STAPHYLOCOCCAL THROAT INFECTION

THESIS

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BY

AHMED KHALIL KHALIL IBRAHIM

M.B., B.Ch. (Ain Shams University)

Under The Supervision Of

Prof. Dr. ZEINAB MAGED

Professor of Bacteriology

Faculty of Medicine, Ain Shams University

Assist. Supervisor

Dr. RASHA YOUSSEF

Lecturer of Bacteriology

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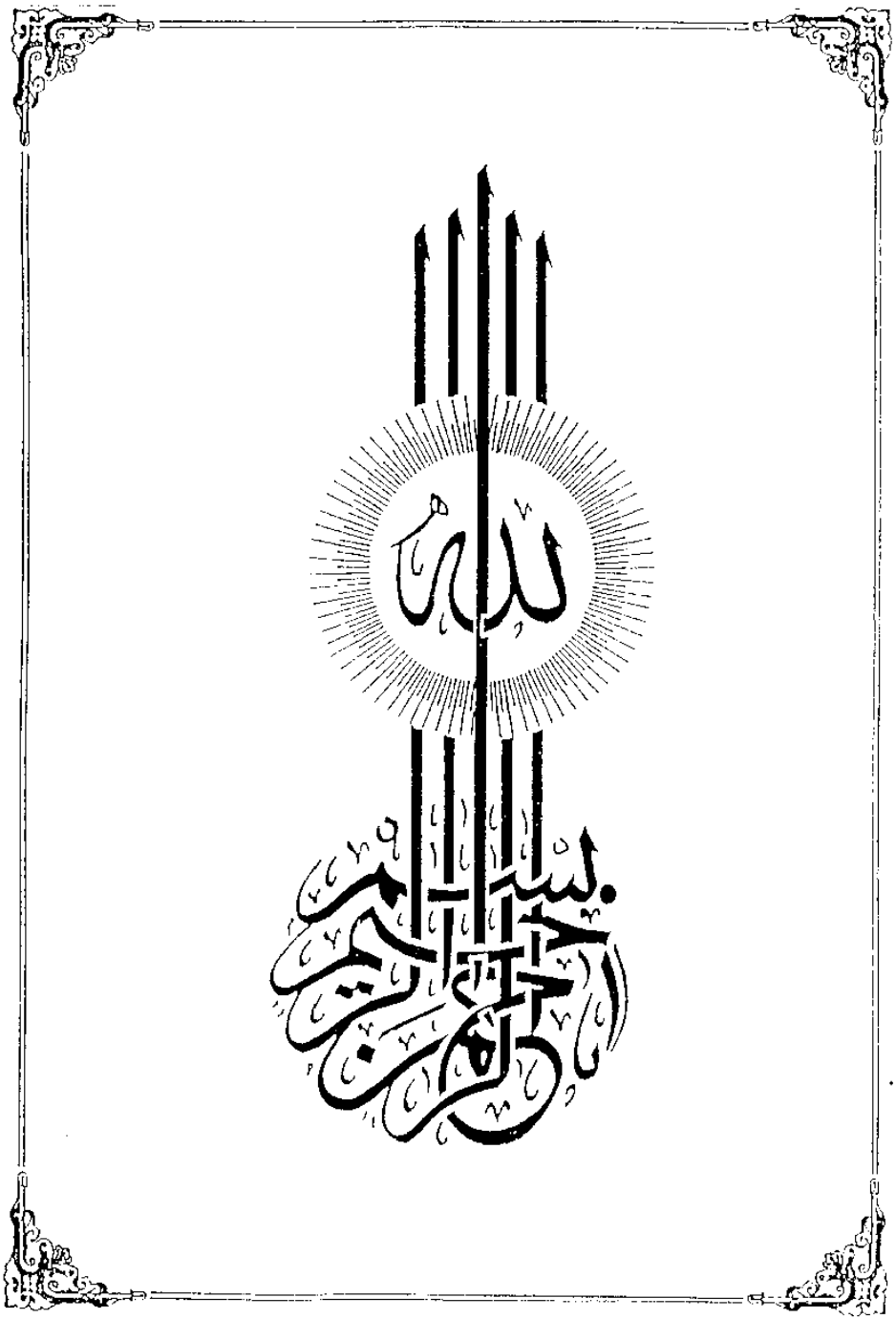

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Throat infection may affect the tonsils or the pharynx or both and produce either acute or chronic inflammation.

