

Antibiotic Sensitivity of *Staphylococcus aureus* Strains Isolated from Fishery Products

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During the course of an investigation on the incidence of *Staphylococcus aureus* contamination in frozen crab meat, frozen prawns and dried fishes from Cochin, 116 strains of *S. aureus* were isolated. The sensitivity of the isolated strains towards nine antibiotics showed that all the *S. aureus* strains were sensitive to kanamycin and streptomycin (100%). Sensitivity to other antibiotics like chloramphenicol, polymyxin-B, erythromycin, tetracycline, neomycin, penicillin and ampicillin were shown by 98.28, 93.10, 87.93, 68.10, 67.24, 56.90 and 55.17 percent of the isolates respectively.

The increase in the number of antibiotic resistant strains of *Staphylococcus aureus* is an important phenomenon for both therapeutic and epidemiological reasons. During the early years of antibiotic era, few penicillin resistant strains were isolated. In Poland, Kurylowicz & Slopek, (1946) studied 200 strains of *S. aureus* and found only 1% of resistant strains. With the introduction of newer antibiotics there is change in the antibiotic resistance pattern of staphylococci. (Barber, *et. al.*, 1949, Gupta & Chakravarthi, 1954, Trivedi & Sarkar, 1954, Beaven & Burry, 1956, Myers & Acharya, 1956, Barua, *et. al.*, 1959, Goyal & Madhavan, 1961, Pal & Ghosh Ray, 1962, James, 1962, Wasek, *et. al.*, 1963, Agarwal, *et. al.*, 1963, Chatterjee & Aikat, 1964, Rao, *et. al.*, 1966, Bhaskaran & Jayakar, 1969, Bhujwala & Mohapatra, 1972, Nanu & Soman, 1980, Vijayalakshmi & Bhaskaran, 1981). The most important problem in dealing with the staphylococcal infection has been progressive emergence of the organism resistant to various antibiotics and chemotherapeutic agents due to the widespread and indiscriminate use of antibiotics. Resistance may appear rapidly or slowly depending on the organism concerned, the volume and type of drug used and the method of application. Information concerning the drug resistant pattern of the prevailing pathogenic bacteria and the appearance of new resistant characteristics is of utmost value for a proper selection of antimicrobial agent for therapeutic purposes (Sundaram *et. al.*, 1982).

With this background in view an attempt was made to screen the strains of *S. aureus* isolated in our laboratory from various fishery products for their antibiotic sensitivity towards nine antibiotics. This study is important because no data is available on the antibiotic sensitivity of *S. aureus* strains of fish and fishery products.

Materials and Methods

S. aureus was isolated from 50 samples (100%) of cooked, picked and frozen crab meat (Sanjeev, *et. al.*, 1982). Nine out of 19 (47%) samples of frozen prawns collected from cold stores and 26 out of 112 (23.2%) samples of dried fishes collected from Cochin (Sanjeev *et. al.*, 1984). A total of 116 strains of *S. aureus* isolated were subjected to *invitro* sensitivity tests to ampicillin, chloramphenicol, erythromycin, kanamycin, neomycin, penicillin, polymyxin-B, streptomycin and tetracycline. The concentration of the antibiotics and the symbols used are as follows.

Antibiotics	Symbol	Concn, mcg/disc
Ampicillin	I	10
Chloramphenicol	C	30
Erythromycin	E	15
Kanamycin	K	30
Neomycin	N	30
Penicillin	P	10 U
Polymyxin-B	X	300 U
Streptomycin	S	10
Tetracycline	T	30

Sterile cotton swab was inserted into 18 h old nutrient broth culture of the organism and rotated it while pressing against the upper inside wall of the tube above the culture fluid level to remove the excess inoculum. The swab was then streaked on to the surface of the pre-set nutrient agar plates and allowed to dry for 10 min. at room temperature. The antibiotic discs having the standard strength were placed apart on the plates using sterile forceps in such a way that there is no chance of overlapping of the zones of inhibition around the discs. The plates were then incubated at 37°C for 24 h and the zone of inhibition around each disc was measured and interpreted as suggested by Anderson (1973).

Results and Discussion

The results of antibiotic sensitivity tests of the strains of *S. aureus* isolated from frozen crab meat, frozen prawns and dried fishes are given in Tables 1, 2 and 3. Antibiotic sensitivity pattern of all the 116 strains of *S. aureus* isolated from the above three products are given in Table 4.

All the 90 strains isolated from frozen products were sensitive to chloramphenicol (100%) and 24 out of 26 (92.3%) from dried fishes. The strains from frozen prawns and frozen crab meat were more sensitive to ampicillin (68.42 and 63.38%) when compared to that of dried fishes (23.08%). 83.10% of strains from frozen crab meat were sensitive to tetracycline and only 34.62% from dried fishes.

