CLINICAL AND EPIDEMIOLOGICAL STUDY OF TETENUS NEONATORUM

THESIS

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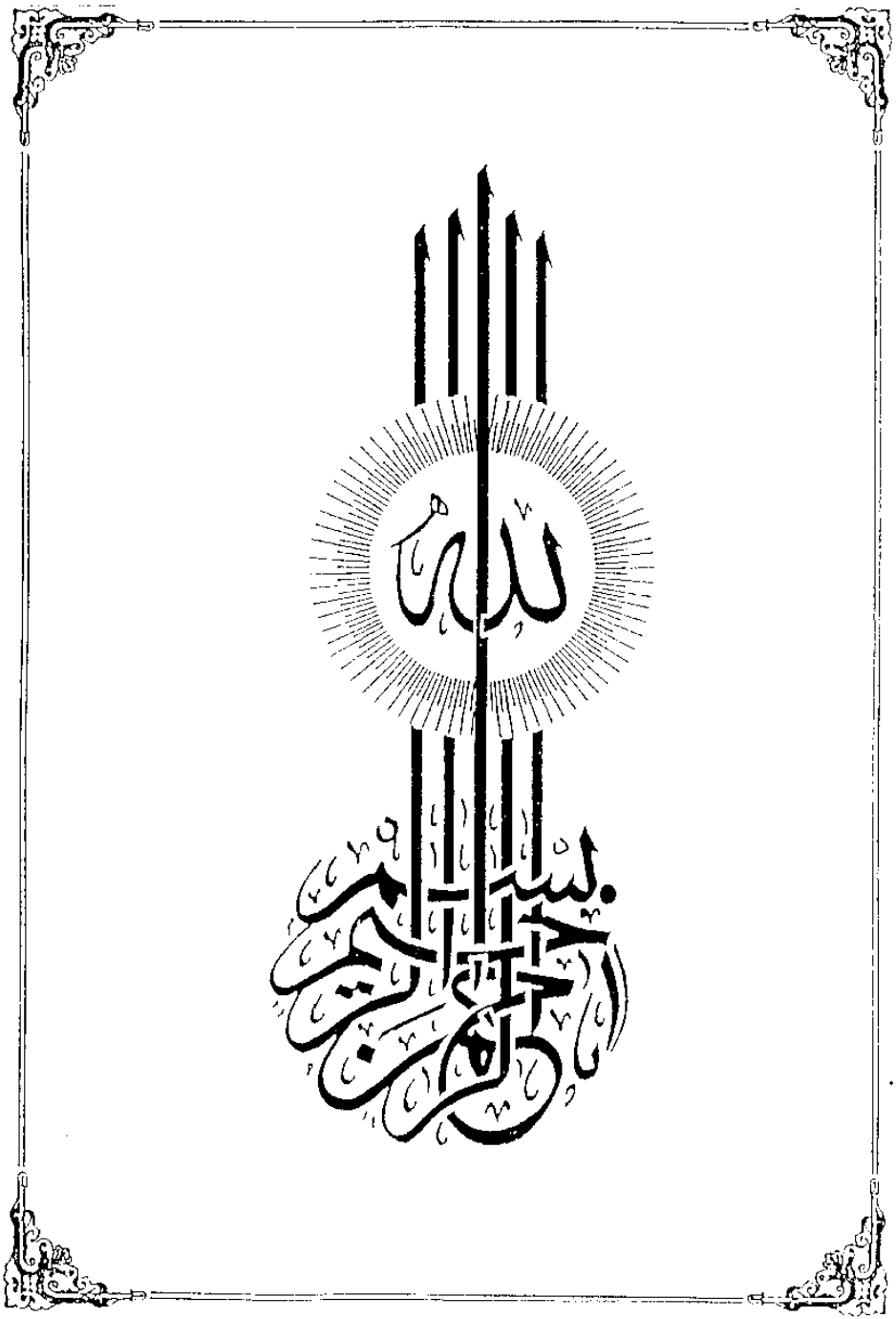

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I INTRODUCTION AND AIM OF THE WORK

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Tetanus is a communicable disease occuring at any age and it is characterised by lock jaw and generalised muscle spasms. The sympathetic nervous system is frequently afffected with its complications.

Next to prematurity, neonatal tetanus is the most frequent cause of death of newborns in primitive countries. The incidence of neonatal tetanus is directly related to the quality of maternity and postnatal care,(Broad head, 1985).

