BIOCHEMICAL CONSTITUENTS OF AMNIOTIC AND ALLANTOIC FLUIDS IN CHITAL DEER (*AXIS AXIS*)

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ABSTRACT

The present study was undertaken to compare the values of some biochemical profiles of allantoic and amniotic fetal fluids among three trimesters of gestation period in Chital deer hinds. The level of glucose declined relatively from first trimester to third trimester of gestation in both amniotic and allantoic fluids. The glucose concentration was higher in the allantoic fluid than amniotic fluid. The total protein level was found to increase in amniotic fluid and decrease in allantoic fluids as gestation advances. The amount of total protein in allantoic fluid was higher than amniotic fluid. There was no significant difference in the urea level in amniotic fluid during different stages of gestation. Urea and creatinine concentrations in allantoic fluid were higher than in the amniotic fluid. The sodium concentration was significantly higher in amniotic fluid when compared to allantoic fluid. Concentration of calcium was significantly higher in allantoic fluid compared to amniotic fluid. There was no significant difference in the level of phosphorus between amniotic and allantoic fluid.

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Keywords: Chital deer; Allantoic fluid; Amniotic fluid; Biochemical constituents.

The concentration of constituents in amniotic and allantoic compartments is influenced by the exchange through the placenta, metabolic products of the fetus, fetal urine formation and fluid flow through the urachus or urethra and fetal secretions from lung and salivary glands (Khojasteh *et al.*, 2011). Information about the fetal fluid is of utmost importance in understanding fetal metabolism and identifying pathologic conditions during pregnancy (Prestes *et al.*, 2001). Studies on fetal fluids composition has been reported in detail in cows (Wintour *et al.*, 1986), sheep (Prestes *et al.*, 2001), buffaloes (Rajasundaram *et al.*, 1990), sows (Razdan *et al.*, 2004) and goats (Khojasteh *et al.*, 2011). However, information regarding the biochemical composition of the fetal fluids is not available in cervid species. The present study was therefore undertaken to determine the values of some biochemical components of fetal fluids during early, mid and late gestation in Chital deer hinds (*Axis axis*).

Three gravid uteri at early, mid and late gestation period were collected at the time of postmortem conducted on three dead pregnant Chital deer hinds at the Department of Forest and Wildlife, Pondicherry. The gravid genitalia were brought immediately to the department of Veterinary Gynaecology and Obstetrics, RIVER in ice box for detailed investigation. The uteri were washed and a careful dissection of the uteri was made along the dorsal curvatures without damaging the fetal membranes. Amniotic and allantoic fluids were aspirated separately using disposable syringe. The aspirated fluids were stored in labeled plastic tubes at -18°C until biochemical analyses. Then, fetuses were expelled from the enclosing membranes and the fetal ages were determined. Forehead- rump length of the fetus was measured and the stage of gestation

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was calculated based on the formula described by Hamilton *et al.* (1985). The normal gestation period for Chital deer is 210 to 238 days with an average of 226 days (Mattioli, 2011). The gestation age and stage of gestation for the three fetuses were 46 days (early gestation), 110 days (mid gestation) and 216 days (late gestation).

The following biochemical profile in the amniotic and allantoic fluids were estimated: Glucose (mg/dl) by O- Toluidine method; Total proteins (g/dl) by Biuret method; Urea (mg/dl) by DAM method; Creatinine (mg/dl) by Jaffe's reaction; Sodium (mmol/L) by Flame photometry; Calcium (mg/ml) by Ferro Ham method and Phosphorus (mg/dl) by colorimetric method (Prestes *et al.*, 2001). Statistical analysis was done by complete randomized design and the comparison between the amniotic and allantoic fluids was made by paired t -test (Snedecor and Cochran, 1989).

Biochemical profile of amniotic and allantoic fluids at three stages of gestation in chital deer are presented in the Table 1. The level of glucose declined relatively from first trimester to third trimester of gestation in both amniotic and allantoic fluids. This result agreed with the finding of Khadjeh *et al.* (2007) in goat and Prestes *et al.* (2001) in sheep. Prestes *et al.*, (2001) stated that decrease of glucose in amniotic fluids during gestation may be due to fetal intake of glucose as a consequence of the fetal swallowing reflex. The glucose concentration was insignificantly higher in the allantoic fluid than amniotic fluid. In contrast, Wintour and McFarlane (1993) reported higher concentration of glucose in amniotic fluid when compared to allantoic fluid.

The total protein level increased as gestation stages increases in amniotic fluid. However, the trend was reverse in allantoic fluid. The result concurred with the findings of Anitha and Thangavel (2011) in sheep. In the present study, the level of total protein in allantoic fluid is higher than amniotic fluid (Table 2). This finding went along with that of Wintour and McFarlane (1993) and Anitha and Thangavel (2011) in sheep.

Even though there is no significant difference in the urea level in amniotic fluid during different stages of gestation, there was an increasing trend in allantoic fluid from early to late gestation period. This observation was in agreement with the findings of Wintour and McFarlane (1993) in sheep, who reported that entry of fetal urine into fluid sac had increased the urea concentration of the allantoic fluid. In case of creatinine, the concentration found to decrease with increasing stage of gestation in amniotic fluid and increases with increasing stages of gestation in allantoic fluid. However, contrast to our findings, Anitha and Thangavel, (2011) reported that as gestation advances, creatinine level raised in amniotic fluid in sheep due to increased protein metabolism in the fetus. The urea and creatinine in allantoic fluid were higher than in the amniotic fluid. The progressive maturity and efficient activity of fetal kidney justifies these findings. The result concurred with the findings in goat (Khadjeh *et al.*, 2007).

The level of sodium was in the decreasing trend as gestation stage advances and lowest level was recorded in the third trimester of gestation compared to first and second trimester of gestation in both amniotic and allantoic fluids. These findings were in agreement with the results of Khadjeh *et al.* (2007) in goat. Prestes *et al.* (2001) reported that the mineralocorticoids activity of intrauterine fetal maturity acts on fetal kidneys, decreasing sodium concentrations in fetal urine. The sodium concentration was significantly higher in amniotic fluid when compared to allantoic fluid. Alexander *et al.* (1958) also reported significantly lower sodium content in allantoic fluid than in amniotic fluid in sheep. Calcium content decreased as gestation advances in the amniotic fluid. On the other hand in allantoic fluid the concentration of calcium was highest during second stage of gestation. Concentration of calcium was significantly higher in allantoic fluid compared to amniotic fluid. The concentrations of phosphorus were highest during first and third trimester of gestation in amniotic and allantoic fluids respectively. Moreover, there was no significant difference in the level of phosphorus between amniotic and allantoic fluid.

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