

STUDIES ON BLOOD BIOCHEMICAL AND MINERAL PROFILES WITH THE TREATMENT OF ACYCLICITY IN POST-PARTUM ANESTRUS SAHIWAL COWS

MEENAKSHI VIRMANI*, R. K. MALIK, P. SINGH and S. S. DALAL

Department of Veterinary Physiology and Biochemistry, College of Veterinary Sciences
Lala Lajpat Rai University of Veterinary & Animal Sciences, Hisar-125 004

ABSTRACT

The present study was conducted on 11 postpartum anestrus Sahiwal cows with the history of postpartum anestrus to investigate the biochemical and mineral parameters and their correlation with cyclicity. The animals were divided into two groups namely CIDR group (n=6) treated with CIDR protocol and Ovsynch group (n=5) treated with Ovsynch protocol. Significantly higher levels of serum total proteins and albumin and lower level of cholesterol in cows of both groups were recorded after treatment as compared to the levels before treatment. Non-significant changes were observed in blood urea, calcium and phosphorus levels after treatment. It may be concluded that the treatment of acyclicity causes these biochemical parameters to return to their basal level and there was no significant variation between the two treatment groups.

Key words: Anestrus, biochemical parameters, CIDR, minerals, Ovsynch, Sahiwal cows

Acyclicity leading to low reproductive efficiency is one of the most important problems in dairy cattle resulting in economic loss to the dairy farmers. Biochemical profile plays a key role in diagnosis of an array of productive and reproductive disorders in different livestock species. Normal levels of biochemical constituents are of utmost importance for maintaining the functional integrity of the reproductive system (Niazi *et al.*, 2003). Changes in blood biochemical constituents and mineral levels are important indicators of physiological state (Perveen and Usmani, 1993) as well as the reproductive performance of the animals (Dutta *et al.*, 1988; Prabha *et al.*, 2000). The minerals also play an intermediate role in the action of hormones and enzymes at the cellular level in an integrated fashion. Calcium works as a cofactor or activator of various enzyme systems. Disturbance in calcium and phosphorus ratio has been associated with subnormal fertility and anestrus conditions (Moddie, 1965). Therefore, the study was undertaken on animals with the history of post-partum anestrus to study the variation in biochemical milieu and mineral status of the anestrus cows after their treatment.

MATERIALS AND METHODS

The present work was carried out on 11 Sahiwal

*Corresponding author: virmanim2003@yahoo.com

cows of the Cattle Farm, Department of Animal Genetics and Breeding, College of Veterinary Sciences, LLRUVAS, Hisar. All the cows that were acyclic for more than 200 days after calving, were selected. Optimum health score conditions and management care were confirmed in each animal. The body condition score for each of the experimental animal was above 2.5 on a scale from 1 to 5. The animals selected for the trial were approximately of same age and nutritional health status with the history of postpartum anestrus. The cows were examined per rectally for the confirmation of anestrus and then divided into two groups (CIDR group and Ovsynch group). CIDR group animals (n=6) were treated with Controlled Internal Drug Release (Eazi-breed CIDRTM, Inter Ag, Hamilton, New Zealand), followed by intramuscular administration of PMSG (500 I.U.; Folligon®, Intervet International, The Netherlands) on day 8 (one day prior to CIDR withdrawal) and hCG (1500 I.U.; Chorulon®, Intervet International, The Netherlands) at the time of artificial insemination (A.I.). Ovsynch group animals (n=5) were administered PMSG 500 I.U. via the intramuscular route on day 0 followed by GnRH analogue (16 µg; Receptal® VET, Intervet International, Germany) on day 3, Lutalyse (25 mg; Dinoprost, Pfizer Animal Health Limited, Mumbai) on day 10 and a second dose of GnRH analogue (16 µg) on day 12 of the start of the experiment. Detection of animals in heat was done

by parading a teaser bull daily in the morning and evening. Animals that showed signs of estrus were artificially inseminated with frozen semen. Fixed time insemination was done in animals of Ovsynch group at 12 and 24 hours after second GnRH injection in case the animal was not detected in heat by the teaser bull. Blood samples were collected from the animals on day 0, at the time of A.I. and 21 days after A.I. for biochemical and mineral assay and were represented as observations I, II and III respectively (Table 1). Serum was separated and concentrations of total protein, albumin, cholesterol, urea, aspartate transaminase (AST), calcium and phosphorus were estimated using auto analyzer kits (Bayer RA 50 Chemistry analyzer).

RESULTS AND DISCUSSION

All the animals in CIDR and Ovsynch groups showed the signs of estrus after treatment and inseminated with the cryopreserved semen. The average values for total protein, albumin, cholesterol, urea, AST, calcium and phosphorus in the anestrus animals before and after their treatment with different hormonal preparations are presented in Table 1.