In the present study 116 strains of *S. aureus* were tested for their antibiotic sensitivity. 100% of the strains were found to be sensitive to kanamycin and streptomycin. For other antibiotics the sensitivity percentages were: chloramphenicol (98.28), polymyxin-B (93.10), erythromycin (87.93), tetracycline (68.10), neomycin (67.24), penicillin (56.90) and ampicillin (55.17). 22 out of 71 (30.98%) strains of *S. aureus* isolated from frozen crab meat, 5 out of 19 (26.30%) strains from frozen prawns and only 1 out of 26 (3.46%) strains from dried fishes were found to be sensitive to all the 9 antibiotics tested. None of the strains showed resistance to all the tested antibiotics.

The kanamycin sensitivity of staphylococci in this study is in complete agreement with the reports of James (1962) and Kapur, *et al.* (1978). But the staphylococcal isolates from market beef showed only 46.94% sensitivity towards kanamycin (Nanu & Soman, 1980). Streptomycin sensitivity of *S. aureus* in this study is almost in agreement with the reports of Murty & Makholia (1963) and Rao (1966), who found it to be 89.80% and 86.86%. Chloramphenicol, ampicillin, erythromycin and penicillin sensitivity of the isolates were in agreement with the reports of Vijayalakshmi & Bhaskaran (1981) where they observed it to be 92.3%, 63.5%, 87.2% and 59.6% respectively.

The results of antibiotic sensitivity presented in Table 4 shows that kanamycin, streptomycin, chloramphenicol, polymyxin-B

Table 1. Antibiotic sensitivity of 71 strains of *S. aureus* isolated from frozen crab meat

Antibiotics	No. of isolates sensitive	%	No. of isolates showing intermediary sensitivity	%	No. of isolates resistant	%
Ampicillin	45	63.38	5	7.04	21	29.58
Erythromycin	67	94.37	4	5.63	0	—
Kanamycin	71	100.00	0	—	0	—
Neomycin	45	63.38	24	33.80	2	2.82
Penicillin	48	67.61	2	2.82	21	29.58
Tetracycline	59	83.10	10	14.08	2	2.82
Streptomycin	71	100.00	0	—	0	—
Chloramphenicol	71	100.00	0	—	0	—
Polymyxin-B	67	94.37	4	5.63	0	—

Table 2. Antibiotic sensitivity of 19 strains of *S. aureus* isolated from frozen prawns

Antibiotics	No. of isolates sensitive	%	No. of isolates showing intermediary sensitivity	%	No. of isolates resistant	%
Ampicillin	13	68.42	1	5.26	5	26.32
Erythromycin	16	84.21	3	15.79	0	—
Kanamycin	19	100.00	0	—	0	—
Neomycin	13	68.42	4	21.05	2	10.53
Penicillin	12	63.16	3	15.79	4	21.05
Tetracycline	11	57.89	3	15.79	5	26.32
Streptomycin	19	100.00	0	—	0	—
Chloramphenicol	19	100.00	0	—	0	—
Polymyxin-B	17	89.47	1	5.26	1	5.62

Table 3. Antibiotic sensitivity of 26 strains of *S. aureus* isolated from dried fishes

Antibiotics	No. of isolates sensitive	%	No. of isolates showing intermediary sensitivity	%	No. of isolates resistant	%
Ampicillin	6	23.08	0	—	20	76.92
Erythromycin	19	73.08	7	26.92	0	—
Kanamycin	26	100.00	0	—	0	—
Neomycin	20	76.92	5	19.23	1	3.85
Penicillin	6	23.08	0	—	20	76.92
Tetracycline	9	34.62	8	30.77	9	34.62
Streptomycin	26	100.00	0	—	0	—
Chloramphenicol	24	92.31	1	3.85	1	3.85
Polymyxin-B	24	92.31	2	7.70	0	—

Table 4. Antibiotic sensitivity of 116 strains of *S. aureus* isolated from fishery products

Source	Total isolates	No. of sensitive isolates to indicated antibiotics								
		I	C	E	K	N	P	X	S	T
Frozen crab meat	71	45 (63.38)	71 (100)	67 (94.37)	71 (100)	45 (63.38)	48 (67.61)	67 (94.37)	71 (100)	59 (83.10)
Frozen prawns	19	13 (68.42)	19 (100)	16 (84.21)	19 (100)	13 (68.42)	12 (63.16)	17 (89.47)	19 (100)	11 (57.89)
Dried fishes	26	6 (23.08)	24 (92.31)	19 (73.08)	26 (100)	20 (76.92)	6 (23.08)	24 (92.31)	26 (100)	9 (34.62)
Total	116	64 (55.17)	114 (98.28)	102 (87.93)	116 (100)	78 (67.24)	66 (56.90)	108 (93.10)	116 (100)	79 (68.10)

Figures in parentheses indicate percentages

I, C, E, K, N, P, X, S, T are antibiotics (see text)

and erythromycin are the effective antibiotics, since 70% or more of the strains of *S. aureus* were sensitive to these antibiotics. Due to the indiscriminate and uncontrolled use of antibiotics *S. aureus* strains have lost the sensitivity against the common antibiotics. The antibiotic resistant organisms present in fishery products pose a threat in public health activities and clinical practices.

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