Immunopathological Study of Renal Changes in Mice Infected with Schistosoma mansoni with and without Treatment with the Antibilharzial Drug Praziquantel

Thesis

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By

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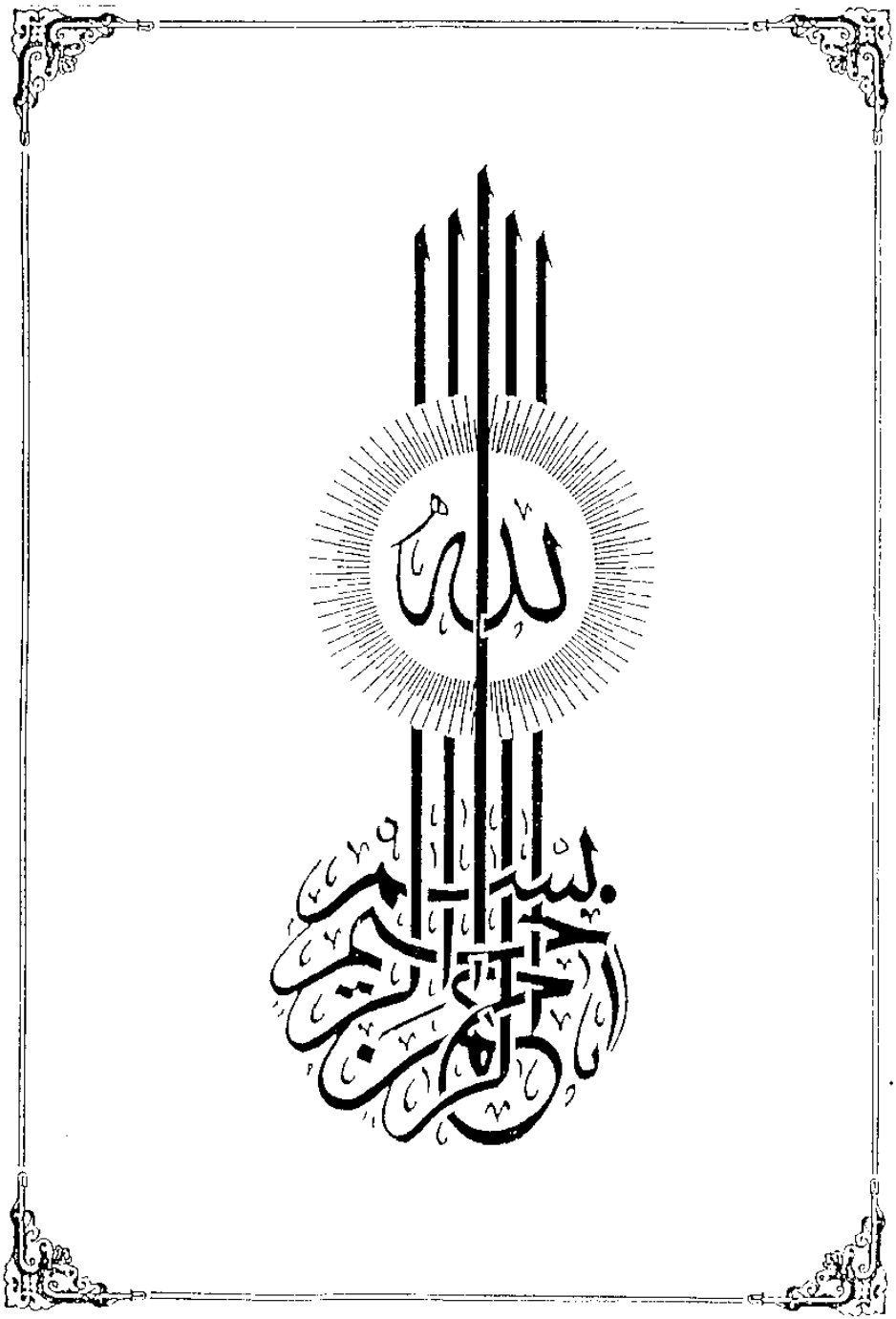
To My Mother



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INTRODUCTION

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Schistosomiasis is the commonest endemic disease in Egypt leading to a high morbidity and mortality. It is for Egypt, the prime health problem, related to our economic and agricultural progress, affecting millions at an early age diminishing productivity and exerting a significant socio-economic impact *(Mohy El Dine, 1978).*

