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SOME BIOCHEMICAL STUDIES ON BUFFALO SEMINAL PLASMA

BY

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SUMMARY

The present work was devoted to study the activities of certain seminal plasma enzymes of the Egyptian buffalo (Bos bubalis); Lactic dehydrogenase (LDH), alkaline phosphatase (ALP), acid phosphatase (ACP) and prostatic acid phosphatase (Pr ACP). Some lipid constituents (Total lipids, phospholipids as well as total cholesterol) were also studied. Paralley, some physical characterestics of semen were recorded. Furthermore, the correlation between the different items studied was calculated. We obtained significant positive correlations between total cholesterol and LDH activity, alkaline and acid phosphatases, acid phosphatase and prostatic acid phosphatase, prostatic acid phosphatase and phospholipids, total lipids and sperm concentration in semen.

INTRODUCTION

The activities of lactic dehydrogenase and phosphatases in semen were investigated by **Melampy et al., (1952); Hlipse, (1960) Hartree and Srivastava, (1973); Abdulla et al., (1973); Abdou et al., (1974 & 1978); Buruiana, (1976) and Dhami & Kodagali, (1987).** These enzymes are concerned with metabolic pathways of sperm cell **(Salisbury et al., 1978).** Little information is available on the lipid compposition of the seminal plasma of buffalo bulls. The present study was planned to illustrate the activities of certain enzymes and the utilization of some lipid constituents in seminal plasma of Egyptian buffalo bulls (Bos bubalis).

MATERIAL AND METHODS

Semen samples were collected from buffalo bulls (Bos. bubalis) raised in the Animal Reproduction research Institute, Giza (a governmental ceter of ministry of agriculture in Pyramid district). All animals were under the same conditions of vaccination, management and nutrition. They were all free of venereal diseases. They appeared healthy and nearly of the same age (about 8 years). For the purpose of artificial insemination in the above mentioned center, bulls were grouped into 5 groups, each of 5 animals. A total of 25 samples were collected from these bulls by artificial vagina. Immediately after collection of semen, the physical characters of each semen sample (volume, motility percentage and concentration of live sperms) were recorded. To obtain the seminal plasma, the samples were centrifuged at 300 rpm for 20 minutes. The plasma was then preserved at -20°C till the time of assay. Lactic dehydrogease and alkaline phosphatase activities were assayed after Emffehlungens der Deutschaft fur **Klinische Chemie (1970 and 1970 and 1970).** The methods used to estimate acid phosphatase and prostatic acid phosphatase activities were these described by **Fishman and Lerner (1953).** Total lipids were estimated by the method of **Frings et al. (1970).** Phospholipids & Cholesterol measured after **Youngburg and Youngburg (1930), and Trinder (1969),** respectively.

The obtained results were analysed by the Student "t" test, analysis of variance and correlation coeffecient **(Snedecor and Cochran, 1967 and Schwartz, 1977).**

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RESULTS AND DISCUSSION

Table (1): Some enzyme activities and certain lipids in seminal plasma of buffalo bulls (Means ± S.E.M.).

Buffalo bulls	LDH IU/L	ALP IU/L	ACP IU/L	Prostatic ACP. IU/L	Total lipids mg%	Phospho-lipids.mg%	Cholesterol mg%
GroupI	307.89 ±67.94	2221.28 ±442.48	2286.64 ±267.02	1660.44 ±271.79	153.87 ±11.07	89.41 ±3.72	21.98 ±3.53
GroupII	444.04 ± 3.71	2051.50 ±270.21	1940.24 ±294.56	1027.70 ±138.89	158.53 ± 8.76	50.86 ±8.81	21.98 ±8.24
GroupIII	303.19 ±50.58	847.10 ±73.18	1369.58 ±130.99	985.92 ±113.53	151.70 ±13.12	84.28 ±10.88	16.68 ±0.25
GroupIV	305.16 ±72.79	1410.52 ±106.74	2003.84 ±202.54	1276.64 ±200.52	116.23 ±14.88	61.66 ±12.83	15.20 ±8.40
Group V	170.75 ±10.81	1726.28 ±78.78	2500.00 ±344.41	2288.68 ±340.81	138.68 ±16.19	60.37 ±9.32	14.61 ±1.77
Overall means ± S.E.M.	306.20 ±36.52	1611.34 ±148.36	2020.06 ±131.38	1449.88 ±135.77	143.80 ± 6.18	69.32 ±5.14	18.09 ±2.44

Table (2): Coefficient of correlations between enzymes, lipids estimated in seminal plasma of buffalo bulls and sperm output character.

