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Role of intravenous acetaminophen infusion for analgesia during active labour

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Abstract

Background: The purpose of the study was to appraise the effectiveness and unfavorable side effects (if any) of an intravenous infusion of 1000 mg of acetaminophen during the active phase of labour.

Materials & Methods: The present study was conducted in the department of Obstetrics & Gynaecology of GMC Amritsar among 100 pregnant females. After obtaining the informed consent, and meeting the inclusion and the exclusion criteria, a total of 100 pregnant females were included in the present study and were broadly divided into two study groups, with 50 patients in each group, as follows:

Group 1: Patients received IV Acetaminophen (1000 grams).

Group 2: Patients receiving matched placebo. (100 ml normal saline)

The duration of study was 1 and ½ year (April 2017 to October 2018). The course of events was studied and decrease in intensity of pain if any during labour was accessed by visual analog score and foetal outcome (i.e., Apgar score at 1 min to 5 min after birth).

Results: Mean duration of first stage of labour among females of the study group and control group was 417 minutes and 622.2 minutes respectively. Significant results were obtained while comparing mean VAS after 30 minutes and 60 minutes among females of the study group and the control group.

Conclusion: Intravenous acetaminophen is an effective intrapartum analgesic in both primigravida and multigravida women candidates, it also helps to reduce the duration of labour without any maternal and foetal adverse effects.

Keywords: Acetaminophen, labour, saline

Introduction

Normal Labour is defined as one in which foetus presents as vertex, starts spontaneously at term without undue prolongation and terminates naturally without clinical aids and without complications.¹

The intensity of pain felt during labour has a direct bearing on maternal psychology, labour progress and fetal well-being. Especially during the first stage, it evokes a generalized neuroendocrine stress response, instigating marked physiologic changes in oxygen consumption, acidemia and cardio-pulmonary functions, along with restraining uterine contractions. Thus, pain relief during labour is expected to reduce maternal stress and improve maternal and perinatal outcome.²⁻⁴

Active management of labour is a part and parcel of modern obstetrics. It is the skill of obstetrician how actively he or she manages labour and how early a woman gets rid of her agonies especially in primigravidae.⁵

Acetaminophen is also known as paracetamol, is commonly used for its analgesic and antipyretic effects. Its therapeutic effects are similar to salicylates, but it lacks anti-inflammatory, antiplatelet, and gastric ulcerative effects.^{6,7}

Though its role in management of postoperative pain has been adequately studied by various authors, there is paucity of work on utilization of paracetamol as an intrapartum analgesic drug. Hence, the purpose of the study was to appraise the effectiveness and unfavorable side effects (if any) of an intravenous infusion of 1000 mg of acetaminophen during the active phase of labour.

Material & Method

The present study was conducted in the department of Obstetrics & Gynaecology of GMC Amritsar among 100 pregnant females. After obtaining the informed consent, and meeting the

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Inclusion and the exclusion criteria, a total of 100 pregnant females were included in the present study and were broadly divided into two study groups, with 50 patients in each group, as follows:

Group 1: Patients received IV acetaminophen (1000 gms).

Group 2: Patients receiving matched placebo. (100 ml normal saline)

The duration of study was 1 and ½ year (April 2017 to October 2018). The course of events was studied and decrease in intensity of pain during labour was accessed by visual analog score and foetal outcome (i.e. Apgar score at 1 min to 5 min after birth).

All the results were compiled and recorded on Microsoft excel sheet and were analysed by SPSS software version 17.0. Chi-square test, Mann Whitney U test and student t test were used for evaluation of level of significance. P-value of less than 0.05 was taken as significant.

Results & Observations

44 percent of the females (22 females) of the study group and 50 percent of the females (25 females) were of Primigravidae, while 56 percent of the females (28 females) and 50 percent of the females (25 females) were of Multigravidae respectively as per Table No.1.

There was no statistically significant difference between the two groups in relation to gravidity ($p=0.548$).

82 percent of the females (41 females) of the study group and 86 percent females (43 females) of the control group belonged to the age group of 21 to 30 years. Mean age was 24.14 ± 3.2 in study group and 24.69 ± 3.17 in control group as per Table No. 2. There was no statistically significant difference of age

distribution between the two groups ($p=0.381$) and both groups were comparable for study.

Mean duration after first infusion among females of the study group and control group in primigravidae was 4.08 hours (245.30 minutes) and 6.85 hours (410.72 minutes) respectively as per Table No. 3. Significant results were obtained while comparing the mean duration of labour after first infusion among primigravidae of both groups ($p < 0.001$) as per Table No.3.

