

Short Communication

Plasma ascorbic acid levels in sheep infected with hydated cyst

Firas Mahmoud Faleh Hayajneh

Abstract

Al Taif University- College of
Pharmacy, Pharmacology
Department.

E-mail: firashope@yahoo.com

This study evaluated 30 sheep, 20 naturally infected with Hydated cyst (infected group) and 10 healthy sheep (control group). Blood samples were collected from both groups for evaluation of ascorbic acid values in plasma and blood cells analysis. Mean plasma ascorbic acid values in the infected group were lower than those in the control group (0.73 and 1.6 mg/dl, respectively). A decrease in erythrocyte, haemoglobin and haematocrit values and an increase in leukocyte values were determined.

Keywords: Ascorbic acid, haematology, hydated cyst, oxidative stress, sheep

INTRODUCTION

Hydatidosis is an important public health issue among populations that breed sheep all over the world (Omer et al., 2010). An important factor that is important in determining the epidemiology of the disease is the fertility of the cyst, which depends on the species of the intermediate host and the area affected with the disease (Ibrahim, 2010).

The most common production practices that may increase the risk of exposure of sheep to hydatidosis were the improper disposal of dead animals, the access of farm dogs to the offal of slaughtered sheep, the carelessness of farmers to treat farm dogs with anthelmintics, and the grazing of flocks in fields where stray dogs have free access (Ibrahim, 2010; Christodoulouopoulos, 2008).

Vitamin C (VC) is the most abundant and probably most important water-soluble antioxidant in mammals (Padilla, 2007). L-ascorbic acid is biosynthetically formed in almost all mammals studied except in man, several other primates and guinea pigs (Hornig, 1975). Calves (Palluda and Wegger, 1984) and perhaps lambs do not synthesize endogenous vitamin C until approximately 3 weeks of age, making them dependent on dietary vitamin C during this period. Vitamin C is a known antioxidant and thereby protects the structural integrity of the cells of the immune system (Bendich, 1993).

Ismail and Al-kennany (2012) resolved the hypothesis that hydatidosis is accompanied by oxidative stress in sheep. It has been shown that animals with protozoa and infectious diseases have lower plasma ascorbic acid concentrations (Üssi et al., 2001), and ascorbic acid deficiency can cause diarrhoea and pneumonia. (Ibrahim, 2010) also reported that ascorbic acid concentrations decreased in coccidial infections. The purpose of this study was to establish the importance of ascorbic acid hydatidosis.

Hydatidosis is an important economic and zoonotic disease, caused by metacestode of adultworms of the genus *Echinococcus*. It commonly develops in dogs, although several other carnivores can also act as definitive hosts (Sher et al., 2006). Canines especially dogs are definitive hosts for the parasite, livestock are the intermediate host. Man is considered to be an aberrant intermediate of the host. This disease results in the development of hydated cyst in lung, liver or other organs.

MATERIALS AND METHODS

The materials for this study were obtained from a farm in Al Taif region. Jugular blood was collected in EDTA

Table 1. Mean, minimum, maximum and standard deviation of plasma ascorbic acid values between the naturally infected and the control group.

Parameter	Infected (X±Xs)	Control group (X±Xs)
Ascorbic acid (mg/dl)	0.73 ±0.10	1.60 ±0.18

P<0.001

Table 2. Mean blood leukocyte, erythrocyte, haemoglobin and haematocrit values between the naturally infected and control groups.

Parameter	n	Infected X±Sx	n	Control X±Sx	Normal values in sheep
WBC control group (10 ⁹ /l)	20	23.60±1.66	10	10.30±0.78	4-12
RBC control group (10 ¹² /l)	20	6.61±0.84	10	11.16±1.70	9-15
Hct control group (%)	20	21.60±3.41	10	29.62±1.84	27-45

Normal values taken from EGBE-NWIYI et al (17), p<0.001

containing a vial of both groups. Plasma of these samples was obtained, by centrifuging 3000 cycles for 7 min. Plasma ascorbic acid levels were measured on a spectrophotometer (Shimadzu UV-1601 model) as described by (Rutkowski and Grzegorzczuk, 2006). Haematological analyses were carried out on a cell counter, MS9.

The results were analysed using SSPS for MS-Windows Release 17.0.

Haematological analyses were carried out on a cell counter, MS9 (MELET SCHLOESING, Laboratoires, France). The results were analysed using SSPS for MS-Windows Release 17.

RESULTS

Mean, minimum and maximum plasma ascorbic acid values between the infected and control groups are shown in Table 1. According to the variance analyses, ascorbic acid values between both groups were significantly different ($P < 0.001$). Leukocyte count increased, erythrocyte and haematocrit values decreased in the infected group. Table 2.

DISCUSSION

Hydatid disease (echinococcosis) is a zoonotic infection of humans caused by *Echinococcus granulosus*. The disease poses an important public health problem in many areas of the world, particularly among populations that practice Sheep husbandry, the infection of hydatidosis in sheep was 13.5% and 6.1% in goats during a study in Taif region, in Saudi Arabia (Hayajneh et al., 2014).