Patients infected with Schistosoma mansoni, particularly those with hepatosplenic schistosomiasis, have a relatively high incidence of renal disease manifested by proteinuria, microscopic hematuria, and in some cases impaired renal function *(Lopez 1964 & Queiroz et al., 1970).*

The frequent association is suggestive of a causal relationship between the parasitic infection and the renal lesion *(Andrade and Queiroz, 1968 & De Brito et al., 1970).*

That schistosomiasis is associated with immune complex glomerular injury is now undisputed. According to most reports from Egypt and Brazil, it seems that hepatic fibrosis is essential for the development of glomerulonephropathy in Schistosoma mansoni infections. This seems quite logical since an intact liver would destroy or modify worm antigens released within the portal circulation. Only if the liver is fibrotic leading to porto-caval collaterals, or if the functions of the Von Kupffer cells are compromised, it is possible for the antigens to reach the systemic circulations leading to glomerular injury *(Barsoom, 1980).*

Schistosomes secrete or excrete antigenic material *(Sadin et al., 1965).* The reaction of antibody with parasite antigen may occur.

1. At site of localization of the parasite or its products.
2. In circulating blood in the case of soluble antigens.
3. In extravascular spaces.

Such complexes may cause vascular damage or lesions in tissues such as that of the kidney, (WHO, 1974).

Praziquantel *(Embay* 8440, Biltricide), is a hydroquinolin pyrazine compound. Praziquantel proved to be equally effective against all the different species of schistosomes studied in the hamster by *Webbe and James (1977):* Schistosoma mansoni, Schistosoma haematobium, Schistosoma intercalatum and Schistosoma mattheii . The same broad spectrum activity was also found in different species of monkeys *(James et al., 1977).*

The drug has also activity against all species of schistosomes pathogenic to man and did not reveal any undesired pharmacodynamic effects. All intramammalian stages of Schistosoma mansoni are equally susceptible to praziquantel in vitro *(Frohberg and Schencking, 1981).*

This finding was somewhat unsuspected because of in vivo results, showing that in mice the developmental stages were less affected than the mature worms or the invasive stages *(Gonnert and Andrews, 1977).*

Praziquantel is rapidly absorbed and metabolized by mammals and man *(Steiner et al., 1976; Steiner and Garbe, 1976; Dickmann and Buhring, 1976).*

AIM OF THE WORK

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The aim of this work is to study renal immunopathology in schistosomiasis mansoni in experimental animals before and after treatment with the antibilharizial drug, praziquantel.

REVIEW OF LITERATURE

ANATOMY OF THE HUMAN KIDNEY

The kidneys are responsible for the removal of excess water, salts and waste products from the blood, and for maintaining its pH *(Romanes, 1975).*

The urinary system comprises the two kidneys where the nephrons or functional units are located, and a system of excretory passages to temporarily store and eventually conduct excreted material to the exterior. Basically in the nephrons, blood plasma undergoes a process of ultrafiltration, and then the ultrafiltrate is modified by reabsorption of most of its volume and components. Proper functioning of the system is of course, essential to life *(Leeson and Leeson, 1976).*

The Human Kidney

The kidneys are reddish brown, bean shaped, about 11 cm in length, 6 cm in breadth and 3 cm in the thickness, and are situated in the posterior part of the upper abdomen, (Fig. 1), one on each side of the upper lumbar vertebrae giving multi-relationships to the surrounding structures, (Fig. 2). In the adult male the weight of the kidney averages about 150 gm, in the adult female 135 gm. *(Warwick and Williams, 1973).*

On the cut surface of the kidney the different architecture of the cortex and the meddulla can be seen, (Fig. 3), and also the pelvicalyceal system. (Fig. 4), *(Romanes, 1975).*

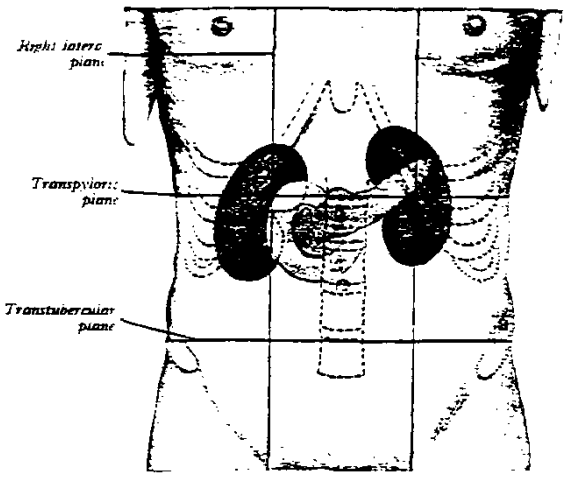

Fig. (1): Location of the kidneys in the abdomen, and their level with the vertebrae *(Warwick & Williams, 1973)*

