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Acute water intoxication in sheep in Sudan

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RÉSUMÉ

ABDELRAHIM (A. I.), HAGIR (B. S.), TAGELDIN (M. H.), SHOMMEIN (A. M.). — Intoxication aiguë par l'eau de boisson chez des moutons au Soudan. *Rev. Elev. Méd. vét. Pays trop.*, 1985, **38** (2) : 180-184.

Une intoxication aiguë par l'eau de boisson est décrite chez des moutons privés de nourriture et d'eau, dans un train très chaud et surpeuplé, lors d'un transport qui a duré 6 jours.

Tous les animaux affectés sont morts au bout de 3 jours. Les signes cliniques prédominants étaient : nervosité et halètement. A l'autopsie, un ictère généralisé a été trouvé chez les animaux morts les derniers.

Au microscope, des hémorragies diffuses et une accumulation de rubigine ont été observées dans les prélèvements de rate, de poumon, de cerveau et de rein examinés.

Une infiltration de graisse dans le foie et des neutrophiles prédominaient aussi. Ces observations confirmaient les résultats cliniques et microscopiques.

Mots clés : Mouton - Intoxication - Eau - Transport par rail - Soudan.

SUMMARY

ABDELRAHIM (A. I.), HAGIR (B. S.), TAGELDIN (M. H.), SHOMMEIN (A. M.). — Acute water intoxication in sheep in Sudan. *Rev. Elev. Méd. vét. Pays trop.*, 1985, **38** (2) : 180-184.

Acute water intoxication was described in sheep following deprivation of food and water for 6 days under stress of high environmental temperatures and crowdness.

All animals affected died over a period of three days without recoveries. Nervous signs together with panting were the prominent features clinically. In autopsy, generalized jaundice was seen in the carcasses of animals that died later.

Microscopically, diffused haemorrhages and haemosidrin accumulation were seen in the examined sections of the spleens, lungs, brains, heart and kidneys.

Liver fatty infiltration and neutrophilia were prominent as well. The serum findings supported the clinical and microscopical results.

Key words : Sheep - Intoxication - Water - Ship - Sudan.

INTRODUCTION

It is known that ingestion of excessive quantities of water by very thirsty animals results in water intoxication which is characterized by nervous manifestation and haemolytic anaemia (3).

The case described herein occurred in Khartoum when 5 280 sheep were shipped by rail in a block train from Western part of the country over a distance of about 700 km. The journey took 6 days instead of one day as usual, during which the animals were deprived of food and water. At the terminal station they were offered water *ad libitum*.

RESULTS

Clinical findings

Eight sheep died few hours after drinking water. Within the next two days one thousand of sheep died. 59 animals were still recumbant and all died by the third day. All the affected animals showed nervous signs characterized by convulsions, muscle tremors and weakness. Other symptoms included shallow rapid respiration, panting, hyperaemia of the conjunctivae and occasionally diarrhoea. The rectal temperatures varied between 39 and 40 °C. The heart rate was irregular. 15 of the affected animals

were bled for haemogram. The affected animals did not respond to treatment trials with hypertonic solution of sodium chloride. The mortality rate was about 20 p. 100.

Postmortem lesions

The necropsy changes in animals that died in the first two days confined to lungs, brains and gastrointestinal tract. The lungs and brains were congested. The gastrointestinal tract was empty of ingesta but contained slimy straw-coloured fluid and the small intestines were contracted while the colon was filled with gases. The livers were pale. Animals that died later showed generalized icterus, hydrothorax, hydropericardium, friable yellow livers and distended gall bladders. The kidneys were haemorrhagic with pale striations. The terminal parts of the intestines were distended with gases and the ruminal contents turned to be dry.

Representative portions of all organs were fixed in 10 p. 100 formal-saline, embedded, sectioned and stained with H & E and Best carmine. Fresh organs were sectioned by cryostate and stained with Sudan 111.

Histopathological findings

Microscopic examination of the livers revealed fatty infiltration (Fig. 1), haemosidrin accumulation in the reticuloendothelial cells and congestion of the periportal zones. The lungs showed congestion, oedema and rupture of the alveoli (Fig. 2). Haemosidrin laden macrophages were also seen. Large amounts of

