STUDY OF CELL MEDIATED AND HUMORAL IMMUNITY IN BACTERIAL MENINGITIS

(THESIS)

Submitted in Partial Fulfillment of the M.Sc. Degree in Tropical Medicine

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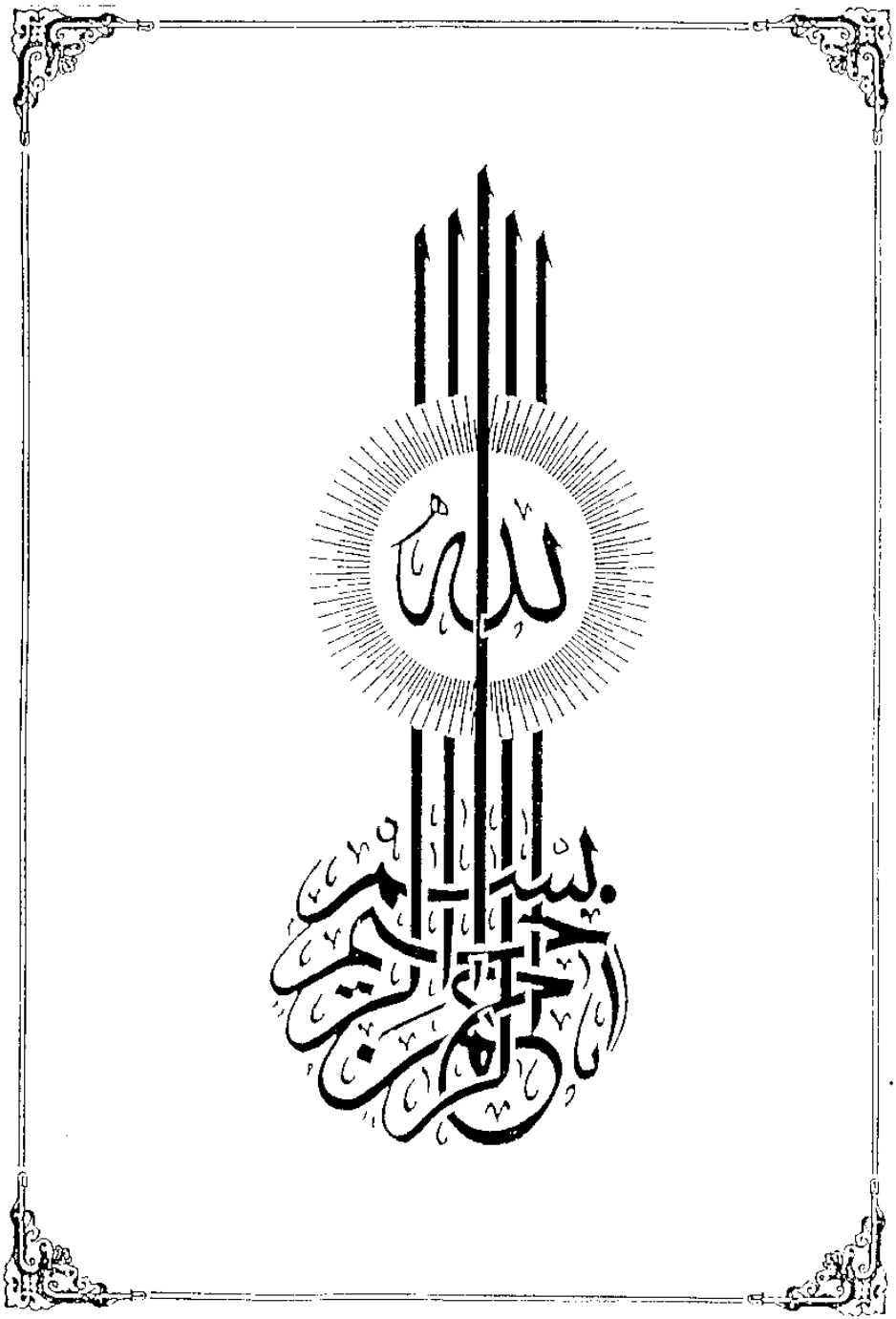

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INTRODUCTION

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INTRODUCTION

Bacterial meningitis is an inflammatory disease of the central nervous system caused by growth of bacteria in and adjacent to the leptomeninges; there is always some degree of concomitant encephalitis. The infecting bacteria usually reach the blood stream. Occasionally, however, infection extends to the meninges directly from traumatic inoculation of extradural bacteria (Overtruf and Hoeprich, 1983).

Spread through the subarachnoid space, involving the leptomeninges, brain and spinal cord, may be exceedingly rapid in acute bacterial meningitis. Rarely, death may ensure after a clinical course measured in hours. However, there is usually time to apply antimicrobial therapy, and cure is possible if treatment is instituted early in the course of the disease (Swartz and Dodge 1965).

The proportion of T lymphocytes in blood are found normal or slightly decreased in patients with bacterial infections (Nikleson and Williams, 1974).

- The serum immunoglobulins IgM, IgG and IgA rise in patients with bacterial meningitis and reach maximum around second or third week of illness (Anderson, et al., 1976).

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- The CSF immunoglobulins IgM , IgG and IgA rise significantly in patients with bacterial meningitis than normal.