According to Scott-Brown (1971) tosilitis is usually accompained by pharyngitis and it may occur as a primary infection originating in the tonsil, or as a secondary infection derived from a general infection of the upper respiratory tract. In the latter case the initial infecting organism is most likely to be a virus.

Although a variety of organisms such as streptococci, staphylococci, pneumococci, diphtheria bacilli, borrelia vincentii, and others are involved in throat infection, yet haemolytic streptococci are the most commonly encountered organisms in these infections.

Staphylococci are among the bacteria which can cause throat infection. Staphylococcal tonsilitis and pharyngitis are characterized by intense inflammatory response accompanied by oedema, hyperaemia and usually copious suppurative exudation (Robbins, 1975).

The aim of the present work is to:

1. Estimate the incidence of Staphylococcus aureus in throat infection as compared to other organisms.

2. Test the biological and biochemical activity of the isolated Staph. aureus.

3. Study the clinical picture of patients with staphylococcal throat infection.

INTRODUCCION

HISTORICAL REVIEW AND CLASSIFICATION

Staphylococci were seen in pus by Koch in 1878. Two years later Pasteur cultivated the organism in a liquid medium (Topley and Wilson, 1975). Ogston (1881) was able to demonstrate the presence of cocci in acute and chronic abscesses. Rosenbach (1884) classified them into two species - Staphylococcus pyogenes aureus and Staphylococcus pyogenes albus. The lemon coloured type Staphylococcus citreus was later added by Passet (1885). Winslow and Roger's (1906) classification included not only the white and golden cocci isolated from animal body, but also the yellow, red, and white saprophytic cocci. Staphylococci were first classified in the 1930's by Julianelle on the basis of differences in antigenic structure (Davis et al., 1973). Cowan (1939) attempted to classify Staphylococci on the basis of coagulase production. In the year 1942 Fisk developed the method of typing them with bacteriophages.

Interest in staphylococci as human pathogens was greatly stimulated in 1928 by a tragic accident in Sundaberg, Australia. Of 21 children inoculated with diphtheria toxin - anti toxin from a single rubber-

capped vial, which had been kept for several days at room temperature in subtropical heat, 16 became ill in 5 - 7 hours with vomiting, diarrhea, high fever, stupor, cyanosis and convulsions. Twelve of the children died within two days and those that survived developed staphylococcal abscesses at the site of injection. The results of subsequent studies suggested that the early deaths were due to the toxin elaborated by the Staphylococcus cultivated from the vial. A different kind of Staphylococcal toxin, which causes food poisoning, was later described by Dack et al., (1930) and named enterotoxin.

The Staphylococcus-micrococcus group are catalase positive, though they could be separated from the rest of the aerobic gram positive cocci by this test. Within this group the staphylococci, which are animal parasites and usually form irregular grape like clusters on solid media, are facultative anaerobe and ferment glucose anaerobically. While the genus micrococcus, which is composed mainly of saprophytic organism and forms either grape-like clusters or tetrades, is usually strict aerobe, and attacks glucose aerobically (Topley and Wilson, 1975).

Baird-Parker (1963) classified the genus Staphylococcus into 6 sub groups, the sub group I contained Staph. aureus which is coaglulase and phosphatase positive and usually attacks mannitol both aerobically and anaerobically. Coagulase negative Staphylococci were classified in sub groups II, III, IV, V and VI. The micrococcus was classified into 7 sub groups. Baird-Parker (1966) classified staphylococcus and micrococcus into 6 and 6 sub groups respectively. Within the genus staphylococcus, Staph. aureus was contained in sub group 1. Later on Baird-Parker (1972) [illegible] Staph. aureus as a single clear cut species [illegible] Staph. epidermidis into another [illegible] in which [illegible] subgroups are recognized.