The aim of this work was to study:-

1 - The various epidemiological factors affecting the disease.

2 - The state of immunity of the mothers against tetanus as measured by the level of tetanus antibodies in their sera.

3 - The common clinical manifestations in this series of cases.

4 - The relation between ABO blood group system and susceptibility to the disease.

II REVIEW OF LITERATURE

NEONATAL TETANUS

Definition:

Tetanus is an acute toxaemic illness affecting man and all species of domestic animals caused by a soluble exotoxin (tetanospasmin) of the bacterium Clostridium tetani. It is characterized clinically by lock jaw, tetany and convulsions . It is highly fatal to the Newborns. (Weinstein, 1973).

Etiology:

Tetanus is caused by gram-positive anaerobic bacillus, Closteridium tetani, which exists in two forms, a vegetative exotoxin producing state and as spores. The spores are highly resistant to heat but can be destroyed by heating at 115°C (239°F) for 20 minutes and also by autoclaving. They are also resistant to light, chemicals and antibiotics. They exist freely in the environment (soil, house dust, salt and fresh water) and faeces of many animals. Also both forms may be found in the intestinal contents of man. The spores, although themselves not responsible for the disease, gain access to the body and if the conditions are suitable, they germinate into the vegetative form which liberates the powerful exotoxin called tetanospasmin (Behrman & Vaughan, 1983). It is diffusible protein and is the most potent poison known (after botulinum toxin) as little as 130 µgm may be lethal for human adults. It is produced only under conditions of reduced oxygen tension

and is responsible for the symptoms and signs of tetanus. Tetanospasmin, once produced, track to the C.N.S along nerve trunks and possibly through the blood stream where it binds to motor end plates of skeletal muscles, the spinal cord, the brain and sympathetic nervous system. (Weinstein, 1973). The toxin interferes with neuromuscular transmission by inhibiting release of acetylcholine from nerve terminals in muscles. Its effects on the spinal cord lead to dysfunction of polysynaptic reflexes. It is bound to gangliosides and suppresses inhibitory influences on the motor neurones and interneurones without directly enhancing excitatory synaptic action. The antidromic inhibition of evoked cortical activity is reduced. These actions are similar to strychnin posioning and explain the hypertonia, spasms and seizures (Weinstein, 1973) . The effects on the sympathetic nervous system are responsible for the rare complications of labile temperature and blood pressure , tachycardia, cardiac arrythmias , profuse sweating circulatory collapse (peripheral vasoconstriction) and shock which can result in death. Once the toxin is bound to the tissues, it is neither dissociated nor neutralized by tetanus antitoxin . The antitoxin may prevent binding in C.N.S if binding has occured only in the periphery. (Corbett, 1969)

Bacteriology:

Several methods are available for anaerobic cultivation of clostridia:-

1 . Cultivation in deep agar.

2 . Cultivation in Robertson cooked meat which contains reducing substances to help reduce oxygen tension.

3 . Mechanical exclusion of oxygen using the McIntosh-Filde's jar.

4 . Chemical union of oxygen and hydrogen in a closed jar to form water by the aid of catalysts using the gas pack (El-Batawi, 1984).

Pathology:

Infections with C. tetani remain localized and elicit mininal tissue reaction. Pathologic changes which may occur are secondary events. Pneumonia due to other micro-organisms may be related to difficulty in clearing seret-ions. Degeneration of striated muscles, including the diaphragm, intercostals, psoas, rectus abdominis and other muscles may be noted .The principal pathologic changes include loss of stripes, lysis and disappearance of myofibrils, and bleeding and rupture of muscle bundles. Degenerative changes in the intercostal muscles and diaph-ragm may contribute in part, to the ventilatory failure of the patient and also explain the myesthenia which may be observed during convalescence. Vertebral fractures also may occur as a result of tetanic contractions. (Weinstein, 1973).

Epidimiology:

In many parts of the world, neonatal tetanus is a serious, common and frequently fatal disease. The mortality

can be as high as 70 to 90 percent of cases where no treatment is available, but with meticulous attention to details in management this high mortality can be reduced to less than 10%.

The incidence of neonatal tetanus is directly related to the quality of maternity and postnatal care. Where the services are good, the condition is rare , but in countries where services are poor or non existent, neonatal tetanus is one of the commonst causes of neonatal death. (Broad head, 1985).

