

A report on the Shigella cultures isolated in Korea(1974)*

Soon-hit Kim, B.S., Nam-ho Chun, M.D., Younghat Ryu, M.D.

Department of Microbiology, National Institute of Health, Korea

==국문초록==

1974년 한국에서 분리된 이질균에 관한 보고

국립보건연구원 미생물부

김순희 · 전남호 · 유명해

저자들은 1967년 이래 '71년, 72년, 73년 4년에 걸쳐 232주의 전형적인 이질균을 동정확인하여 정리한바 있다.

1974년에도 1,504주의 장내 병원성세균이 각 시, 도, 위생시험소 및 종합병원 등에서 수집되어 검사대상이 되었으며 이질균으로 동정확인된 47주를 얻게 되었으므로 그들의 미생물학적 성상을 보고하는 바이다. 서울에서 분리된 *shigella flexneri* 3주를 제외하고는 강원도에서 44주가 분리되었으며, 그 내역은 *shigella dysenteriae* 가 1주, *shigella flexneri* 가 43주, *shigella sonnei* 가 3주이었다.

생물학적 성상중 과거에 시험되지 않았던 Christensen's citrate, Sodium acetate, Sodium alginate, Esculin test 등을 시도하였으며 그결과는 미국 Center for Disease Control에서 발표된 성적과 비슷한 결과로 나타났다.

우리나라에서 흔히 상용될 수 있는 항생제에 대한 감수성 검사를 실시하였으며 nitrofurantoin, cephalosporin, ampicillin, penicillin G 1 μ g 에 대해서는 1973년도 균주와 마찬가지로 감수성균으로 반응을 보였으며, 반대로 bacitracin, lincomycin, penicillin V 10 μ g 에 대해서는 전적으로 내성이 있는 것으로 나타났다. 이 결과들은 예년과 마찬가지로 Ericsson 씨 법에 의해 관찰된 것이었다.

INTRODUCTION

Following the reports on the Shigella cultures published in previous years, the authors identified forty seven cultures of Shigella among 1504 suspectable of enteric pathogens collected and sent by the eleven provincial & city hygiene laboratories and several hospitals in order to be bacteriologically confirmed in

the National Institute of Health, Korea in 1974.

Of the forty-seven cultures one belonged to the subgroup A, forty-three to the subgroup B, and the rest to the subgroup D, and none of cultures belonged to the subgroup C as observed in the last year.

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

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MATERIALS AND METHODS

The number of suspectable cultures of enteric pathogens were 1504 which were screened and transported in KIA or TSI, sometimes in Cary & Blair's transport media, to the National Institute of Health by the eleven cities & provincial laboratories and some hospital laboratories. Most of cultures were screened in those laboratories through the procedure by direct streaking on MacConkey agar media and S.S. agar media. In some cases, they were transported from epidemic areas in Cary & Blair's transport media.

IMViC test, motility test, urease and KIA or TSI responses were observed, which were key tests for the classification of enteric pathogens primarily. Continuously, varieties of carbohydrate were tested such as lactose, sucrose, mannitol, dulcitol, salicin, abonitol, inositol, sorbitol, arabinose, raffinose, rhamnose, and gas and acid production from glucose.

KCN, O-F test, nitrate reduction test, gelatin liquefaction test, malonate, Jordan's tartrate, phenylalanine deaminase, Christensen's citrate, Sodium acetate, Sodium alginate, esculin and decarboxylase tests were performed.

Furthermore the tests for maltose, trehalose, cellobiose and xylose, which were described already by Ewing in his reports "Salmonella and Shigella", were added.

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

The sensitivity of the cultures to various antimicrobial drugs were observed by means of Ericsson's disc methods using nitrofurantoin, cephalosporin, ampicillin, penicillin G & V, bacitracin, lincomycin, sulfisodimidine, chloramphenicol, tetracycline, oxytetracycline, doxycycline, erythromycin and streptomycin.

RESULTS

1. Forty-seven cultures of *Shigella* were identified by the National Institute of Health, Korea among 1504 suspectable cultures isolated in Korea in 1974.