GENERAL PROPERTIES AND BACTERIOLOGICAL REVIEW.

Natural Habitat:

The body surface of many species of mammals and birds is the normal habitat of staphylococci. Varying numbers of staphylococci are also present in the air and dust of occupied buildings and in milk, food, and sewage (Topley and Wilson, 1975).

In the case of normal human beings, 90 percent of infants become nasal carriers of Staphylococcus aureus by the end of the first ten days of life. The carrier rate falls to 20 to 30 per cent by the second year, only to rise again by the fourth or fifth year to a more stable adult rate of about 50 per cent. Some adults (10 per cent) are intermittent carriers. The factors that control the dynamics of the carrier rate remain obscure (Lewis et al., 1973).

Staphylococcus is carried in different parts of the body of healthy persons. Skin carriage rates of 5 - 20 per cent are found in most areas of the body except the hands, where up to 40 per cent of swabs may yield Staphylococcus aureus (Williams, 1946). The

nose is the site most frequently found to yield Staphylococcus aureus, nasal carrier rates of normal individuals ranging from 30 to 50 per cent. The rate of carriage of Staphylococcus aureus in the throat of healthy persons is between 4 and 64 per cent. Faecal carriage rates of healthy individuals is between 20 to 30 per cent (Williams, 1963). Among adults, nasal carriers have been found to yield Staphylococci from their faeces more often than non-carriers. (Matthias et al., 1957).

Morphology and Staining Reaction:

The Staphylococci are rounded or somewhat oval cells with an average diameter of 0.8 - 1.0 um. (Topley and Wilson, 1975). The individual cocci of pathogenic strains tend to be slightly smaller than those of non-pathogenic strains (Davis et al., 1973). In films prepared from pus or from solid culture medium they appear grape-like clusters with some single and paired cocci. Films prepared from broth show small groups, pairs, singles and short chains (less than five cocci in a line). They are non motile organisms which produce no spores (Cruickshank et al., 1975).

Most staphylococci are non capsulated, but Staph. aureus strains with definite capsules have been described. The most intensively studied of these is the "Smith" Strain, which is exceptionly virulent for mice by the intraperitoneal route (Topley and Wilson, 1975).

Staining Reaction:

The staphylococci stain well with most aniline dyes and are uniformly gram-positive in young cultures (Topley and Wilson, 1975).

Cultural Characteristics:

Staphylococci are facultative anaerobe. Temperature for growth ranges between 12° - 44° C, optimum [illegible]. The optimum pH is 7.4 - 7.6 (Cruickshank et al., 1975).

On nutrient agar they often produce yellow pigmented colonies which are smooth, circular, opaque, and 1-2 mm in diameter, after overnight incubation at 37°C. The growth of Staphylococcus aureus is butyrous, but Staphylococcus epidermidis is somewhat gelatinous (Cruickshank et al., 1975).

On nutrient broth most strains give a moderate to dense turbidity with some powdery deposit, but some coagulase negative strains form a thick sticky deposit. No pigment is found in liquid media (Topley and Wilson 1975).

Liquifaction of gelatin within a few days occurs by nearly all strains of Staphylococcus aureus. Also many strains of staphylococcus epidermidis liquify gelatin more slowly, but the difference between the species is not clear cut (Topley and Wilson, 1975).

On MacConkey's agar, Staphylococcus aureus colonies are small and pale pink after 24 hour incubation and deep pink after 48 hour incubation (Topley and Wilson, 1975).

Hoffstadt and Youmans (1952) described variant colonial types which include rough and dwarf forms. Dwarf colony variants of staphylococcus aureus were occasionly isolated in a pure culture from septic lesion in man (Hale, 1947). Browning and Adamson (1950) isolated dwarf colonies from strains growing in the presence of antiseptics (streptomycin, penicillin, crystal violet, acriflavine, 2-7 diamino