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Clinical studies on incidence of dystocia in goats with comparison of haemato-biochemical profiles

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Abstract
The clinical experiment was conducted on 22 goats to evaluate incidence of maternal and fetal dystocia and hemato-biochemical profiles in dystocia affected goats. The goats of different parities were divided into three groups (1) EU (normal parturition) (n=6), (2) DYM (maternal dystocia) (n=5) (3) DYF (fetal dystocia) (n=11). In the present study, incidence of foetal originated dystocia (68.75%) was higher than maternal originated dystocia (31.25%). Out of 11 cases of fetal dystocia four cases had deviation of head (36.36%), three cases had bilateral shoulder flexion (27.27%), one case emphysematous fetus (9.09%), two cases had oversized fetus (18.18%) and one case had hind limb flexion (9.09%). Out of 5 cases of maternal dystocia, two cases had uterine inertia (40%), one case had post cervical uterine torsion (20%), and two cases had incomplete pelvic space (40%). No significant (p≤0.05) difference was observed in RBC count and albumin concentration among all three groups. The values of WBC, NEU, PCV, AST and ALT were significantly (p≤0.05) higher in DYM and DYF as compared to EU group at pre-partum and significantly decreased at post-partum (24 hr) period. No significant changes (p≤0.05) were observed at 24 hr postpartum in the values of Hb, PCV and WBC among all three groups. Significant (p≤0.05) decrease was observed at 24 hr postpartum in the values of Hb, NEU, AST, ALT and TP in both DYM and DYF groups as compared to pre-partum period. However, the values of Hb, PCV, WBC, ALT, Total protein decreased non-significantly at 24 hr postpartum in EU group. It was concluded that fetal cause of dystocia more prone than maternal causes and haemato-biochemical changes including WBC, neutrophils, PCV, serum AST and ALT level were higher in dystocia affected goats as compared to normal parturated goats, whereas, Hb, TP values decreased in dystocia affected goats may be useful in management of obstetrical conditions.

Keywords: Dystocia, normal parturition, goat, hemato-biochemical

Introduction
Dystocia are the most important conditions compromising the future reproductive life of domestic animals. In Indian goats, the incidence of dystocia ranges between 15.02 and 39.38% (Gopal *et al*., 2015; Mansingh, 2016) [15]. Dystocia can be classified into maternal causes and fetal causes (Noakes *et al*., 2001). Fetal causes of dystocia includes head deviation, fore limbflexion, breech presentation, dog sitting position, and foetal monsters. In goats, the incidence of foetal dystocia was reported as 42.30 percent (Camara *et al*.,2012) [6] and 44.44 percent (Anusha *et al*., 2016) [2]. Lateral deviation of head and flexion of the carpal and shoulder joints are the most frequent fetal causes of dystocia in goats, followed by relative foetal oversize. The maternal causes of dystocia include abdominal expulsive forces failure, birth canal obstruction, uterine rupture, uterine torsion, and pelvic fracture. In goats, the incidence of dystocia due to maternal factors was reported to be 31.4 percent and 57.8 percent. Maternal dystocia is most often caused by a failure of cervical dilatation, followed by uterine inertia. Parturition is a complex process which involves a sequence of endocrine events in the maternal, foetal and placental tissues that results in haemato-biochemical changes in the dam (Vannucchi *et al*., 2015) [26]. Difficult births or dystocia is a complicated and stressful process, which makes the procedure more complicated and painful. The alteration in haemato-biochemical characteristics in dystocia have been extensively studied in goats (Patel *et al*., 2020) [19].

Liver functions are altered in dystocia and also in normally parturated goats. As the dystocia is a profound source of stress for goat and is particularly related with hepatic dysfunction, as demonstrated by a significant increase in aspartate aminotransferase (AST), alanine aminotransferase (ALT), total protein, albumin, and globulin levels (Madan *et al*., 2020) [14]. Haemato-biochemical alterations during dystocia and normal parturition were extensively studied in cattle and buffaloes. However, there are few reports on goats. Hence, a study was conducted to evaluate the hemato-biochemical changes in goats affected with dystocia and normal parturition.

