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## Biochemical constituents in the seminal plasma of NARI Suwarna strain of sheep

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#### Abstract

The present study was conducted in NARI Suwarna strain of sheep (60% Deccani, 30% Madgyal and 10% Garole) to find out the biochemical components of seminal plasma. Thirty six ejaculates were collected with an artificial vagina (AV) from all the six NARI Suwarna rams twice in a week and samples were centrifuged and seminal plasma was separated and stored at -20°C till biochemical estimation. The seminal plasma samples were subjected for analysis of cholesterol, albumin, total proteins, calcium, potassium, sodium and chloride. The present findings of all the estimated proteins and minerals in seminal plasma are within normal range. The mean values for total proteins, albumins, sodium varied within the NARI Suwarna rams with significant difference. However, the mean values for cholesterol, calcium, potassium, sodium, chloride and pH did not differ.

**Keywords:** Seminal Plasma, NARI Suwarna, Biochemical

#### Introduction

Biochemical estimates of seminal plasma (SP) are used for semen evaluation, since using semen characteristics alone are not completely satisfactory for semen appraisal in the current practice of commercial artificial insemination<sup>[1, 2]</sup>. Biochemical evaluation of ram semen and its relationship with physical characteristics are still completely unknown. Understanding reproductive physiology and more accurate and rological evaluations could be conducted to improve reproductive efficiency in rams. Several studies were conducted and reported about the biochemical composition of seminal plasma in different domestic livestock species. However, limited studies have been conducted in NARI Suwarna strain of sheep to find out the biochemical components of seminal plasma and hence, present study conducted.

#### Materials and Methods

The study was carried out on six mature NARI Suwarna rams (60% Deccani, 30% Madgyal and 10% Garole) at Department of Veterinary Gynaecology and Obstetrics, Veterinary College, Bidar, India. Bidar is located at 17.9°N 77.5°E lies at a central position in Deccan, a plateau at an elevation of 2300 ft from the sea level and lies between 17°35' and 18°25' north latitudes and 76°39' east longitudes. The Bidar experiences semi-arid climate with extreme summer and coldest months are December and January and temperature varies between 20°C and 42°C. All the rams were monitored under uniform management conditions and reared under the semi-intensive housing system. Thirty six ejaculates were collected with an artificial vagina (AV) from all the six NARI Suwarna rams twice in a week and samples were centrifuged and seminal plasma was separated and stored at -20°C till biochemical estimation. The seminal plasma samples were subjected for analysis of cholesterol, albumin and total proteins as per the assay procedures mentioned in kits (Swemed Diagnostics, Bangalore) using Auto chemistry blood Analyzer (Artos Elita Swemed Biomedicals Pvt Ltd, Bangalore) and for analysis of calcium, potassium, sodium and chloride as per standard procedure by using Lablyte, Electrolyte analyzer (Triviron Health Care, Hyderabad). The data was analyzed as per standard procedures<sup>[3]</sup>.

#### Results and Discussion

##### Ram wise biochemical constituents in seminal plasma of NARI Suwarna rams

The mean total proteins values were ranged from 3.04±0.16 to 4.29±0.16 mg/dL whereas the albumin levels 1.20±0.22 to 2.50±0.31 mg/dL. The mean cholesterol levels were ranged from

39.76±3.243 to 55.29±4.083 mg/dL as well as calcium values 2.32±1.02 to 4.29±0.21 m. mol/L. The mean potassium levels were ranged from 13.22±0.80 to 15.00±0.00 m. mol/L and the mean sodium values 65.80±0.61 to 71.58±0.91 m. mol/L. The mean chloride values were ranged from 55.82±0.16 to 56.65±0.40 m. mol/L and pH 6.12±0.11 to 6.53±0.21 in the seminal plasma of all the six NARI Suwarna rams (Table 1).

The present findings of all the estimated proteins and minerals in seminal plasma are within normal range. Total protein, Na, K, Ca, and Mg in SP influence osmotic balance and are components of many important enzymes [4], that maintain sperm function. Sperm function is highly dependent on its ionic environment [5]. And differences in dietary mineral levels may affect ion concentrations of SP. Na is the principle cation in SP, with the exception of bull semen where Ca concentration is very high [6]. Na ion is an important element for spermatozoal function [7]. K is a natural metabolic inhibitor and higher K concentrations in SP decrease sperm metabolism thereby, decreasing sperm motility. Intracellular concentrations of potassium are higher than those of seminal plasma, and therefore potassium levels are linked to sperm concentration. In sheep, increasing potassium levels are negatively correlated with progressive motility, while the reverse is true for sodium and chloride [8]. Variation in the concentrations of calcium, magnesium, copper and zinc in stallion SP do not appear to affect freezability [9]. Pre-sperm fluid and the first sperm-rich fraction contain low levels of calcium and magnesium, while the first sperm-rich fraction

