Full Length Article

EFFECT OF DIFFERENT TREATMENT PROTOCOLS ON THE SERUM BIOCHEMICAL PARAMETERS OF FOLLICULAR CYST AFFECTED COWS

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ABSTRACT

Follicle like structures with a minimum of 17 mm diameter and persisting for more than 6 days in the absence of corpus luteum is called as follicular cyst. It is the hypothalamo-hypophyseo gonadal axis that governs the reproductive events primarily. Plasma is a medium that reflects the changes in any organ apart from providing nutrients and draining the metabolic wastes. Cows brought for infertility treatment were screened and cows which were diagnosed as follicular cyst randomly allotted in to four groups of eight cows each. Different groups were subjected to different treatment protocols viz, Regular co-synch protocol, modified co-synch protocol, Trans-gluteal follicular cyst evacuation technique and trans-gluteal follicular cyst evacuation technique cum modified co-synch protocol for Group I, II, III and IV, respectively. Blood samples were collected from all the cows of different groups on day 0 (initiation of treatment), 7 and 9 of treatment and were analyzed for biochemical parameters. Cholesterol, triglyceride, total protein, calcium and phosphorus concentration was quantified using an automatic analyser UV-VIS spectrophotometer. There was no significant difference ($P > 0.05$) noticed between the mean concentration of biochemical parameters of different treatment groups, on days 0 and 7 in serum. The mean concentrations of cholesterol were 116.13±20.28, 59.67±10.50, 70.88±6.57 and 64.00±8.36 mg/dl in Group I, II, III and IV cows, respectively and were significantly ($P < 0.05$) higher in Group I. The mean concentration of all other biochemical parameters were non-significant ($P > 0.05$) between all treatment groups, on day 9 in serum. This might be due to steroid bio transformation of cholesterol.

Keywords: Follicular Cyst, GnRH, hCG, Biochemical Parameters

Received : 10.12.2023 Revised : 30.01.2024 Accepted : 30.01.2024

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INTRODUCTION

Fertility stands as a critical factor determining a cow's lifetime reproductive performance. In dairy cows, maintaining a regular calving cycle of every 365 days relies heavily on a properly functioning reproductive system (Noakes *et al.,* 2009).

Follicle like structures with minimum of 17 mm diameter and persisting for more than 6 days in the absence of corpus luteum is called as follicular cyst (Silvia *et al.,* 2002). Modifications in the constituents of plasma due to either physiological processes or pathological conditions can potentially disrupt ovarian functions such as the production of steroids, the growth of follicles, and the formation of the corpus luteum (Nora *et al*., 2018). Alterations of several serum metabolite concentrations, belonging to lipids and lipid-like molecules, organic acids and derivatives, were associated with the presence of a follicular cyst. The aim of the present study was to compare the biochemical parameters in follicular cyst affected cows treated with hormonal and aspiration protocols.

MATERIALS AND METHODS

Crossbred cows brought to Large Animal Clinics, Gynaecology unit of Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu with the history of infertility were screened and the cows diagnosed as follicular cyst with body condition of 2.5 to 3.5 and in their first to fourth parity were selected for the present study. Cows selected with follicular cyst were randomly allotted to 4 groups (Group I to IV) of 8 cows each, and were subjected to four different kind of treatment protocols *viz,* co-synch protocol (Group I), modified co-synch protocol (group II), trans-gluteal follicular cyst evacuation technique (Group III) and trans-gluteal follicular cyst evacuation technique cum modified co-synch protocol (Group IV). Blood samples were collected from all the cows of different groups on day 0 (initiation of treatment), 7 and 9 of treatment and the sera were analyzed for biochemical parameters.

Cholesterol, triglyceride, total protein, calcium and phosphorus concentration was quantified using an automatic analyser UV-VIS spectrophotometer (Selectra ProX, ELI Tech Group SAS, France) with a photometric range of -0.1 to 3.0 absorbance and resolution 0.001 Abs using the commercial kit (Q line® from Q Line, Biotech, New Delhi, India) using commercial kits as per the recommendations of the manufacturer. The data concerning biochemical parameters were subjected to statistical analysis using SPSS® 16. Software package.

RESULTS AND DISCUSSION

Sero-biochemical parameters in cystic cows of different treatment groups on day 0 are presented in table 1. There was no significant difference ($P > 0.05$) noticed between the mean concentration of biochemical parameters of different treatment groups, on day 0 in serum.