Mean duration of labour after first infusion among multigravidae of the study group and control group was 3.55 hours (232.70 minutes) and 6.12 hours (367.26 minutes) respectively. Significant results were obtained while comparing the mean duration of labour after first infusion among multigravidae of study group and the control group ($p=0.007$) as per Table No.4.

Mean duration of labour after first infusion among females of the study group and control group was 3.97 hours (238.06 minutes) and 6.53 hours (391.95 minutes) respectively. Significant results were obtained while comparing the mean duration of labour after first infusion among females of the study group and the control group ($p < 0.001$) as per Table No.5.

Mean VAS after 30 minutes of infusion among females of study group and control group was 6.90 and 7.40 respectively. Significant results were obtained while comparing mean VAS after 30 minutes of infusion among females of both groups ($p < 0.001$) as per Table No. 6.

Mean VAS after 60 minutes of infusion among females of study group and control group was 7.10 and 7.93 respectively. Significant results were obtained while comparing mean VAS after 60 minutes of infusion among females of both groups ($p < 0.001$) as per Table No.7.

Table 1: Distribution of females of the study group and control group according to Gravidity

Gravidity	Study group (n=50)		Control group (n=50)		p- value
	Frequency	Percentage	Frequency	Percentage	
Primigravidae	22	44	25	50	0.548
Multigravidae	28	56	25	50	
Total	50	100	50	100	

Table 2: Age-wise distribution of females of the study group and control group

Age group (in years)	Study group (n=50)		Control group (n=50)		p- value
	Frequency	Percentage	Frequency	Percentage	
<= 20	6	12	3	6	0.381
21 to 30	41	82	43	86	
31 to 40	3	6	4	8	
Total	50	100	50	100	
Mean age in years (\pm SD)	24.14 ± 3.2		24.69 ± 3.17		

SD: standard deviation

Table 3: Comparison of duration after first infusion among primigravidae of study group and the control group

Duration after first injection hours	Study (acetaminophen infusion)		Control group (NS infusion)		Mann Whitney U test	P- value
	Frequency	Percentage	Frequency	Percentage		
1-2	8	16	5	10	401.500	< 0.001
3-4	18	36	10	20		
5-6	9	18	17	34		
7-8	10	20	10	20		
More than 8	5	10	8	16		
Mean	4.08		6.85		401.500	< 0.001
\pm SD	1.85		3.11			
Range	7.42		14.58			

Table 4: Comparison of duration of labour after first infusion among multigravidae of study group and the control group

	Study (acetaminophen infusion)		Control group (NS infusion)		Mann Whitney U test	P- value
	Frequency	Percentage	Frequency	Percentage		
1-2	9	18	5	10		
3-4	18	36	9	18		
5-6	10	20	18	36		
7-8	8	16	11	22		
More than 8	5	10	9	18		
Mean	3.88		6.12		-2.811	0.007
\pm SD	2.33		3.08			
Range	8		9.77			

Table 5: Comparison of duration of labour after first infusion among females of the study group and the control group

Duration of labour after first infusion (in hours)	Study (acetaminophen infusion)		Control group (NS infusion)		Mann Whitney U test	P- value
	Frequency	Percentage	Frequency	Percentage		
1-2	10	20	4	8		
3-4	19	38	8	16		
5-6	15	30	18	36		
7-8	4	8	14	28		
More than 8	2	4	6	12		
Mean	3.97		6.53		-4.65	<0.001
\pm SD	2.11		3.08			
Range (in hours)	8.45		14.58			

Table 6: Comparison of VAS after 30 minutes of infusion among females of the study group and the control group

VAS Score at 30 minutes	Study		Control group		Mann Whitney U test	P- value
	Frequency	Percentage	Frequency	Percentage		
≤ 3	0	0	0	0	625	0.00
4- 6	44	88	37	74		
≥ 7	6	12	13	26		
Mean	6.90		7.30			
\pm SD	0.63		0.74			
Range	1.5		2.5			

Table 7: Comparison of VAS after 60 minutes of infusion among females of the study group and the control group

VAS Score at 60 minutes	Study		Control group		Mann Whitney U test	P- value
	Frequency	Percentage	Frequency	Percentage		
≤ 3	0	0	0	0	620	0.00
4- 6	42	84	35	70		
≥ 7	8	16	15	30		
Mean	7.10		7.93			
\pm SD	0.66		0.56			
Range	1.9		2.7			

Discussion

A total of 100 pregnant females were included and were broadly divided into two study groups, with 50 patients in each group, as follows:

Group 1: Patients receiving IV Acetaminophen,

Group 2: Patients receiving matched placebo.

