STUDIES ON THE EFFECT OF INFECTION WITH IRRADIATED NEOASCARIS VITULORUM ON THE WHITE RAT

THESIS

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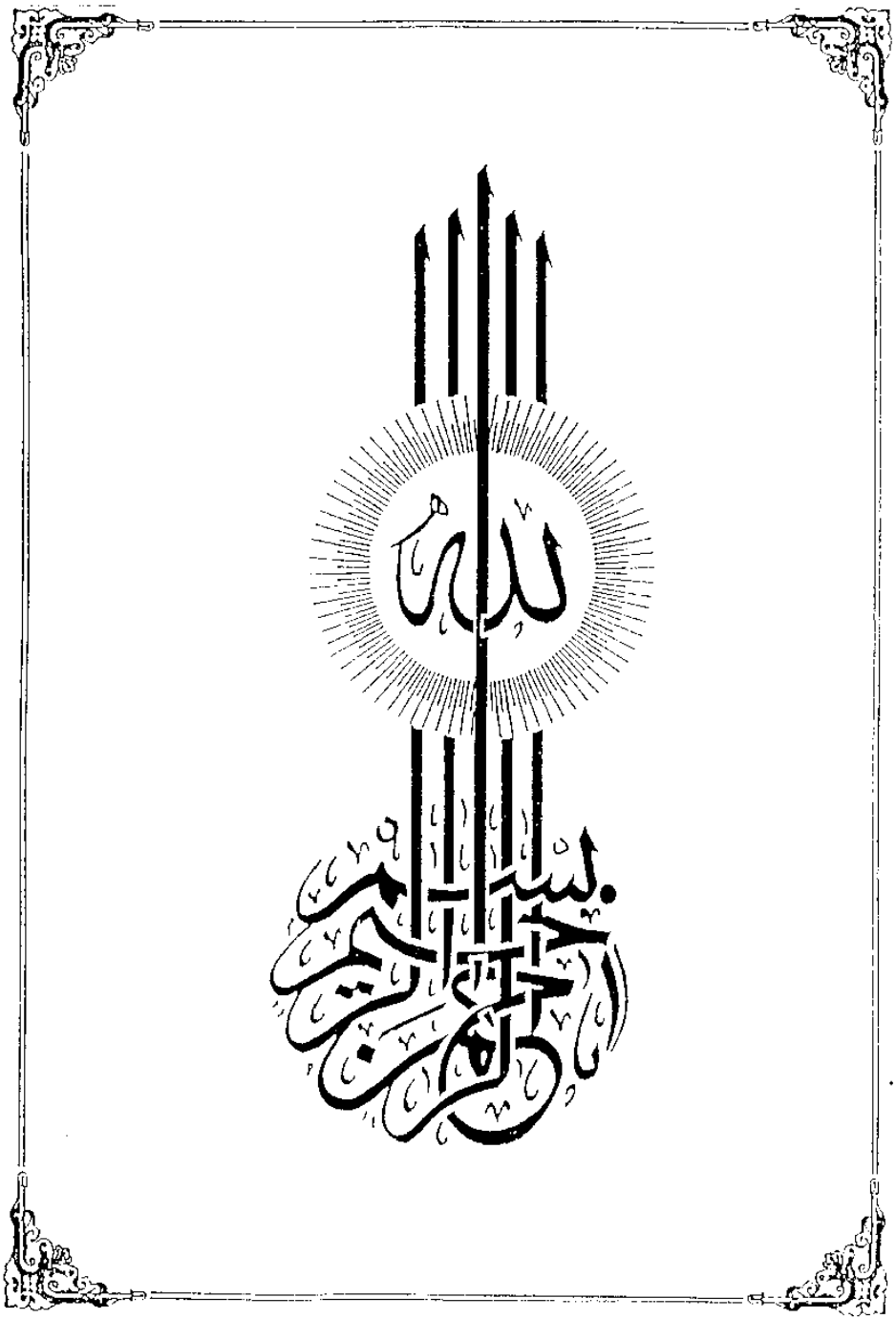

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CHAPTER I

Introduction

Introduction

Buffaloes are known to be of most economic importance in Egypt for production of milk and meat as well as for working in farms. Since long time ago, parasitic infestations are considered to be the main cause of low productivity of animals. Neoascaris vitulorum is one of the most dangerous intestinal parasites specially affecting buffalo calves in tropical and subtropical countries. It is considered to be the only ascarid that occur in cattle. The different ascarids like most nematodes possess a developmental migratory route through most of the vital organs and tissues in the body of the host, before reaching the sexually mature stages in the intestine. Infestation with gastrointestinal worms often cause outbreaks of diseases producing a continual source of economic loss.

Recently, there is a great interest in the feasibility of using ionizing radiations as a possible mean of reducing or controlling parasitic diseases of animals. One of the developing and hopeful routes of vaccination is to use feebly irradiated parasite as a vaccinating antigen. However, it is of importance to make full understanding of the antigenic components of the parasite as well as of the antibodies raised against the introduced parasitic antigens.