2. Of forty-seven *Shigella* cultures confirmed three cultures were isolated among the specimen sent from Seoul area, and forty-four cultures from Kang-Won-Do.

3. According to the table 1, forty-three cultures belonged to the subgroup B, three to the subgroup D, one to the subgroup A, none of cultures belonging to the subgroup C was detected in 1974. Forty one cultures out of forty three *Shigella flexneri* were found to be B_{2a} and the rest B_{3c}. *Shigella dysenteriae* culture was A₂. Among three cultures of *Shigella sonnei*, one was found to be phase 1 and the others phase 2.

4. The results of the physicochemical responses of the identified *Shigella* cultures were summarized in table 2 and 3, and all the cultures appeared to show the typical properties as described in texts according to the analyzed serotypes. In regards to the biochemical results, those cultures showed quite agreeable results comparing with the descriptions published by the Center for Disease Control, U.S.A.

5. With the results obtained from the drug sensitivity tests, all the cultures showed sensitive patterns to nitrofurantoin, cephalosporin, ampicillin, and penicillin G 1 μ g but resistant

Table 1. Number of *Shigella* cultures identified in 1974 by serotypes and geographical distribution

Areas	No. of cultures identified	Serotypes				
		A ₂	B _{2a}	B _{3c}	D ₁	D ₂
Seoul area	3		3			
Kangwon-Do	44	1	38	2	1	2
Total	47	1	41	2		3

Table 2. The physicochemical properties of shigella cultures identified in 1973 and 1974

Serotype	Shigella	A ₂		B _{2a}		B _{3a}		B _{3c}		B _{1/2}	
Sign	Sign	+/-		+/-		+/-		+/-		+/-	
Substrate	Year	1973	1974	1973	1974	1973	1974	1973	1974	1973	1974
		Indol	-or+	ND*	1/0	0/26	35/6	25/0	ND	ND	2/0
Methyl Red	+	ND	1/0	26/0	41/0	25/0	ND	ND	2/0	7/0	3/0
Voges-Proskauer	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
Simmons' citrate	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
Gas from glucose	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
Hydrogensulfide	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
Urease	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
KCN	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
Motility	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
Oxidation-Fermentation	+	ND	F1	F26	F41	F25	ND	ND	F2	F7	F3
Nitrate reduction	+	ND	1/0	26/0	41/0	25/0	ND	ND	2/0	7/0	3/0
Gelatin liquifaction	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
Malonate	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
Jordan's tartrate	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
Phenylalanine deaminase	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
Christensen's citrate	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
Sod. acetate	-	ND	0/1	ND	0/41	ND	ND	ND	0/2	ND	0/3
Sod. alginate	-	ND	0/1	ND	0/41	ND	ND	ND	0/2	ND	0/3
Esculin	-	ND	0/1	ND	0/41	ND	ND	ND	0/2	ND	0/3
L-Lysine dihydrochloride	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3
L-Arnyine monohydrochloride	d	ND	0/1	2/24	0/41	0/25	ND	ND	0/2	7/0	0/3
L-ornithine dihydrochloride	d	ND	0/1	0/26	0/41	5/20	ND	ND	0/2	7/0	3/0

* ND: not tested.

patterns to bacitracin, lincomycin and penicillin V 10 µg.

SUMMARY

The authors identified forty-seven *Shigella* cultures among 1504 susceptible cultures of

enteric pathogens collected from all over the country in 1974. Forty-three out of forty-seven cultures belonged to *Shigella flexneri*, three to *Shigella sonnei* and the rest to *Shigella dysenteriae*, and none of cultures belonging to subgroup C was detected in 1974. Three *Shigella flexneri* 2a cultures were isolated in

