# A STUDY OF THE COMPLEMENT COMPONENT $C_3$ IN SCHISTOSOMIASIS

THESIS

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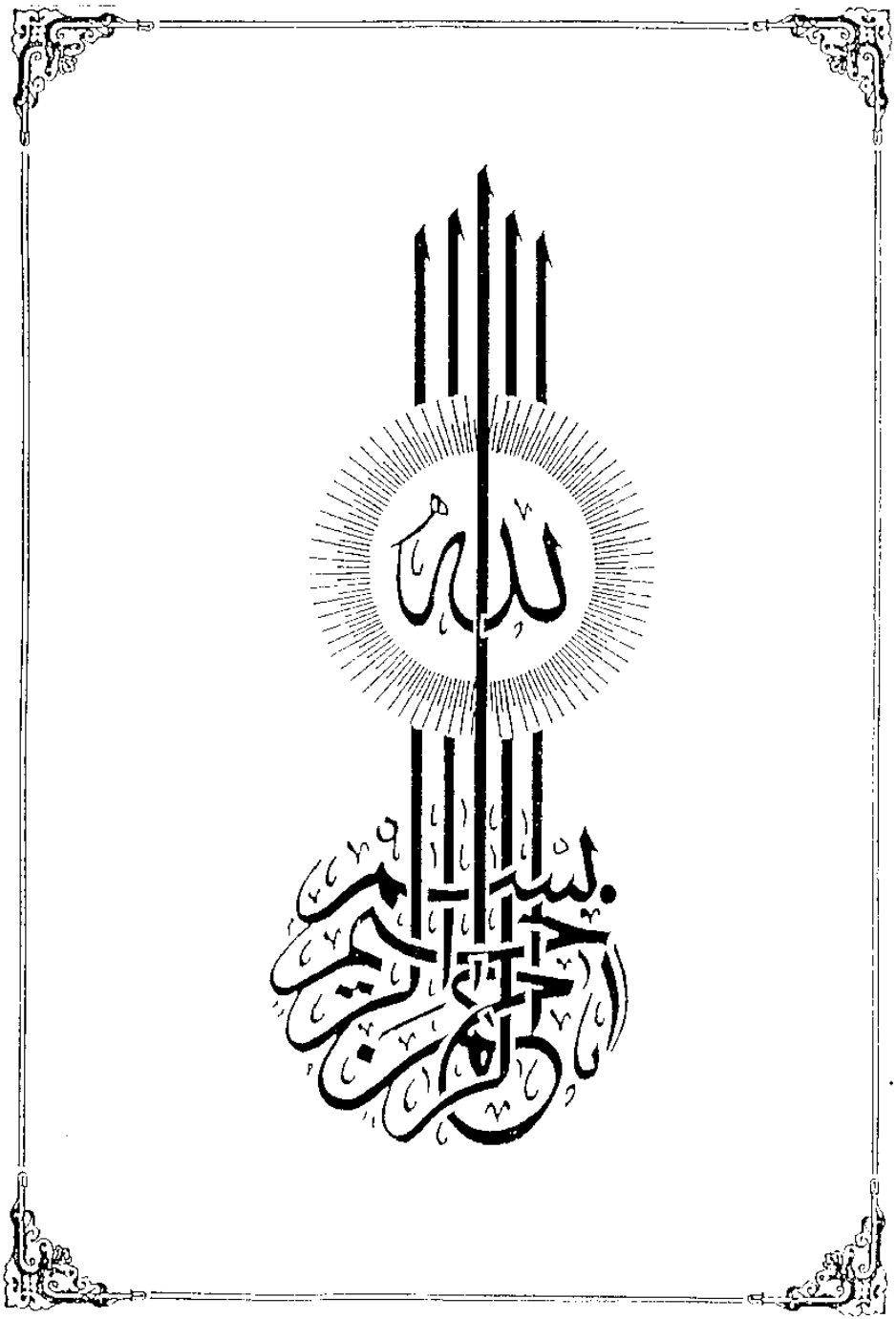

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## Introduction and aim of the work

Schistosomiasis is one of the most prevalent diseases in Egypt. It heads the list of communicablediseases as regards its prevalence, gravity and its repercussions on the national economy of the country (Mousa, 1976). In the last few years,

Schistosomiasis has been considered to be one of the immune complex diseases (Sela,,1979). Several circulating antigens both in blood and urine were found to be the consequence of parasitic infection by schistosomes (capron, 1978) these antigens stimulate the formation of antibodies to from antigen-antibody complexes.

