaware of the process used to assign patients to groups. After that, a comparison is done between

the onset of pain relief therapy and the development of premature labour. Vital signs, vaginal haemorrhage, foetal membrane rupture, heart rate, uterine contractions, and mother blood pressure are all recorded during the study.

The questionnaire will include midwifery details regarding the expectant mother, her exams, the kind of prescribed medication, adverse effects, treatment failure cases, and the time between starting treatment and experiencing relief from discomfort or stillbirth. Information is not included in cases where foetal distress or other factors led to the induction of labour. Factors include the number of deliveries, the gestational age of the mother, the history of preterm labour, the rate of cervical dilation and effacement, Measured and examined were the intensity of uterine contractions, the time interval from the start of preterm labour to the start of treatment, and the time interval from the start of treatment to the improvement of discomfort or delivery. The frequency and percentage of the qualitative variables and the mean and standard deviation of the quantitative variables are used to characterise the data.

The t-test (Mann-Whitney if needed), chi-square test, logistic regression, and survival analysis method were utilised for data analysis.

With SPSS software version 20, all analyses were carried out, and statistical significance was defined as $P < 0.05$.

Results

There was no statistically significant difference in the number of uterine contractions, cervical effacement and dilatation at the beginning of treatment, maternal age, gestational age, or number of previous deliveries among the 100 pregnant women with gestational ages of 28 to 34 weeks who were randomly assigned to the Nifedipine and Magnesium sulphate groups.

Discussion

Preterm labour must be prevented and treated in order to lower the risk of unfavourable complications for newborns, improve survival rates, and improve their quality of life. Preterm birth management really aims to improve infant outcomes and lower morbidity and mortality rates in addition to extending pregnancy.

Because of this, we ought to make every effort to avoid premature labour by removing the contributing factor or inhibiting uterine contractions. The purpose of this study was to compare

the effectiveness of magnesium sulphate and nifedipine in preventing preterm labour. The results indicated that there was a statistically significant difference between the two groups' responses to treatment, with the nifedipine group responding to treatment more favourably.

Not a single patient in either of the two groups experienced a problem that required stopping their medication. The effectiveness of the two medications in postponing birth for 48 hours was comparable in a 2007 Lille research, and the group that received nifedipine experienced fewer maternal problems. Consistent with the findings of this study, Dr. Faraji's 2013 study conducted in Iran discovered that if labour was postponed for more than 48 hours, nifedipine was more successful than magnesium sulphate.

In a 2007 Stanford University study, Deirdre discovered that magnesium sulphate was more effective than nifedipine at halting contractions within the first 48 hours (87% versus to 72% at $p = 0.01$), Nifedipine was significantly associated with fewer maternal complications, but delayed labour, gestational age at delivery, and neonatal major outcomes were similar in the two groups (Deirdre, Pullen, Campbell, Ching, Druzin, Chitkara, Burrs, Caughey, & EL-Sayed, n. d.). These results contrast with our recent study.

Similar to our study's findings, a 1999 investigation by Dr. Haghghi at the University of Tehran found that while both nifedipine and magnesium sulphate had comparable efficacy and side effects, nifedipine had a quicker effect on halting uterine contractions (Haghghi, 1981).

In a different Glock study from 2002, oral nifedipine was just as successful as magnesium sulphate in comparing the effects of the drug on patients with premature labour.

Magnesium sulfate's ability to halt preterm labour is comparable to the findings of our trial, which indicated that nifedipine had a quicker effect on avoiding premature labour. 100 women with verified preterm labour were randomly randomised to receive either magnesium sulphate ($n = 50$) or nifedipine ($n = 50$) as tocolytic therapy in a 2013 study conducted in Iran by Dr. Nikbakht. The days gained in utero did not differ statistically between the two groups, and both medications were similarly successful in preventing labour and postponing delivery by more than seven days, 56% vs. 64% in the groups receiving nifedipine and magnesium sulphate. Due to severe symptoms, 2% of the magnesium sulphate group and 6% of the nifedipine group had to stop taking their medications. Additionally, there were no ap-

preciable variations in the maternal traits of the two groups. In both groups, the overall success rate and adverse effects were comparable.

According to the current research, nifedipine offers several advantages over other medications, such as less adverse effects, improved patient acceptance and tolerance, and oral intravenous infusion delivery. Moreover dose-dependent, nifedipine side effects sporadically result in intolerance and treatment cessation. The most frequent side effect is hypotension (less than 90.50 mmHg) in the mother, which usually appears 20 minutes after the second oral dose. It is usually mild and not clinically significant, therefore it can be avoided with appropriate fluid management. In the current study, there were statistically significant maternal adverse events in 12 patients (24%) of the nifedipine group and 26 patients (56%) of the magnesium sulphate group.

Conclusion

The findings suggest that if magnesium sulphate is not working well in premature labour, nifedipine may be a suitable alternative because of its low cost, good efficacy, and easy tocolytic administration.

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