Materials and Methods

The present study was conducted on the goats presented to the department of Veterinary Gynaecology and Obstetrics, CVAS, Bikaner (RAJUVAS), for the period of three months (1 August 2021 to 30 October 2021) and goats rearing at Bikaner and nearby goat farms in Bikaner city (for normal parturition). A total number of 22 goats of different parties were included in the study and divided into three groups (1) EU (normal parturition) (n=6), (2) DYM (maternal dystocia) (n=5) (3) DYF (fetal dystocia) (n=11). Gynaeco-clinical examination was done in all the goats. Does were treated as per the cause of dystocia through mutation, forced extraction or modified schaffer's methods for torsion and proper medicinal therapy was given after management.

Blood samples collected in EDTA vial and in a plain vial from dystocia affected and normally parturited goats were taken just before handling of dystocia or parturition (0 hr), and 24 hours after manual delivery or parturition. Blood from EDTA containg vial were subjected for the estimation of various hematological parameters and Serum was separated from plain tube by centrifuging the sample at 3000 rpm for 10 minutes and stored at -20 °C until further estimation of biochemical profiles. Various hematological parameters *viz*., Haemoglobin (Hb), total erythrocyte count (TEC), total leucocyte count (TLC), neutrophils (NEU), and packed cell volume (PCV). These parameters were analysed as per the methods described by Jain (1986) [32]. serum biochemical traits *viz*, alanine amino transferase (ALT), aspartate amino transferase (AST), total protein (TP), albumin, and globulin, parameters were evaluated. Serum biochemical parameters were analysed using Kinetic UV test employing commercially available test kits (Erba, India) and the results were read on a colorimeter (Vchemnext, India) as per previously described procedures.

Results and Discussions

In the present study on clinical cases of goats, the percentage of incidence of fetal and maternal causes recorded as 68.75% and 31.25%, respectively of total dystocia. The results of present study are in support of the previous findings of Bhattacharyya *et al*. (2015) [4] who found incidence of dystocia of fetal causes (54.29%) and maternal causes (37.14%) in sheep and goats. Elchikh *et al*. (2020) [9] also found that maternal and foetal causes of dystocia in goats at a rate of 25% and 75%, respectively. In contrast to present study, Anusha *et al*. (2016) [2] also observed that the incidence of dystocia in goats due to maternal and foetal causes was 55.56% and 44.44%, respectively.

In present study, out of 11 cases of fetal dystocia, four cases had deviation of head (36.36%), three cases had bilateral shoulder flexion (27.27%), one case had fetal emphysema (9.09%), two cases were of oversized fetus (18.18%), and one case had hind limb flexion (9.09%). The present findings are in accordance with the observation of who found that lateral head deviation and flexion of the carpal and shoulder joints are the most frequent fetal causes of dystocia in goats, followed by relative fetal oversize. Similar findings were also observed by Hussain and Zaid (2010) [33] who found that 50% goats suffered dystocia due to lateral deviation of head and neck and 30% goats suffered dystocia due to bilateral shoulder flexion associated with absolute fetal oversize. Similarly, Sharma *et al*. (2014) [38] also noticed types of fetal causes as abnormal disposition (45.45%), monster (18.18%) and large size foetus (36.37%) in small ruminants. Bhattacharyya *et al*. (2015) [4] also reported that the most common foetal causes were head deviation, forelimb flexion, breech presentation, dog sitting position, and foetal monstrosities in sheep and goats.

In current study, out of 5 cases of maternal dystocia, two cases had uterine inertia (40%), one case had post cervical uterine torsion (20%) and two cases had incomplete pelvic space (40%). In accordance to the present findings, Elchikh *et al*. (2020) [9] also observed narrowing pelvis as most common cause in maternal causes of dystocia which accounts for 80% of cases. Similarly, Gupta *et al*. (2020) [31] also reported that small pelvis (10.34%), ring womb and uterine inertia (6.89 % each) were most common maternal causes of dystocia in goats. Sharma *et al*. (2014) [38] also observed that maternal causes of dystocia in small ruminants involves incomplete cervical dilatation (42.10%), narrow pelvis (36.84%), secondary uterine inertia (10.53%) and uterine torsion (10.53%). In contrast to present study, Anusha *et al*. (2016) [2] reported that incomplete cervical dilatation was the most common cause of maternal dystocia (80.00%) in small ruminants. The absence of release of hormones involved in collagen softening or the failure of collagen in the cervix to respond to hormonal stimulation could explain the insufficient cervical dilation (Wu *et al*., 2004) [39].