The site of formation of these complexes is not yet known. It is known that some immune complexes are nephritogenic and it has been suggested that the genetically determined variation in the host's immune response may infleunce the amount and characterictics of antigen - antibody complex.

In this study, the complement, $C_3$ was estimated in the sera of patients with schistosomiasis who did not have obvious nephritis.

The aim of the work is to study the level of complement component, $C_3$ in schistosomal patient's sera as an indirect method detecting the presence of circulating antigen - antibody complexes, to correlate this level with the degree of

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# INTRODUCTION AND AIM

# OF THE WORK

antigenemia of the patients and with functional activity of the liver, as the liver is the major site of synthesis of $C_3$.

Other immune complex diseases, such as viral hepatitis, were excluded as it is recently known that schistosomal patients once infectedtend to retain the hepatitis B surface antigen (HBsAg) for long periods.

The correlation between the level of $C_3$ and those carrying HBsAg in their sera was also studied.

# REVIEW OF LITERATURE

## A Review Of Schistosomiasis

Schistosomiasis is the name given to a group of diseases caused by trematodes of the genus Schistosoma, three main species infect man ; Schistosoma hematobium, S. mansoni ans S. japonicum (Sabbour and Farid, 1978). The first two species are found in Egypt.

Man and other animals are definitive hosts, Snails of various genera are the intermediate hosts (Manson-Bahr and Apted, 1982).

In 1965 the world health orgenization estimated that 180 - 200 milion persons were infected through out the world (Manson- Bahr and Apted, 1982).

Khalil started proper surveys based on microscopical examination of urine and faeces from different classes of population in widespread localities, in saft El Enab (lower Egypt), in Gemmeza (lower Egypt), in Nag Hamadi (upper Egypt) and in tura (upper Egypt). He found that the prevalence of S. hematobium was 74%, 53%, 75.2% and 77% respectively, The prevalence of S. mansoni was 34% in saft El Enab and 14% in Gemmeza and Zero in the other two districts. (Azim, 1935).

However, there is now a changing pattern of the prevalence of both schistosoma species in Egypt. The Aswan dam has

converted most of the Egyptian irrigation to the perenial type and the snail hosts of the both S. hematobium and S. mansoni have extended southwards, where as with the traditional basin irrigation only the Bulinus snails were found in the south. With the ecological changes now resulting from the High Aswan dam, Biomphalaria alexandrina is replacing Bulinus trancatus in Middle and upper Egypt.

S. mansoni will thus become the predomiant species in upper Egypt and could neutrilize at present the successful metrifonate treatment which has greatly reduced the incidence of S. hematobium (Manson-Bahr and Apted, 1982).

In Egypt, the prevalence of bilharziasis increases rapidly with age up to about the age of 14 years, declines somewhat up to the age of 48 years, and then remains fairely constant at a rate of about 30%. The rates of infection reached maximum in the age group of 10-14 years (Farooq et al., 1966).

The difference between males and females as regards the infection rate of Bilharziasis was observed in Egypt. All surveys conducted in Egypt, showed that the infection rates of bilharziasis are higher in males than in females (Farooq et al., 1966).

The higher infection rates among males reflets the greater chances of exposure during their work in feilds, swimming and bathing or fishing in infected sites.

## Pathology of shistosomiasis

The stages of schistosomiasis involves : invasion, maturation, stage of established infection and late stage (Manson - Bahr and Apted, 1982).