The concentration of glucose in serum observed in the present study in follicular cyst affected cows ranged from 42.50±1.49

to 57.25±8.14 and was in accordance with Purohit *et al*. (2001) and Song *et al*. (2021) who have reported mean value as 42.66±2.70 and 56.34±2.57 mg/dl, respectively. However, the glucose concentration obtained in the present study was slightly lower than Dehkordi *et al*. (2015) who reported 61.33±1.87 mg/dl. The lower concentration observed in the present study might be due to the breed variation and variation in the metabolic rate.

The serum cholesterol concentration observed in the present study in follicular cyst affected cows was slightly higher than Song *et al*. (2021) who have reported mean value as 69.30±1.27 mg/dl. The higher concentration observed might be because in present study the serum cholesterol concentration was studied only in follicular cysts which is in contrast to Song *et al.* (2021) who have reported the combined concentration in both follicular and luteal cyst in cows.

The serum triglyceride concentration observed in the present study in follicular cyst affected cows ranged from 43.88±4.60 to 58.63±7.97 mg/dl which was in agreement with Allam *et al*. (2019) who have recorded 61.00±4.39 mg/dl in follicular cyst affected cows.

The total protein concentration in serum observed in the present study in follicular cyst affected cows ranged from 5.18±0.38 to 6.07±0.18 g/dl which was in accordance with Song *et al*. (2021) who have reported mean serum total protein value as 5.50±1.48 g/dl. However, the serum total protein in this study was slightly lower than Purohit *et al*. (2001) who have reported the mean value of serum total protein as 7.50±0.45 in Rathi cows, which might be due to breed variation.

The concentration of serum calcium observed in the present study in follicular cyst affected cows was almost in accordance with Dehkordi *et al*. (2015) who have reported 8.76±0.18 mg/dl. However, the serum calcium was slightly lower in our study than in Purohit *et al*. (2001) who reported the mean value of serum calcium as 9.18±0.57 mg/dl in Rathi cows, which might be due to breed and feed variation.

The serum phosphorus concentration observed in the present study in follicular cyst affected cows ranged from 2.23±0.27 to 3.21±0.28 and was lower than Purohit *et al*. (2001) and Dehkordi *et al*. (2015) who have reported 4.10±0.18 and 4.14±1.78 mg/dl, respectively which might be due to feed, breed and climatic variation.

Sero-biochemical parameters in cystic cows of different treatment groups on day 7 (n=8) are presented in table 2. There was no significant difference ($P > 0.05$) noticed between the mean concentration of biochemical parameters of different treatment groups, on day 7 in serum.

Sero-biochemical parameters in cystic cows of different treatment groups on day 9 (n=8) are presented in table 3. The mean concentrations of cholesterol were 116.13±20.28, 59.67±10.50, 70.88±6.57 and 64.00±8.36 mg/dl in Group I, II, III and IV cows, respectively and were significantly ($P < 0.05$)

higher in Group I. The mean concentration of all other biochemical parameters was non-significant (P > 0.05) between all treatment groups, on day 9 in serum.

This might be because of usage of LH in Group II and IV would have resulted in good quality corpus luteum (Rensis *et al*., 2010) and would have responded well to the luteolytic dose of $PGF_2\alpha$ administered on day 7 resulting in prompt estrus induction and excess use of cholesterol for steroid production.

Sero-biochemical parameters in Cy-Gn group cows (n =8) on different days are presented in table 4. There was no significant difference (P > 0.05) noticed in the mean concentration of sero-biochemical parameters of cows in Cy-Gn group between different days.

Sero-biochemical parameters in Cy-LH group cows (n =8) on different days are presented in table 5. There was no significant difference (P > 0.05) noticed in the mean concentration of sero-biochemical parameters of cows in Cy-LH group between different days.

Sero-biochemical parameters in Cy-Ev group cows (n=8) on different days are presented in table 6. There is no significant difference (P > 0.05) noticed in the mean concentration of sero-biochemical parameters of cows in Cy-Ev group between different days. Serum biochemical parameters in the follicular cyst affected cows did not differ significantly irrespective of the dominant structure (follicle or CL) present in the ovary. Similar results were reported by Acar *et al*. (2013) who had also studied glucose, triglycerides, cholesterol, total protein, calcium and phosphorous in serum during follicular and luteal phases of estrous cycle and reported non-significant difference in the concentration of biochemical parameters between follicular and luteal phases in water buffaloes.

Sero-biochemical parameters in Cy-Ev+LH group cows (n =8) on different days are presented in table 7. The mean concentrations of triglyceride were 57.63±5.03, 68.50±9.12 and 50.63±4.06 mg/dl on days 0, 7 and 9, respectively and was significantly higher (P < 0.05) on day 0 than day 9. The mean concentrations of calcium were 5.49±0.35, 6.79±0.64 and 7.60±0.34 mg/dl on days 0, 7 and 9, respectively and was significantly lower (P < 0.05) on day 0 than day 9. The mean concentration of all other sero-biochemical parameters was non-significant (P > 0.05) between different days in Group I. The higher concentration of triglyceride might be due to the physiological state of the animal or high lipid diet.

