

TIME FACTOR AND EOSINOPHIL COUNT IN RELATION TO EXPERIMENTAL SCHISTOSOMA MANSONI INFECTION

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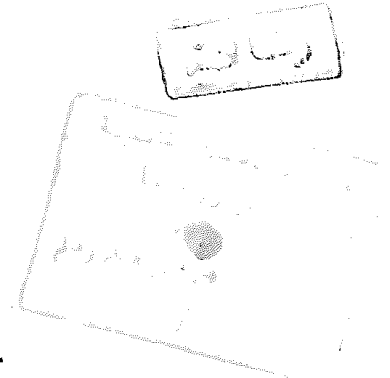
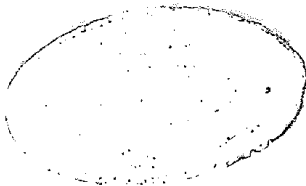
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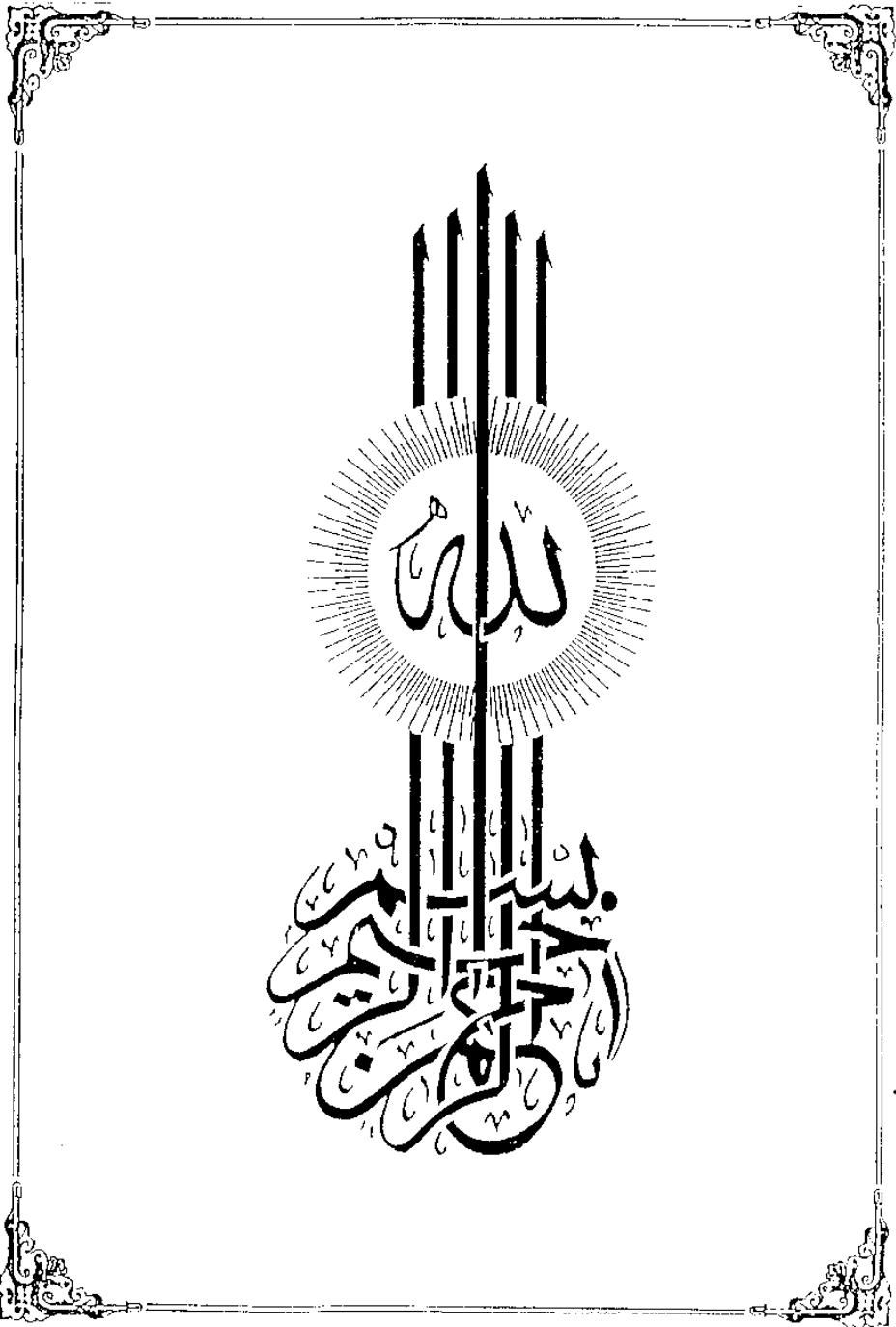
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

"رب اشرح لي صدري ويسر لي امري
واحلل عقدة من لساني يفقهوا قولي"
صدق الله العظيم.



To :

. The soul of my father

. My helpful mother and sister

. My understanding husband

and

. My pretty girl Farah.

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**INTRODUCTION
AND AIM OF THE WORK**

INTRODUCTION

Although **Jones (1846)** was the first to observe eosinophils in peripheral blood, it was **Paul Ehrlich** who established methods for ready identification of these cells. In **1879 Ehrlich** stained smears of human peripheral blood cell with aniline dyes and discovered leukocytes which avidly bound acidic dyes (**Hirsch & Hirsch 1980**). He termed this cell the eosinophil because of the increase avidity of eosin for the leukocyte granules, later that year **Ehrlich** found that cells with eosinophilic granules were particularly abundant in the bone marrow of a patient with leukemia and hypothesized that an uncontrolled growth of eosinophils had occurred in the bone marrow. Subsequently, **Ehrlich** staining procedure was widely used for examination of peripheral blood, and by the early part of this century the association of peripheral blood eosinophilia with parasite and allergic diseases had been established. In the past two decades, a rebirth of interest in the eosinophil has occurred, certain functions of the cell have been elucidated and its role in health and disease have been partially defined.