In normal patients without CNS abnormalities CSF IgM = nil , IgG 3.1 $\pm$ 1.2 mg/dl. and IgA = 0.43 $\pm$ 0.55 mg/dl. (Smith and Bannister , 1973).

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AIM OF THE WORK

Meningitis is a major health problem all over the world including Egypt. Early and rapid diagnosis is a challenge for the clinicians.

In this work it is planned to evaluate both the cellular immunity by rosette test, and the level of IgM and IgG in serum and CSF of patients with acute bacterial meningitis,.

Also a study of the cellular immunity by rosette test and evaluate the level of IgM and IgG in serum and CSF of patients with no CNS abnormality as a control group.

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REVIEW OF LITERATURE

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Epidemology

The classification of meningitis is difficult, but for many years this condition has been divided into two major categories ; pachy meningitis and leptomeningitis.

Pachymeningitis : is used to designate inflammation of the dura, the usual causes of which are osteomylitis, otitis media, mastoiditis, sinusitis and trauma. The organisms commonly found in presence of pachymeningitis are species of Streptococcus, Staphylococcus and Pneumococcus.

Lepto meningitis : denotes inflammation of the arachnoid and pia. Organisms commonly associated with this form of the disease are H. influenzae, Neisseria meningitidis and Diplococcus Pneumonia. Some of less common organisms are members of the genera streptococcus , staphylococcus, the coliform organisms and species of leptospira (Wellman, 1967).

As bacterial meningitis has a world wide distribution, it can be produced by any potential pathogen (Miner and Edman, 1978).

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Aetiology :

Three organisms : Neisseria meningitis, Streptococcal Pneumonia and Haemophilus influenzae account for the majority of reported cases of bacterial meningitis in Egypt (Hassan and Abdel Wahab, 1969); Miner and Edman, 1978). Nigeria (Tugwell et al., 1976 ; Babalola and Coker, 1982) England (Davey et al., 1982) and U.S.A. (Haggerty and Ziai, 1964 ; Hodges and Perkins, 1975).

Many other specific bacterial organisms are isolated from CSF in cases of bacterial meningitis; they are : Listeria monocytogenes, Ercherchia Coli, Klebsiella species, Salmonella enteritidis, Staphylococcus aureus and Streptococcus pyogenes, these bacteria account for 0.1 % (Hassan et al., 1971) to 15% (Hodges and Perkins, 1975). The etiologic agents in bacterial meningitis vary with time, geography and patient's age. (Gold,1982).

"Neisseria meningitis "

Bacteriologic aspect :

The meningococcus is an aerobic gram - negative coccus that manifests enhanced growth in 5-10 % Co_2 environment at 35°C and on enriched media such as chocolate and blood agar (Sanbarn, 1969).

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Meningococci have been serogrouped by their capsular acid polysaccharide into A,B,C,D, W_{135} , X, Y, Z and Z serogroups (Sippel, 1981).

World Distribution of N meningitids Serogroups :-

Meningitis caused by the group A meningococcus was confined during the past world war II period to the African countries where it produced large and severe epidemics (Lapeyssonnia, 1963);

Menigitis in the west (North America and Europe) was caused by serogroups B and C.

Meningitis caused by the group A meningococcus has recently occured in epidemics in finland (Makela et al., 1975), and Brazil (Anonymous, 1974) and outbreaks in Canada (Ronald, 1972). The North Western U.S. (center of disease control , 1976), and Alaska (Center for disease control, 1976).

In Egypt, the group A meningococcus is endemic (Miner and Edman, 1978; Sippel, 1981).

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Geographic Distribution Of Meningococcal Meningitis In Egypt :

El Akkad, (1969)), noticed that the incidence of the disease is usually higher in :-

1) The towns near the sea shore than in inner regions due to the effect of humidity on the growth of meningococci . In the sea shore - towns, the relative humidity is higher and constant.

2) The urban areas than the rural areas.
In the urban areas the towns are crowded with citizens who have their out-doors lives which help susceptibility to infection and its spread too.

3) The lower Egypt than in the upper Egypt. This is due to colder, raing and more prolonged months of winter in lower Egypt. (El, Akkad, 1969).

Age and Sex Distribution :-

Although meningococcal meningitis occurs in all age group but it is primarily a disease of children and young adults.

In Egypt, 51% of patients were less than 10 years, old. It was extremely rare 1% after about 45 years old.

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The mean age for ceses was 12.75 years for males and 10.66 years for females (Miner and Edman, 1978). The sex ratio (male : female) for all cases was 1.31 : 1 and ranged from 1.57 : 1 in 1973 to 1:1 in 1975 (Miner and Edman, 1978).

In England N.meningitidis was the commonest over all causes of bacterial meningitis. It is responsible for most cases up to 25 years old. The male to female ratio was 1.5 : 1 (Davey et al., 1982).

In U.S.A. N.meningitidis was most frequent in the first three decades of life with decline thereafter (Hodges and Perkins, 1975).

Transmission :

Humans are the only reservoir for the meningococci and the respiratory route is the usual mode of transmission (Aycock and Muller, 1950).

Dissemination of the organism from this site probably occurs only in the small percentage of infected individuals depending on the state of their immunity (Gold Schneider et al., 1969).

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