تقييم للتغييرات فى بعض مكونات الدم فى حالات البول المدمم فى الأبقار والجاموس

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أجرى هذا البحث على ٤٥ حيوان سليم و ٩٢ حالة مرضية بالبول المدمم فى الأبقار والجاموس ، وبالتحليل الدموى لهذه الحالات اتضح الآتى :

١ ـ زيادة طفيفة فى معدل الكرياتين والكرياتنين فى حالات اصابات الكلى .

٢ ـ زيادة متوسطة فى بولينا الدم فى الأبقار والجاموس المصابة بالبابيزيا .

٣ ـ قلة البروتين الكلى فى سائل دم كل الحالات المرضية .

٤ ـ زيادة المستوى الكلى للكوليستيرول فى حالات الالتهاب الكلوى .

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BLOOD PARAMETERS AND BLOODY URINE

(With 7 Tables)

By

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(Received at 20/11/1979)

SUMMARY

The present investigation was carried out on 45 clinically healthy and 92 diseased cases of cattle and buffaloes showing signs of haematurea. Blood analysis of such cases revealed the following findings:

1-Blood creatinine and creatine remained within the normal values, only slight elevation was noticed in patients with kidney affections.

2-Moderate increase was noticed in blood urea nitrogen to 38. 14±8.39 and 37.8±13.72 mg% in babesia infected cattle and buffaloes respectively. The highest value of it was recorded in buffaloes with embolic nephritis (40.3 mg%).

3-The non-protein nitrogen behaves the same manner as the blood urea nitrogen.

4-Decreased total serum proteins in all cases with bloody urine. Most lower level (5.58 ± 0.46gm%) was seen in cattle with babesiosis, and 5.30 ± 1.62 gm% in buffaloes with cystitis.

5-Total serum cholesterol was markedly elevated to 302.5 and to 171.67 mg% in cattle and buffaloes with nephritis respectively.

6-The blood parameters including haemoglobin, packed cell volume and red cells count showed marked drop in all diseased cases.

7-Slight increase in the leucocytes count was observed in some cases.

8-All animals with hypophosphataemia showed great drop in the serum inorganic phosphorus.

9-Either the hypophosphataemic animals or those with renal lesions showed any detectable change in serum sodium and chloride.

10-Decreased level of serum potassium was only seen in few cases with hypophosphataemia.

11-No change was detected in serum calcium and copper in most of the diseased cases.

INTRODUCTION

The veterinary literature contain enormous number of investigators dealing with metabolic and infectious cases suffering from haematuria and haemoglobinuria. ROSENBERGER (1939), BODDI, (1949); PENNEY,(1956), AWAD and ABD EL-LATIF, (1963) ; ABD EL-LATIF and AWAD, (1964) and MARTINOVICH and OODHOUSE (1971) reported that,post-parturient haemoglobinuria was disease of good milker cows and buffaloes of 5-8 years old and between the 3rd and 6th calving. MARTINOVICH and WOODHOUSE (1971) reported low copper level in a farm with an outbreak of postparturient haemoglobinuria later, SMITH (1972 and 1973) correlated low copper content with post-parturient haemoglobinuria. LITTLE et al. (1950),SIPPEL et al. (1952) and FREEMAN (1957) were among those dealing with leptospirosis in cattle and other animals. Babesiasis was another haemolytic disease affecting cattle (MARTYIAN, 1956; WRIGHT and WOODFORD, 1968; ROBERTS et al. 1962 and RIEX,1968). Idiopathic haemoglobinuria in farm animals was noticed in the current literature(RODERICK 1944; SMITH, 1954; PISTER and CARDON, 1949 and WOODS et al., 1950).

The present investigation aimed to clear up the relation betwenn diseases causing haematuria or haemoglobinuria with the corresponding change in the level of some blood serum constituents.

MATERIAL AND METHODS

Blood and serum samples were collected from 92 patients of cattle and buffaloes delivered to our clinic and from other Veterinary Medical Centers arround Assiut City. Others(18 samples)were collected from local abattoirs. The animals were chosen from those with a history of urinary tract disease or those during clinical and laboratory examination with detectable haematuria and haemoglocinuria. Another 45 animals served as clinically healthy normal and were subjected to the same clinical and laboratory examination.