In the present study, DYM and DYF goats, haemoglobin value was found significantly ($p \leq 0.05$) decreased at 24 hours after assisted kidding as compared to pre-partum period. The results of present study agree with previous research of Sangami (2017) [20] who found that Hb concentration was decreased significantly at post-partum (24hr) period as compared to pre-partum in dystocia affected goats. In contrast to findings of the present study, Patel *et al*. (2020) [19] also reported that no significant difference in Hb levels at pre-partum and post-partum (24hrs) period in dystocia affected goats. In normal EU goats there was no significant difference in haemoglobin concentration before and after kidding. The findings of present study agree with previous research of Sangami (2017) [20] who found that Hb concentration was decreased non-significantly at post-partum (24hr) period as compared to pre-partum period in normal parturited goats.

In current study, WBC count was noticed significantly higher in DYM and DYF goats as compared to EU goats at pre-partum period. However, WBC count decreased significantly ($P \leq 0.05$) at post-partum (24 hr) period in both DYM and DYF goats. The results of present findings are in agreement with Sangami (2017) [20] who also found that in dystocia affected goats, total leucocyte was significantly higher as compared to eutocia goats at pre partum period (0hr) and decreased significantly in post-partum period. Similarly, Patel *et al*. (2020) [19] also reported that total leucocyte count was lower in post-partum period in dystocia affected goats.In the present study, no significant difference was found in the values WBC in EU goats at pre-partum as compared to post-partum (24hr)

period. The results of present study agree with the observations of Azab *et al.* (1999) [29] who found no significant difference in WBC count at 0 day and 7 days after parturition in goats. Similarly, Kumar (2018) [13] also noticed no significant difference in the values WBC in EU buffaloes at pre-partum as compared to post-partum (24hr) period.

In the current study, the neutrophil count in DYM and DYF goats was found significantly (P≤0.05) higher as compared to EU goats at per-partum period. The findings of current study are in consistent with those of Ellah *et al.* (2014) in cows, respectively with uterine torsion and Yildiz *et al.* (2011) in cows suffering from dystocia, where a significantly raise in neutrophils as compared to eutocia cows. In the current study, the neutrophil count in DYM, DYF and EU goats was found significantly (p≤0.05) lower at post-partum (24 hr) period as compared to per-partum period.The results of present study are in agreement with observations of Azab *et al.* (1999) [29] who found that neutrophils count was significantly decreased in post-partum period in goats.

In the present study, the values of PCV in DYM and DYF goats found significantly (P≤0.05) higher as compared to EU goats. This increased PCV in dystocia-affected animals could be attributed to dehydration (Ghuman *et al.*, 2010) [11]. In contrast to the findings of this study, Thangamani *et al.* (2019) [25] observed no significant difference in PCV values in dystocia and eutocia buffaloes at pre-partum as well as at post-partum period. Also, the PCV values found significantly lower in DYM and DYF goats at post-partum (24hr) period as compared to pre-partum period. The findings of the current study agree with previous findings of Yuksel *et al.* (2011) [28] who found significant decline in packed cell volume during the post-partum period as compared to pre-partum period in goats and cows, respectively. Similarly, Patel *et al.* (2020) [19] also reported that PCV values was lower in post-partum period compared to pre-partum period in dystocia affected goats.

In the current study, the mean values of serum ALT and AST were significantly (P≤0.05) higher in DYM and DYF goats as compared to EU goats at pre-partum period. Also, the mean values of serum ALT and AST decreased significantly (P≤0.05) at post-partum (24hr) period as compared to pre-partum period in DYM and DYF goats. Earlier, higher ALT values have been observed in dystocia and uterine torsion affected cattle and buffaloes (Singh *et al.*, 2009; Jeenger *et al.*, 2015) [23, 12]. Similarly, after 24 hours of foetal birth, ALT levels declined, confirming previous studies (Singh *et al.*, 2009) [23] in buffaloes. Likewise, increased serum AST levels have been found in cattle, buffalo, and camels with uterine torsion and dystocia (Jeenger *et al.*, 2015) [12]. The current findings are consistent with previous studies (Amin *et al.*, 2011) [1] who reported increased blood serum AST activity during maternal and foetal dystocia, particularly during maternal dystocia.

