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## Original Research Article

# Comparative study of single versus double time application of dinoprostone E2 gel on the induction of labor in term pregnancy and it's fetomaternal outcomes

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## ABSTRACT

**Background:** Labor is defined as a cascade of effective uterine contractions leading to progressive effacement and dilatation of cervix resulting in the expulsion of the fetus, placenta and the membranes. The aim of the study was to evaluate the effect of single time and double time application of dinoprostone E2 gel and to compare fetomaternal outcomes after single and double application of dinoprostone E2 gel and its complications.

**Methods:** This was a prospective observational study conducted on 200 pregnant females with a period of gestation  $\geq 37$  completed weeks between 1<sup>st</sup> January 2020 to 31<sup>st</sup> January 2021. Group A included females undergoing single time application of PGE2 gel and in group B, second dose applied after 6 hrs of first dose if there was no improvement in Bishop score. If necessary, oxytocin for augmentation of labor was started only 6 hrs after the last dose.

**Results:** Mean age in group A was  $24.38 \pm 4.37$  years and in group B was  $24.02 \pm 3.76$  years and this difference was not found statistically significant ( $p > 0.05$ ). Majority of cases had vaginal delivery. In group A, 28% cases had LSCS delivery while in group B, 17% cases had LSCS delivery ( $p > 0.05$ ). There was significant increase in mean Bishop score after second dose of PGE2 gel in double application group by 3.24 assessed at 12 hours after induction. Double times application of gel resulted in a smaller number of failed inductions i.e.; 23 out of 100 cases in single application group and 7 out of 100 cases in double application group. Main maternal complication was nausea and vomiting which was 5% cases in group A and 11% cases in group B.

**Conclusions:** Double times application of dinoprostone gel resulted in improved Bishop score, facilitates the process of induction, increased number of successful inductions, shortened application delivery interval and decreased cesarean section rate compared to single application. There was slight increase in maternal and fetal complications with double times application.

**Keywords:** Dinoprostone, Induction of labour, Augmentation

## INTRODUCTION

In the era of modern medicine, with the increasing awareness over the past few years, labour is often induced to decrease risk of maternal or neonatal morbidity and mortality. In case of unfavourable cervix, a successful vaginal birth is less likely. Bishop developed a

standardized cervical scoring system for cervical assessment. The duration of labor is inversely correlated with the Bishop score; a score that exceeds 8 describes the patient most likely to achieve a successful vaginal birth. Bishop score of less than 6 usually require a cervical ripening method to be used before other methods.<sup>1,2</sup> Calder et al said that ripening of cervix governs the ease and the

success of induction of labor.<sup>3</sup> Prins et al said that if ripening of cervix fails to occur, then delivery and labor may be prolonged and sometimes unsuccessful.<sup>4</sup> To be successful, induction of labor must fulfil three aims. First it should result in labor namely adequate uterine contractions and progressive dilatation of cervix. Second this labor should result in vaginal delivery, as there is little purpose in bringing about labor as a mere preparation for cesarean section. Third, in viable pregnancies, these aims must be achieved with minimum discomfort and risk to both mother and fetus. Favourable predictive factors for successful induction of labor are: (a) pregnancy nearer the term or post term; (b) Bishop score  $\geq 6$  is favourable; (c)

positive oxytocin sensitivity test of uterus; (d) presence of fetal fibronectin (fFN) in vaginal swab ( $>50$  ng/ml); and (e) other factors- maternal height  $>5'$ , normal BMI, EFW  $<3$  kg.

### Bishop score

Bishop score also known as pre-labor scoring system which is assessed by manual vaginal examination.<sup>5</sup> Duration of labor is inversely correlated with the Bishop score. Cervical effacement is replaced with cervical length in modified Bishop score.

**Table 1: Bishop score.**

Cervix	Bishop score			
	0	1	2	3
Cervical dilation (cm)	0	1-2	3-4	5+
Cervical length (cm)	$>4$	2-4	1-2	$<1$
Station of presenting part	-3 or above	-2	-1,0	+1, +2
Consistency	Firm	Medium	Soft	-
Position	Posterior	Mid-position	Anterior	-

Note: Total score-13, favourable score- 6-13, unfavourable score- 1-5.

