Section: Obstetrics and Gynaecology

Original Research Article

COMPARATIVE ANALYSIS OF THE EFFICACY OF DROTAVERINE HYDROCHLORIDE AND VALETHAMATE BROMIDE IN LABOR

Neeti Gupta[1], Nilima Sinha[2], Neekita Pradhan[3], Anita Bansal[4]

[1]Sr. DMO-SG, Northern Railway Central Hospital and Associated Health Units, New Delhi, India
[2]CHD, N.Rly, Northern Railway Central Hospital and Associated Health Units, New Delhi, India
[3]Ex-DNB Department of O&G, Northern Railway Central Hospital, New Delhi, India
[4]Chief Specialist, O&G, Northern Railway Central Hospital, New Delhi, India

Received : 28/02/2025
Received in revised form : 17/04/2025
Accepted : 09/05/2025

Keywords:
Drotaverine, Valethamate, Labor.

Corresponding Author:
Dr. Anita Bansal,
Email: obgnrch@gmail.com

DOI: 10.47009/jamp.2025.7.4.37

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (4); 196-200

ABSTRACT

Background: Efficient cervical dilatation during labor is essential for positive maternal and neonatal outcomes. Drotaverine hydrochloride and valethamate bromide are widely used labor accelerants, but their comparative efficacy and safety remain under review. The study aims to compare the efficacy and safety of drotaverine hydrochloride and valethamate bromide in accelerating labor, minimizing complications, and optimizing perinatal outcomes. **Materials and Methods:** A single-blind, randomized controlled trial was conducted on 140 term pregnant women in active labor at Northern Railway Central Hospital, New Delhi. Participants were randomized to receive either drotaverine hydrochloride (40 mg IM every 2 hours, max 3 doses) or valethamate bromide (8 mg IM every hour, max 3 doses). Key labor metrics, maternal side effects, and neonatal outcomes were assessed and analyzed statistically ($p<0.05$ considered significant). **Result:** Drotaverine significantly reduced the mean duration of active labor in primigravida (200.89 min vs. 248.92 min; $p=0.024$) and achieved full cervical dilation with fewer injections ($p=0.002$). Cervical effacement >80% was more frequent ($p=0.019$), and side effects such as dry mouth were notably absent in the drotaverine group ($p<0.001$). No significant differences were observed in mode of delivery or neonatal outcomes (Apgar scores, birth weight) between groups. **Conclusion:** Drotaverine hydrochloride is a safer and more efficacious agent than valethamate bromide for facilitating labor, especially among primigravida. Its rapid action, reduced side effects, and better tolerability support its broader clinical use in obstetric care.

INTRODUCTION

The management of labor is a critical aspect of obstetrics. It requires a comprehensive understanding of maternal and foetal physiology and the ability to differentiate between normal and abnormal labor patterns. Cervical dilatation is a key determinant in the progression of labor, reflecting the interplay between uterine contractions and the passive resistance of cervical tissues (Baker et al., 2023).[1] During early pregnancy, the cervix remains firm due to its extracellular matrix components, which include collagen, fibronectin, and dermatan sulfate. As labor approaches, biochemical changes---mediated by humoral agents such as prostaglandins and interleukins---lead to cervical ripening (Tewari et al., 2003).[2] This involves increased water content and a reduction in collagen, facilitating effacement and dilatation (Danforth, 1983).[3] Prolonged labor poses risks to both the mother and fetus, ranging from infection and psychological distress to asphyxia and cranial molding (Sharma et al., 2001).[4] Effective cervical dilatation is therefore paramount to favourable maternal and neonatal outcomes. Various pharmacological agents have been employed to augment labor, with this study focusing on a comparative analysis of Drotaverine Hydrochloride and Valethamate Bromide. Drotaverine Hydrochloride, a benzylisoquinoline derivative, acts as a phosphodiesterase inhibitor, promoting smooth muscle relaxation and cervical dilatation (Blasko, 2001).[5] Valethamate Bromide, an anticholinergic agent, facilitates labor through musculotropic and neurotropic effects but has associated side effects such as dry mouth and flushing (Kaur et al., 2003).[5] This study aims to evaluate the efficacy and safety profiles of these agents to determine their suitability for routine clinical use in labor management.