Parameters	LDH	ALP	ACP	Pr.ACP	Total lipids	Phospholipids	Cholesterol
ALP(IU/L)	1						
ACP(IU/L)	r=0.52 P<0.01	1					
Prostatic ACP(IU/L)	r=0.36 N.S.	r=0.65 P<0.01	1				
LDH(IU/L)	1	r=0.34 N.S.	r=0.20 N.S.	r=-0.31 N.S.			
Cholesterol(mg%)	r=0.60 P<0.01	r=0.13 N.S.	r=0.24 N.S.	r=-0.06 N.S.			1
Phospholipids(mg%)	r=0.03 N.S.	r=0.37 N.S.	r=0.38 N.S.	r=+0.40 P<0.05		1	r=0.05 N.S.
Total lipids(mg%)	r=-0.19 N.S.	r=0.10 N.S.	r=0.002 N.S.	r=+0.08 N.S.	1	r=-0.05 N.S.	r=0.01 N.S.
Motility (%)	r=0.21 N.S.	r=0.22 N.S.	r=0.07 N.S.	r=-0.30 N.S.	r=0.09 N.S.	r=-0.13 N.S.	r=0.22 N.S.
Density (10 sperm /ml)	r=0.16 N.S.	r=0.21 N.S.	r=0.19 N.S.	r=+0.28 N.S.	r=0.48 P<.05	r=-0.01 N.S.	r=-0.20 N.S.
Volume(ml)	r=0.25 N.S.	r=0.22 N.S.	r=0.09 N.S.	r=+0.14 N.S.	r=0.23 N.S.	r=-0.07 N.S.	r=-0.25 N.S.

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1. Enzyme activities:

Studies on the activity of LDH in seminal plasma showed great degree of variability. **Stallcup et a., (1968)** found LDH activity of the epididymal fluid of bulls to be 3860 U/ml. **Tuli and Singh (1982)** recorded 1836.2 IU/L in the semen of bulls. These results are too high compared with the present results (306.20 IU/L). This may be due to the place in the genital organs of bulls from which seme was collected or due to feeding status and species difference. Our results are early the same as those iven by **Dhami and Kodagali, (1987)** as 387.05 IU/L.

In this the activity of acid phosphatase (ACP) was found to be higher than that of alkaline phosphatase (ALP). Thisfinding is in agreement with that formerly given by **Nafornita et al. (1977)**. They recorded 2002.2 and 1508.04 IU/L, for acid and alkaline phosphatases, respectively being close to 2020.06 and 16.11.34 IU/L obtained in this present work.

Other authors **(Abdou et al., 1974)** gave higher results of 8087.18 and 3945.83% IU/L, for acid and alkaline phosphatases, respectively. The great differece in enzyme levels given by different authors is probably due to the effect of the feeding status of animals, condition of testes as testicular degeneration and age of animals **(Roussel and Stallcup, 1965)**. The prostatic acid phosphatase activity of seminal plasma (Pr ACP) has been found to be 1449.88 IU/L. This value amounts to 70.8% of total acid phosphatases and coincides with the record of **Bell and Lake (1962)**. It is clear that in seminal plasma of buffalo bulls, the acid phosphatase is higher than alkaline and prostatic acid phosphatase. This fact agress with the statement of **Abdulla et al. (1973) and kavanagh and bardsley (1979)**. Table (2) shows a significat positive correlation between ACP and ALP (r = 0.52), and between ACP and prostatic acid phosphatase (r = 0.65).

2. Lipids content in seminal plasma:

The phospnolipids are importnat structural components of spermatozoal membrane **(Jain and Anad, 1976)**. They can play a role especially in chemical changes associated with sperm maturation in epididymis **(Poulos et al., 1974)**. In the present study, the total lipids (Table 1) were found to be 143.84 mg% which is early the same as give by **Jain and Anand (1976)** who recorded 150 mg%. The total phospnolipids obtained in this study amounted to 69.32mg%. This agrees with the values give by different athors **(Komarek et al., 1964; Pursell and Graham, 1967; Clegg and Foote, 1973 and Jai and Anad, 1976)**. These authors worked on seminal plasma of different breeds of buffalo bulls and gave values for phospholipids as 89.0, 31.3, 96.0 and 59.4 mg%, respectively. In the present study, the average value of total cholesterol was 18.09 mg% in buffalo seminal plasma and this result is nearly the same as given by **Pursell and Graham, (1967)** who recorded 19.8 mg%.

The correlations between the diferent lipids cocetrations in seminal plasma ad sperm characters on one hand ad previous enzymes studied on other hand were studied i details (Table 2). This analysis demostrated that the total lipids were significantly and directly correlated ($P < 0.05$ with the concentration of sperm ejaculates ($r = 0.48$). A positive correlation has been found between phospholipids and prostatic acid phosphatase ($r = 0.40$) and between total cholesterol and LDH ($r = 0.60$) estimated in the same sample of seminal plasma.

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