Blood samples were collected from the Jugular vein and blood smear from ear vein. Also, gross examination of kidneys was carried out on the samples collected from the abbatoris.

Haemoglobin, packed cell volume, total erythrocyte count and total leucocyte count were estimated according the described methods of COLES (1967). The blood urea was determined according to the colormetric method of RAITSKA (1970). The blood creatinine,and non protein nitrogen were estimated after the methods described by HAWK and OSER (1965). The total serum cholesterol was estimated after the method of ILCA (1962). The total serum proteins were estimated by refractometer method described by MACFATE (1972). Serum inorganic phosphorus was determined using the method of FISKE and SUBBAROW (1925),while serum chlorides, by the method of SCHALES and SCHALES (1941). EBEL Flame photometer was used for the estimation of serum sodium and potassium. Serum calcium and copper were determined

after the methods of CLARK and COLLIP (1925) and ZAK and RESSLER (1956) respectively. The obtained data were statistically analysed (SNEDECOR, 1956).

RESULTS AND DISCUSSION

The means values of the blood serum organic constituents were arranged in tables 1, 3 and 6. Generally it appears that the level of creatinine and creatine remained within the range of normal values. Slight elevation in their levels was noticed in patients with kidney affection. It is well known that creatiinie and creatine levels do not exceed their normal values in the blood unless there is an extensive renal damage (DOXEY, (1971).

Moderate increase was noticed in the blood urea nitrogen to 38.14 ± 8.39 and 37.8±13.72 mg% in babesia infected cattle and buffaloes respectively. The highest level in this blood constituent was recorded in buffaloes with embolic nephritis (40.3 mg%) and in some cases with hypophosphataemia(37.0 mg%). Such elevation in the level of blood urea nitrogen was in agreement with that reported by MALHERBE (1966), ROGERS (1971) and EL-ALLAWY (1973). This change may be attributed to kidney involvement causing inability of that organ to perform fully its function (COLES, 1967).

Slight increase in the level of non-protein nitrogen to 33.1 ± 4.27 mg% in cattle and to 34.4 ± 1.93 mg% in buffaloes was noticed in the blood of babesia infected animals. Also,few individual cases with hypophosphatemia showed an elevation in this blood constituent. The observed increase in its level may be explained on the same basis of blood urea nitrogen and/or a slight degree of liver involvement. The continous elimination

of haemoglobin as a result of erythrocyte breakown in babesiasis and hypophosphataemia may regard at a certain point as a nephrotoxic substance.

Screening the obtained data on the total serum proteins in the various conditions of haematuria and haemoglobinuria revealed a slight decrease in this constituent. The observed drop in total serum proteins in hypophosphataemic animals may be due to loss of proteins from the destructed erythrocytes. In Babesia infected animals, it reached 5.58±0.46 mg% in cattle and 5.85±0.24 gm% in buffaloes. Here, the recorded hypoproteinaemia in babesiosis could be attributed to the alterations in liver function as this organ plays a great role in the biosynthesis of plasma protein.Such results were in accordance with that reported by AFRIDZHANOV et al. (1964), COLLINS et al. (1970), SUTEN and GIVRGEA-ICOB (1971)and EL-ALLAWY (1973). The hypoproteinaemia in patients with cystitis was due to the destruction of its epithelial membrane, while that of kidney affections to the increased permeability of the glomeruli (HEYMANN, 1959 and COLES 1967).

Unfortunately, the recorded normal levels of total serum cholesteral vary widely from those of DOXEY (1971) where the animals diet may contain high per cent of fat. The level of total serum cholesterol was markedly elevated to 305.5 mg% in cattle and to 117-67 mg% in buffaloes in cases of nephritic animals and to 180.67 mg% in case of buffaloes affected with embolic nephritis. Our findings were in agreement with those reported by HEYMANN (1957). The mechanism of such hypercholastrolaemia with renal disease is still obscure. However, the evidence obtained by SEEGAL et al.(1955), STICKER et al.(1956) and HEYMANN (1957) has been interpretted that albuminaemia, which occurs secondary to albuminuria,may play a mjor role in

the pathogenesis of hypercholestrolaemia. On the other hand, the observed hypocholestrolaemia in cattle (192.2±30.22mg%) and buffaloes (130.13±38.30 mg%) with cystitis may be due to the acute infection (BENJAMIN, 1961). Values of this constituent in hypophosphataemic and babesia infected patients remained within the normal level.