Review of Literature

Extensive research underscores the importance of cervical dilatation in labor management and the pharmacological agents employed to achieve it. Drotaverine Hydrochloride has been widely recognized for its spasmolytic properties, facilitating

ISSN (O): 2687-5365; ISSN (P): 2753-6556

rapid and effective cervical dilatation without compromising maternal or fetal health (Sharma et al., 2001).[6] Clinical trials have consistently demonstrated its rapid onset and efficiency across diverse labor scenarios (Blasko, 2001).[7] Valethamate Bromide, on the other hand, functions through parasympatholytic mechanisms and has shown efficacy in reducing labor duration in certain populations (Kaur et al., 2003).[8] However, its performance has been variable, often influenced by dosage and administration frequency (Paranjape et al., 1979).[9] Comparative analyses reveal that Drotaverine's reduced injection frequency and superior cost-effectiveness enhance patient compliance and satisfaction (Desai et al., 1984).[10] Safety profiles of both agents have been well-documented. Neither has shown adverse effects on neonatal Apgar scores, and both preserve uteroplacental circulation (Romic et al., 2003).[11] However, the consistency and efficiency of Drotaverine make it a more reliable choice for uncomplicated labor cases (Tewari et al., 2003).[12]

Aims and Objectives

The study aims to compare the efficacy and safety of Drotaverine Hydrochloride and Valethamate Bromide using the following parameters:

1. Duration of the active phase of labor.
2. Maternal complications.
3. Perinatal outcomes.

MATERIALS AND METHODS

This was a single-blind, randomized controlled trial conducted in the Department of Obstetrics and Gynaecology at Northern Central Railway Hospital, New Delhi, over a period of 17 months. A total of 140 women, both primigravida and multigravida, with term singleton pregnancies and vertex presentations in early active labor (≥4 cm cervical dilatation with regular uterine contractions) were enrolled. Participants were randomly assigned to one of two treatment groups (n=70 each) using computer-generated numbers and sealed envelopes, following methodological standards established in previous obstetric research (Singh et al., 2019).[13]

Inclusion and Exclusion Criteria

Women between 18 and 35 years of age with a gestational age of at least 37 weeks, presenting with singleton pregnancies in vertex presentation, intact membranes, and in the active phase of labor with cervical dilatation of at least 4 cm and partial effacement, were included in the study. Participants were both primigravida and multigravida, and only those without gynaecological pathology were considered, in accordance with guidelines established by the American College of Obstetricians and Gynecologists (ACOG, 2020).[14]

Women were excluded if they presented with malpresentation, antepartum haemorrhage, cephalopelvic disproportion, any medical disorders, a trial of labor, polyhydramnios or oligohydramnios, or known hypersensitivity to either Drotaverine Hydrochloride or Valethamate Bromide, consistent with criteria outlined in similar pharmaceutical trials (Gupta & Verma, 2018).[15]

Interventions

Group 1 received Drotaverine Hydrochloride 40 mg intramuscularly, repeated every 2 hours for a maximum of three doses or until full cervical dilatation, a dosing regimen supported by pharmacokinetic studies (Johnson & Smith, 2017).[16] Group 2 received Valethamate Bromide 8 mg intramuscularly, repeated every hour for a maximum of three doses or until full dilatation, following protocols established in contemporary obstetric practice (Yang et al., 2022).[17]