Aim of work

It was aimed in the present study to have a good understanding of the effect of irradiated *N. vitulorum* infesting eggs on some haematological and immunological aspects of the host. The white rat was used as a small laboratory animal model capable of being infected with the parasite. The infective eggs were irradiated with three doses of gamma irradiations and comparison was carried out using rats infected with non-irradiated eggs as well as rats which were not infected at all. The aspects studied included red blood cells count (RBC), blood haemoglobin level (HB), haematocrit value (PCV), white blood cells count (WBC), differential count of white blood cells, mean corpuscular haemoglobin concentration (MCHC), mean corpuscular haemoglobin (MCH), mean corpuscular volume (MCV), the serum activities of the enzymes glutamate pyruvate transaminase (GPT), glutamate oxaloacetate transaminase (GOT) and alkaline phosphatase. Three immunoprecipitation techniques were used in an attempt for testing the pattern of the evoked immunity in the sera of rats infected with the three doses irradiated *N. vitulorum* eggs.

CHAPTER II

Review of Literature

Historical Review

Although Neoascaris vitulorum (Goeze, 1782; Travassos, 1927) is regarded as one of the most important and common helminth parasites of cattle and buffaloes in tropical and subtropical countries, yet the literature dealing with its biology is still lacking. However, the biology of N. vitulorum has been taken into consideration by Tubangu (1947) and de Leon & Juplo (1966) in Philippines, Gadzheiv (1951) and (1957) in U.S.S.R., Sarwar & Nawaze (1951) in Pakistan, Sinniah (1954) in Ceylon, Lancaster (1958) in Malaysia; Serivastava (1963) in India, Bikov (1965) in the Italian region, Selim & Tawfik (1966) & (1974) in Egypt and Chaudhri & Riaz (1984) in Pakistan. Mohan (1968) reviewed most of the reports concerning the biology of N. vitulorum.

This parasite has been previously described under the name Ascaris vitulorum Goeze (1782) by Neuman (1883), Ransom (1911), Baylis & Daubney (1922), Boulenger (1922) and Macfie (1922). Later on, the genus Neoascaris was proposed to be separated from genus Ascaris by Travassos (1927) on account of the presence of a ventricles or granular bulb at the posterior end of the oesophagus in the bovine Ascaris.

Although this species was described once more by Baylis (1936), yet the same author used the nomenclature Ascaris vitulorum again without consideration of the presence of the ventricles as a reasonable cause for establishing the new genus. Skryabin & Karokhin (1945) separated the genera which possess a posterior granular ventricles at the base of the oesophagus from family Ascarida to a new family which was mentioned family Anisakidae to which genus Neoascaris was included. This family had been amended by Hartwich (1954) and restricted to the forms having a uniramous excretory system. The author proposed that ascarids possessing a biramous excretory system, having an oesophagus with a posteriorly globoid or spherical part without appendix and with lips possessing labial wings should be included in a separate family which was named Toxocaridae. Consequently, it was proposed that genus Neoascaris should be transferred to the family Toxocaridae, as its numbers possess the above mentioned characters.

Mozgovoi (1952) summarized the various ascarids in relation to the route of migration in the vertebrate hosts as follows:

1- Ascaridioid, represented by Ascaridia galli in which the larvae do not migrate via the blood system of the host.

2- Ascarioid, represented Ascaris lumbricoides in which the larvae have a hepato-pulmonary migration.

3- Toxocaroid, represented by Toxocara and Neoascaris in which the larvae migrate from the pregnant animal to the foetus via the placenta and become adult shortly after its birth.

4- Anisakoid, represented by contracaecum and Pseudoanisakis in which larval development occurs in an intermediate host.

Sprent (1952) classified these ascarids into 2 types. The author's idea was based on the migratory paths following the infection of white mice with the larvae:-

The first group includes those parasites which adopt the tracheal pattern (Ascaris lumbricoides and Parascaris equorum) where the larvae penetrate the intestinal wall passing via the liver to the lungs. In the lung they break out into the bronchial tree and return to the intestine where they grow to maturity. Consequently, infection with those worms is invariably acquired by postnatal infection of the host. The second group follows a somatic course. This route is known for Toxocara canis and Ascaris columnaris.

Sprent (1954) reported a 3rd type in which the larvae develop in the intestinal wall without any further need to migrate through the tissues. This type

is represented by Toxascaris leonina and Toxocara cati. Furthermore, Lee (1958) and Soulsby (1965 & 1968) criticized the fore-mentioned groupings. They indicated that the developmental cycle of N. vitulorum follows the same route as Toxocara canis and its larvae undergo the somatic type of migration.

Enyenihi (1971) and Chauhan & Pande (1972) studied the migration of N. vitulorum larvae in Guinea pigs and calves. The 2nd stage larvae were found in the liver, heart, lungs and kidney one day after Guinea pigs infection. The lungs contained the 2nd stage larvae of increasing size up to the 6th day of infection where they multimoult developing the 3rd-stage larvae. A peak larval count was recorded on the 10th day post infection then the count decreases until there was non on the 30th day. No 3rd stage larvae were found in the liver, heart, kidneys. On the 6th day, the 3rd stage larvae developed in the lungs start to break into the alveoli and migrate through the bronchioles, up to the trachea and into the oesophagus. The 3rd stage larvae were found in the intestinal contents from the 6th day. Those larvae which reached the intestine of both of Guinea pigs and calves are expelled in the faeces. No patent period was observed for these larvae.