## METHODS

This was a prospective study conducted in the department of Obstetrics and Gynaecology, S.P. Medical College and Associated Group of Hospitals, Bikaner, Rajasthan from 1<sup>st</sup> January 2020 to 31<sup>st</sup> January 2021. The study population constituted 200 pregnant females with period of gestation  $\geq 37$  completed weeks admitted in the labor room in obstetrics and gynaecology department of Sardar Patel Medical College, Bikaner.

### Group A

Included females undergoing single time application of dinoprostone E2 gel and were observed for next 24 hrs.

### Group B

Included females undergoing double times application of the dinoprostone E2 gel where second dose given after 6 hrs of first dose administration and were observed for next 18 hrs.<sup>6,7</sup>

### Application of PGE2 gel

Under all aseptic precautions PGE2 gel containing 0.5 mg dinoprostone pre-filled syringe instilled strictly intra-cervically under the direct visualization of cervix using speculum. Contents of syringe (3 g gel containing 0.5 mg of PGE2) was administered into the cervical canal starting from the level of internal os, while slowly withdrawing the catheter. After application, patient was advised to remain recumbent for 30 min to avoid spillage of gel. The application was repeated after 6 hrs in group B patients if there was no improvement in Bishop score. If necessary,

oxytocin for augmentation of labor was started only 6 hrs after the last dose.

If after 24 hrs, labor not occurred then patients from both the groups considered as failed induction cases. Temperature, pulse, respiratory rate, blood pressure, uterine activity and vaginal bleeding was examined immediately after insertion, then hourly for 4-6 hrs. After delivery Apgar score was calculated, baby vitals were taken care into account if there was any distress due to meconium aspiration or any other means.

### Statistical analysis

Appropriate statistical analysis was applied using Chi square test, mean $\pm$ SD, p value $<0.05$  was significant using SPSS version 17.0 statistical software.

## RESULTS

The present study was conducted in department of obstetrics and gynaecology, S.P. Medical College and associated group of Hospitals, Bikaner, consisting of 200 patients. Cases were selected for induction of labour by taking into consideration all inclusion and exclusion criteria. Then dinoprostone gel was applied intra-cervically and effect on progress of labour checked by assessing improvement in Bishop score.

In this study, we divided our patients into two groups (100 patients in each group) i.e.; group A (single application group) and group B (double application group where PGE2 gel repeated after 6 hrs of first application). Mean age in group A was 24.38 $\pm$ 4.37 years and in group B was 24.02 $\pm$ 3.76 years and this difference was not found statistically significant (p $>0.05$ ) (Table 2). Out of total 200

cases, 68% and 59% were nulliparous and 32% and 41% were multiparous in group A and group B respectively and this difference was not found statistically significant ( $p>0.05$ ) (Table 2).

Majority of cases had their gestational age between 37-38 weeks, where total 156 cases were found having 78% in each group A and B and this difference was found statistically insignificant ( $p>0.05$ ) (Table 3).

Out of total 200 cases, 154 females had normal vaginal delivery and out of them, 72 females belonged to group A and 82 females belonged to group B while 45 females had cesarean section delivery and out of them 28 belonged to group A and 17 females belonged to group B.

Only 1 female had instrumental delivery and she belonged to group B (Table 3).

