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A Report on the Shigella Cultures Isolated in Korea(1973)*

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=國文抄錄=

1973年 韓國에서 分離된 痢疾菌에 關한 報告

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著者들은 1967年, 1971年 및 1972年에 各其 41株, 45株 및 88株의 典型的인 痢疾菌株를 同定試驗하고 그들의 微生物學的 및 生化學的 性狀과 血淸型的 分類結果를 報告한 바 있었다.[1~3]

1973年度에 全國 11個市道 衛生試驗所와 各級 綜合病院에서 同定依賴된 1644件의 菌株中 58株의 痢疾菌이 最終的으로 同定되었으므로 그들의 性狀과 試驗結果를 要約하여 이에 報告하는 바이다.

비록 檢體는 全國各地에서 蒐集되었으나 最終的으로 痢疾菌이 同定檢出된 地域은 서울地方과 全羅北道, 江原道 및 濟州道이었으며 總菌株 58株中에서 51株가 S. flexneri이었고 나머지 7株는 S. sonnei이었다. S. flexneri 51株中 26株가 B_{2a}이었으며 서울地方 및 江原道에서 分離되었다. B_{3a}가 25株 있었던바 全羅北道와 江原道에서 檢出되었다. 濟州道에서는 前年에 B_{3a} 1株가 分離된데 이어 今番에는 S. sonnei 1株가 檢出되어 過去에 腸內 病原性細菌이 檢出되지 않던 來歷이 近年에 와서 달라졌다고 하겠다.

生化學的性狀에 있어서는 arginine decarboxylase 陽性菌이 S. flexneri B_{2a}에서 2株 觀察된 것 外에는 前年度와 같이 典型的인 樣相을 나타내었다.

韓國에서 常用되는 몇가지 抗菌劑에 對한 感受性檢査를 Ericsson 氏法에 依하여 實施한 結果 ampicillin, cephalosporin 및 nitrofurantoin에 對하여서는 全菌株가 感受性菌으로 나타난 反面 neomycin, bacitracin 및 colistin에 對하여서는 耐性菌으로 나타났다. chloramphenicol에 對하여서는 S. flexneri B_{2a}는 大部分 耐性菌이 었으나 B_{3a}는 大部分 感受性이 있었으며 S. sonnei는 約 半半이었다. gentamycin에 對하여서도 比較的 感受性이 있었던 것으로 試驗管內試驗에서 觀察되었다.

INTRODUCTION

Following the reports on the Shigella cultures in previous years[1~3], the authors identified fifty-eight cultures of Shigella among 1644 suspectable cultures of enteric pathogens collected and sent by the eleven provincial & city hygiene laboratories and some hospitals in order to be bacteriologically confirmed in the National Institute of Health, Korea in 1973.

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Of the fifty-eight cultures fifty-one belonged to the subgroup B and the rest to the subgroup D, and none of cultures belonging to the subgroup A or the subgroup C was detected as observed in the last year.

The geographical distribution was analysed, and the biochemical and serological properties of the identified cultures were tabulated in addition to the results summarized from the antibiotics sensitivity tests in this report.

MATERIALS AND METHODS

The number of suspectable cultures of enteric pathigens were 1644 which were screened and transported in either KIA or TSI media to the NIH by the eleven cities and provincial laboratories or some hospital laboratories. They were originally screened in those laboratories through the procedures using direct streakings on MacConkey agar media or SS agar media of the specimens either directly sampled in hospitals or carried from the epidemic areas in the Cary and Blair transport media.[4]

Indole test, methly red test, Voges-Proscauer test and citrate utilization test were performed by means of the conventional procedures recommended by Edwards and Ewing.[5] Motility test, the test for the growth in air, catalase test, oxidase test, glucose test (gas), oxidation-fermentation test, urease test, KCN test, nitrate reduction test, gelatin liquefaction test were carried out according to the first-stage diagnostic scheme published by Cowan and Steel.[6] For the Jordan's tartrate test, phenylalanine deaminase and decarboxylase tests were performed according to the recommedation made by Edwards and Ewing.[5] For the fermentation tests of carbohydrates, lactose, sucrose, maltose, trehalose, cellobiose, raffinose, arabinose, xylose, rhamnose, glucose, salicin, adonitol, dulcitol, glycerol, mannitol, sorbitol and inositol were used.