Table 2 and 5 showed the blood picture of hypophosphataemic and kidney affected animals. Values of haemoglobin, packed cell volume and red cells count were greatly affected in hypophosphataemic animals than those with kidney affection. The mentioned parameters showed marked drop especially in hypophosphataemic cases. Similar results were reported by ALBRITTON (1955), PENNY (1965) CLEGG and EVANS (1962), AWAD and ABDEL-LATIF (1963) and MARTINOVICH and WOODHOUSE (1971). They attibuted these changes to the destruction of red cells. The slight increase in the number of leucocytes in some diseased cases was in agreement with that proviously reported in cattle by MARTYIAN (1956) and COLES (1967) and in buffaloes by NEITZ (1958) and DORNER (1967).

Tables 4 and 7 demonstrated the level of some inorganic constituents in the serum of animals with hypophosphatuemia, and in different kidney affections.

Although, the 3 groups of animals with hypophosphataemia showed marked drop in serum inorganic phosphorus, those with kidney affections were without change. Lowering in its level have been previously reported by many investigators(ALBRITTON, 1955; PENNY, 1956; CLEGG and EVANS 1962; AWAD and ABDEL-LATIF, 1963 and MARTINOVICH and WOODHOUSE, 1971). No characteristic changes could be noticed in the calcium and copper levels in the blood serum of diseased cases. Similar findings were previously reported by ALBRITTON (1955), PENNY (1956), AWAD and

ABDEL-LATIF (1963) and MARTINOVICH and WOODHOUSE (1971).

There is no obvious change in the level of sodium and chlorids in affected cattle and buffaloes with hypophosphataemia. Also the levels of sodium and chlorides remained nearly within their normal range in animals with different kidney affections. On the contrary to our findings GARTNER (1962) and COLEMAN et al. (1966) showed that the nephritic kidneys were less capable than normal for retaining sodium and considerable daily losses may occur. Hoe and O'SHEA (1965) stated that, the increase in serum chlorides occur in severe kidney damage. The obtained result indicated that, the damage in affected animals was slight. In hypophosphataemic animals the potassium level tended to decrease. The logic expected result is a rise of potassium not a decrease as the red cells contain relatively large amount of this cation. The needed study in this respect is to estimate the transfered potassium from the red cells to the serum. When this happened it may lead the observer that hypokalaemia is an end result in this condition. The observed hyperkalaemia in cases with different kidney affections was due to the decreased capability of the kidneys to excrete this cation (MEIER, 1963 and HOE and O'SHEA 1962).

Serum calcium and copper levels of affected cattle and buffaloes showed no characteristic changes.The abtained levels were in agreement with most investigators (PENNY, 1956; CLEGG, 1962 and MARTINOVICH and WOODHOUSE, 1971).

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Table 1: Serum organic constituents of cattle and buffaloes in various conditions accompanied by haematuria and haemoglbinuria

Condition	Animal Species	No. of Animals	Creatiniine mg %	Creatine mg %	B. U. N. mg %	N. P. N. mg %	T. S. P. mg %	T.S. Cholest. mg %
Hypopho-	Cattle	15	1.21±0.35	0.98±0.28	25.29±6.7	22.5±1.01	5.96±0.32	228. 1±76.1
sphataemia	Buffaloes	19	1.54±0.94	0.75±0.46	32.92±10.75	25.28±5.2	6.36±1.67	206. 3±66.03
Babesiosis	Cattle	18	1.43±0.28	0.81±0.35	38.14±8.39	33.1±3027	5.58±0.46	206.1 ±53.8
	Buffaloes	5	1.46±0.71	0.87±0.37	37.8 ±13.72	34.4±1.93	5.85±0.24	172.4 ±4.29
Cystitis	Cattle	5	1.42±0.1	0.91±0.25	25.0 ±3.25	23.4±2.01	5.76±0.47	192.2 ±30.22
	Buffaloes	12	1.45±0.15	0.73±0.25	24.89±6.52	22.7±3.34	5.3 ±1.62	130.13±38.4
Different Kidney	Cattle	4	1.66±0.28	0.99±0.24	29.9 ±5.34	20.95±2.67	6.35±0.48	305.5 ±76.79
Affections	Buffaloes	14	1.77±0.38	1.1 ±0.27	27.25±11.18	23.68±5.29	6.35±0.74	163.92±58.4
Normal	Cattle	18	1.46±0.52	0.92±0.64	27.1 ±4.72	23.33±2.38	6.68±0.38	233.3 ±22.12
	Buffaloes	27	1.47±0.77	0.75±0.39	24.9 ±10.65	22.88±5.99	6.83±1.62	163.6 +47.28

Table 2: Blood picture of non - pregnant, pregnant and postparturient cattle and buffaloes in cases of hypophosphataemia.

