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ORIGINAL ARTICLE

Comparison of Efficacy and Safety of Magnesium Sulphate Versus oral Nifedipine in Acute Tocolysis of Preterm Labour

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ABSTRACT

Aim: To compare the efficacy and safety of magnesium sulphate and oral nifedipine in acute tocolysis of preterm labor.
Study design: Randomized controlled trial.
Place and duration of study: Department of Obstetrics & Gynecology, DHQ Hospital, Mirpur from 19th October 2019 to 18th April 2020.
Methodology: This study included 178 pregnant women with singletons (18 to 40 years of age) assessed through ultrasonography and presented preterm labor. Pregnant women having fetal growth restriction, fetal death, severe preeclampsia, fetal distress, hyperthyroidism,any maternal contraindication for the use of tocolytic drugs, cardiovascular disease, abruptio placentae or placenta-previa were placed in the seclusion criteria of the study. In the group A, oral loading dose of nifedipine 20mg was given. While in group B, magnesium sulphate was injected intravenously with a loading dose of 4 grams over 15 minutes followed by maintenance dose of 2-3 grams/hr. All patients in both groups were evaluated by the researcher herself for prolongation of pregnancy at 48 hours after the start of treatment and efficacy and safety was noted.
Results: Efficacy was seen in 80 (89.89%) in group A (Oral nifedipine) and 67 (75.28%) in group B (magnesium sulfate) with p0.019. Safety was seen in 72 (80.90%) in group B (magnesium sulfate) and 83 (93.26%) in group A (oral nifedipine) with p 0.014.
Practical Implication: The administration of corticosteroids and also assist in reducing mortality and morbidity related with preterm labor events.
Conclusion: This study concluded that oral nifedipine is efficacious and safe than magnesium sulphate for acute tocolysis of preterm labour.
Keywords: Tocolytic Agents, Preterm Birth, Magnesium Sulphate.

INTRODUCTION

Preterm labor is termed as the presence of uterine-contraction in a sufficient intensity and number which further affects the cervix dilation and progressive effacement before actual labor time. It can occur between any time from 20 to 37 weeks. It results in half of the cases of preterm mortality all over the globe[1-2]. Preterm labor is also associated with a 70% mortality and morbidity of the neonates in the world.[2]Early diagnosis of the preterm labor can result into higher survival chances of the neonates with timely management resulting in prevention of premature delivery[3].

The main process of initiation of the pre-term labor is not much accurately understood and it is assumed that various theories are related with its initiation. These includes the withdrawal of progesterone, initiation of the oxytocin's, premature-decidual activation[2,3]. The later one is considered as the most likely mechanism of initiation.

The decidual activation has been reported to occur as a result of upper genital tract infections and might be mediated through some parts of decidualpacrine-system of fetus in addition to the intrauterine bleeding. There are 15.8% of preterm labour incidence in country like Pakistan placing it in 4th position worldwide in accordance with WHO report. An annual prematurity in neonates is identified as more than 7000 cases with a high mortality and morbidity rate presented in them.[3,4]There are various tocolytic agents identified including beta agonists as well as calcium antagonists, prostaglandin inhibitors,Magnesium sulfate, agonists of competitive oxytocin, α-17- hydroxyl-progesterone caproate and or Nitric oxide donor drugs, antibiotics, progesterone[5,6]. Within all the above mentioned tocolytic agents magnesium sulphate has been reported to prevent preterm labor for 48 hours in 88% of the cases while nifedipine application have been able to prevent preterm for the same time in 74.4% of the cases[7].

There are other studies which has reported nifedipine application to prevent preterm in 80% of the cases while magnesium sulphate application prevented preterm in 70% of the cases[8]. Many studies have identified tachycardia to be the major risk associated with magnesium sulphate as well as nifedipine[9,10]. There is still a major debate on choice of tocolytic agent most suitable for the prevention of preterm labor.

The present study was also designed for evaluating the suitable tocolytic agent for prevention of preterm labor.

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MATERIALS AND METHODS

This study was performed atDepartment of Obstetrics & Gynecology, DHQ Hospital, Mirpur after the ethical approval of this study. There were 178 cases included in this study post completion of inclusion criteria which included preterm labor. All women participating in the study were divided into two major groups where Group A was administered oral nifedipine (20mg) while group B was delivered with magnesium sulphate (intravenously: 4 grams over 15 minutes followed by maintenance dose of 2-3 grams/hr). The selection of patients in the groups was conducted randomly. In cases where contractions continued post an hour the dosage was repeated. A maintenance dose was then administered after suppression of pre-term labor through 1 or 2 doses deliverance as through every 6 hours continued until 48 hours.