The mean concentrations of calcium were significantly lower (P < 0.05) on day 0 than day 9. In the present study, day 9 of treatment indicated the onset of cyclicity (induced estrus) and the lower value on day 9 (similar to cyclic cows) was in accordance with Purohit *et al*. (2001) who had also reported lower calcium concentration in cystic cows than in cyclic cows.

Table 1. Mean (± SE) of sero-biochemical parameters of cystic cows in different groups on day 0 (n=8)

S. No.	Parameters	Group I	Group II	Group III	Group IV	F value	P Value
1.	Glucose (mg/dL)	57.25±8.14	47.88±6.41	49.13±2.83	42.50±1.49	1.10 NS	0.364
2.	Cholesterol (mg/dL)	85.13±17.32	85.38±21.59	94.00±13.86	67.13±9.10	1.96 NS	0.142
3.	Triglyceride (mg/dL)	51.25±7.44	43.88±4.60	58.63±7.97	57.63±5.03	1.36 NS	0.275
4.	Total Protein (g/dL)	5.31±0.26	6.07±0.18	5.18±0.38	5.67±0.10	0.88 NS	0.444
5.	Calcium (mg/dL)	7.36±0.83	6.16±0.66	7.24±0.44	5.67±0.10	1.84 NS	0.739
6.	Phosphorous (mg/dL)	2.23±0.27	2.55±0.23	3.21±0.28	2.73±0.49	1.34 NS	0.281

Means bearing different superscripts differs significantly (P < 0.05) *, (P < 0.01) **

NS – Statistically non-significant (P > 0.05)

Table 2. Mean (± SE) of sero-biochemical parameters of cystic cows in different groups on day 7 (n=8)

S. No.	Parameters	Group I	Group II	Group III	Group IV	F value	P value
1.	Glucose (mg/dl)	47.00±4.44	43.57±3.24	50.63±3.10	44.75±3.00	1.12 NS	0.357
2.	Cholesterol (mg/dl)	89.88±18.52	86.00±32.79	75.00±9.38	69.38±15.00	0.19 NS	0.901
3.	Triglyceride (mg/dl)	46.75±6.39	53.14±11.19	51.75±7.69	68.50±9.12	1.16 NS	0.342
4.	Total Protein (g/dl)	5.39±0.38	5.00±0.36	5.37±0.19	5.87±0.11	1.61 NS	0.208
5.	Calcium (mg/dl)	6.65±0.76	5.56±0.55	7.16±0.32	6.79±0.64	1.70 NS	0.189
6.	Phosphorous (mg/dl)	2.55±0.26	2.29±0.22	2.97±0.26	3.28±0.56	1.26 NS	0.304

Means bearing different superscripts differs significantly (P < 0.05) *, (P < 0.01) **
NS – Statistically non-significant (P > 0.05)

Table 3. Mean (± SE) of sero-biochemical parameters of cows in different groups on day 9 (n=8)

S. No.	Parameters	Group I	Group II	Group III	Group IV	F value	P Value
1.	Glucose (mg/dL)	56.13±6.45	42.50±2.07	50.75±2.83	39.88±3.26[a]	0.31[NS]	0.31
2.	Cholesterol (mg/dL)	116.13±20.28[b]	56.80±3.87[a]	70.88±6.57[ab]	64.00±8.36[a]	3.35*	0.031
3.	Triglyceride (mg/dL)	48.50±4.86	61.17±12.60	54.00±6.06	50.63±4.06	0.68 [NS]	0.57
4.	Total Protein (g/dL)	2.78±0.13	5.53±0.13	5.51±0.22	5.56±0.11	0.67 [NS]	0.578
5.	Calcium (mg/dL)	7.39±0.67	7.24±0.60	6.48±0.42	7.60±0.34	0.75 [NS]	0.527
6.	Phosphorous (mg/dL)	3.03±0.25	2.40±0.10	2.87±0.34	2.75±0.24	0.93 [NS]	0.435

Means bearing different superscripts within a row differ significantly (P < 0.05) *, (P < 0.01) **
NS – Statistically non-significant (P > 0.05)

Table 4. Mean (± SE) of sero-biochemical parameters of cows in Cy-Gn group (n =8)