has high phosphate concentrations [10, 11]. In sheep ejaculates, intracellular calcium and magnesium concentrations were higher than in SP in contrast with phosphate levels. Lower values of progressive motility were correlated with increasing levels of calcium and decreasing magnesium and phosphate concentrations [8]. Extracellular calcium regulates sperm capacitation [12]. And hyperactivation [13]. Ca triggers the acrosome reaction in mammalian spermatozoa and is also involved with sperm motility [14]. Magnesium, found in nearly all enzymatic systems, is regarded as a marker of seminal vesicle secretions [15]. and may play an important role in sperm motility [16]. Some authors obtained a negative correlation between abnormal sperm morphology and P, Ca and Na concentrations and a positive correlation with K concentration [17]. Increased concentration of Cl in SP may play a role in infertility [4]. The distribution of major ions between sperm and SP might be a basis for variation of semen quality of different successive ejaculates and should be considered in the interpretation of fertility evaluation of semen. Some authors have observed a negative correlation between sperm motility and Na, K concentrations [14]. Studies with human spermatozoa have shown that high Na or K concentration in SP may induce spontaneous lipid peroxidation of plasma membranes [18]. Further studies will be necessary to clarify a possible physiological role of ions or organic molecules present in SP in the determination and regulation of semen quality, possibly secretory products of accessory sex glands.

**Table 1:** Some biochemical constituents in seminal plasma (SP) of NARI Suwarna rams

Biochemical constituents	Ram no. 4668	Ram no. 5550	Ram no. 5514	Ram no. 5597	Ram no. 4931	Ram no. 5200
Total proteins (mg/dL)	3.04±0.16 <sup>b</sup>	3.16±0.24 <sup>ab</sup>	3.88±0.089 <sup>ab</sup>	4.21±0.45 <sup>ab</sup>	3.21±0.21 <sup>ab</sup>	4.29±0.16 <sup>a</sup>
Albumin(mg/dL)	1.70±0.23 <sup>abc</sup>	1.20±0.22 <sup>bc</sup>	1.90±0.12 <sup>abc</sup>	1.90±0.25 <sup>abc</sup>	1.40±0.063 <sup>b</sup>	2.50±0.31 <sup>a</sup>
Cholesterol (mg/dL)	39.76±3.243 <sup>a</sup>	55.29±4.083 <sup>a</sup>	53.95±6.118 <sup>a</sup>	53.55±5.258 <sup>a</sup>	43.11±4.881 <sup>a</sup>	52.21±2.531 <sup>a</sup>
Calcium (m.mol/L)	4.29±0.21 <sup>a</sup>	2.32±1.02 <sup>a</sup>	2.61±0.75 <sup>a</sup>	2.43±0.55 <sup>a</sup>	2.84±0.55 <sup>a</sup>	3.08±0.83 <sup>a</sup>
Potassium (m.mol/L)	15.00±0.003 <sup>a</sup>	15.00±0.00 <sup>a</sup>	14.42±0.33 <sup>a</sup>	14.01±0.72 <sup>a</sup>	14.95±0.05 <sup>a</sup>	13.22±0.80 <sup>a</sup>
Sodium (m.mol/L)	68.05±1.20 <sup>ab</sup>	65.80±0.61 <sup>b</sup>	71.58±0.91 <sup>a</sup>	69.95±1.50 <sup>ba</sup>	71.05±0.74 <sup>a</sup>	71.08±0.87 <sup>a</sup>
Chloride (m.mol/L)	56.08±0.31 <sup>a</sup>	56.00±0.26 <sup>a</sup>	55.82±0.16 <sup>a</sup>	56.65±0.40 <sup>a</sup>	56.55±0.49 <sup>a</sup>	56.25±0.50 <sup>a</sup>
pH	6.40±0.15 <sup>a</sup>	6.29±0.19 <sup>a</sup>	6.41±0.17 <sup>a</sup>	6.12±0.11 <sup>a</sup>	6.50±0.17 <sup>a</sup>	6.53±0.21 <sup>a</sup>

## Conclusion

Based on the results, it was concluded that the mean values for total proteins, albumins, sodium varied within the NARI Suwarna rams with significant difference however, the mean values for cholesterol, calcium, potassium, sodium, chloride and pH did not differ.

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