Haryana Vet. (September, 2023) **62(SI-2),** 93-95 ISSN 0033-4359 (P)

Research Article

COMPARATIVE EFFICACY OF VARIOUS TREATMENT PROTOCOLS IN INCOMPLETE CERVICAL DILATATION IN GOATS

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Received: 19.11.2022; Accepted: 07.02.2023

ABSTRACT

The present study was done to study the effect of three treatment protocols on cervical dilatation in goats. In this study, three treatments *vis-à-vis* Group I (N=6) intracervical hyaluronidase injection, Group II (N=6) misoprostol, and Group III (N=6) dinoprostone gel was applied to the cervix. The time required from the treatment to delivery was shortest in the Hyaluronidase group compared to the other three (P<0.001). The One-way ANOVA on body weight, parity, and age revealed no statistical difference between groups P>0.001. However, comparing the effects of treatments on cervical dilatation post-treatment revealed that there was a statistically significant difference among the different groups F (3,20 = 21.01, p<0.001). The lowest time was taken in the hyaluronidase group as compared to others (P<0.001). The minimum time and maximum cervical dilatation noticed in hyaluronidase treatment was around 7.4 ±0.75 h and was almost two or three-fold less than of the other treatment groups. In conclusion, the application of intracervical hyaluronidase could hasten cervical dilation and delivery.

Keywords: Dinoprostone, Dystocia, Goats, Hyaluronidase, Incomplete cervical dilatation, Misoprostol

How to cite: Bhardwaj, A., Bawaskar, M., Sahatpure, S., Gawande, A., Bhojne, G. and Patil, M. (2023). Comparative efficacy of various treatment protocols in incomplete cervical dilatation in goats. *Haryana Vet.* **62(SI-2)**: 93-95.

Indian goat population stands on second place with 148.88 million, contributing to 27.8% of the total livestock (20th livestock census, 2019). The incidence rates of dystocia in sheep and goats were found at 45%, and 25%, respectively and the most frequent cause of dystocia was improper positioning i.e., 50-56% followed by obstruction of the birth passage 35% (Jackson, 2004). Incomplete cervical dilation is less frequently reported cause of caprine dystocia, accounting for 20-30 percent (Noakes *et al.*, 2009). Cervical ripening is a complex process, which involves the loosening of connective tissue, smooth muscle relaxation by interleukin 8 and collagenase production by neutrophils in sheep (Kershaw *et al.*, 2005). Recently, different treatments have been used in the case of sheep and goats by (Batista *et al.*, 2009), along with newer methods like mechanical dilators, synthetic prostaglandin E1, and E2, and intravenous oxytocin (Byers *et al.*, 2010). However, in humans, advanced therapeutic treatments have been utilized like hyaluronidase, dinoprostone and misoprostol and mifepristone (Bakker *et al.*, 2017). However, such studies are scarce in caprines and this study was designed to compare the various therapeutic protocols as an effective treatment for incomplete cervix dilatation. Our aim was to test the hypothesis that hyaluronidase application may shorten the time from cervical dilatation to delivery. For this study, we utilized a goat model for cervical dilatation using hyaluronidase, mifepristone, and misoprostol.

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MATERIALS AND METHODS

Animal selection and per vaginal examination: The present research work was carried out from December 2018 to July 2019. Proper diagnosis was made by the history of continuous straining from four to six hours, no or slight vaginal discharge, visible liquified cervical seal, per-vaginally only one finger able to pass and animals were unable to complete the second stages of parturition process further with no delivery of kid.

Experimental design and Treatment protocols: All these procedures were approved by the University Animal Ethics Committee under the board of studies meeting number BoS/01/2019. In Group I, Inj. Hyaluronidase @ 1500 I.U. 0.5 ml of normal saline was given locally at 3,6,9, and 12 o clock (Fig. 1). In Group II, misoprostol paste and in Group III, three grams of dinoprostone gel was smeared on the cervix. In control group, Calcium borogluconate was infused intravenously as a supportive treatment and kept as a control group as no other treatment is administered.