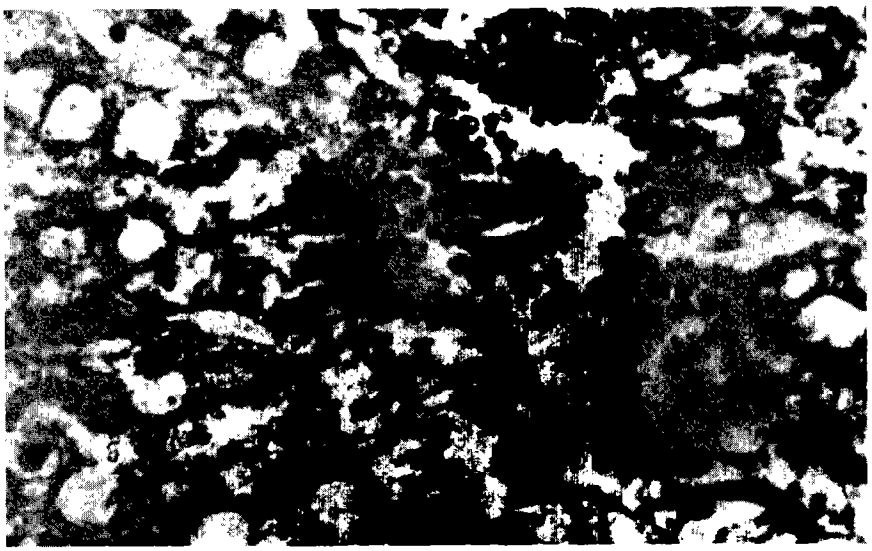

Fig. 1. — Liver section showing fatty infiltration. H & E × 400.

Fig. 2. — Lung section showing oedema and rupture of the alveoli. H & E × 400.

haemosidrin were accumulated in the spleen. The brain sections displayed vacuolation in both cerebrum and cerebellum (Fig. 3). Extensive perivascular oedema was seen mainly in the cerebrum together with diffused haemorrhage and congestion (Fig. 4). Moderate congestion coupled with some haemorrhages and haemosidrin were observed in the heart sections. Kidney sections showed accumulation of cast in the renal tubules (Fig. 5). The small intestines displayed hypertrophy of the mucous glands of the submucosa.

Haematological findings

Changes in some of the blood components were presented in Table I. The outstanding feature in these results was the marked neutrophilia accompanied with lymphocytopaenia.

Serum constituents findings

Table II summarized the findings of the serum constituents. The prominent findings were the marked elevation of the activity of aspartate transaminase and alkaline phosphatase and the sharp increase in urea and creatinine concentrations. The potassium level was decreased while sodium values ranged from subnormal to normal. It is worthmentioning that bilirubin values in some of the latest victims were extremely high (10.3 µmol/l).

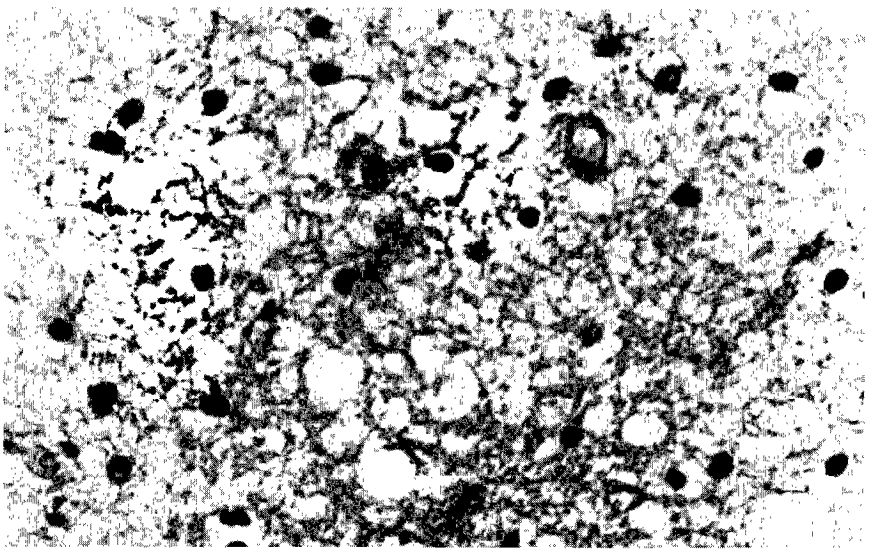

Fig. 3. — Brain section showing vacuolation. H & E × 400.

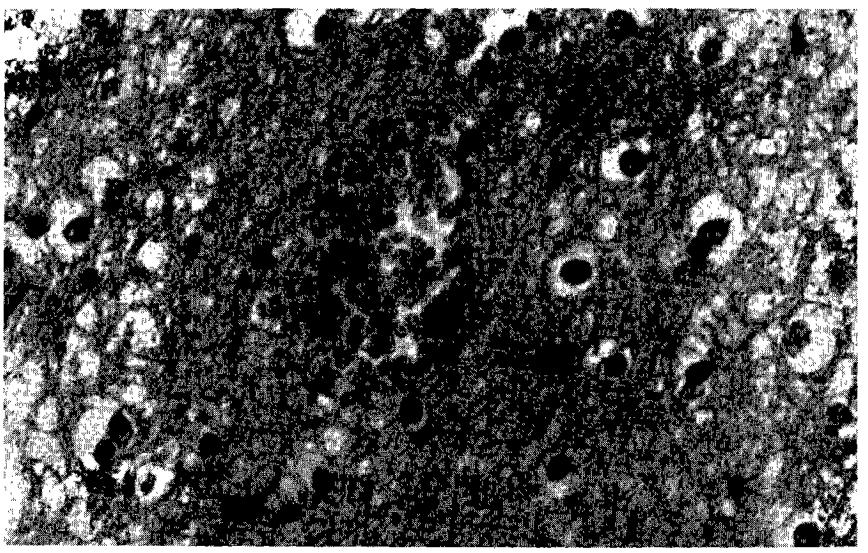

Fig. 4. — Brain section showing diffused haemorrhage and congestion. H & E × 400.

