Use of Litchi Chinesis Lectins (Agglutinins) in Diagnostic Microbiology.

Pages with reference to book, From 110 To 111

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Abstract

One hundred and thirteen clinical isolates of organisms were tested for agglutination by Litchi chinensis seed extract. The extract selectively agglutinated gram positive organisms and most of the B-haemolytic Esch. coli and Proteus isolates.
Further studies with a purified extract made it possible to develop an identification procedure for certain important antigenic groups of organisms. (JPMA 35: 110, 1985).

Introduction

Lectins are proteins or glycoproteins of non-immune origin with sugar specificity which can agglutinate some bacterial species. Some plant extracts also contain substances which may agglutinate several types of erythrocytes. By strict definition these “agglutinins” are not lec tins, because they do not possess carbohydrate specifleities and are not proteins, nevertheless, the extracts are selective agglutinating agents. Lectin cell binding can elicit a variety of phenomena including agglutination, mitogenesis, and cytotoxicity. Lectins also form precipitates with carbohydrate containing macromolecules and have been used for their isolation and purification, they also have the ability to agglutinate certain species of bacteria. The specificity of agglutination of bacteria by lectins resides in the unique cell surface structures of bacteria interacting with the carbohydrate specific lectins.[1] In addition to differentiation of bacteria, plant agglutinins have also been used to differentiate yeasts.[2]
The objective of this study was to develop a rapid procedure for differentiating different bacteria, by use of lectins or agglutinins of plants, other than those already studied, and try to develop a practical diagnostic procedure for clinical laboratory.

Material and Methods

Reagent:

Fresh seeds of Litchi chinensis were washed and dried for a few days in shade untill they shrivelled. The dried seeds were ground into a coarse powder, which was transferred to a clean glass container. Boiling hot water was added to the glass container, equal to the volume of the ground seeds. The contents were mixed and allowed to stand for 30 minutes to infuse. After 30 minutes the infusion was filtered through a Whatman No. 40 filter, .to free it from coarse particles. The filtrate was dried to one half of its original volume at 25 ° centigrades.
After drying the filtrate was centrifuged at 500 RPM for 20 minutes, the clear supernatant was separated, and used as reagent.
The reagent was kept at 4-8° centigrades in a refrigerator.

Micro-organisms:

The microorganisms tested were those isolated in the laboratory from clinical specimens submitted for examination. The identity of the organisms was confirmed by biochemical tests[3]. Serological typing of the organisms could not be done.
Test.

Suspension of the organisms was made on a clean glass slide. A drop of the reagent was added and mixed togather. The mixture was observed for agglutination for one minute. When there was immediate clumping into large partides, the agglutination test was considered to be positive.

Results

One hundered and thirteen clinical isolates were screened for agglutination by the rapid slide test by the extract.(Table)

Table

Rapid Slide Agglutination Test for Organisms by the Extract.

Serial number	Organism	Number of isolates tested	Any characteristic	Number of strains Agglutinated	Not agglutinated
1.	Esch. coli	9	B-haemolytic on sheep blood agar	6	3
2.	Esch. coli	47	Non haemolytic on sheep blood agar	3	44
3.	Proteus vulgaris	4		2	2
4.	Proteus morganii	1		0	1
5.	Proteus spp. (which could not be biochemically tested)	11		9	2
6.	Pseudomonas aeruginosa	12	In one isolate homogeneus suspension could not be made.	4	7
7.	Staphylococcus aureus	8		7	1
8.	Staph. epidermidis	8		8	0
9.	Micrococcus	9		7	2
10.	Strep. viridans	1		1	0
11.	Bacillus spp.	1		0	1
12.	Corynebacterium spp.	2	one isolate was autoagglutinable	1	0

The extract selectively agglutinated gram positive organisms. Most of the Each. coli isolates, which were B-haernolytic on sheep blood agar, were agglutinated and non-haemoiytic were not agglutinated by the extract This probably depended upon their antigenic structure.

Most of the tests were repeated after subculture of the organisms on to nutrient agar plates and it was observed that the results were reproducible.

One isolate of Pseudomonas aeruginosa and one of Corynebacterium spp. developed auto-agglutination in normal saline, therefore the test with the extract could not be interpreted.

Discussion

Within the last 12 years some researchers have demonstrated the ability of lectins to agglutinate certain species of bacteria and the lectin agglutination of bacteria has been used as a method of definitive identification of clinical isolates. Wheat germ agglutinin (Triticum vulgaris) specifically agglutinates

Neisseria gonorrhoeae and does not agglutinate encapsulated Neisseria meningitidis[2].
This study shows that Litchi chinensis seeds extract can also be used for laboratory identification of certain antigenic types of organisms within the same species, and with purification of the extract and antigenic studies of the organisms, it could be made possible to develop an identification procedure for certain important antigenic groups of organisms.
The demonstrations that plant lectins can be utilized in the rapid diagnosis of microorganisms suggests the broad potential for employing different lectins in the selective agglutination and identification of clinically important bacteria to the species level.
Lectin agglutination test is rapid, requiring only one minute to perform, thereby eliminating long procedures; it is economical and based on 113 tests performaed in this study, it is sensitive, reliable and easy to read.

References

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