In the present study, the values of serum total protein were significantly (P≤0.05) lower in DYM and DYF goats as compared to EU goats and decreased significantly in post-partum (24hr) period as compared to pre-partum period in DYM and DYF goats. Similar findings were observed by Dhindsa *et al.* (2008) [7] who reported significantly lower values of plasma proteins in dystocia affected buffaloes as compared to normally parturited buffaloes. In contrast to present study, the concentration of serum TP was found to be higher in dystocia affected buffaloes as compared to EU (Bugalia *et al.*, 1996) [31] buffaloes. Similarly, some researchers found non-significant difference between EU and DY in cows (Satya *et al.*, 2005) [37].

Table 1: Mean (±S.E.) haematological values in eutocia and dystocia affected goats

parameters	Group of animals	Pre-partum (0 hr)	Post-partum (24 hrs)
Hb (g/dl)	EU	9.47^{aA}±0.56	9.32^{aA}±0.52
	DYM	$10.42^{aA\pm}$0.46	8.84^{aB}±0.28
	DYF	10.13^{aA}±0.30	9.11^{aB}±0.17
TLC (10^6 /µl)	EU	17.45±0.89	16.39±0.61
	DYM	16.47±0.75	15.55±0.60
	DYF	17.08±0.48	16.10±0.52
PCV (%)	EU	31.82^{aA}±1.87	30.36^{aA}±1.52
	DYM	36.3^{bA}±0.68	32.96^{aB}±1.08
	DYF	35.67^{bA}±0.85	$32.39^{aB\pm}$0.78
TLC (10^3 /µl)	EU	14.82^{aA}±1.37	12.49^{aA}±1.75
	DYM	$17.33^{bA\pm}$0.56	$13.12^{aB\pm}$0.50
	DYF	17.88^{bA}±0.49	13.85^{aB}±0.62
NEU (%)	EU	57.36^{aA}±0.67	55.34^{aB}±0.42
	DYM	61.8^{bA}±0.66	58.4^{bB}±0.51
	DYF	62.19^{bA}±0.42	58.17^{bB}±0.54

Means having different superscripts in row (capital letter A, B) and in column (small letter a, b) differ significantly (P≤0.05)

Table 2: Mean (±S.E.) Biochemical values in eutocia and dystocia affected goats

parameters	Group of animals	Pre-partum (0 hr)	Post-partum (24 hrs)
ALT (IU/L)	EU	19.09^{aA}±0.42	20.59^{aA}±0.93
	DYM	$29.8^{bA\pm}$1.09	24.26^{bB}±1.11
	DYF	$27.79^{bA\pm}$1.08	$23.62^{bB\pm}$0.73
AST (IU/L)	EU	101.37^{aA}±1.6	72.25^{aB}±1.72
	DYM	$109.68^{bA\pm}$6.04	84.22^{bB}±3.73
	DYF	$120.94^{bA\pm}$5.32	$86.98^{bB\pm}$4.30
TP (g/dl)	EU	$6.97^{bA\pm}$0.14	$6.74^{bA\pm}$0.14
	DYM	6.09^{aA}±0.02	5.49^{aB}±0.06
	DYF	$6.01^{aA\pm}$0.03	$5.58^{aB\pm}$0.05
ALB (g/dl)	EU	3.11±0.10	2.9±0.12
	DYM	3.08±0.08	2.82±0.23
	DYF	2.97±0.14	2.76±0.08

Means having different superscripts in row (capital letter A, B) and in column (small letter a, b) differ significantly (P≤0.05)

Conclusion

It was concluded that fetal cause of dystocia more prone than maternal causes and haemato-biochemical changes including WBC, neutrophils, PCV, serum AST and ALT level were higher in dystocia affected goats as compared to normal parturated goats, whereas, Hb, TP values decreased in dystocia affected goats may be useful in management of obstetrical conditions.

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