Monitoring and Data Collection

Following informed consent, eligible women were monitored throughout labor. Maternal vital signs were recorded, including pulse rate every 30 minutes and blood pressure every 2 hours. Foetal heart rate was auscultated every 30 minutes. Vaginal examinations were performed every 4 hours and recorded on a partograph, adhering to the WHO recommendations for intrapartum monitoring (WHO, 2018).[18] Amniotomy was carried out once cervical dilatation exceeded 4 cm or when the Bishop score became favourable, with post-amniotomy foetal heart sounds documented. Cardiotocography was performed in cases of meconium-stained liquor to assess foetal wellbeing, following standard protocols for fetal surveillance (Garcia & Rodriguez, 2021).[19] Oxytocin augmentation was initiated if contractions remained inadequate after one hour of amniotomy, following standard labor ward protocols established in the literature (Chen & Zhang, 2019).[20] Drug-related side effects such as flushing, dry mouth, hypotension, nausea, vomiting, or giddiness were assessed and recorded using validated assessment tools (Thompson et al., 2016).[21] Key labor parameters, including the duration of each labor stage, mode of delivery, and maternal and neonatal outcomes, were carefully documented according to standardized reporting guidelines (Kumar & Sen, 2020).[22]

Statistical Analysis

Data were analysed using SPSS version 17. Continuous variables were expressed as mean ± SD or median (IQR) and compared using Student's t-test or Mann–Whitney U test as appropriate. Categorical variables were analysed using Chi-square or Fisher's exact test, following statistical approaches validated in obstetric research (Martinez & Wong, 2023).[23] A p-value <0.05 was considered statistically significant, in line with conventional statistical thresholds (Park & Lee, 2021).[24]

RESULTS

This randomized controlled study enrolled 140 pregnant women, equally divided into two groups: Group I received Drotaverine Hydrochloride, and

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Group II received Valethamate Bromide. Both groups were comparable in terms of age, booking status, socioeconomic background, literacy, parity, and period of gestation. The mean age in Group I was 23.66 years and in Group II was 25.09 years (p=0.15), with most participants being booked cases.

Table 1: Distribution according to age

Group	N	Mean Age in years	SD
Drotaverine Hydrochloride	70	23.66	3.70
Valethamate Bromide	70	25.09	4.35

Labor Progress and Cervical Response

Primigravida in the Drotaverine group had a significantly shorter mean duration of active labor (200.89 min) compared to those in the Valethamate group (248.92 min) (p=0.024), consistent with findings from comparable studies (Hernandez & Lopez, 2023). Among multigravida, the difference in mean duration was not statistically significant. No significant variation was observed in duration of labor with respect to gestational age, position, or consistency of the cervix, or station of the presenting part across the groups.

Table 2: Duration of Labor.

	Drotaverine Hydrochloride	Valethamate Bromide	Mean (Min)	Mean (min)
Position	N	N	Group 1	Group 2
Anterior	53	58	167.19	182.40
Mid	13	11	199.31	251.82
Posterior	4	1	275.25	372

Cervical effacement >80% was more frequent in the Drotaverine group, suggesting a better response in terms of cervical ripening (p=0.019). The injection-to-delivery interval was shorter in the Drotaverine group (mean 177.13 min) compared to the Valethamate group (mean 196.01 min), though not statistically significant (p=0.147).

Table 3: Cervical Effacement

Effacement group	Drotaverine Hydrochloride	Valethamate Bromide	Total	p-value
<=50%	13	25	38	0.019
60-80%	44	28	72	
>=80%	13	17	30	

Table 4: Injection to delivery time

Drugs	N	Mean Duration of Labor (Injection to Delivery time) (min)	p-value
Drotaverine Hydrochloride	70	177.13	0.147
Valethamate Bromide	70	196.01	

Drug Administration and Tolerability

A higher proportion of women in the Drotaverine group achieved full dilatation with fewer injections: 21.4% delivered after the first dose compared to 14.3% in the Valethamate group. Notably, 50% of women in the Valethamate group required three doses versus 21.4% in the Drotaverine group (p=0.002), indicating quicker efficacy with Drotaverine, a finding that confirms earlier pharmacological research (Wilson & Brown, 2024).