STATISTICAL ANALYSIS

Different parameters were recorded and arranged in tabular form in Microsoft Excel 2019. Initial dilatation levels included the extent of prevaginal hand insertion in vagina and further examination of cervix and measuring this with a scale e.g., cervix closed, cervical seal visible, insertion of one finger, two finger and full hand into cervix. The data was presented as mean ± standard error of the

Table 1. Comparative parameters of the goats treated with different therapeutic protocols

Observations	Groups			
	Misoprostol	Hyaluronidase	Dinoprostone	Control
Body Weight (in kgs.)	17.8±2.82	26.2±2.61	25.0±2.60	27.0±2.40
Parity	2.3±0.71	2.0±0.51	1.7±0.33	2.3±0.49
Age (in months)	18.8±4.04	19.7±4.27	21.8±4.46	22.2±3.94
Cervix dilated pre-treatment (in cms.)	2.2±0.44	1.6±0.37	1.2±0.34	1.6±0.33
Cervix dilated post-treatment (in cms.)	12.3^{b}±0.58	15.1^{c}±0.59	11.5^{b}±0.45	9.2^{a}±0.49
Time from treatment to delivery (in hrs.)	13.5^{b}±0.70	7.4^{a}±0.75	19.1^{c}±0.54	24.3^{d}±1.92

*Mean ± SE with different superscripts differ significantly within rows ($p<0.05$)

Table 2. Distribution pattern of animals according to the age, size, and parity

Variable	Total no. of animals	Stratification based on age (months)			
		< 15	15-25	25-35	>35
Age	18+6 (control)	7 (38.89%)	6 (33.33%)	2 (11.11%)	3 (16.67%)
		Stratification based on body weight (kgs.)			
		< 25	25-35	35-45	>45
Size	18+6 (control)	10 (55.55%)	6 (33.33%)	2 (11.11%)	-
		Parity			
		1st	2nd	3rd	4th
Parity	18+6 (control)	8 (44.44%)	4 (22.22%)	3 (16.67%)	3 (16.67%)

mean (SEM). Statistical analysis was performed using a Student-t test and one-way analysis of variance (ANOVA) and a p-value of <0.05 and <0.001 was considered statistically significant.

RESULTS AND DISCUSSIONS

There were no significant differences in maternal body weight (P=0.083), age (P=0.783), parity (P=0.927), and cervical dilatation levels pre-treatment (P=0.171) between the four groups (Table 1). The efficacy response for three treatments were 83.33 (5/6), 66.67 (4/6) and 66.67% (4/6) in Group I, II and III, respectively. The time required from the treatment to the delivery of the kid was shortest in the Hyaluronidase group compared to the other three ($p<0.001$). The primiparous goats contributed to the maximum cases (44%), and others by multiparous like second, third, fourth and fifth parity (22,17,13 and 4%, respectively. The one-way ANOVA analysis on body weight, parity and age revealed that there was no statistical difference found between groups P>0.001. The One-way ANOVA was performed to compare the effects of treatments on cervical dilatation post-treatment. It revealed that there was a statistically significant difference among the different groups $F(3, 20 = 21.01, P<0.001)$. Tukey's b test for multiple comparisons found that the mean value of cervical dilatation post-treatment was significantly different between groups ($p <0.001$). The time taken from the treatment to dilation was also found statistically significant between the groups $F=(3,20) =41.79$, $P<0.001$). The lowest time was taken in the hyaluronidase group as compared to others ($P<0.001$) i.e., 7.4 ±0.75 h and was two to three-fold (Table 1).

Dystocia in young sheep and goats occurred more in first and second parity and in 1-2.5 years old females with 20% twin pregnancies and 60 % were male kids (Hussain and Zaid, 2010), 2-4 years (Prasad *et al.*, 2017) and our study coincides with our study i.e., 66% of animals of first and second parity (Table 2).