Mean age of the subjects of the study group and control group was 24.14 years and 24.69 years respectively. Our results were in correlation with the results obtained by Ekweani J *et al.* Mean age of the subjects of their study was 28.1 years [9].

In the present study, 44 percent of the cases were of primigravidae and 56 percent of the cases were of multigravidae. Non-significant results were obtained while comparing the distribution of patients. Our results were in concordance with the result obtained by El-Halwagy AAS *et al.* who also observed similar findings in their study [10].

In the present study, mean duration of first stage of labour among subjects of the study group and the control group was 6 hours 57minutes (417 minutes) and 10 hours 22.2 minutes

(622.2 minutes) respectively and was reduced significantly in the study group. ($p < 0.001$)

Mean duration after first infusion among the subjects of the study group and the control group was 3 hours 58.06 minutes and 6 hours 31.5 minutes respectively and was decreased significantly in the study group. ($p < 0.001$)

There was no statistically significant difference in the mean drug to delivery interval between the two groups, although there was some shortening effect than the usual anticipated duration of 4 to 6 hours. This could be attributed to the positive influence of analgesia on maternal bearing down efforts and progress of labour. However, these results were different from those obtained by few recent studies (Abdollahi MH *et al.* Jain M *et al.*). The possible reasons could be the non-recording of dose and mean duration of administration of oxytocin by those investigators, besides lack of adequate power in those studies. Nevertheless, the role of acetaminophen in shortening the drug delivery interval needs to be observed in the future on a larger scale [11-12].

Observations of the present study demonstrate that use of IV acetaminophen injection for intrapartum analgesia is superior to control group, as determined by the considerable drop in VAS score at 30 minutes and 60 minutes in comparison to the pretreatment VAS pain score. These results were better than the research of Lallar *et al.* and Elbohoty *et al.* involving IV acetaminophen and intramuscular tramadol; after 1 hour only 4% had horrible pain and 29% had distressing pain as compared to tramadol where 30% had horrible pain and 60% had distressing pain. After 3 hours in acetaminophen group only 26% had distressing pain where as in tramadol group 51% had horrible pain and 35% had distressing pain, thus establishing intravenous acetaminophen as a feasible option for labour analgesia^[13-14].

Mean VAS of the control group at 30 minutes and 60 minutes was 7.30 and 7.93 respectively. Mean VAS of the study group at 30 minutes and 60 minutes was 6.90 and 7.10 respectively. Significant difference was observed in the VAS of control group and study group at 30 minutes and 60 minutes (P-value > 0.05). Mean VAS of the control group at 60 minutes was significantly higher than mean VAS of the study group (P-value < 0.05). Our results were in concordance with the results obtained by Zutshi V *et al.* and Abd-El-Maeboud KH *et al.* who reported reduction in VAS score. Pretreatment score of VAS and after 2 hours and 4 hours gives reassuring data about the effectiveness of acetaminophen as labor analgesic^[15-16].

Results from the past studies have shown a statistically significant reduction in the duration of first and second stage of labor after administration of intravenous acetaminophen as compared to tramadol; there was significant reduction in pain intensity as well as duration of labour i.e. 4 hours and 6 hours respectively. Hence, total duration of labor was reduced in patients who received acetaminophen. More studies are required to explain the effect of intravenous paracetamol on labor duration, as decrease in labor duration has multiple potential benefits and better maternal and perinatal outcome^[14-17].

Absence of any Maternal adverse effects (sedation, respiratory depression, delayed gastric emptying, nausea and vomiting) or neonatal adverse effects (respiratory depression and decreased Apgar scores) associated with opioids in the current study further support liberal use of acetaminophen to alleviate labour pain. Adequate assessment of pain, utilizing authenticated tools appropriate for the study population is an indispensable prerequisite for successful analgesia^[11-18-19]. All the above mentioned findings thus validate IV acetaminophen to be an effective and harmless intrapartum analgesic of equitable cost.

Conclusion

Intravenous acetaminophen is an effective intrapartum analgesic in both primigravida and multigravida women candidates, it also helps to reduce the duration of labour without any maternal and foetal adverse effects. However, the effect of acetaminophen in reducing duration of labour needs further studies with larger study group for better exploration of results.

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