Neonalal Tetanus In The Developing Countries:-

In the newborn, the site of entery for the tetanus spores is nearly always the umbilical stump. It provides an ideal medium for the spore of Cl. tetani to germinate. If peri-umbilical infection from other organisms such as staphylococcus aureus , this further encourages the spores to germinate, the spores enter usually at the time the cord is cut with dirty instruments such as scisors, a knife cleaned in the earth, or sharp stone. (Senecal, 1979).

In many tribs in Africa there is much mystery and ritual surrounding the treatment of the cord. They apply mixtures of oils and plant extracts and these are substances which can bring spores into contact with the umbilical stump. In the southern sudan, the Dinka trib often apply

ash to the umbilicus to stop it bleeding . In India, where tetanus is called the "eighth day disease" because of its appearance so commonly eight days after birth. The disease is more common in Hindus than in Muslims. The cow is a sacred animal to the Hindu and in rural areas the application of cow's urine or ghee (butter milk) to the stump predisposes to tetanus. (Broad Head, 1985).

Neonatal tetanus is more common in rural areas where animal husbandry and farming are means of living than in urban areas. The natural habitat for Cl.tetani spores is in the soil and they are frequently found and spread in the faeces of herbivores such as horses, donkeys, cows, sheep, camels and goats.

The dung of these animals is often stored in the huts for fuel. In some rural parts of India, liquid cow's faeces is mixed with earth and smeared over the walls and floor where it dries into a smooth plaster.A baby lying naked with the umbilicus contacting the ground is at risk. (Handalage & Wickramasinghe , 1976).

The application of binders or dirty umbilical covers predisposes to infection which encourages tetanus. Practices of ritual cautary to the baby, ear piercing in the avascular cartilage rather than the fleshy lobe of the baby's ear using a thorn or rusty needle can cause tetanus especially if the wound becomes infected. (Pederneiras, 1971).

Incidence of Neonatal Tetanus in the Developing Countries

The true incidence of neonatal tetanus is difficult to assess in developing countries since it is highest in rural areas and many babies die before going to hospital. In some areas of New Guinea, mothers are considered unclean after birth and their babies are confined in special houses for 2-3 weaks by which time the baby may have succumbed (Scholfield, 1961).

The elemination of neonatal tetanus is essential and attainable goal. It may be achieved by combining two approaches:-

(1) Increasing the immunization coverage of women of childbearing age, and especially pregnant women, with tetanus toxoid.

(2) improving maternity care, with particular emphasis on increasing the proportions of deliveries that are attended by trained persons.

Neonatal tetanus mortality should serve as an index of:-

* The quality and the extent of utilization of the maternal health servieces.
* The impact of immunization programes
* The progress being made in achieving the WHO goal of " Health for all by the year 2000 " (Stanfield & Galazata , 1984).

- Underestimation of Neonatal tetanus:-

Bytchenko (1966) drew attention to the disease and said that it is one of the most under-reported communicable diseases. He attributed the under-report to the following:-

1 - Neonatal tetanus has been overlooked by the health services:-

(i)Owing to the relative neglect of neonates by the health servieces in many parts of the world and the very high cost of treatment of neonatal tetanus which cannot be afforded by most developing countries, the outcome of this disease is often very discouraging and death is accepted as inevitable.(Bytchenco, 1966).

(ii)Tetanus, unlike other critical and communicable diseases, is not communicable from one patient to another , despite an equally high and steady death rate.

(iii)Reliable epidemiological information is laking because - Tetanus is still not a notifiable disease in many countries

- In many others, owing to incomplete notifications and neglect by the public health information servieces; there are sometimes actually more cases admitted to a single hospital than the total number given in the annual report

for the whole country. (Bytchence, 1966)

- Notification from hospitals is generally neglected because tetanus is not regarded as a communicable disease.

- The reporting of neonatal disease is also handicapped by the absence of records concerning this period of life.

- Admission to hospital or even death may occur before the birth has been registered, and such cases of neonatal tetanus will essape notification . (Bytchenco , 1966).

- The baby often dies at home or fails to reach the hospital .

- Frequently, if the mother sees no improvement, she will discharge herself and the baby to home.

Berggren (1974) noted that, during a widespread and successful program to immunize all pregnant women with tetanus toxoid and train traditional birth attendants in Haiti, the number of hospital cases of neonatal tetanus actually increased although the incidence per 1000 live birthes was progressively decreasing (Berggren, 1974).

2 - Neonatal tetanus is hidden within the community:

* In some countries, the family is waiting for the fate of the baby. If it lives, it can be regarded as part