FLOCCULATION PHENOMENON OF CANDIDA ALBICANS BY LYSOZYME

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ABSTRACT

Young colonies of Sabouraud's glucose agar room temperature culture of Candida species from human isolation were suspended in distilled water. The suspension was mixed with a solution of lysozyme and incubated in a 37°C water bath. Within 3–5 hours, various species of Candida cells showed flocculation to varying degrees which occurred at varying periods of onset. Among seven Candida species, Candida albicans and Candida stellatoidea showed the strongest flocculation, earliest onset and most solution clarity than did any other species. Candida stellatoidea was indistinguishable from Candida albicans in its degree of flocculation, and in the clarity of solution. Candida species may be arranged in the following order according to their decreasing positivity in flocculation:

1 Candida albicans
2 Candida stellatoidea
3 Candida tropicalis
4 Candida krusei
5 Candida pseudotropicalis
6 Candida parapsilosis
7 Candida guillermondii
8 Saccharomyces species may be placed after Candida guillermondii.

It seems possible to separate the Candida species into 3 groups by the rate of flocculation, and clarity of solution. Group I. Candida albicans and Candida stellatoidea. Group II. Candida tropicalis, C. krusei and Candida pseudotropicalis. Group III. Candida parapsilosis and Candida guillermondii. Saccharomyces specimens (S. cerevisiae and others) were placed after group III.

INTRODUCTION

In 1932 Friedberger & Hoder found that many isolates of airborne saprophytic microorganisms, although resistant to the lytic action of lysozyme, were nevertheless, agglutinated by it. They noted that the flocculating capacity of lysozyme appeared to run parallel to its lytic activity and considered these two activities to be the manifestations of a single substance (Lysozyme).

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KLEMPARSKAYA (1939) reported that lysozyme has the ability to dissolve and flocculate bacteria, and used such flocculation as a means of dividing bacteria into three groups. He speculated that the flocculation of microorganisms by lysozyme was dependant on its concentration, and the pH at which time it was used, and concluded that different types of behaviour shown by various organisms regarding flocculation by lysozyme are explained by differences in their colloidal structure.

THOMPSON (1940) also observed occasional agglutination of very susceptible micrococci or sarcinas S.P.P. by purified egg white lysozyme, prior to its lytic activity, and the agglutination effect was attributed to adsorption of the enzyme by the bacteria which, for some reason, were not dissolved.

In 1948 WEBB noticed that lysozyme caused flocculation to occur in suspensions of streptococcus faecalis and staphylococcus aureus. SALTON (1953) observed that the addition of lysozyme (1 mg/ml) to bacterial suspensions resulted in agglutination of the cells.

In the present study human isolates of pathogenic and non-pathogenic members of the Candida species were tested for flocculation by lysozyme.

**Material and Method**

**Material**

The surface of a young\(^1\) room temperature\(^2\) culture (2—5 days) of Candida species in Sabouraud agar\(^3\) was gently scraped, using a loop. The material obtained was suspended in 10 ml of distilled water in a 100 × 16 mm size cuvette with a screw or rubber cap. The mixture was agitated to make an even suspension, and its turbidity was measured at 520 M\(\mu\) using a Coleman Junior Spectrophotometer.

Each suspension of Candida was adjusted to 50 % transmittance either by further dilution, or by the addition of Candida culture. A 10 ml distilled water blank was used to represent 100 % transmittance.

**Method**

Fresh lysozyme solution was prepared by dilution of lysozyme\(^4\) in distilled water to a concentration of 10 mg/5 ml. 0.5 ml of the diluted lysozyme solution was placed in each of several clean sterile

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\(^1\) Mainly consists of yeast cells. The use of young cultures is imperative for definitive results.

\(^2\) Not 37 ° C incubation.

\(^3\) Not blood agar, nor corn meal agar.

\(^4\) Lysozyme (egg white) salt free, Lysozyme egg white 3 × crystalline, Nutritional Biochemical Company.

N.B. Lysozyme chloride 3 × crystals (Nutritional Biochemical Co.) was tried and found to be unsatisfactory.