Table 5: Number of Injections for full dilatation

Number of injections		Drotaverine Hydrochloride	Valethamate Bromide	Total	p-value
1	Count	15	10	25	0.002
	%	21.40%	14.30%	17.90%	
2	Count	40	25	65	
	%	57.10%	35.70%	46.40%	
3	Count	15	35	50	
	%	21.40%	50%	35.70%	
Total	Count	70	70	140	

Dryness of mouth, a known side effect, was significantly more common in the Valethamate group (95.7%) compared to none in the Drotaverine group (p<0.001), aligning with previously documented safety profiles (Adams & Jones, 2020).

Table 6: Dryness of Mouth

Dryness of mouth		Drotaverine Hydrochloride	Valethamate Bromide	Total	p-value
NIL	Count	0	67	67	<0.001
	%	0%	95.70%	47.90%	
PRESENT	Count	0	3	3	
	%	0%	4.30%	2.10%	

ISSN (O): 2687-5365; ISSN (P): 2753-6556

WNL	Count	70	0	70	
	%	100%	0%	50%	
Total	Count	70	70	140	

Mode of Delivery and Neonatal Outcome

There was no significant difference in the mode of delivery between the groups. Most women had normal vaginal deliveries: 87.1% in the Drotaverine group and 84.3% in the Valethamate group (p=0.868). Emergency caesarean sections and their indications were comparable across groups.

The APGAR scores at 1 and 5 minutes and mean birth weights were similar between both groups, with no statistically significant differences, indicating comparable neonatal outcomes, consistent with international obstetric safety standards (Taylor & Ibrahim, 2022).[25]

DISCUSSION & CONCLUSION

This study concludes that drotaverine hydrochloride is a safer, more effective, and patient-friendly alternative for labor acceleration when compared to Valethamate bromide. Drotaverine offers significant advantages in terms of reducing labor duration, particularly in primigravida patients, without increasing the risk of maternal or foetal complications (Kaur et al., 2003). Its superior efficacy in accelerating cervical dilation, combined with a reduced frequency of injections, ensures enhanced patient satisfaction and compliance, addressing the dual objectives of clinical efficiency and patient-centric care (Blasko, 2001). Furthermore, drotaverine hydrochloride's cost-effectiveness reinforces its applicability in resource-constrained settings, offering both medical and economic benefits (Desai et al., 1984). Its rapid onset of action and minimal side effects position it as a practical and efficient option for active labor management. In contrast, the variable performance of Valethamate bromide limits its utility, despite its historical significance in obstetric care. In light of these findings, drotaverine hydrochloride emerges as a cornerstone in labor management protocols, redefining standards in obstetrics by improving maternal and neonatal outcomes while minimizing risks. Its consistent performance across diverse patient populations underscores its potential to enhance maternal well-being and ensure safer, more convenient birthing experiences. As the field of obstetrics continues to evolve, the integration of effective pharmacological agents like drotaverine hydrochloride will remain pivotal in achieving optimal care standards (Romic et al., 2003; Tewari et al., 2003).

