Haryana Vet. (June, 2023) **62(1),** 78-80 ISSN 0033-4359 (P) **Research Article**

ASSESSMENT OF OXIDATIVE STRESS IN DYSTOCIA AFFECTED DOES

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ABSTRACT

The study to evaluate the oxidative stress in does suffered with dystocia (maternal dystocia, n=6 and fetal dystocia, n=6) and normal kidding (n=6) was undertaken. The results indicated the malondialdehyde (MDA) varied significantly (P<0.05) within groups while glutathione reductase (GR) varied significantly (P<0.05) within groups as well as various periods. The study suggested that dystocia is stressful malady and both maternal and fetal dystocia exerts equal amount of oxidative stress to does.

Keywords: Does, Dystocia, Glutathione reductase, Lipid peroxidase

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Dystocia is common obstetrical problem in all farm animals, which unless relived leads to death of fetus and sometimes death of dam ((Naokes *et al.*, 2019). Reactive oxygen species (ROS) or free radicals, formed during physiological and pathological conditions in the body, are extremely reactive and react with proteins, lipids, carbohydrates and nucleic acids. Uncontrolled increase of free radicals may cause damage of cells and tissues through oxidative chain reactions and lipid peroxidation, resulting in oxidative stress. Enzymatic antioxidants like GSH-Px, SOD, together with catalase, and non-enzymatic antioxidants like vitamins A, E, and -carotene and GSH protect living organisms against ROS. Normal cells have the capacity to detoxify superoxide radicals using antioxidant enzymes, such as superoxide dismutase (SOD), glutathione peroxidase (GSH-Px), glutathione reductase, and catalase (CAT), which help in maintaining the intracellular concentration of reduced glutathione and NADPH necessary for the optimal function of the antioxidant defense system (Al-Qudah, 2011). Imbalances between the generation of ROS and Scavenging capacity of antioxidants in body may results in oxidative stress. The process of parturition is a stressful events and abnormal parturition adds to normal stress of parturition (Nakao and Grunet, 1990). Lipid peroxidation and glutathione reductase are the important markers of oxidative stress. Compared to other species, relatively very little/no information is available about oxidative stress in dystocia affected does. Therefore, the present investigation was undertaken to ascertain the altered oxidative stress in does affected with dystocia.

MATERIALS AND METHODS

A total of 18 does, comprised of 12 difficult kidding presented at clinical complex, Deesa and 6 normally kidded selected from pinjrapole, Kant) were included in the present study. The dystocic does (n=12)underwent further detailed obstetrical examination and based on etiology classified as, Group I-Maternal dystocia (n=6) and Group II-Fetal dystocia (n=6). Normal kidded does (n=6) served as a control (Group III). Depending upon the nature of dystocia, it was relived either by forced traction, mutation, or caesarean section. The appropriate post-operative therapy after reliving the dystocia i.e. Inj. Cefriaxone as broad spectrum antibiotic, Inj. Meloxicam as analgesic and Normal saline plus Ringer's lactate as a supportive fluid therapy were given. Blood was collected aseptically from each doe at the time of clinical presentation just prior to reliving the dystocia/just prior to kidding (P1); immediately after reliving the dystocia/just after the kidding (P2); on the day 7(P3) and day 11(P4) post obstetrical maneuver/kidding. Plasma was harvested and stored at -20º C until analysis. All the plasma samples were analysed for membrane peroxidative damage at cellular level in terms of malondialdehyde (MDA) by using the method of Zadeh *et al.* (1996) and expressed as ìmol/ml, while the glutathione reductase (GR) content of blood plasma was measured using the method of Sedlak and Lindsay (1968) and expressed as U/L. The data obtained were analysed statistically by factorial randomized block design (FRBD) followed by Duncan's new multiple range test (MRT) to assess the statistical significance between the groups during various period as described by Snedecor and Cochran (1994).

RESULTS AND DISSCUSSION

Significantly (P<0.05) higher values of mean plasma MDA was found in both type of dystocia affected groups (I and II) as compared to normally kidded does

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Table 1. Plasma MDA values (Mean±SEm,umol/ml) at various periods in three groups of does

Periods	Group I	Group II	Group III
P1	2.34±0.28^{ab}	2.40±0.31^{a}	1.97±0.22^{b}
P2	2.27±0.27^{a}	2.52±0.32^{a}	1.65±0.24^{b}
P3	1.77±0.31^{b}	2.42±0.29^{a}	1.70±0.13^{b}
P4	1.75±0.22^{b}	2.22±0.19^{a}	2.02±0.28^{ab}

Note: Mean bearing different superscripts in rows differ significantly (P<0.05)

Table 2. Plasma GR values (Mean± SEm, U/L) at various periods in three groups of does

Periods	Group I	Group II	Group III
P1	10.49±0.54^{br}	10.51±0.51^{rb}	13.31±0.75^{as}
P2	10.90±0.50^{br}	11.02±0.61^{rb}	13.98±0.67^{ar}
P3	11.51±0.49^{eq}	12.10±0.54^{bq}	14.60±0.63^{aq}
P4	12.32±0.69^{cp}	12.890±0.74^{bp}	15.20±0.62^{ap}