Condition	Animal Species	No. of Animals	HB. Gm %	P. C. V. %	R.B.CS. X 10^6/C.mm.	W. B. CS. X10^3 /C.mm.
Non-Pregnant	Cattle	4	7.9 (5.0-10.5)	20 (12-5.49)	3.56 (1.51-5.49)	9.7 (7.2-14.0)
	Buffaloes	6	6.6 (6.2-7.0)	17 (13-20)	2.3 (1.71-2.84)	8.5 (7.2-9.8)
Pregnant	Cattle	3	5.7 (5.5-6.0)	15 (14-16)	2.13 2.01-2.26)	7.3 (7.2-7.4)
	Buffaloes	8	7.9 (5.0-10.0)	19.9 (13-32)	3.19 (1.96-6.21)	7.3 (5.7-9.2)
Post-parturient (18-30) days.	Cattle	8	5.8 (5.2-6.0)	14.4 (11-18)	1.91 1.56-2.21)	7.0 (6.4-7.6)
	Buffaloes	5	6.8 (6.4-7.0)	16 (14-17)	2.3 (2.01-2.73)	6.5 5.4-7.3)
Normal	Cattle	18	10.5 (9.5-11.0)	32 (28-38)	6.12 (5.96-6.45)	7.6 (5.6-9.8)
	Buffaloes	27	9.5 (8.0-11.5)	30 (27-40)	5.83 (4.12-8.72)	7.6 (5.4-9.2)

Table 3: Serum organic constituents of non-pregnant, pregnant and post-parturient cattle and buffaloes in cases of hypophosphatæmia.

Condition	Animal Species	No. of Anoùams	Creatinine mg %	Creatine mg %	B. U. N. mg %	N. P. N. mg %	T. S. P. mg %	T.S. cholesterol mg %
non-Pregnant	Cattle	4	1.05 (1.0-1.2)	1.01 (1.0-1.2)	26.18 (20.6-29.4)	24.28 (21.4-28.2)	6.01 (5.7-6.2)	277.5 220-328
	Buffaloes	6	1.28 (1.2-1.4)	0.75 (0.4-1.0)	23.2 (A1.4-50.4)	25.92 (20.1-35.2)	4.48 (3.5-6.5)	223.8 (161-274)
Pregnant	Cattle	3	1.03 (1.0-1.1)	0.89 (0.8-1.0)	13.3 (12.2-14.2)	17.4 (16.1-18.1)	5.9 (5.8-6.0)	221.3 (212-236)
	Buffaloes	8	1.26 (1.1-1.4)	0.67 (0.4-1.0)	31.01 (19.6-41.4)	22.9 (19.6-41.4)	1.26 6.4-9.4)	175.6 (86-236)
Post-parturient	Cattle	8	1.35 (1.0-2.1)	1.1 (0.9-1.5)	29.34 (26.1-32.1)	24.34 (22.8-25.6)	5.95 (5.2-6.3)	233 (182-278)
(18-30) days	Buffaloes	5	1.8 (1.2-4.1)	1.0 (0.4-2.0)	37.0 (29.4-46.2)	28.3 (24.7-32.2)	6.47 (4.5-8.8)	216.4 (166-280)

N.B: The mean Normal Values mentioned in table 1.

Table 4 : Serum inorganic constituents of non-pregnant, pregnant and post - parturient cattle and buffaloes in cases of hypophosphataemia.

