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BACTERIOLOGICAL EXAMINATIONS OF THE PUS FROM PATIENTS IN THE SURGERY WARDS OF DR. SOETOMO HOSPITAL, SURABAJA, INDONESIA*

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Hideo KUBOTA, Masahiro YAMAMOTO, Mikio TOKUCHI, Kunio SHINOMURA, Martatko MARMOWINOTO, and I. D. G. SUKARDJA. *Bacteriological Examinations of the Pus from Patients in the Surgery Wards of Dr. Soetomo Hospital, Surabaya, Indonesia.* Kobe J. Med. Sci. 16, 267-272, December 1970—Isolation of bacteria was attempted using the pus collected from local lesions of patients admitted in the Surgery Wards of Dr. Soetomo Hospital, Surabaya, Indonesia, in August-September of 1968. The isolated organisms were identified by various biological and biochemical techniques and were tested for *in vitro* sensitivity to routinely used chemotherapeutics.

The results obtained are summarized as follows: (1) Major isolates were *Staphylococcus aureus*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, and *Escherichia coli*. Smaller numbers of *Staphylococcus epidermidis* and other gram-positive cocci together with gram-negative rods were also recovered. (2) As compared with previous data regarding similar materials of Japanese origin, the following tendencies were noted: (i) Frequencies of isolating *Proteus vulgaris* and *Pseudomonas aeruginosa* were higher in the Indonesian cases than in Japanese ones; (ii) among the major isolates above-mentioned, frequencies of the strains resistant to certain antibiotics were apparently lower than those to the same drugs found in Japan.

INTRODUCTION

Isolation of bacteria and their identification together with drug-sensitivity tests are essential for diagnosis, therapy and prophylaxy of acute bacterial infections. Such

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examinations were carried out with pus specimens from the patients admitted in Surgery Wards of Dr. Soetomo Hospital, a teaching hospital of Airlangga University Faculty of Medicine, in August-September of 1968.

MATERIALS AND METHODS

Putrid specimens were collected from local lesions of patients by the use of a wire needle. Deep puncture cultures were made in nutrient agar media which were transported to Japan by air after an incubation at 37°C for 18 hours at Surabaya. A few weeks later, the subcultures were made on plates of beef extract agar, sheep blood agar, brom thymol blue agar, trypticase soy agar, and staphylococcus medium No. 110, from which colonies grown were fished.

The isolated organisms were subsequently identified by various biological and biochemical tests as listed in Table 1.

Table 1. Biological and biochemical tests for identification of bacterial isolates.

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1. Gram stain.
 2. Mortility test (by dark field illumination microscopy and semi-liquid agar cultivation).
 3. Carbohydrate decomposition tests (using glucose, xylose, mannose, levurose, rhamnose, lactose, sucrose, maltose, dextrine, sorbit, mannit, sulcit, inosit, and sulicine).
 4. Hemolysin test.
 5. Indol production test.
 6. Methylred test.
 7. Acetylmethylcarbinol test.
 8. Citrate utilization test (Simmons)
 9. Gelatine liquefaction test.
 10. Growth test in potassium cyanate medium.
 11. Growth test in 5% NaCl medium.
 12. Catalase test.
 13. Coagulase test.
 14. Malonate utilization test.
 15. Lysine decarboxylation test.
 16. Phenylalanine deaminase production test.
 17. Cytochrome oxidase test.
 18. Oxidase test.
 19. Nitrate reduction test.
 20. Pigment production.
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Drug-sensitivity tests were performed by the following procedures: (1) Cultivate the organism of each strain in nutrient broth at 37°C for 18 hours; (2) put 0.1 ml each of the homogeneous culture fluid on each plate of sensitivity test agar and distribute the inoculum evenly on the surface of the medium by a sterile bent glass rod; (3) after drying the surface of the plate until there is no visible moisture, place sensitivity test discs and incubate the plates at 37°C for 18-24 hours.

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An inhibitory zone more than 1 mm from the edge of discs was regarded as "positive sensitivity" which was further divided into 3 categories (+++, ++, and +) according to criteria as indicated in Table 2.

Table 2. Criteria for drug-sensitivity of test bacteria.

Drug-sensitivity	Inhibitory zone produced:
+++ :	By low concentration disc*
++ :	By medium or high concentration disc
+ :	Only by high concentration disc
- :	No inhibitory zone produced even by high concentration disc

*Procured from EIKEN Co., Japan.

RESULTS

Isolated bacteria and their drug-sensitivities are summarized in Tables 3, 4, and 5.

Table 3. Bacteria isolated from patients' pus.