Patients were evaluated in both groups on the basis of efficacy and safety of the drug. All the demographic details as well as clinical history and evaluation results of the cases were documented on structure proforma wherein age, gestational age, parity, BMI, previous h/o preterm labor, efficacy (yes/no) and safety (yes/no was recorded. Data was analyzed using SPSS

version 26.0 where chi square tool was used for analysis. The p-value ≤0.05 was taken as significant.

RESULTS

Majority of the cases were within 18 to 40 years with a mean age as 26.23±3.95 years. Mean age in group A and B were 25.92±3.92 and 26.48±4.01 years respectively. Around 81.45% pf the patients were in the age limit of 26 to 35 years as represented in the Table 1. The mean gestation age was determined as 33.13±2.31 weeks in group A while 32.57±2.30 weeks in group B (Table 2). Parity distribution suggested 1-3 parous to be higher than 4-5 (Table 3).The mean value of BMI in the cases was measured as27.58±3.04kg/m^2 (Table 4). The patient's distribution in accordance with the history of preterm showed that 82.02% had no history of preterm with no significance variations within both groups (Table 5).

Efficacy for controlling preterm was observed in 89.89% cases of group A (administered with Oral nifedipine) in comparison to 75.28% cases presented in group B (administered with magnesium sulfate). A p-value of 0.019 was calculated to be significantly variant within the groups (Table 6). Safety of the tocolytic drug nifedipine was observed to be 93.26% in group A compared with magnesium sulfate in group B as 80.9% with p0.014 (Table 7).

Table 1: Age distribution for both groups (n=178)

Age (years)	Group A		Group B		Total	
	No.	%	No.	%	No.	%
18-30	74	83.15	71	79.78	145	81.46
31-40	15	16.85	18	20.22	33	18.54
Mean±SD	25.92±3.92		26.48±4.01		26.23±3.95	

Table 2: Distribution of patients according to Gestational age (n=178)
Gestational Age (weeks)

Gestation age(weeks)	Group A		Group B		Total	
	No.	%	No.	%	No.	%
<32	41	46.07	46	51.69	87	48.88
33-36	48	53.93	43	48.31	91	51.12
Mean±SD	33.13±2.31		32.57±2.30		32.79±2.29	

Table 3: Distribution of patients according to parity (n=178)

Parity	Group A		Group B		Total	
	No.	%	No.	%	No.	%
1-3	71	79.78	69	77.53	140	78.65
4-5	18	20.22	20	22.47	38	21.35
Mean±SD	2.57±1.01		2.66±0.97		2.61±0.98	

Table 4: Distribution of patients according to BMI (n=178)

BMI (kg/m^2)	Group A		Group B		Total	
	No.	%	No.	%	No.	%
≤27	46	51.69	48	53.93	94	52.81
≥27	43	48.31	41	46.07	84	47.19
Mean±SD	27.58±3.03		27.57±3.09		27.58±3.04	

Table 5: Distribution of patients according to previous H/O preterm labour (n=178)

H/O preterm labour	Group A		Group B		Total	
	No.	%	No.	%	No.	%
Yes	15	16.85	17	19.10	32	17.98
No	74	83.15	72	80.90	146	82.02

Table 6: Comparison of Efficacy between both Groups (n=178).

Efficacy	Group A (n=89)	Group B (n=89)
Yes	67(75.28%	80(89.89%)
No	22(24.72%)	9(10.11%)

1`1P value is 0.010 which is statistically significant.

Table 7: Comparison of safety between both Groups (n=178)

Efficacy	Group A (n=89)	Group B (n=89)
Yes	72(80.90%)	83(93.26%)
No	17(19.10%)	6(6.74%)

P value is 0.014 which is statistically significant.

DISCUSSION

There are various approaches conducted for controlling preterm labor including bed rest, sedative applications, fluid therapies as well as the use of tocolyitc agents.[10,11]Magnesimsulphate is one of the most applied tocolytic agent in countries like Iran as well as in North American regions.[12] The drug acts by relaxing contractions of smooth muscles in the myometrium area through decrease in the release of acetylycholine at nerve and muscle junctions. This further reduces the sensitivity of the terminal motro-end plate to the acetylcholine. There have been various reports on the side effects of this tocolytic drug. Moreover, it is economically not cost effective as well leading to the replacement of this drug with other tocolyticagents as calcium blockers including nifedipine[13].

