

A COMPARATIVE STUDY OF SERUM IMMUNOGLOBULIN-E LEVELS IN HEALTHY AND WARBLE AFFECTED CATTLE OF ARID ZONE

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ABSTRACT

Total immunoglobulin-E levels and total eosinophil counts were measured in Tharparker cattle native to arid zone of Rajasthan. The sera collected from 29 adult healthy and 6 female cattle affected with warbles were analysed. Significantly higher IgE levels and higher eosinophilic counts were recorded in warble infected cattle than the healthy group.

Key words: Cattle, eosinophils, radioimmunoassay, serum immunoglobulin-E, warbles.

INTRODUCTION

The increased immunoglobulin E (IgE) level is considered an important parameter in the allergic diseases. Many of the workers have correlated higher levels of IgE with different allergens and parasitic infestations in humans as well as in animals (Gurish *et al.*, 2004; van den Broek *et al.*, 2000; Wilkerson *et al.*, 2004; Kataria and Kataria, 2004). The tendency of an animal to make IgE against parasitic antigens suggests strongly that IgE has evolved specifically to counteract these organisms (Tizard, 1996).

In contrast some workers have also indicated that serum IgE levels are unreliable for predicting worm burdens in cattle (Baker and Gershwin, 1993).

The two commonest situations in which the determination of serum IgE levels is of interest are allergic disease and helminthic infection, and 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. Only scarce literature is available on large animals on this aspect.

The IgE levels 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).

The present work was carried out to find out total IgE levels by radioimmunoassay together with eosinophil counts in healthy and warble affected cattle of arid region reeling under severe drought.

MATERIALS AND METHODS

Animals

The blood samples were collected during summer from 35 adult female cattle of Tharparker breed from villages of Jaisalmer district, an arid zone of western Rajasthan. Sera were separated and kept at -20°C till measurement of total IgE levels. Out of the lot of 35 cattle, 6 animals had warble (larva of *Hypoderma* spp.) infection.

To determine total serum IgE levels, Coat-A-Count Total IgE IRMA kit (DPC, USA) was used. This is a solid-phase double antibody immunoradiometric assay in which ^{125}I -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 radioactivity was counted in ^{125}I Gamma counter (ECIL) for one min. and total IgE concentrations in the sera were determined from the graph plotted for calibrators provided with the kit.

The direct method of Pilot (1950) was used to determine the absolute number of eosinophils by employing propylene glycol to lyse erythrocytes and sodium carbonate to lyse all leucocytes except the eosinophils.

RESULT AND DISCUSSION

The study revealed that healthy animals had an IgE mean level equal to 3.02 ± 0.07 IU/ml whereas the warble affected cattle showed a significantly higher levels of IgE i.e., 12.10 ± 0.89 IU/ml (Table 1).

Superscript 'b' indicates significant ($p \leq 0.05$) difference between mean values of healthy and warble affected animals.

Increased serum IgE levels are found in atopic diseases, especially atopic dermatitis. It is generally accepted that the high serum IgE levels are increased by exposure to exogenous antigens. In the present study presence of parasite in the skin could be assigned a cause of constant irritation to the animals' immune system leading to higher levels of IgE. The results corroborated the findings of Kataria and Kataria (2004) who estimated levels of serum IgE in camel and recorded that mange affected camels had higher levels than those without mange. They discussed that mange is a chronic mite infested skin disease which might have raised the IgE levels in serum. Similarly Hill *et al.*, (1995) determined concentration of serum IgE in healthy and dogs with internal and external parasites by ELISA. They recorded two times mean total serum IgE concentrations in parasitized dogs than that in healthy ones.

Foster *et al.* (2003) also found a statistically significant difference in the IgE concentration between normal dogs, and the dogs with atopic or GI disease. 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. In contrast atopic and non-atopic dogs receiving stringent parasite control treatments could not be differentiated on the basis of their serum total IgE concentrations by Fraser *et al.*, (2003).

In the present study only estimation of total IgE was carried out and not of the antigen specific-IgE but Lewkowich *et al.*, (2004) identified a strong, consistent relationship between total and antigen-specific IgE, regardless of the phenotype of the immune response, the nature of the immune response, the genetic background of mouse strain examined, or the intensity of the initial immunological stimulus and indicated that measurement of total IgE levels through straight-forward, easy to develop, total IgE ELISAs offers an appropriate surrogate for measurement of Ag-specific IgE levels.

In the present study significantly higher counts of

eosinophils were recorded in the individuals with raised IgE levels. The results are in conformity to the findings of Kataria and Kataria (2004) who recorded higher levels of serum IgE together with increased eosinophil counts in camel. 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 immunized mice and concluded that IgE and eosinophils were required for adaptive protective immunity to larval *O. volvulus* in mice. Sacco *et al.*, (2003) found serum levels of total and specific IgE correlated positively with eosinophil counts in the allergic asthmatic population of children.

In contrast to the above observations, 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.

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Table 1: Levels of IgE and counts of eosinophils in the healthy and warble affected cattle

S.No.	Category (No. of animals)	IgE (IU/ml) (Mean values)	IgE (IU/ml) (Range)	Total eosinophil Counts/ml (Mean values)	Total eosinophil Counts/ml (Range)
1.	Healthy (29)	3.02±0.07	2.00 - 4.80	390±11.83	256 - 510
2.	Warble affected (6)	12.10±0.89 ^b	8.50 - 15.67	1102±43.09 ^b	780 - 1590

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