The agglutination tests were performed with the diagnostic subgroup antisera prepared in the National Institute of Health, Korea and the determination of the specific serotypes was done with both ordinary suspensions and boiled suspensions of the cultures by using the type-specific and group-specific factors prepared by the Wellcome Research Laboratories.

The sensitivity of the cultutes to various antimicrobial drugs were carried out by means of Ericsson's disc method[7] using nitrofurantoin, cephalosporin, ampicillin, colistin, bacitracin, neomycin, sulfisodimidine, lincomycin, penicillin V & G, chloramphenicol, tetracycline, oxytetra-cycline, doxycycline, meticillin, erythromycin, kanamycin, gentamycin and streptomycin.

RESULTS

1. Fifty-eight cultures of Shigella were identified among 1644 cultures submitted by the eleven hygiene laboratories of cities and provincial level in order to be bacteriologically confirmed in the National Institute of Health, Korea, from all over the country in 1973.

2. Of fifty-eight cultures of Shigella confirmed thirty-four cultures were isolated among the specimens sent from Kangwon-Do, twenty-one cultures from Jeonla-bug-Do, two cultures from Seoul area, and one from Cheju-Do where was considered to be a virgin area for enteric pathogens until a couple of years ago.

3. As shown in Table 1, fifty-one cultures belonged to the subgroup B and seven cultures to the subgroup D, and none of cultures belonging to the subgroup A or the subgroup C was detected in 1973. Twenty-six cultures out of 51 Shigella flexneri were found to be B_{2a} and the rest B_{3a}. Among seven cultures of Shigella

Table 1. Number of Shigella cultures isolated in 1973 by serotypes and geographical distribution

Areas	No. of cultures identified	Serotypes			
		B_{2a}	B_{3a}	D_1	D_2
Seoul area	2	2			
Jeonla-bug-Do	21		21		
Kwangwon-Do	34	24	4	3	3
Cheju-Do	1				1
Subtotal	58	26	25	3	4
Total	58	51		7	

Table 2. The physicochemical properties of Shigella cultures identified in 1973

Tests or substrates	B_{2a} (26 cultures) % +ve	B_{3a} (25cultures) % +ve	$D_{1,2}$ (7cultures) % +ve
Indole	0	100	0
Mtehyl Red	100	100	100
Voges-Proskauer	0	0	0
Simmons' citrate	0	0	0
Gas from glucose	0	0	0
Hydrogen sulfide	0	0	0
Urease	0	0	0
KCN	0	0	0
Motility	0	0	0
Catalase	100	100	100
Oxidase	0	0	0
Oxidation-Fermentation	100F	100F	100F
Nitrate reduction	100	100	100
Gelatin liquefaction	0	0	0
Malonate	0	0	0
Jordan's tartrate	0	0	0
Phenylalanine deaminase	0	0	0
L-Lysine diqydrochloride	0	0	0
L-Arginine monohydrochoride	7.6	0	100
L-Ornithine dihydrochloride	0	20	100

sonnei, three cultures were found to be phase I and the others phase II.

4. The results of the physicochemical tests on the identified Shigella cultures were summarized in Table 2 and all the cultures tested demonstrated typical properties as described in texts according to the different serotypes. In regards to the biochemical properties, those cultures showed quite agreeable results comparing with the descriptions made in other countries except the variable results obtained from fermentation tests of rhamnose and glycerol although they were observed as delayed reactions as shown in Table 3.