The oral application of nifedipine inhibits calcium influx and smooth myometrium muscle contractions through calcium voltage channels blockage. There is evident literature to prove its application for prevention of preterm labor[14]. In the current study the 89.8% of the cases applying nifedipine were prevented from preterm labor while in comparison to this only 75.28% of cases using magnesium sulphate were prevented from preterm labor concluding nifedipine to be more safe and efficient drug than magnesium sulphate. Similar results have been reported by Nazet al[15] in their research where oral application of nifedipine had been able to prevent muscle contractions of preterm labor for a period of 48 hours in 74.1% of the cases. Kawagoe et al [16] on the contrary proved magnesium sulphate to prevent preterm labor in 90% of the cases for more than 48 hours. Conde-Agudelo et al[18] as well as Hangekar et al[19] reported nifedipine to be a better tocolytic agent than magnesium sulphate in reducing the preterm labor with high efficiency. Nifidipine application has also been reported to reduce respiratory distress[20]. There are still other literature available which concludes similar efficacy of both tocolytic agents. One such research was published by Glock and his colleagues[22]and other inNetherland. The former research elaborated the efficacy of nifedipine and magnesium sulphate as 93% and 92% respectively. Whereas no variation in side effects was observed in the later reported research[23].

Medical resources, diagnosis, and treatment must improve in developing countries. There are limited resources available: lack of access to medical and health resources to the patients about disease; limited knowledge and trainings, and awareness about disease. The trainings should be conducted to improve the health literacy and how to access the medical resources for patients in Pakistan[24-30].

CONCLUSION

Oral application of nifedipine is more efficacious in controlling and preventing preterm labor in comparison to the magnesium sulphate. Nifedipine is recommended for its application as a first line agent in inhibiting uterine-contractionsand benefiting pregnancy prolongation, fetal lung maturation through the administration of corticosteroids and also assist in reducing mortality and morbidity related with preterm labor events.

Conflict of interest: Nothing to declare

REFERENCES

1. Hassan SM, Belal DS. Nifedipine versus nitroglycerin in the inhibition of preterm labour. Med J Cairo Univ. 2015;83:99-104.
2. Gyamfi-Bannerman C, Thom EA, Blackwell SC. Antenatal betamethasone for women at risk for late preterm delivery. N Engl J Med. 2016;374(14):1311-20.
3. Practice Bulletin No. 159: Management of preterm labor. Obstet Gynecol. 2016;127(1):29–38.
4. Wolf HT, Huusom L, Weber T, Piedvache A, Schmidt S, Norman M, et al. Use of magnesium sulfate before 32 weeks of gestation: a European population-based cohort study. BMJ Open. 2017;7(1):013952.
5. Esmailzadeh S, Ramezani M, Pahlevan Z, Taheri S, Zabihi F, Naeimirad M. Nifedipin versus magnesium sulfate for the suppression