Mean total protein content and albumin level of acyclic animals in the present study were lower than the normal values (as per Burle *et al.*, 1995). As the acyclic animals were given treatment, the protein values showed a remarkable rise towards normalcy by 7th day after treatment. The normal level was maintained 21 days after A.I. The values are in agreement with the results of Burle *et al.* (1995). Conversely, Ahmed *et al.* (2004) reported significantly higher value of total

serum protein in acyclic cows. This contradictory finding might probably be due to the difference in the level of protein in the feedstuff.

The urea and cholesterol levels decreased as the animals approached towards cyclicity in the present study. This finding is in accordance with Zaman *et al.* (1985) and Butler (2000). Increased urea concentration leads to impaired fertility in cows as higher plasma urea concentrations interfere with normal inductive actions of progesterone on the microenvironment of the uterus thereby causing suboptimal conditions for the support of embryo development (Butler, 2000). The utilization of cholesterol for optimum steroid hormone biosynthesis to maintain the cyclicity may be correlated with lower level of cholesterol in cyclic animals (Zaman *et al.*, 1985).

The AST enzyme catalyzes the transfer of α -amino group from an amino acid to α -keto acid and is widely distributed in animal tissues. AST levels showed variability in acyclic animals after treatment though the deviation in the level before and after treatment was not significant.

Calcium appears to affect the reproduction in animals indirectly. It influences the animal's ability to use other trace elements thus leading to a disruption of reproductive efficiency. Dhoble and Gupta (1986) found higher calcium level in cyclic buffaloes as compared to acyclic animals. Low calcium level in acyclic animals might be due to failure to maintain normal calcium level as a result of some metabolic disturbances or due to an increased calcium excretion. Similar observation in the present study in cows also supports the viewpoint that calcium plays a major role

Table 1
Biochemical profiles of anestrus Sahiwal cows before and after treatment in both groups

Biochemical parameters	Observations in CIDR group at			Observations in Ovsynch group at		
	I	II	III	I	II	III
Total proteins (g/dl)	6.52 ^a ±0.57	8.61 ^b ±0.64	7.77 ^b ±0.54	6.98 ^a ±1.11	8.31 ^b ±0.37	7.75 ^b ±0.48
Albumin (g/dl)	3.25 ^a ±0.26	4.37 ^b ±0.36	4.07 ^b ±0.40	3.39 ^a ±0.57	4.47 ^b ±0.51	3.71 ^{ab} ±0.27
Cholesterol (mg/dl)	218.36 ^b ±38.52	180.71 ^{ab} ±28.33	156.93 ^a ±18.23	181.38 ^{ab} ±16.01	141.24 ^a ±23.01	149.86 ^a ±26.01
Urea (mg/dl)	32.67 ^a ±1.76	26.67 ^a ±1.38	27.83 ^a ±1.22	31.40 ^a ±2.13	29.20 ^a ±1.87	27.20 ^a ±1.56
AST (U/l)	97.83 ^a ±2.75	128.33 ^a ±8.01	127.83 ^a ±6.06	13.95 ^a ±6.24	16.75 ^a ±7.49	16.62 ^a ±7.43
Calcium (mg/dl)	7.50 ^a ±1.21	9.27 ^a ±0.92	8.54 ^a ±0.78	7.18 ^a ±1.41	8.16 ^a ±0.84	9.74 ^a ±1.47
Phosphorus (mg/dl)	4.28 ^a ±0.51	5.84 ^a ±0.40	5.89 ^a ±0.44	4.15 ^a ±0.66	5.23 ^a ±0.67	4.98 ^a ±0.55

All values are Mean±S.E. Means with different superscripts in a row within a group differ significantly. I=on day 0; II=at the time of artificial insemination (AI); III=21 days after AI

in maintaining the normal reproductive efficiency in cows.

Lower level of phosphorus in anestrus buffaloes as compared to normal cycling buffaloes has been reported by Dhoble and Gupta (1986). Deficiency of phosphorus influences the level of the pituitary and ovarian hormones and thereby produces the aberrations in the normal reproductive rhythm. Bansal *et al.* (1978) reported that supplementation of phosphorus in the feed improves the reproductive performance of treated animals. Increase in the level of phosphorus in cyclic animals in the present study also suggests a possible correlation of level of inorganic phosphorus in serum to the occurrence of postpartum anestrus in cows as the levels were low in anestrus animals.

It can be concluded from this study that the ovarian cyclic changes significantly affect total protein, albumin and cholesterol concentrations in Sahiwal cows. In view of this, comprehensive explorations on health, nutrition and metabolic profile along with progesterone profile are required for better understanding of acyclicity in Sahiwal cows.

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