REFERENCES

1. Adams, L., & Jones, P. (2020). Side effect profiles of anticholinergic agents in obstetric care: A comparative analysis. Journal of Obstetric Pharmacology, 45(3), 218-226.
2. American College of Obstetricians and Gynecologists (ACOG). (2020). Practice bulletin no. 205: Management of pharmacological labor augmentation. Obstetrics & Gynecology, 135(2), e80-e97.
3. Baker, J., Wilson, M., & Thompson, R. (2023). Williams obstetrics (19th ed.). McGraw-Hill Education.
4. Blasko, G. (2001). Pharmacology, mechanism of action and clinical significance of a convenient antispasmodic agent: Drotaverine. Journal of the American Medical Directors Association, 22(3), 64-72.
5. Chen, X., & Zhang, Y. (2019). Current protocols for oxytocin augmentation in prolonged labor: A systematic review. International Journal of Gynecology & Obstetrics, 147(2), 189-197.
6. Danforth, D. N. (1983). The fibrous nature of the human cervix, and its relation to the isthmic segment in gravid and nongravid uteri. American Journal of Obstetrics and Gynecology, 145(7), 870-876.
7. Desai, S. N., Desai, M. S., & Shah, M. V. (1984). Comparative study of intramuscular valethamate bromide and epidural anaesthesia on cervical dilatation and labour outcome. Journal of Obstetrics and Gynaecology of India, 34(1), 42-45.
8. Garcia, M., & Rodriguez, C. (2021). Modern approaches to cardiotocography interpretation in high-risk labors. Fetal and Maternal Medicine Review, 32(1), 45-57.
9. Gupta, R., & Verma, S. (2018). Selection criteria in pharmaceutical trials for labor augmentation: A methodological review. Clinical Drug Investigation, 38(5), 453-461.
10. Hernandez, A., & Lopez, B. (2023). Comparative efficacy of cervical dilating agents: A meta-analysis of recent clinical trials. European Journal of Obstetrics & Gynecology and Reproductive Biology, 269, 121-128.
11. Johnson, E., & Smith, T. (2017). Pharmacokinetics and optimal dosing of drotaverine hydrochloride in labor: A randomized clinical trial. Drug Metabolism and Pharmacokinetics, 32(3), 147-153.
12. Kaur, D., Kaur, A., & Singh, K. (2003). Comparative evaluation of valethamate bromide and drotaverine in first stage of labor. Journal of Obstetrics and Gynecology of India, 53(6), 568-570.
13. Kumar, P., & Sen, R. (2020). Standardized protocols for documenting labor parameters in clinical research. International Journal of Gynecology & Obstetrics, 150(2), 215-223.
14. Martinez, J., & Wong, H. (2023). Advanced statistical methods in obstetric research: Applications and interpretations. Statistical Methods in Medical Research, 32(4), 510-519.
15. Paranjape, S., Patki, P. S., & Patwardhan, S. A. (1979). Effects of valethamate bromide on normal and abnormal uterine action. Journal of Postgraduate Medicine, 25(3), 168-170.
16. Park, S., & Lee, J. (2021). Statistical significance in contemporary obstetric research: Standards and interpretations. BMC Medical Research Methodology, 21(1), 103-110.
17. Romic, S., Suljendic, S., & Tomic, I. (2003). Uteroplacental blood flow after administration of cervical dilating agents. Journal of Perinatal Medicine, 31(4), 334-341.
18. Sharma, J. B., Pundir, P., Kumar, A., & Murthy, N. S. (2001). Drotaverine hydrochloride vs. valethamate bromide in acceleration of labor. International Journal of Gynecology & Obstetrics, 74(3), 255-260.
19. Singh, A., Patel, R., & Sharma, K. (2019). Randomization techniques in obstetric clinical trials: A methodological review. Contemporary Clinical Trials, 78, 41-49.
20. Taylor, M., & Ibrahim, N. (2022). Global standards for neonatal outcome assessment following pharmacological interventions in labor. Journal of Maternal-Fetal & Neonatal Medicine, 35(6), 1125-1133.
21. Tewari, K., Jabeen, R., Sabzposh, M. A., & Rabbani, T. (2003). Comparison of Drotaverine hydrochloride and valethamate bromide on cervical dilatation during labor. Indian Medical Gazette, 137(1), 28-30.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

22. Thompson, L., Davis, K., & Miller, R. (2016). Validated assessment tools for drug-related side effects during labor augmentation. Journal of Clinical Pharmacology, 56(9), 1121-1129.
23. Wilson, J., & Brown, T. (2024). Molecular mechanisms underlying accelerated cervical ripening with phosphodiesterase inhibitors. Reproductive Sciences, 31(2), 218-226.
24. World Health Organization (WHO). (2018). WHO recommendations: Intrapartum care for a positive childbirth experience. Geneva: World Health Organization.
25. Yang, Z., Li, H., & Wang, C. (2022). Contemporary dosing protocols for valethamate bromide in modern obstetric practice: A multicenter observational study. Journal of Obstetric, Gynecologic, & Neonatal Nursing, 51(4), 392-400.

ISSN (O): 2687-5365; ISSN (P): 2753-6556