

STUDY OF CORRELATION BETWEEN PRINCIPAL PATHOGENIC FACTORS OF SOME STAPHYLOCOCCUS SPECIES

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Summary

Staphylococcus aureus, but some other staphylococci species also, is capable to produce toxins and some extracellular proteins like: enterotoxins, coagulase, A protein, hemolysins, fibrinolysins, nucleases and staphylokinases (2). It is well known that major factors of pathogenicity of species belonging to *Staphylococcus* genus are represented by enterotoxins, hemolysins and coagulase (6, 7, 8).

Data from specialized literature specify that regardless of species, the majority of *Staphylococcus* strains are not capable to synthesize all pathogenicity factors.

Considering this characteristic of species belonging to *Staphylococcus* genus, this research try to establish a correlation between the principal factors of pathogenicity represented by coagulase, hemolysins and enterotoxins.

Materials and methods

The research was conducted on 186 staphylococci strains, isolated from raw milk and milk products. The isolation and identification of strains belonging to *Staphylococcus* genus was conducted in accord with the methodology stated by EN ISO 6888 procedure (11).

The capacity of coagulase secretion was determined by in tube method toward rabbit serum, hemolysins secretion was determined on 10% sheep blood nutritive agar.

The identification of *Staphylococcus* species was conducted using the API – Staph gallery and the enterotoxins secretion using TECRA immunoenzymatic test.

Results and discussions

The obtained data reveal differences between strains, differences implying the capacity of pathogenic factors synthesis (table 1). If the majority of coagulase-positive strains elaborated hemolysins (87,88%), only 60,67% synthesized enterotoxins. It is to be mentioned that only few coagulase-negative strains synthesized hemolysins (2,5%) and enterotoxins (5,00%).

Table 1

Strains behavior toward some pathogenic tests

Number of studied strains	Parameter	From which			
		Positive		Negative	
		Number	%	Number	%
186	coagulasis	66	35.48	120	64.51
	hemolysins	58	31.18	3	2.50
	enterotoxins	40	21.50	6	5.00

This aspect is characteristic to *Staphylococcus* species due to very complex enzymatic equipment, which could be correlated with pathogenic properties, but can wide vary from a strain to another one.

The biochemical study, done with Api-Staph test, allowed the bordering of all 186 strains in eight species, all belonging to *Staphylococcus* genus.

Table 2

Bordering of staphylococci strains

No.	Specie	strains	
		No	%
1.	<i>Staphylococcus aureus</i>	57	30.65
2.	<i>Staphylococcus xylosus</i>	24	12.90
3.	<i>Staphylococcus chromogenes</i>	16	8.60
4.	<i>Staphylococcus chonii</i>	7	3.76
5.	<i>Staphylococcus intermedius</i>	19	10.21
6.	<i>Staphylococcus sciuri</i>	10	5.38
7.	<i>Staphylococcus warneri</i>	16	8.60
8.	<i>Staphylococcus saprophyticus</i>	37	19.90
Total		186	100

The obtained data emphasize that the majority of coagulase-positive strains belong to *Staphylococcus aureus* specie (86.36%), while coagulase-negative strains belong to *Staphylococcus saprophyticus* specie (30.83%).

Considering the pathogenic capacity of all eight species of staphylococci, the obtained data emphasize the high incidence of strains that synthesize all the three studied pathogenic factors, but with some differences from specie to specie.

Table 3

Distribution of species according to pathogenic factors

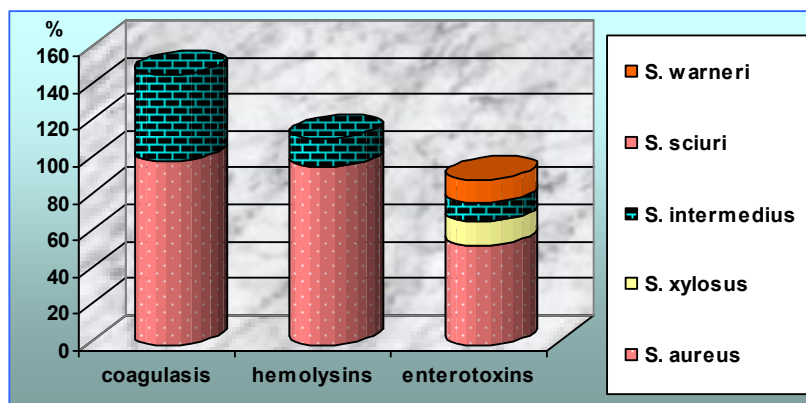
Specie	No of strains	Parameter					
		Coagulasis		Hemolysins		Enterotoxins	
		No.	%	No.	%	No.	%
<i>S. aureus</i>	57	57	100	55	96,5	31	54.3
<i>S. xylosus</i>	24	-	-	-	-	3	12.5
<i>S. chromogenes</i>	16	-	-	-	-	-	-
<i>S. chonii</i>	7	-	-	-	-	2	28.5
<i>S. intermedius</i>	19	9	47.3	3	15.8	2	10.5
<i>S. sciuri</i>	10	-	-	-	-	-	-
<i>S. warneri</i>	16	-	-	-	-	2	12.5
<i>S. saprophyticus</i>	37	-	-	-	-	-	-
TOTAL	186	66	35.4	58	31.1	40	21.5

This aspect does not exclude the presumptive capacity of a staphylococci strain to be pathogenic, because, due to it's metabolism it can synthesize one or more factors that could be correlated with pathogenity. However, it has to be mentioned that the majority of strains that synthesized all the three pathogenic factors belonged to *Staphylococcus aureus* specie (46.97%). Also, from nine coagulase-positive strains of *Staphylococcus intermedius* two synthesized both hemolysins and enterotoxins.

Considering the studied pathogenic factors, it can not be establish a positive correlation (chart 1).

Chart 1

Repartition of isolated staphylococci strains, considering the pathogenic factors



Among a total of 66 coagulase-positive strains, 58 (87,89%) synthesized both hemolysins and enterotoxins, while from 120 coagulase-negative strains only 7 strains (5,83%) synthesize enterotoxins, but do not synthesize hemolysins.

Besides, *Adesiyun* and co. (1), studying 175 *Staphylococcus aureus* strains, stated that 42,9% of them were both hemolytic and enterotoxigen, *Becker* and co. (3) stated that from 281 coagulase-positive strains of *Staphylococcus intermedius* 17% were also enterotoxin producers. Also, *Khambaty* and co. (5) reported food poisoning episodes provoked by *Staphylococcus intermedius*.

Conclusions

- Among the principal pathogenic factors of staphylococci strains does not appear a positive correlation.
- The coagulase-positive strains synthesized both hemolysins and enterotoxins.
- Some coagulase-negative strains belonging to *Staphylococcus xylosus*, *Staphylococcus chonii* and *Staphylococcus warneri* species were non hemolytic, but synthesize enterotoxins.

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