The most widely distributed strain around the world is the strain responsible for infection in sheep. It is reported as a dominant strain both in human and animals (Sima et al., 2006; Hemingway, 1991). In addition, the variability could be related with age and the different sources of sheep in the kingdom of Saudi Arabia. Culture differences, social activities and attitudes to dogs also contribute to this variation (Hornig, 1975; Seifi, 1996). The oldest animal slaughtered in this study.

Ascorbic acid level decreased in infectious diseases because of inappetence and especially decrease intake of proteins. As a result of this, the immune system will be depressed (Egbenwiyi et al., 2000). Ascorbic acid deficiency can often result in impaired resistance to infectious organisms and decreased immunity status (Hemingway, 1991; Seifi, 1996) because of increased tissue utilization of ascorbic acid, the demand on ascorbic acid increases (Wilson, 1975).

In this study, in the control group mean ascorbic acid was 1.60 mg/dl and in the infected group it was 0.73 mg/dl. In the infected group plasma ascorbic acid values were below the normal range.

According to the variance analysis, in the infected group ascorbic acid values were significantly lower than those in the control group ($P < 0.001$).

REFERENCES

- Bendich A (1993). Physiological role of antioxidants in the immune system. *J. Dairy Sci.* 76, 2789-2794.
- Christodoulouopoulos G, Theodoropoulos G, Petrakos G (2008). Epidemiological survey of cestode-larva disease in Greek sheep flocks. *Vet. Parasitol.* 153 (3-4), 368-573.
- Egbenwiyi TN, Nwaosu SC, Salami HA (2000). Haematological values of apparently healthy sheep and goats as influenced by age and sex in arid zone of Nigeria. *Afr. J. Biomed. Res.*; vol 3; 109-115.
- Hayajneh F, Althomali A, Nasr A (2014). Prevalence and characterization of hydatidosis in animals slaughtered at Al Taif

- abattoir, Kingdom of Saudi Arabia. *Open J. Anim. Sci.*, 4, 38-41. doi: 10.4236/ojas.2014.41006.
- Hemingway DC (1991). Vitamin C in the prevention of neonatal calf diarrhea. *Can. Vet. J.*; 32: 184.
- Hornig D (1975). Metabolism of ascorbic acid. *World Rev Nutr Diet* 23, 225-258.
- Kh. Ismail H, Al-Kennany ER (2012). Correlation of malondialdehyde and glutathione levels with pathological changes of sheep liver infected with hydatid cyst, 26 المجلد المجلة العراقية للعلوم البيطرية. Available online at <http://www.vetmedmosul.org/ijvs>.
- Kolb E (1998). Die bedeutung der vitamine fuer das immunsystem. *Roche, Vitamine und Feinchemikalien*; 3: 49-54.
- Maciej R, Krzysztof G (2007). Modifications of spectrophotometric methods for antioxidant vitamins determination convenient in analytic practice. *Acta Sci. Pol., Technol. Aliment.* 6(3), 17-28.
- Mohamed MI (2010). Study of cystic echinococcosis in slaughtered animals in Al Baha region, Saudi Arabia: Interaction between some biotic and abiotic factors. *Acta Tropica* 113:26-33.
- Omer RA, Dinkel A, Romig T, Mackenstedt U, Elnahas AA, Aradaib IE, Ahmed ME, Elmalik KH, Adam A (2010). A molecular survey of cystic echinococcosis in Sudan. *Vet. Parasitol.* 169, 340-346.
- Padilla L, Matsui T, Ikeda S, Kitagawa M, Yano H (2007). The effect of vitamin C supplementation on plasma concentration and urinary excretion of vitamin C in cattle. *J. Anim. Sci.* 85:3367-3370 doi:10.2527/jas.2007-0060.
- Palludan B, Wegger I (1984). Plasma ascorbic acid in calves. In: *Proc. Workshop on Ascorbic Acid in Domestic Animals*.
- Seifi HA, Mokhber DMR, Bolurchi M (1996). The effectiveness of ascorbic acid in the prevention of calf neonatal diarrhoea. *J. Vet. Med. B.*; 43: 189-191.
- Sher A, Muhammad N, Roomana GUL, Muhammad Z, Abdulrazzaq (2006). Some Epidemiological Aspects of Hydatidosis of Lungs and Livers of Sheep and Goats in Quetta, Pakistan, Pakistan *J. Zool.*, vol. 38(1), pp. 1-6.
- Sima P, Kenan S, T. Ilay BYK, Bayram AY, Metin KA (2006). Plasma Ascorbic Acid Levels in Lambs With Coccidiosis. *Turk. J. Vet. Anim. Sci.* 30 219-221.
- Üssi M, Gi Y, Dabak M (2001). Serum vitamin C level in goats with Petse des Petits Ruminants (PPR). *Turk. J. Vet. Anim. Sci.*; 25: 539-544.
- Wilson CWM (1975). Clinical pharmacological aspects of ascorbic acid. *Ann. N.Y. Acad. Sci.*; 258: 355-376.