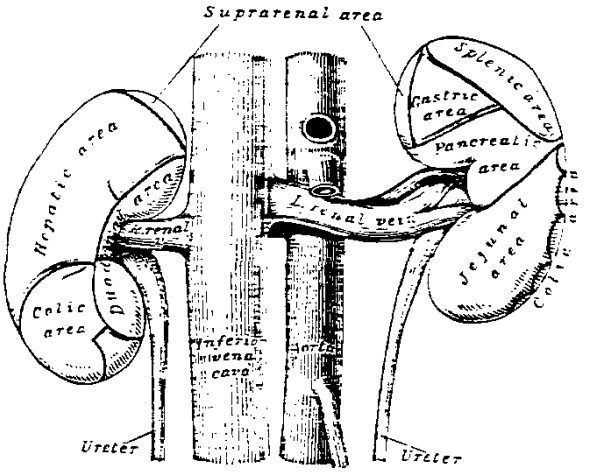

Fig. (2): The anterior surface of the kidneys, showing the areas related to neighbouring viscera, *(Warwick & Williams, 1973).*

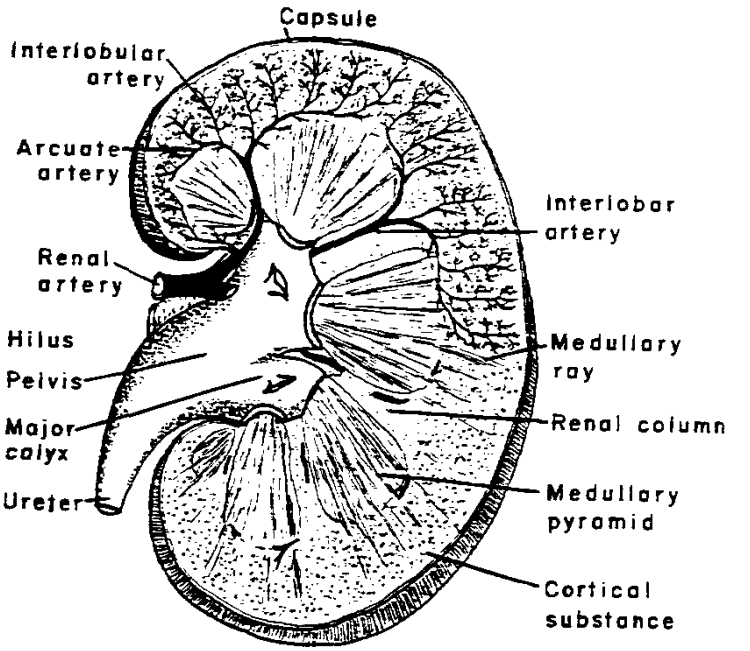

Fig. (3): Diagram of the human kidney, sectioned vertically. The arterial supply is indicated in the upper half of the kidney only, *(Leeson and Leeson, 1976).*

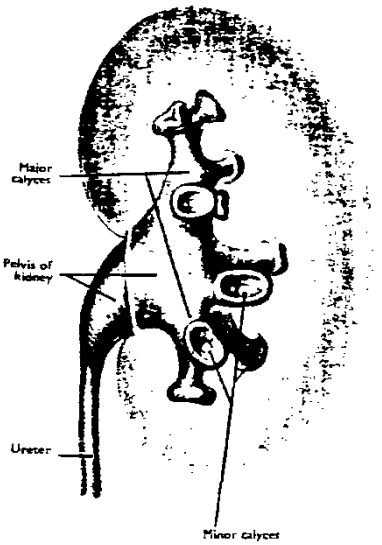

Fig. (4): The pelvis and calyces of the kidney, from a cast. The cupped appearance of the lesser calyces is due to a renal papilla inserted into it. *(Romanes, 1975)*

The Nephron

The kidney can be considered as a compound tubular gland which secrete urine, each kidney containing a large number of urineferous tubulules. (Fig. 5), *(Abd El-Hamid, 1981).*