**Table 2: Distribution of cases according to the age (years).**

Characteristics	Group A (single application)		Group B (double application)		Total	
	No. of cases	%	No. of cases	%	No. of cases	%
<b>Age group (years)</b>						
≤20	22	22.0	21	21.0	43	21.5
21-25	44	44.0	45	45.0	89	44.5
26-30	23	23.0	27	27.0	50	25.0
31-35	9	9.0	7	7.0	16	8.0
36-40	2	2.0	0	-	2	1.0
Total	100		100		200	
<b>Parity</b>						
Nulliparous	68	68.0	59	59.0	127	63.5
Multiparous	32	32.0	41	41.0	73	36.5
<b>Gestational age (weeks)</b>						
37-38	78	78.0	78	78.0	156	78.0
39-40	19	19.0	19	19.0	38	19.0
>40	3	3.0	3	3.0	6	3.0

**Table 3: Distribution of cases according to the mode of delivery.**

Mode of delivery	Group A (single application)		Group B (double application)		Total	
	No. of cases	%	No. of cases	%	No. of cases	%
<b>Normal vaginal</b>	72	72.0	82	82.0	154	77.0
<b>Instrumental vaginal</b>	0	-	1	1.0	1	0.5
<b>C. section</b>	28	28.0	17	17.0	45	22.5
<b>Total</b>	100		100		200	

Note:  $\chi^2=2.823$ ,  $p=0.093$ .

30 females had NPOL or failed induction and out of them 23 and 7 females belonged to group A and B respectively, 10 females had meconium with fetal distress and out of them 3 and 7 females belonged to group A and B respectively, 4 females had fetal distress and out of them 2 females belonged to each group, while only 1 female had placental abruption which belonged to group B (Table 4). In present study, out of total 100 females of group A, 5 females had nausea/vomiting while 1 female had PPH and all other females had no complications while in group B, out of total 100 females, 11 females had nausea/vomiting, 2 females each had hyperstimulation and PPH and 85 females had no complications (Table 5).

Apgar score at 1 min, 17 neonates had their APGAR score <8 and out of them 4 and 13 belonged to group A and B respectively while 183 neonates had their Apgar score at 1

min  $\geq 8$  and out of them 96 and 87 neonates belonged to group A and B respectively (Table 6).

Apgar score at 5 min, 2 neonates had their Apgar score <8, both belonged to group B while 198 neonates had their Apgar score at 5 min  $\geq 8$  and out of them 100 and 98 neonates belonged to group A and B respectively. In group A, all 4 neonates improved their Apgar score from <8 at 1 min to  $\geq 8$  at 5 min while in group B, 11 out of 13 neonates improved their Apgar score from <8 at 1 minute to  $\geq 8$  at 5 min (Table 6). Majority of cases (N=169) had their indication postdatism and out of them, 83 and 86 belonged to group A and B respectively, 22 cases had PIH and out of them 9 cases belonged to group A and 13 cases belonged to group B, 5 cases had IUGR and they all belonged to group A while 4 cases had obstetric cholestasis and out of them 3 belonged to group A and 1 belonged to group B (Figure 1).

**Table 4: Distribution of cases according to the indications of cesarean section.**

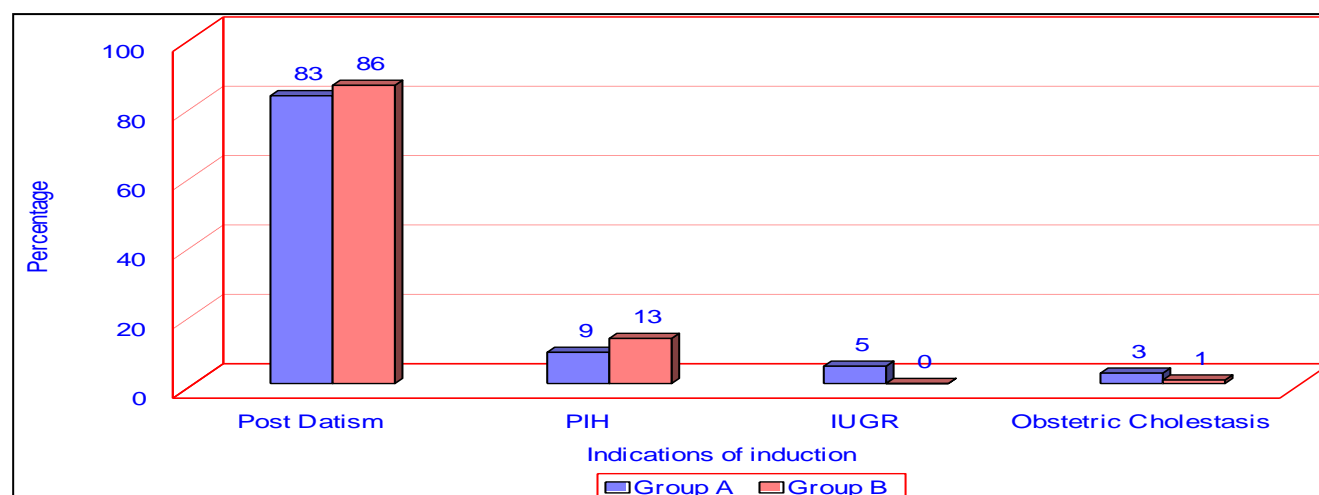
Indications of C. section	Group A (single application)		Group B (double application)		Total	
	No. of cases	%	No. of cases	%	No. of cases	%
Fetal distress	2	7.1	2	11.8	4	8.9
Meconium+fetal distress	3	10.7	7	41.2	10	22.2
NPOL+failed induction	23	82.2	7	41.2	30	66.7
Placental abruption	0	0	1	5.8	1	2.2
<b>Total</b>	<b>28</b>		<b>17</b>		<b>45</b>	