Note: Mean bearing different subscripts in columns and superscripts in rows differ significantly (P<0.05)

(group III) without any significant variations in periods during the present study (Table 1 and Fig. 1). Similarly, Bansal *et al.* (2011) also obtained higher of plasma MDA in dystocia affected buffaloes as compared to normal parturated buffaloes while Thangamani *et al.* (2019), Ehrisir *et al.* (2006) and Sathya *et al.* (2007) recorded higher value of plasma MDA in maternal dystocia affected buffalo for both periods (at the time of clinical presentation, 24 hrs. later) compared with fetal dystocia and eutocia groups. In general, increased lipid peroxidation in dystocia was expected due to physical efforts of calving. The problem of dystocia and the obstetrical operations such as forced traction, mutation and caesarian section were highly stressful (Aggarwal *et al.*, 2005). Under these stressful conditions, levels of adrenaline, non-adrenaline and glucocorticoids had increased resulting in excessive production of ROS (Freeman and Crapo,1982). Subsequently, ROS caused peroxidation of placental membrane lipids especially polyunsaturated fatty acids, which lead to disturbances in membrane structure and functions and resulted in LPO/oxidative stress (Kumar *et al.*, 2010). However, higher values of MDA on the day of kidding have been reported by Rejitha and Karthiayini (2013) in crossbreed Malabari does while Manat (2015) reported higher values of MDA on the day 14 post-partum in Surti does.

In the present study, a significant (P<0.05) difference was observed between the groups and various periods in the mean plasma glutathione reductase concentrations (Table 2 and Fig. 2). Significantly (P<0.05) higher value of plasma GR was found in normal kidded does as compared to dystocic does, further, higher level of

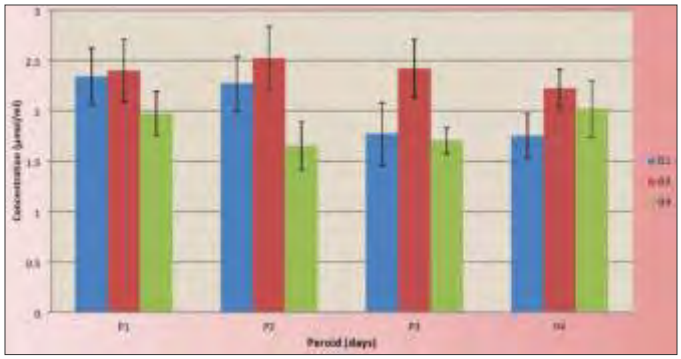

Fig. 1. Mean LPO (in terms of MDA, mmol/ml) in different groups of does.

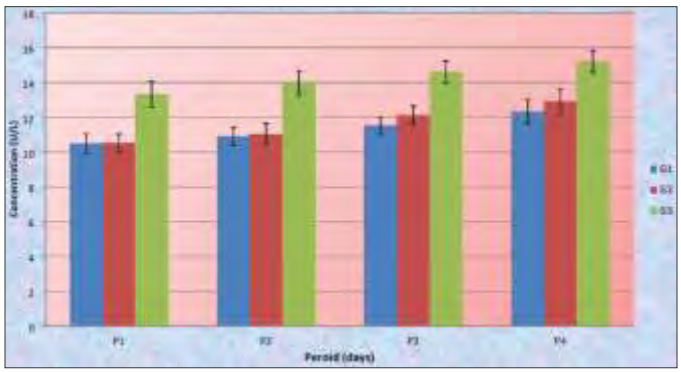

Fig. 2. Mean GR value (U/L) in different groups of does.

plasma GR was noticed on day 11 of kidding/obstetrical maneuver. Similarly, Thangamani *et al.* (2019), Ahmed *et al.* (2009), Sathya *et al.* (2007) and Bansal *et al.* (2011) also reported higher values of plasma GR in normal parturated buffaloes as compared to dystocia affected buffaloes in support the findings of the present study. Higher levels of GR in normally kidded does compared to dystocic ones might be explained by higher levels of eicosanoids and epinephrine-induced pathways of aerobic energy production associated with immediate parturition, which generated ROS and thus caused lipid per oxidation, thereby reduced the GR profiles (Nockels, 1996). Further, higher levels of plasma GR found on day 11 of normal kidding/obstetrical maneuver were supported with the findings of Manat (2015). While Rejitha and Karthiayini (2013) in crossbreed Malabarid does reported non-significant increases in plasma GR one week after kidding. Glutathione reductase performs an auxiliary function in the antioxidant mechanism associated with glutathione. Reduction of the oxidized glutathione restored its antioxidant properties, thus enabling its participation in reactions catalyzed by GSH-PX and glutathione S-transferase, as well as its capacity to directly eliminate ROS (Somani *et al.*, 1996).

It is concluded that dystocia is stressful malady and both maternal and fetal dystocia exerts equal amount of oxidative stress to does.

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