	Species	No. of strain	%
Gram positive cocci	<i>Staphylococcus aureus</i>	22	28
	<i>Staphylococcus epidermidis</i>	3	4
	Others unidentified	2	3
Gram negative rods	<i>Escherichia coli</i>	9	11
	<i>Proteus vulgaris</i>	24	30
	<i>Pseudomonas aeruginosa</i>	12	15
	Others unidentified	7	9
Total		79	100

Table 4. Sensitivity to test drugs of gram positive isolates.

Sensitivity	PC*	EM	SM	CM	TC	S
<i>Staphylococcus aureus</i> (22 strains)						
+++	1	21	7	15	20	9
++	2	1	1	2	1	1
+	3	0	5	5	1	2
-	16	0	9	0	0	10
<i>Staphylococcus epidermidis</i> (3 strains)						
+++	1	2	1	2	2	1
++	0	0	0	0	0	1
+	0	1	1	1	1	0
-	2	0	1	0	0	1
Other gram positives (2 strains)						
+++	0	1	0	1	1	0
++	0	0	0	0	0	0
+	0	0	0	1	0	0
-	2	1	2	0	1	2

*Abbreviation of name of drug:

PC=penicillin, EM=erythromycin, SM=streptomycin, CM=chloramphenicol, TC=tetracycline, S=sulfisoxazol.

Table 5. Sensitivity to test drugs of gram-negative isolates.

Sensitivity	PC*	EM	SM	CM	TC	S
<i>Escherichia coli</i> (9 strains)						
+++	0	0	3	3	6	0
++	1	1	0	0	0	1
+	2	2	2	0	3	0
-	6	6	4	6	0	8
<i>Proteus vulgaris</i> (24 strains)						
+++	1	1	4	8	2	3
++	6	1	3	5	3	1
+	8	1	8	7	18	1
-	9	21	9	4	1	19
<i>Pseudomonas aeruginosa</i> (12 strains)						
+++	1	0	1	1	0	0
++	0	0	0	0	0	0
+	0	1	0	2	3	0
-	11	11	11	9	9	12
<i>Other gram negatives</i> (7 strains)						
+++	1	2	1	6	5	0
++	1	0	0	0	2	0
+	1	1	4	0	0	1
-	4	4	2	1	0	6

* The abbreviations of name of drug are the same as indicated in Table 4.

DISCUSSION AND SUMMARY

The present studies were conducted under some limited conditions as above-mentioned. It is true at the same time that, while the disc test is an easy and useful tool for examination of the drug sensitivity of bacteria, many technical points must be carefully considered in order to achieve satisfactory accuracies by this method.^{2, 3, 4, 7)} Keeping these aspects in mind, our data will be discussed in comparison with those recently reported, especially regarding similar materials obtained by Japanese investigators.

The following aspects are to be pointed out:

(1) Frequencies of isolating *Proteus vulgaris* and *Pseudomonas aeruginosa* in the present examinations were higher than those by Oguri⁵⁾ who reported isolation frequencies of 4.7% for *Proteus vulgaris* and of 8.7% for *Pseudomonas aeruginosa*.

(2) In our data, no strain of EM-resistant *Staphylococcus aureus* was found, while frequencies of the same organism resistant to PC, SM, CM, TC and S were essentially the same as those reported by previous investigators dealing with specimens obtained in Japan^{5, 6)} or in Okinawa, Korea, Continental China, Formosa, Philippines, etc.¹⁾

(3) Stains of *Staphylococcus epidermidis* and other gram positive cocci isolated in the present studies were too few to discuss the significance of the drug-sensitivity data.

(4) Frequencies of TC-resistant *E. coli* in our data were apparently lower than those in other reports⁶⁾ in which more than 50% of Japanese isolates of the same species were shown to be resistant.

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(5) Although *Proteus vulgaris* is generally resistant to many kinds of chemotherapeutics, number of the CM-resistant *vulgaris* strains in the present records appeared to be a little lower, as compared with the other results obtained in Japan.⁶⁾

In short, while the present protocols regarding the Indonesian specimens are compatible with those by previous investigators dealing with similar materials of Japanese origin, tendencies were noted so far that frequencies of isolating *Proteus vulgaris* and *Pseudomonas aeruginosa* from the pus were higher in the Indonesian cases than in Japanese ones, and that, among the major isolates of Indonesian origin, frequencies of *Staphylococcus aureus*, *E. coli* and *Proteus vulgaris* resistant to certain kinds of antibiotics were lower than those to the same drugs found in Japan.

Problems of whether, or how, such bacteriological differences are correlated with geographic-climatological and/or medico-social differences between the two countries, such as temperature, humidity, living custom, usage of chemotherapeutics, etc., are not clear from the present data and deserve future investigations.

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