Misoprostol was applied intracervically 200 µg, 1 mg (Azawi *et al.*, 2011) for cervical softening, and kids delivered between 20-45 minutes and was very less as compared to our study i.e., 13.5±0.70 h. Patil and Thorat (2013) applied Misoprostol 200 µg intravaginally and cervical dilatation occured in 6 h. Similarly, (Palmoo, 2015) effectively used 200 µg endocervically and are in agreement with our findings. The time required for cervical dilatation was found to be 20-25h, when misoprostol and dinoprostone were used in goats. Ghosh and Das (2000) reported that complete kidding process took 94-95 minutes, and contraindicated our studies. (Leite *et al.*, 2018) used Misoprostol to cause dilatation in 66.7% and the results were similar to that of ours. Some studies revealed 83.33 percent after use of hyaluronidase with a dose rate of 3000 IU in buffaloes post detorsion and similar results were reported in Group I i.e., 83.33%, while 66.67% in both Group II and

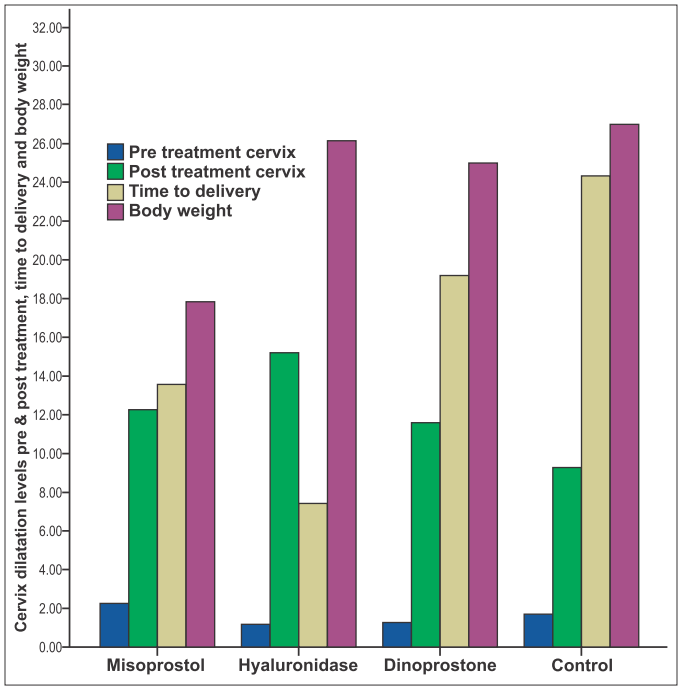

Fig. 1. Comparison between the parameters of four groups

III was delivered within twenty-five hours. Hyaluronidase dilated 82% cervix in women (Kavanagh *et al.*, 2006), and took seven and twelve hours for dilatation (Spallicci *et al.*, 2007) and are in accordance with our study. According to (Perry *et al.*, 2010) intracervical hyaluronan took 54 h and contraindicated our study i.e., 7.5 h. Candappa *et al.* (2009) used a dinoprostone vaginal insert in ewes with 67% success rate after 24 h of treatment and time period was more than that of our study i.e., 19.1±0.54 h.

CONCLUSION

This is concluded from present study that hyaluronidase injections intracervically could lead to better cervical dilatation and hastened the delivery of fetus. This is the first report of using hyaluronidase injections effectively in goats for cervical ripening and dilatation for accelerated delivery of kids and preserving future fertility and improving the condition of the poor farmers.

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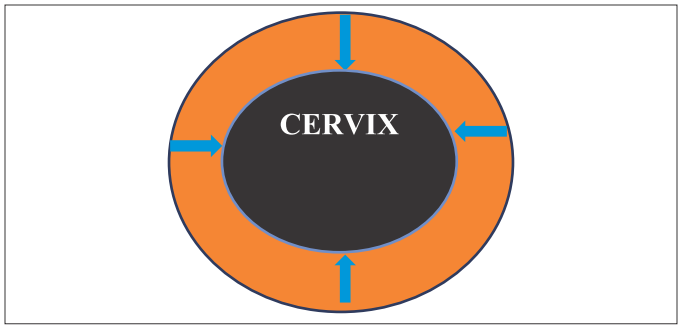

Fig. 2. Depiction of injection sites at 3, 6, 9 and 12 o'clock on cervix

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