Condition	Animal species	No. of Animals	Sodium m-Eq/l.	Potassium m-Eq/l.	Chloride m-Eq/l.	Phosphorus mg %	Calcium mg %	Copper mg %
Non-pregnant	Cattled	4	153.5 (142-16)	5.1 (4.9-5.2)	115.03 (1.1-132)	1.01 (0.8-1.4)	10.1 (9.8-10.3)	182.9 (100-213.3)
	Buffaloes	6	148 (135-192)	6.8 (4.3-9.5)	103.2 (95.1-109.2)	1.02 (0.8-1.3)	10.5 (10.4-11.5)	167.3 (100-213.3)
Pregnant	Cattle	3	138.7 (135-145)	4.7 (4.4-4.8)	116.6 (111.6-122)	1.8 (1.7-2.0)	9.6 (9.1-10.0)	166.3 (100-200)
	Buffaloes	8	175.75 (143-240)	6.95 (4.9-9.5)	105-58 (95.1-113.6)	1.55 (0.8-2.2)	9.9 (9.6-10.9)	136.3 (100-200)
Post-parturient (18-30)days	Cattle	8	145 (138-153)	4.96 (3.2-5.7)	121.-45 (116.2-131)	1.18 (0.86-1.7)	8.1 (8.3-9.7)	201.3 (166-313.6)
	Buffaloes	5	137.2 (127-152)	4.86 (4.4-5.7)	114 (104.7-124.6)	0.78 (0.5-1.1)	9.6 (9.2-10.1)	194.3 (166.6-213.3)
Normal	Cattle	18	191.0	5.17	113.6	5.59	9.7	161.6
	Buffaloes	27	157.96	5.62	108.9	4.02	10.9	143.49

Table 5: Blood picture in case of different renal affections.

Kidney Affections	Animal Species	No. of Animals	Hb. gm %	P.C.V. gm %	R.B.Cs. $X10^6$/ c.mm.	W.B.Cs $X10^3$/c.mm.
Nephritis	Cattle	4	9.6 (8.5-10.5)	27.8 (23-31)	5.48 (5.1-6.1)	8.7 (5.8-14.0)
	Buffaloes	9	10.2 (9.0-11-0)	31.9 (29-35)	7.45 (5.96-8.28)	8.1 (5.4-8.6)
Embolic Nephritis	Buffaloes	4	8.5 (7.5-10.5)	27 (21-32)	6.01 (4.98-8.23)	8.7 (7.3-9.6)
Renal Calculi	Buffaloes	1	8.5	26	5.1	9.2

N.B.: The Normal values mentioned in Table 2.

Table 6: Serum organic constituents in cases of different renal affections.

Kidney Affections	Animal Species	No. of Animals	Creatinine mg %	Creatine mg %	B.U.N mg %	N.P.N. mg %	T.S.P. mg %	T.S. Cholesterol mg %
Nephritis	Cattle	4	1.68 (1.5-2.2)	0.99 (0.35-0.4)	29.9 (19.6-32)	20.95 (14.8-26)	6.35 (5.25-7.03)	305.5 (236-404)
	Buffaloes	9	1.71 (1.1-2.6)	1.1 (0.55-1.7)	29-89 (9.0-32)	22.57 (14.5-28)	6.55 (4.85-8.07)	171.67 (120-328)
Embolic Nephrilis	Buffaloes	4	1.73 (1.2-2.4)	1.08 (1-1.5)	40.3 (30-48)	27 (21-34)	5.73 (5.3-6.3)	180.67 (126-250)
Renal Calculi	Buffaloes	1	1.7	1.3	-	-	-	-

N.B. The normal values mentioned in Table 1.

Table 7: Serum inorganic constituents in cases of different renal affections.

Kidney Affections	Animal Species	No. of Animals	Sodium m,Eq/l	Potassium m,Eq/l	Chloride m,Eq/l	Phosphorus mg %	Copper mg %
Nephritis	Cattle	4	166 (150-170)	8.63 (5.2-10.3)	108.3 (101-114.9)	3.4 (2.5-4.2)	113.33 (66.6-153.3)
	Buffaloes	9	137.3 (123-120)	6.86 (4.6-9.5)	100.9 (97.5-131.6)	4.37 (2.1-6.4)	123.6 (66.6-153.3)
Embolic Nephritis	Buffaloes	4	144.75 (142-149)	8.28 (5.2-9.5)	113.78 (97.5-141)	4.378 (3.3-6.1)	166.6 (120-213.3)
Rznal calculi	Buffaloes	1	146	7.4	108.3	7.6	128

N.B.: The mean normal values mentioned in Table 4.