Fig. 5. — Kidney section showing accumulation of cast in the renal tubules. H & E × 400.

TABLE N° I - M ± SD and range of haematological findings of water intoxicated sheep

Parameters	Mean ± SD	Range	Normal range	References
Haemoglobin g/dl	7.80 ± 1.00	7.20 - 9.20	8.20 - 13.90	ADAM & OTHERS 1974
Haematocrit L/L	0.23 ± 0.05	0.22 - 0.31	0.25 - 0.37	"
Erythrocyte count x 10^{12}/L	7.40 ± 1.60	5.60 - 8.44	8.40 - 15.80	"
MCV fL	31.70 ± 5.00	23.40 -40.00	19.00 - 34.60	"
MCHC g/dl	29.60 ± 3.00	21.00 -36.50	22.20 - 47.90	"
Leucocyte count x 10 /L	9.80 ± 2.40	5.60 -14.30	4.75 - 13.80	"
Neutrophils p.100	73.00 ± 2.00	70.00 -78.00	4.00 - 54.00	"
Lymphocytes p.100	*23.00 ± 3.00*	*18.00 -28.00*	*40.00 - 86.00*	"

TABLE N° II - Mean ± and range of serum constituents findings of the water intoxicated sheep

Parameters	Mean ± SD	Range	Normal Range valeues	References
Sodium mmol/L	138.0 ± 40.0	130.0 - 143.0	142.0 - 160.0	DOXEY 1977
Potassium mmol/L	3.3 ± 0.4	2.7 - 4.1	4.0 - 5.5	"
Total protein g/L	79.0 ± 6.0	70.0 - 85.0	60.0 - 85.0	"
Bilirubin/Umol/L	2.8 ± 3.5	0 - 10.3	0 - 6.8	"
Urea mmol/L	11.9 ± 4.9	6.1 - 19.8	2.7 - 6.6	"
Creatinine/Umol/L	241.3 ± 136.0	145.9 - 495.0	44.0 - 150.0	"
Alkaline phosphatase IU/L	137.0 ± 57.4	71.0 - 241.4	30.0 - 43.0	MILLER & OTHERS 1965
Aspartate transaminase IU/L	101.5 ± 16.5	69.0 - 114.0	15.0 - 25.0	ADAM & OTHERS 1974

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DISCUSSION

The pronounced nervous symptoms among affected sheep were very similar to those of water intoxication described by Blood *et al.* (3). The prolonged time of thirst and starvation besides the high environmental temperature (43 °C) and crowdness may aggravate the condition. The diffused haemorrhages and haemosiderosis seen in almost all the tissues examined were indicative of the lysis of the erythrocytes which resulted in the haemolytic jaundice and consequently the extremely high levels of serum bilirubin. The disturbance in the osmotic pressure created by the inbalance of sodium-potassium levels leads to oedema culminating in the rupture of tissue cells, especially in the lungs. The vacuolation of the brain cells together with the decreased levels of potassium might lead to the nervous signs as described previously by CHEVILLE (4). The weakness of the skeletal muscles and the impaired function of the intestines could explain the high activity of the serum alkaline phosphatase (6).

The microscopic lesions observed in the renal tissues coupled with the high concentration of urea and creatinine gave evidence of the renal disfunction (5). The liver fatty infiltration might be due to the fat mobilization during the starvation period (4). The heart ill-effect was supported by the marked elevation in the aspartate transaminase values.

The clear rise in the neutrophils was largely due to stress, exhaustion and/or intoxication of the animals (2).

As reported earlier, the high mortality rate recorded would have been lowered or avoided altogether if the animals were allowed to have limited access to water (3). Similarly, treatment with hypertonic solutions of sodium chloride would have been favourable if it was administered before recumbency.

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RESUMEN

ABDELRAHIM (A. I.), HAGIR (B. S.), TAGELDIN (M. H.), SHOMMEIN (A. M.). — Intoxicación aguda por el agua de bebida en carneros en Sudán. *Rev. Elev. Méd. vét. Pays trop.*, 1985, **38** (2) : 180-184.

Se describe una intoxicación aguda por el agua de bebida en carneros mantenidos, sin alimento y sin agua, en un tren muy cálido y superpoblado, durante un transporte de 6 días.

Al cabo de 3 días, todos los animales murieron. Los síntomas clínicos predominantes eran : nerviosismo y jadeo. Durante la autopsia, se encontró una ictericia generalizada en los animales muertos últimos.

Al microscopio, se observaron hemorragias difusas y una acumulación de pigmento ocre en las muestras de bazo, de pulmón, de cerebro y de rinon examinados.

Una infiltración de grasa en el hígado y neutrofilos predominaban también.

Estas observaciones confirmaban los resultados clínicos y microscópicos.

Palabras claves : Carnero - Intoxicación - Agua - Transporte por ferrocarril - Sudán.

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