Table 3. Biochemical properties of *Shigella* cultures with carbohydrates

Sero-types		Shigella		A ₂		B _{2a}		B _{3a}		B _{3c}		D _{1,2}	
SiSn	Sign	+/-		+/-		+/-		+/-		+/-		+/-	
Substrate	Year	1973		1974		1973		1974		1973		1974	
		Lactose	d	ND	0/1	0/26	0/41	(6)/19	ND	ND	0/2	0/7	0/3
Sucrose	d	ND	0/1	1/25	0/41	1(18)/6	ND	ND	(2)/0	0/7	0/3		
Maltose	d	ND	0/1	7(2)/17	12/29	25/0	ND	ND	0/2	7/0	3/0		
Trehalose	d	ND	0/1	22(1)/3	33/8	25/0	ND	ND	2/0	7/0	3/0		
Cellobiose	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3		
Raffinose	d	ND	0/1	(5)/21	23/36	9(4)/12	ND	ND	(1)/1	(2)/5	0/3		
Arabinose	d	ND	0/1	13(1)/2	9(25)/7	(8)/17	ND	ND	2/0	7/0	3/0		
Xylose	d	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3		
Rhamnose	d	ND	(1)/0	1/25	(1)/40	0/25	ND	ND	0/2	7/0	3/0		
Glucose	+	ND	1/0	26/0	41/0	25/0	ND	ND	2/0	7/0	3/0		
Salicin	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3		
Adonitol	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3		
Dulcitol	d	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3		
Mannitol	+or-	ND	1/0	26/0	41/0	25/0	ND	ND	2/0	7/0	3/0		
Sorbitol	d	ND	0/1	0/26	0/41	25/0	ND	ND	0/2	0/7	0/3		
Inositol	-	ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7	0/3		

Numbers in parenthesis: Positive reactions after 3 or more days.

Table 4. The sensitivity of *Shigella* cultures to the antibiotics tested in 1973 and 1974

Serotypes		A ₂		B _{2a}		B _{3a}		B _{3c}		D _{1,2}	
No. of cultures		0	1	26	41	25	0	0	2	7	3
Antibiotics	Year	1973	1974	1973	1974	1973	1974	1973	1974	1973	1974
	Nitrofurantoin		ND	0/1	0/26	0/41	0/25	ND	ND	0/2	0/7
Cephalosporin		ND	0/1	0/1(25)	0/11(30)	0/4(21)	ND	ND	0/1(1)	0/(7)	0/(3)
Ampicillin		ND	0/(1)	0/(26)	0/1(40)	0/(25)	ND	ND	0/(2)	0/7	0/(3)
Penicillin G 1 µg		ND	0/(1)	0/(26)	0/(41)	0/25	ND	ND	0/(2)	0/(7)	0/(3)
Bacitracin		ND	1/0	26/0	41/0	25/0	ND	ND	2/0	7/0	3/0
Lincomycin		ND	1/0	16(10)/0	41/0	6(18)/(1)	ND	ND	2/0	7/0	3/0
Penicillin V 10 µg		ND	1/0	16(10)/0	41/0	9(14)/2	ND	ND	2/0	7/0	3/0
Sulfisodimidin 0.25 mg		ND	0/1	24(1)/1	38/3	25/0	ND	ND	1/1	7/0	3/0
Sulfisodimidin 2.5 mg		ND	0/1	23(1)/1(1)	38/3	24/1	ND	ND	1/1	7/0	3/0
Chloramphenicol		ND	1/0	24/2	37/4	3/22	ND	ND	1/1	4/2(1)	3/0
Tetracycline		ND	0/1	19(4)/3	24(14)/3	(3)/22	ND	ND	1/1	4(2)/1	0/2(1)
Oxytetracycline		ND	0/1	23/3	38/3	3/22	ND	ND	1/(1)	6/1	3/0
Doxycycline		ND	0/1	22(1)/3	38/3	3/22	ND	ND	1/(1)	4(3)/0	3/0
Erythromycin		ND	1/0	9(19)/(2)	5(24)/4(8)	2(18)/4(1)	ND	ND	1(1)/0	7/0	3/0
Streptomycin		ND	(1)/0	17(8)/1	29(6)/3	1(17)/7	ND	ND	1/1	(7)/0	(3)/0

/: No. of cultures resistant/No. of cultures sensitive.

(): The number in parenthesis means either moderate resistant or moderate sensitive.

Seoul area, but the others in Kangwon-Do.

All the *Shigella* cultures were sensitive to nitrofurantoin, cephalosporin, ampicillin and penicillin G 1 μ g, but resistant to bacitracin, lincomycin and penicillin V. 10 μ g by means of the In-Vitro tests.

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