**Table 5: Distribution of cases according to the maternal complications after application of gel.**

Maternal complications	Group A (single application)		Group B (double application)		Total	
	No. of cases	%	No. of cases	%	No. of cases	%
Nausea/vomiting	5	5	11	11	16	8
Hyperstimulation	0	0	2	2	2	1
PPH	1	1	2	2	3	1.5
None	94	94	85	85	179	89.5
<b>Total</b>	<b>100</b>		<b>100</b>		<b>200</b>	

**Table 6: Distribution of cases according to the neonatal outcome.**

Apgar score	Group A (single application)		Group B (double application)		Total		
	No. of cases	%	No. of cases	%	No. of cases	%	
At 1 min	<8	4	4.0	13	13.0	17	8.5
	≥8	96	96.0	87	87.0	183	91.5
	Mean	7.76±0.69		7.94±0.44		7.85±0.57	
At 5 min	<8	0	-	2	2.0	2	1.0
	≥8	100	100.0	98	98.0	198	99.0
<b>Mean</b>	8.99±1.05		9.21±0.98		9.10±1.02		



**Figure 1: Distribution of cases according to the indications of induction.**

## DISCUSSION

### Age group

In our study, out of total 200 cases, most common age group was 21-25 years in both the groups, in which group

A contained 44% and group B contained 45% cases. This was similar to study done by Maskharia et al which had 59.3% in group A and 65.2% in group B in age group of 21-25 years.<sup>8</sup> Study done by Rao et al also comparable to our study which had 59.3% in group A and 65.2% in group B in the age group of 21-25 years.<sup>9</sup>

### **Parity**

In our study, out of total 200 cases, nulliparous and multiparous were 63.5% and 36.5% respectively. This study was comparable to study done by Gupta et al where 60% were primigravida and 40% were multigravida.<sup>10</sup>

This study also comparable to study done by Maskharia et al where 73% were primigravida, 27% were multigravida<sup>8</sup> and also with the study done by Sheela Jayprakash et al where 67.5% women were nulliparous and 32.5% were multiparous.<sup>11</sup>

### **Gestational age**

In our study, majority of cases had their gestational age between 37-38 weeks, where total 156 (78%) cases were found. This was comparable with the study done by Jayprakash et al where 85% patients were of >37 weeks gestation.<sup>11</sup>

### **Indication of induction**

In our study, out of 200 cases, 169, 22, 5 and 4 cases had their indication for induction as postdatism, PIH, IUGR and obstetric cholestasis respectively. Above data shows that most common indication for induction was postdatism (84.5%) which was 83% and 86% in group A and group B respectively.

