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Short term effects of dexamethasone on hyaluronidase activity and sperm characteristics in rams

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Abstract

The aim of this study was to determine the effects of dexamethasone on sperm characteristics and hyaluronidase activity of serum and semen. In this investigation, 14 healthy Akkaraman rams, at the age of 2 years and weighing between 50–60 kg, were used. The rams were randomly divided into two groups. After the last administration of dexamethasone intramuscularly at a dose of 0.25 mg/kg, semen and blood samples were taken at different times. The results showed that the serum hyaluronidase activity was increased significantly ($p < 0.001$) in the treatment group when compared with the control group except for the 1st hour. There was a significant difference ($p < 0.001$, 0.01, 0.05) in the hyaluronidase activity of semen between the treatment group and the control group. Furthermore, there was a significant difference ($p < 0.01$) in sperm concentration between both groups at all the times except the 96th hour. There were statistically significant ($p < 0.05$) differences in semen volume between the treatment and control groups. There were also significant differences ($p < 0.05$) in sperm motility between the treatment and control groups except for the 72 and 96th hours.

These findings indicate that dexamethasone increases hyaluronidase activity of serum and semen, but it decreases sperm concentration, semen volume and sperm motility in rams. Therefore the use of these drugs in breeding rams during breeding season is not suitable.

Keywords: Dexamethasone; Hyaluronidase; Serum; Semen; Ram

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1. Introduction

Dexamethasone, a synthetic adrenocortical steroid, practically white, odorless, crystalline powder (Kovarik et al., 1998), is used widely in treating endocrine disorders, rheumatic disorders, collagen diseases, dermatologic diseases, allergic states, ophthalmic diseases, respiratory diseases, haematologic disorders, neoplastic disease, edematous states, gastrointestinal disease, cerebral edema and diagnostic testing of adrenocortical hyperfunction (Kovarik et al., 1998; Ram et al., 1993). In general, the side effects of dexamethasone on male fertility could be not determined until the males were examined andrologically. The transient inhibition of ram fertility by dexamethasone is possible, if one of the following functions interferes: spermatogenesis, sperm maturation within the epididymis, sperm transport, sperm metabolism and motility, semen liquefaction, capacitation, acrosomal reaction, or ovum penetration. It seems that in many species, dexamethasone treatment directly affects testicular function (Abbaticchio et al., 1981).

Acrosin, hyaluronidase, esterases and acid hydrolases are acrosomal enzymes (Garner and Hafez, 2000). Hyaluronidase is an acrosomal enzyme, which participates in the dissolution of the cumulus oophorus matrix containing hyaluronic acid and is essential for the fertilization process (Savion et al., 1986). Hyaluronidase has been found in a wide variety of mammalian tissues (Csoka et al., 1997). It has been reported that (Tsantarliotou et al., 2002; Berger and Clegg, 1985) total acrosin activity in spermatozoa was reduced between 7–28 days after dexamethasone administration. Dexamethasone also induced a reduction in mean value and basal level of blood testosterone and inhibited its episodic secretion between 1 and 4 days after administration (Berger and Clegg, 1985). The reduction of acrosin activity apperad relatively soon after dexamethasone administration in Chios rams (Tsantarliotou et al., 2002).

The influence of dexamethasone on sperm characteristics and hyaluronidase activity of semen and serum were investigated in the present study.

2. Materials and methods

2.1. Animals

In this study, 14 Akkaraman healthy rams, at 2 years of age and between 50–60 kg live weights were used. The rams were randomly divided into two groups as control ($n = 7$) and treatment ($n = 7$). The rams were fed on grass supplemented with alfalfa hay and drinking water was provided ad libitum.

2.2. Administration of dexamethasone and sample collection

Semen and serum samples were taken from both control and treatment group rams before the administration of dexamethasone. Then dexamethasone [Dexamethasone 21-phosphate disodium, (Dekort 8 mg/2 ml, DEVA Co., Istanbul)] was injected intramusculary at a dose of 0.25 mg/kg (this dose is recommended by the manufacturer) body weight to the treatment group, once daily for 2 days. After the last administration of the drug, blood and semen