

IMMUNORADIOMETRIC ASSAY OF SERUM IGE LEVELS IN DROMEDARY CAMEL

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ABSTRACT

Total immunoglobulin E levels were estimated in 54 camels (*Camelus dromedarius*) by radioimmunoassay (RIA) method and related it with total eosinophil counts. The sera collected from 30 adult healthy camels (18 males and 12 females) and 24 camels (14 males and 10 females) affected with mange were analysed. Significantly higher levels of IgE were recorded in camels suffering from mange than in the healthy ones. No significant difference was recorded due to sex. Slightly higher counts of eosinophils were recorded in the individuals with raised IgE levels.

Key words: Camel, eosinophils, immunoglobulin E, mange, radioimmunoassay (RIA)

The two most common situations in which the determination of serum immunoglobulin E (IgE) level is of interest are allergic disease and helminthic infection. Type I hypersensitivity is mediated by IgE and the antigens responsible for production of IgE are delivered through mucous membrane and skin. The tendency of an animal to make IgE against parasitic antigens suggests strongly that IgE has evolved specifically to counteract these organisms (Tizard, 1996).

The elevated levels of IgE is considered an important parameter in the allergic diseases and has been correlated with different allergens and parasitic infestations in humans and different species of animals (Gurish *et al*, 2004; van den Broek *et al*, 2000; Wilkerson *et al*, 2004). However, serum IgE levels have also been found to be unreliable for predicting worm burdens in cattle (Baker and Gershwin, 1993).

The immunoglobulins E have been measured in terms of total IgE and/or antigen specific IgE in different studies and various immunological methods have been employed for their measurement viz. enzyme linked immunosorbent assay (ELISA), radioallergosorbent assay (RAST), radioimmunoassay (RIA) etc.

Most of the studies on allergies or parasitism have been carried out in human subjects or in mouse models and few on small animals like dogs. But literature could not be traced for such studies involving camel. The present work was

carried out to find out total IgE levels in sera of healthy camels and in those affected with mange by radioimmunoassay.

Materials and Methods

Animals : During a survey study on camel diseases the blood samples were collected from 32 adult male camels of which 14 were affected with mange and 22 adult females of which 10 had mange. In mange affected animals different parts of the body were involved with variable severity in different animals.

Sera collection : The blood was collected from camels from jugular vein, serum was separated and kept at - 20°C till use.

The total serum IgE levels were determined using Coat-A-Count Total IgE IRMA kit (DPC, USA) as per the instructions supplied with the kit. Coat-A-Count Total IgE IRMA is a solid-phase double antibody immunoradiometric assay in which ¹²⁵I-labelled anti-IgE monoclonal antibodies in liquid phase act as tracer and a polyclonal anti-IgE antibody is immobilised to the wall of polystyrene tube. The activity was counted in ¹²⁵I Gamma counter (ECIL) for one minute. Total IgE concentrations were determined from the graph plotted for calibrators provided with the kit.

The absolute number of eosinophils was determined by the direct method (Pilot, 1950) by

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employing propylene glycol to lyse erythrocytes and sodium carbonate to lyse all leucocytes except the eosinophils.

Results and Discussion

Estimation of total immunoglobulin E levels by radioimmunoassay (RIA) method revealed that normal healthy male camels had a IgE mean level equal to 2.38 ± 0.05 IU/ml whereas the male camels showing lesion of mange had IgE levels equal to 8.21 ± 1.54 . It were 2.31 ± 0.09 and 6.11 ± 0.75 IU/ml in healthy female and mange affected female camels, respectively. A significantly higher levels of IgE were recorded in camels suffering from mange than the healthy ones. No significant difference was recorded between male and female camels (Table 1).

The IgE levels in camel recorded in the present study were lower than those of dogs reported by Hill *et al* (1995) who measured mean total serum IgE concentrations in healthy, atopic and parasitised dogs as 7.1, 5.8 and 14.3 IU/ml, respectively.

Increased serum IgE levels are found in atopic diseases, especially atopic dermatitis. It is generally accepted that the high serum IgE levels are due to exposure to exogenous antigens. Mange is a chronic mite infested skin disease which is a great problem in camels.

Foster *et al* (2003) found a statistically significant differences in the IgE concentration between the normal dogs and dogs with atopic or GI disease, for all the different antigens they tested. Novak and Bieber (2003) also found elevated total serum IgE levels in the atopic diseases.

However, Fraser *et al* (2003) could not differentiate atopic and non-atopic dogs on the basis of their serum total IgE concentrations. Similarly, Hill *et al* (1995) did not find significant difference in IgE levels in healthy atopic and parasitised dogs.

Our study included only estimation of total IgE and not the antigen specific-IgE. Lewkowich *et al* (2004) in an experiment identified a strong, consistent relationship between total and antigen-specific IgE, regardless of the phenotype of the immune response (type 1 vs. type 2 biased), the nature of the immune response (primary vs. recall), the genetic background of mouse strain examined or the intensity of the initial immunological stimulus and indicated that measurement of total IgE levels through straightforward, easy to develop, total IgE ELISAs offers an appropriate surrogate for measurement of Ag-specific IgE levels.

In the present study slightly higher counts of eosinophils were recorded in the individuals with raised IgE levels. The results are in conformity to the findings of Sacco *et al* (2003) who found serum levels of total and specific IgE correlated positively with eosinophil counts in the allergic asthmatic population of children. Similarly, Abraham *et al* (2004) in a study to find out the role of granulocytes and antibodies in protective immune response to larval stages of *Onchocerca volvulus* observed elevated levels of eosinophil and an increase in the IgE level in immunised mice and concluded that IgE and eosinophils were required for adaptive protective immunity to larval *O. volvulus* in mice.

In contrast, Gurish *et al* (2004) examined the role of IgE in mast cell responses and parasite elimination wherein they observed that IgE promotes *Trichinella spiralis* elimination from gut but did not observe difference in the eosinophilic counts due to infection.

In the mange affected camels there is constant irritation and stimulation of the immune system by the mites which might lead to higher levels of IgE in their sera. van den Broek (2000) estimated lesional area with enumeration of lesional mast cells and eosinophils during primary and challenge infestations of sheep with *Psoroptes ovis*. They recorded that

Table 1. Levels of IgE and eosinophils in the healthy and mange affected camels.

S.No.	Category (No. of animals)	IgE (IU/ml) (Mean values)	IgE (IU/ml) (Range)	Total eosinophils counts/ μ l (Mean values)	Total eosinophils counts/ μ l (Range)
1.	Overall	2.35 ± 0.05	1.98 - 2.90	381.33 ± 12.91	263-500
(i)	Healthy male (18)	2.38 ± 0.05	2.1 - 2.90	378.88 ± 16.65	270-500
(ii)	Healthy female (12)	2.31 ± 0.09	1.98 - 2.70	385.00 ± 21.33	263-495
2.	Overall	$7.33^b \pm 0.98$	2.0 - 21.0	$1032.50^b \pm 47.35$	690-1410
(i)	Mange affected male (14)	8.21 ± 1.54	2.0 - 21.0	1007.14 ± 59.14	700-1300
(ii)	Mange affected female (10)	6.11 ± 0.75	2.0 - 9.8	1068.00 ± 84.65	690-1410

expansion of lesional area was significantly less and serum IgE titres significantly greater in challenge infestation. Similarly, Wilkerson *et al* (2004) in a study observed that Flea antigen-specific IgE values were highest in dogs exposed to fleas on a continuous basis compared to those episodically exposed.

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