This was comparable with the study done by Rao et al where out of 100 cases, 76 had their indication for induction as postdatism with 75.9% in group A and 76.1% in group B.<sup>9</sup>

Study done by Mashkaria et al also comparable to our study where 62.5% were in group A and 75% were in group B had indication of postdatism.<sup>8</sup>

### **Mode of delivery**

In our study, majority of cases (out of 200) i.e.; 155 (77.5%) had vaginal delivery with 72% and 82% in single and double application group respectively and 45 (22.5%) cases underwent cesarean section with 28% and 17% in single application and double application group respectively. This was comparable to the study done by Khichar et al where 73% and 80% cases delivered vaginally and 27% and 20% had LSCS in single application and double application group respectively.<sup>12</sup>

Study done by Gupta et al was also comparable to our study where 87.6% and 84% cases delivered vaginally and 12.3% and 16% had LSCS in single application group and double application group respectively.<sup>10</sup>

Our study was also comparable to study done by Raza et al where success rate in terms of vaginal delivery was 82%.<sup>13</sup>

Study done by Deshmukh et al was also comparable to our study with incidence of vaginal delivery and LSCS was 74.28% and 25.71% respectively.<sup>14</sup>

Success rate in terms of vaginal delivery was 81% in study done by George et al which was also comparable to our study.<sup>15</sup>

### **Indications of LSCS**

In our study, out of 200 cases, 45 cases underwent cesarean section, main indication for LSCS (total 30 cases) was NPOL and failed induction in both the groups (66.7%). NPOL and failed induction cases were higher in group A (23/28) compared to group B (7/17). FD and meconium with FD cases were higher in group B (2/17, 7/17) compared to group A (2/28, 3/28) respectively. There was only a single case of placental abruption which was in group B.

These results were comparable to the study done by Parate et al where no. of failed induction cases were more in single application group (2/8) compared to no failed induction in double application group.<sup>16</sup>

This study was also comparable to study done by Jayprakash et al in which out of total 80 patients, 6 patients required LSCS, main indication of LSCS was failed induction (4/6) and other indication was fetal distress (2/6).<sup>11</sup>

### **Maternal complications**

In our study, maternal complications were slightly higher in group B. GIT symptoms (nausea and vomiting) were found in 5% vs 11% in single vs double application group. PPH found in 1% vs 2% in single v/s double application group. Hyperstimulation was in 2% cases in double application group only.

This study was comparable to study done by Khichar et al where GIT symptoms (nausea and vomiting) were found in 8% vs 11% in single vs double application group. PPH found in 3% vs 5% in single vs double application group. Hyperstimulation was in 2% vs 4% in single v/s double application group.<sup>12</sup>

### **Apgar score**

In our study, out of 200 neonates, 8.5% neonates had their Apgar score <8 at 1 min and 1% neonates had their Apgar score <8 at 5 min. No. of neonates having Apgar score <8 at 1 minute and 5 minute were slightly higher in group B, all 4 neonates in group A, which were having Apgar score <8 at 1 min improved to Apgar score ≥8 at 5 min while in group B, 11 out of 13 neonates improved their Apgar score to ≥8 at 5 min, remaining 2 neonates had their Apgar score <8 at 5 min. Mean Apgar score at 1 minute in group A was 7.76 and in group B it was 7.94 and at 5 min mean APGAR score was 8.99 in group A and 9.21 in group B.

This study was comparable to study done by Rao et al in which total about 3% of newborns had their Apgar score <7.<sup>9</sup>

These results were also comparable to study done by Deshmukh et al in which mean Apgar score at 1 min was 7 and at 5 min was 9.<sup>14</sup>

## CONCLUSION

Though further studies are mandatory to reach sound conclusions, available data suggests that intracervical application of PGE2 gel 0.5 mg is an effective, safe and acceptable method for induction of labour in women with unfavourable cervix.

Double times application of dinoprostone gel resulted in improved Bishop score, facilitates the process of induction, increased number of successful inductions, shortened application delivery interval and decreased cesarean section rate compared to single application. There was slight increase in maternal and fetal complications with double times application.

This study concluded that double time application should be used cautiously in appropriately selected cases.

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