5. With the results observed from the drug sensitivity tests, all the cultures were found to be sensitive to nitrofurantoin, cephalosporin and ampicillin, and resistant to colistin, bacitracin regardless the different serotypes as summarized in the Table 4. The majority of Shigella cultures

Table 3. Biochemical properties of Shigella cultures with carbohydrates

Serotypes / Substrates	B_{2a} % +ve (% +ve)	B_{3a} % +ve (% +ve)	$D_{1,2}$ % +ve (% +ve)
Lactose	0	(24)	0
Sucrose	3.8	4(72)	0
Maltose	26.6 (7.6)	100	100
Trehalose	84.8 (3.8)	100	100
Cellobiose	0	0	0
Raffinose	(19)	36(16)	(14)
Arabinose	49.4(41.8)	(32)	100
Xylose	0	0	0
Rhamnose	3.8	0	100
Glucose	100	100	100
Salicin	0	0	0
Adonitol	0	0	0
Dulcitol	0	0	0
Glycerol	(3.8)	0	(100)
Mannitol	100	100	100
Sorbitol	0	100	0
Inositol	0	0	0
No. of cultures tested	26	25	7

* Signs & numbers in parenthesis: Positive reactions after 3 or more days.

were found to be either resistant or moderate resistant to other drugs tested except gentamycin. Chloramphenicol, tetracycline, oxytetracycline and doxycycline were found to show fairly effective inhibitory results for the majority of Shigella flexneri 3a tested.

SUMMARY

The authors identified fifty-eight Shigella cultures among 1644 cultures and specimens of enteric pathogens collected from all over the country in 1973.

Fifty-one out of fifty-eight cultures belonged to Shigella flexneri and the rest to Shigella sonnei. None of cultures belonging to either subgroup A or C was detected in 1973. Of fifty-one cultures of Shigella flexneri twenty-six cultures were B_{2a}, which were isolated in Seoul area and Kwangwon-Do. The rest were B_{3a} which were isolated in Jeonla-bug-Do and Kangwon-Do. It would not be possible to understand that there might not have been the cases or carriers of Shigella in the areas where the organisms were not isolated in 1973 and that there might not have been any other serotypes existing in the country, although there was a quite disparity found in the distribution between different areas and in the detection of the serotypes as shown in Table 1.

Concerning the biochemical properties there were only two cultures showing positive arginine decarboxylase test among B_{2a}, and there were three cultures of trehalose negative cultures, one of rhamnose positive culture and one of glycerol positive culture observed, which were considered to be unusual.

All the Shigella cultures were sensitive to nitrofurantoin, cephalosporin and ampicillin, and resistant to colistin, bacitracin and neomycin. Majority of them showed sensitive results to gentamycin, and the majority of Shigella B_{3a} appeared to be sensitive to chloramphenicol, tetracycline, oxytetracycline and doxycycline, but the majority of B_{2a} and Shigella sonnei were observed resistant to those antibiotics by means of the In-Vitro tests.

Table 4. The sensitivity of 58 Shigella cultures to the antibiotics tested in 1973

Drugs \ Serotypes	B_{2a} (26 cultures)	B_{3a} (25 cultures)	$D_{1,2}$ (7 cultures)
Nitrofurantoin	0/26	0/25	0/7
Cefalpsporin	0/1(25)	0/4(21)	0/(7)
Ampicillin	0/ (26)	0/ (25)	0/7
Colistin	26/0	25/0	7/0
Bacitracin	26/0	25/0	7/0
Neomycin	6(20)/0	6(19)/0	(7)/0
Sulfisodimidin 0.25 mg	/(1)	25/0	7/0
Sulfisodimidin 2.5 mg	23(1)/1(1)	24/1	7/0
Lincomcin	16(10)/0	6(18)/(1)	7/0
Penicillin-V 10μg	16(10)/0	19(14)/(2)	7/0
Penicillin-G 1.0μg	0/(26)	(25)/0	0/(7)
Penicillin-G 10μg	1/(25)	0/(25)	(5)/(2)
Chloramphenicol	24/2	3/22	4/2(1)
Tetracycline	19(4)/3	(3)/22	4(2)/1
Oxytetracycline	23/3	3/22	6/1
Doxycycline	22(1)/3	3/22	4(3)/0
Meticillin	24/2	20/5	0/7
Erythromycin	5(19)/(2)	2(18)/4(1)	7/0
Kanamycin	(12)/14	(12)/13	(4)/3
Gentamycin	(4)/(22)	(8)/1(16)	(2)/(5)
Streptomycin	17(8)/1	1(17)/7	(7)/0

No./No.: Number of cultures showing resistant (moderate resistant)/ sensitive (moderate sensitive).

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