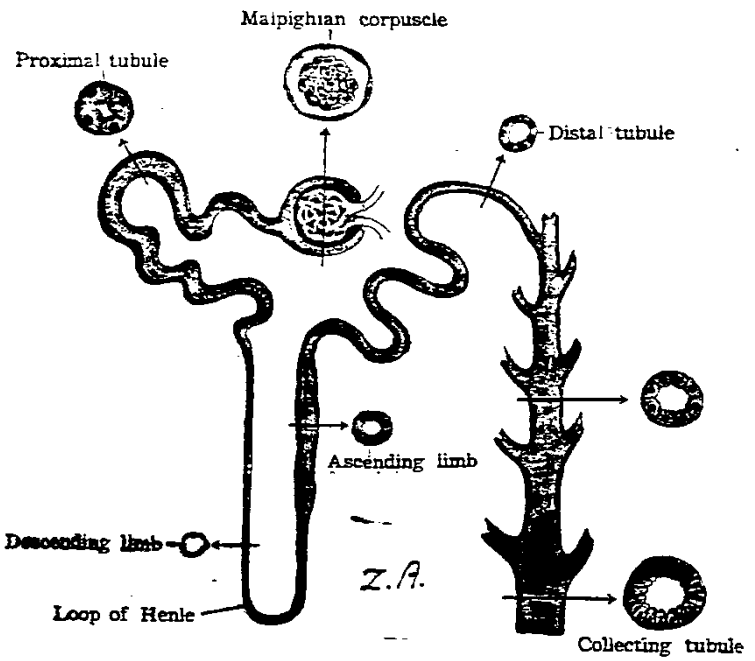

Fig. (5): The urineferous tubule, and the lining epithelium of its segments. *(Abd El-Hamid, 1981).*

It does not branch and each is formed of:

1. The Malpighian renal corpuscle, (Fig. 6).
2. The proximal and distal convoluted tubules. (Fig, 7).
3. The loop of Henle.

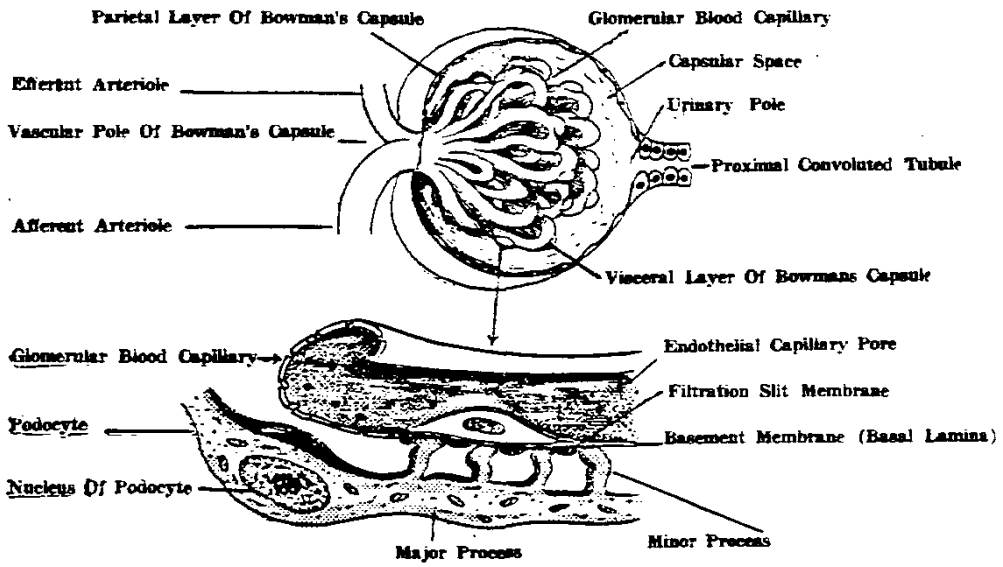

Fig. (6): Ultrastructure of the glomerulus and its relation to the podocyte *(Abd El-Hamid, 1981).*

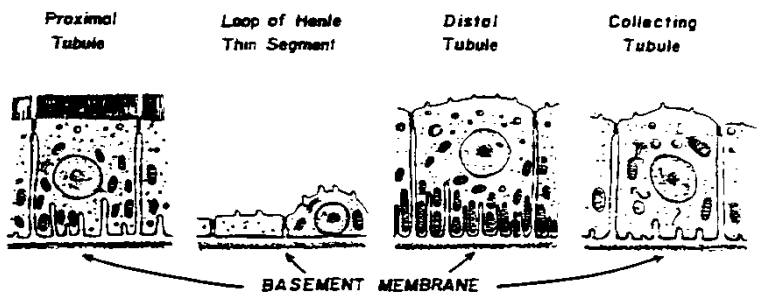

Fig. (7): Characteristics of the epithelial cells in different tubular segments, *(Guyton, 1976).*