S. No.	Parameters	Day 0	Day 7	Day 9	F value	P Value
1.	Glucose (mg/dl)	57.25±8.14	47.00±4.44	56.13±6.45	0.67[NS]	0.520
2.	Cholesterol (mg/dl)	85.13±17.32	89.88±18.52	116.13±20.28	0.75[NS]	0.482
3.	Triglyceride (mg/dl)	51.25±7.44	46.75±6.39	48.50±4.86	0.12[NS]	0.886
4.	Total Protein (g/dl)	10.65±4.93	5.39±0.38	2.78±0.13	0.91[NS]	0.416
5.	Calcium (mg/dl)	7.36±0.83	6.65±0.76	7.39±0.67	0.29[NS]	0.749
6.	Phosphorous (mg/dl)	2.23±0.27	2.55±0.26	3.03±0.25	2.35[NS]	0.119

Means bearing different superscripts differs significantly (P < 0.05) *, (P < 0.01) **
NS – Statistically non-significant (P > 0.05)

Table 5. Mean (± SE) of sero-biochemical parameters of cows in Cy-LH group (n =8)

S. No.	Parameters	Day 0	Day 7	Day 9	F value	P Value
1.	Glucose (mg/dl)	47.88±6.41	43.57±3.24	42.50±2.07	0.08[NS]	0.501
2.	Cholesterol (mg/dl)	85.38±21.59	86.00±32.79	59.67±10.50	1.23 [NS]	0.817
3.	Triglyceride (mg/dl)	43.88±4.60	53.14±11.19	61.17±12.60	0.20 [NS]	0.400
4.	Total Protein (g/dl)	6.07±0.18	5.00±0.36	5.53±0.13	0.33 [NS]	0.290
5.	Calcium (mg/dl)	6.16±0.66	5.56±0.55	7.24±0.60	0.97 [NS]	0.101
6.	Phosphorous (mg/dl)	2.55±0.23	2.29±0.22	2.40±0.10	0.31 [NS]	0.807

Means bearing different superscripts differs significantly (P < 0.05) *, (P < 0.01) **

NS – Statistically non-significant (P > 0.05)

Table 6. Mean (± SE) of sero-biochemical parameters of cows in Cy-Ev group (n =8)

S. No.	Parameters	Day 0	Day 7	Day 9	F value	P Value
1.	Glucose (mg/dl)	49.13±2.83	50.63±3.10	50.75±2.83	0.71 [NS]	0.920
2.	Cholesterol (mg/dl)	94.00±13.86	75.00±9.38	70.88±6.57	0.20 [NS]	0.311
3.	Triglyceride (mg/dl)	58.63±7.97	51.75±7.69	54.00±6.06	0.95 [NS]	0.818
4.	Total Protein (g/dl)	5.43±0.30	5.37±0.19	5.51±0.22	1.45[NS]	0.723
5.	Calcium (mg/dl)	7.24±0.44	7.16±0.32	6.48±0.42	2.07 [NS]	0.395
6.	Phosphorous (mg/dl)	3.21±0.28	2.97±0.26	2.87±0.34	0.21 [NS]	0.730

Means bearing different superscripts differs significantly (P < 0.05) *, (P < 0.01) **

NS – Statistically non-significant (P > 0.05)

Table 7. Mean (±SE) of sero-biochemical parameters of cows in Cy-Ev+LH group (n =8)

S. No.	Parameters	Day 0	Day 7	Day 9	F value	P Value
1.	Glucose (mg/dl)	42.50±1.49	44.75±3.00	39.88±3.26	0.71^{NS}	0.500
2.	Cholesterol (mg/dl)	67.13±9.10	69.38±15.00	64.00±8.36	1.78^{NS}	0.192
3.	Triglyceride (mg/dl)	57.63 ± 5.0^{3}a	68.50 ± 9.1^{2a}b	50.63 ± 4.0^{6}b	4.55*	0.023
4.	Total Protein (g/dl)	5.67±0.10	5.87±0.11	5.56±0.11	2.41^{NS}	0.114
5.	Calcium (mg/dl)	5.49 ± 0.3^{5}a	6.79 ± 0.6^{4a}b	7.60 ± 0.3^{4}b	5.54*	0.035
6.	Phosphorous (mg/dl)	2.73±0.49	3.28±0.56	2.75±0.24	0.43^{NS}	0.656

Means bearing different superscripts differs significantly (P < 0.05) *, (P < 0.01) **

NS – Statistically non-significant (P > 0.05)

It can be concluded from the present study that hormonal or aspiration protocol does not influence the concentration of sero-biochemical parameters in follicular cyst affected cows on different days of treatment except cholesterol.

ACKNOWLEDGMENT

The work was carried out in Department of Veterinary Gynaecology and Obstetrics, Veterinary College and Research Institute, Orathanadu.

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