The eosinophil, like the neutrophil and the basophil, is bone marrow derived polymorphnuclear leukocyte. Clinically, differences between eosinophils and neutrophils are indicated by the different diseases and immunologic responses with which the two classes of leukocytes are associated. Neutrophils function in host defense against bacteria and some other types of microbial organisms by phagocytizing and killing them. In contrast, eosinophils play no significant role in defense against traditional pyogenic organisms. The eosinophils role in antimicrobial immunity is predominantly against stages of metazoan parasites, large multicellular

noningestible worms. Eosinophils usually constitute less than 5% of circulating blood leukocytes, but increased blood or tissue eosinophils occur not only with the metazoan parasitic infections but also with allergic diseases and a variety of other, often idiopathic condition (**Spry 1988 and Nutman et al., 1988**).

Although the eosinophil has been studied less extensively than the quantitatively more predominant neutrophil, the eosinophils clearly differs from other polymorphnuclear leukocytes in its morphology, in some of its major or constituent proteins and elaborated products, and in the diseases with which it is involved. While touch remains to be learned about the participatory roles of eosinophils in many types of inflammatory responses, increasingly the structure and functional capacities of eosinophilic leukocytes are being defined. (**Gleich and Adolphson 1986 and Weller 1991**).

The eosinophil is characterized by specific cytoplasmic granules that contain a series of cationic toxins able to kill many targets, including helminths, protozoan, bacteria and other cells. In bronchial asthma, considerable evidence exists that the eosinophil releases granule proteins, especially the major basic protein (MBP), which in turn mediate tissue abnormalities. Among eosinophil-activating factor, interleukin (IL-5) has been associated with helminth infection and hypersensitivity diseases and would appear to be an attractive target for pharmacological intervention. Information about the eosinophil has rapidly expanded over the past several years.

AIM OF THE WORK:

To detect the effect of diurnal variations of eosinophilic count on worm burden after primary exposure to S. mansoni infection in mouse model.



REVIEW OF LITERATURE



MORPHOLOGY OF EOSINOPHILS

The human eosinophil which measures 12 to 17 μm in diameter, is only slightly larger than the neutrophil but, unlike the neutrophil, usually has a bilobed nucleus.

Although eosinophils, are usually circular or ovoid when observed by light microscopy, cells with one or more pseudopodia-like processes have been observed in human peripheral blood, sputum, bone marrow and nasal smears (**Hanker et al., 1980, and Brown et al., 1986**). These cells have been called medusa cells, although the significance of these cells is unknown, they may be related to alternation of the cell during the course of its death.

The mammalian eosinophil is distinguished by its characteristic granules. Eosinophils contain three types of granules; primary granules, which are round, uniformly electron dense, and characteristically present in eosinophilic promyelocytes (i.e., arise early in eosinophil maturation), and may persist in lesser numbers in mature eosinophils (**Dvorak et al., 1990**). Secondary granules, which are composed of an electron-dense core and an electron-lucent matrix (**Mahmoud 1990**). The third granule are small and contain acid phosphatase and arylsulfatase. Eosinophil granules usually contain only one or two crystalline cores per granule, but eosinophil granules containing more than five cores per granule have been reported as familial trait (**Parmley et al., 1981**).

Eosinophils also contain lipid bodies (**Weller and Dvorak 1985**). Lipid bodies are roughly globular in shape and range in size from minute to the size of large cytoplasmic granules. Lipid bodies are found in

neutrophils and other cells, especially in association with inflammation. These cytoplasmic inclusions can serve as repositories of esterified arachidonic acid (**Weller and Dvorak 1985, and Weller et al., 1991a**), and site of eicosanoid formation (**Weller and Ryeom 1991**).

CONSTITUENTS OF EOSINOPHILS

The constituents of eosinophil can be divided into molecules associated with membranes and molecules associated with granules.

A. Membrane Proteins:

Eosinophils express cell surface proteins that are receptors for immunologic ligands.

The immunoglobulin receptors include those for IgG, IgE and for IgA; while IgM receptors on eosinophils were not detected, but studies using ox erythrocytes coated with rabbit IgM have shown the presence of these receptors (**De Simone et al., 1982**).

Several studies indicate that eosinophils possess receptors for IgG and C₃ fragments, (**Butterworth et al., 1976 and Goers et al., 1984**) and the presence of these receptors has been linked to effector functions of the eosinophil toward target such as parasites (**Butterworth et al., 1977 and Ramalho-Pinto et al. 1978**) and cells (**Parillo and Fauci 1978**).

Eosinophils from patients with increased numbers of circulating eosinophils possess greater number, of IgG Fc receptors than eosinophils from normal persons (**Tai & Spry 1976, Anwar and Kay 1977 and Parillo and Fauci 1978**). The number of normal blood eosinophils possessing IgG Fc receptors is only a relatively small proportion of the total, averaging less than 10% (**Sher and Glover 1976 and Parrillo and Fauci 1978**); even in patients with marked eosinophilia the proportion is usually less than 20% (**Parillo and Fauci 1978**).