### Invasion stage :

In this stage cercariae penetrate the skin or mucous membrane to reach the lymphatic system and thence the veins, the right side of the heart and the lung. After that, their progress is not clearly known, but they reach the liver where, presumably, they mature. In this stage, patient may complain from allergic manifestations as itchy papule and local oedema.

### Maturation stage :

It begins two to eight weeks after infection, males and females couple and eggs are produced. At this stage there is an acute febrile reaction with eosinophilia up to 80%, persisting for several days or weeks.

### Stage of established infection :

In this stage there is intense production and excretion of eggs at about 10 - 12 weeks after infection. The eggs set

up an inflammatory reaction with the farmation of granuloma, which may coalesce. Papilloma formation occure in heavy S. mansoni infection or in mixed infection of S. mansoni and S. hematobium.

There is congestion and possibly ulceration of the rectal mucosa, later on there is fibrosis with changes in the bowel habits (Manson - Bahr and Apted, 1982).

In S. hematobium infection, there is cellular infiltration of histiocytes and other cells followed by eosinophils leading to hyperplasia of epithelial and muscle cells. This goes on to an atrphic stage in which fibrous tissue begins to replace the granulomatous reaction, leading to reduced blood supply.

Damage to the liver is primarily due to eggs swept back by the portal circulation (Manson - Bahr and Apted, 1982).

Late stage :

This is a stage of fibrosis and the number of eggs extruded are reduced, that will favour granuloma formation and passage of eggs to the liver.

Diagnosis :

It depends upon two types of methods, direct and indirect methods. By the direct methods the parasite or one of its stages is demonstrated in the excreta or in tissue obtained by

biopsy, the search for ova is the most common method used for diagnosis. Indirect methods are serological techniques which may either involve recognzition of antibody circulating in the serum or fixed on tissue cells (woodruff, 1979),

The aim of such methods is to diagnose the presence of active infection.

## Biochemical changes in Schistomiasis

Ragheb, 1956, reported that schistosomiasis affects mainly mesenchymal tissue and spares the parenchyma until very late in course of the disease. So it was expected that the liver function tests revealed little impairement of the hepatocellular function.

In man, schistosomiasis affects the total serum proteins including a decrease in albumin with marked decrease in albumin/globulin ratio. (Ragheb, 1956).

The lowered serum albumin is more in ascitic cases than the non ascitic ones (Erfan et al., 1957). The hypoalbuminemia is considered to be due to protein malnutrition, blood loss and hemodilution from salt and water retention. Serum globulins on the other hand are raised through the gamma fraction, which reflects reticulo-endothelial activity, so that the A/G ratio is markedly reduced and inverted (El-Hawary et al., 1971).

Cholangiolar implication is rare and very late, the ictrus index and serum bilirubin are usually normal (Mousa et al., 1967) but alkaline phosphatase which is sensitive to focal cholangiolar involvement is moderately raised in 30% of non-ascitic cases (Mousa et al., 1967). Also, Barreto (1971) found that it was frequently elevated in bilharzial liver fibrosis.

It spite of a minimal hisopathological damage to the liver cells (Abdel-Ghafar and Shoeb, 1962), serum glutamic oxalacetic transaminase (SGOT) and serum glutamic pyruvic transaminase (SGPT) (Higazi, 1960) are frequently elevated in bilharzial hepatic fibrosis. Also, saif et al, (1964) studied both SGOT and SGPT in a series of cases of bilharzial affection of the liver, intestine and bladder. Significant elevation in both enzymes was found in all bilharzial cases, and generally ran parallel to the course of the disease. In general, different authors agree that the liver function tests are not altered greatly in hepatic schistosomiasis (Ragheb 1956 and El-Mofty, 1962).

Finally, most liver functions show garther deterioration with onset of ascites and after a bout of hematemesis (Mousa et al., 1967). The rapid deterioration of liver functions occuring in cases of bilharzial hepatosplenomegaly, which had apparently normal liver functions, after any production of antigen by insult to the liver such as viral hepatitis, nutritional factors, anoxia from episodes of hematemmesis and anaest-