of preterm labor: a randomized clinical trial. Caspian J Reprod Med, 2017;3(1):25-30.
6. Khooshideh M, Rahmati J, Teimoori B. Nifedipine versus magnesium sulfate for treatment of preterm labor: comparison of efficacy and adverse effects in a randomized controlled trial. Shiraz E-Med J. 2017;18(6):e46875.
7. Tabassum S, Shahzadi U, Khalid A. Comparative study of efficacy of magnesium sulfate and nifedipine in suppression of preterm labour. Pak J Med Health Sci. 2016;10(4):1307:12.
8. Kamel HEH, HosamEldin NMS, Soltan MAA. Comparative study between the effect of nifedipine, ritodrine and magnesium sulphate therapy on doppler indices of fetal umbilical and middle cerebral arteries in patients with preterm labour. Egyptian J Hospital Med. 2019;74(2):364-74.
9. Aziz H, Batool S, Hashmi KS. Comparison of efficacy of magnesium sulphate versus nifedipine for tocolysis of preterm labour. Pak J Med Health Sci. 2018;12(4):1669-72.
10. Hubinont C, Debieve F. Prevention of preterm labour: 2011 update on tocolysis. J Pregnancy. 2011;2011:941057.
11. Grimes DA, Nanda K. Magnesium sulfate tocolysis: time to quit. ObstetGynecol. 2006;108(4):986-989.
12. Deirdre J, Lyell DJ, Pullen k, et al. Magnesium Sulfate compared with nifedipine for acute tocolysis of preterm labour: a randomized controlled trial. Obstet& Gynecol. 2007; 110(5): 1170-1171.
13. Haghighi L. Prevention of preterm delivery: nifedipine or magnesium sulfate. Int J Gynaecol Obstet. 1999;66(3):297-298.
14. Conde-Agudelo A, Romero R, Kusanovic JP. Nifedipine in the management of preterm labor: a systematic review and metaanalysis. Am J Obstet Gynecol. 2011;204(2):134 e1-20.
15. Naz S, Majid E, Soomro S, Perveen R, Baloch R. Efficacy of nifedipine in suppression of preterm labour. Pak J Surg. 2011;27(4):299-303.
16. Kawagoe Y, Sameshima H, Ikenoue T, Yasuhi I, Kawarabayashi T. Magnesium sulfate as a second line tocolytis agent for preterm labour: a ramdomized controlled trial in Kyushu Island. J Pregnancy. 2011;2011:9650656.
17. Lyell DJ, Pullen K, Campbell L, Ching S, Druzin ML, Chitkara U. Magnesium sulfate compared with nifedipine for acute tocolysis of preterm labor: a randomized controlled trial. Obstet Gynecol. 2007; 110(1):61-67.
18. Conde-Agudelo A, Romero R, Kusanovic JP. Nifedipine in the management of preterm labor: a systematic review and meta-analysis. AJOG 2011;204:134. e1-e20.
19. Hangekar PM, Karale A, Risbud N. Our experience of nifedipine as a tocolytic agent in preterm labor (24 weeks to 36 weeks 6 days). Int J Reprod Contraception Gynecol2017;6:636-9.
20. Papatsonis DNM, Kok JH, van Geijn HP, Bleker OP, Ader HJ, Dekker GA. Neonatal effects of nifedipine and ritodrine for preterm labor. Obstet Gynecol. 2000;95:477–481.
21. Conde-Agudelo A, Roberto Romero R, Juan Pedro Kusanovic JP. Nifedipine in the management of preterm labor: a systematic review and metaanalysis. Am J Obstet Gynecol. 2011;204:1–20.
22. Glock JL, Morales WJ. Efficacy and safety of nifedipine versus magnesium sulfate in the management of preterm labor: A randomized study. Am J Obstet Gynecol. 1993;169:960–4.
23. de Heus R, Mol BW, Erwich JJ. Adverse drug reactions to tocolytic treatment for preterm labour: prospective cohort study. BMJ. 2009;338:b744.
24. Jabeen M, Shahjahan M, Farid G. Information Dissemination during COVID-19 Pandemic among Postgraduate Allied Health Sciences Students in Pakistan. Pakistan Journal of Medical & Health Sciences. 2022;16(11):366-.
25. Shahjahan M, Jabeen M, Farid G. Information Providing in COVID-19 by Health Professionals in Pakistan. Pakistan Journal of Medical & Health Sciences. 2022 Dec 12;16(10):641-.
26. Farid G, Zaheer S, Khalid A, Arshad A, Kamran M. Evaluating Medical College Lib Guides: A Usability Case Study. Pakistan Journal of Medical & Health Sciences. 2022 Aug 26;16(07):461-
27. Farid G, NiaziAk, Muneeb M, Iftikhar S. Attitude towards Utilization of e-Resources of Medical Images among Health Care Professionals. Pakistan Journal of Medical and Health Science. 2021 Sep 15 (9);261-263
28. Farid G, Iqbal S, Iftikhar S. Accessibility, Usage, and Behavioral Intention of Print Books and eBooks by Medical Students. Library Philosophy and Practice. 2021:1-25.
29. Farid G, Abiodullah M, Ramzan M. A comparative study of information seeking behaviors of medical faculty working in government and private run medical colleges. International Journal of Information Management Science. 2013;2(1):17-24.
30. Shahbaz T, Farid G, Asghar RS, Rashid A. Hepatitis B and C: Knowledge, attitude and behavior of health care workers at RLMC and affiliated hospitals (AMTH & HLH). The Professional Medical Journal. 2015 Nov 10;22(11):1383-9.