

ANNUAL AND GEOGRAPHICAL DISTRIBUTION OF SHIGELLA SEROTYPES IN SABAH, MALAYSIA FROM 1974 TO 1978

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SUMMARY

19,983 cases of diarrhoea throughout Sabah, Malaysia from January 1974 to December 1978 were bacteriologically examined for *Shigella*. A total of 241 *Shigella* isolates representing 9 serotypes were encountered. *S. flexneri* and *S. sonnei* accounted for 69.7% and 29.5% of the isolates respectively. *S. flexneri* type 2 was very common and comprised 47% of the *flexneri* strains. *S. flexneri* types 5, 6 and Y were rarely found. Only two cases of *S. boydii* were isolated. *S. dysenteriae* was not encountered. Isolation rates ranged from 0.64% to 1.73% while the percentages of cases of diarrhoea bacteriologically examined in relation to the number notified ranged from 13.7 to 29.6. Kota Kinabalu, Tawau and Sandakan accounted for 50.6%, 21.2% and 8.2% of *Shigella* isolates respectively. However, no isolations were made from Lahad Datu, Semporna and Victoria [Labuan Island]. *S. flexneri* type 5 was only found in Sandakan while *S. flexneri* type Y was isolated from Kota Kinabalu. No *S. sonnei* was found in Ranau and Tenom.

INTRODUCTION

IN DEVELOPING countries diarrhoeal diseases are the leading cause of morbidity and mortality

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particularly in infants and are widespread in areas where there are poor environmental sanitations which permit contamination of food and water with human excreta. Although much is known of the various bacterial causes of diarrhoea in Peninsular Malaysia (Lim *et al.*, 1970; Jegathesan *et al.*, 1975; Jegathesan and Paramasivam, 1976; Jegathesan *et al.*, 1976) no information as such is available in Sabah. Relatively little is known on the prevalence, distribution and epidemiology of the various bacterial agents that are responsible for diarrhoea in Sabah. In January 1974, a surveillance programme on bacterial causes of diarrhoea was initiated. This paper presents data on the annual and geographical distribution of *Shigella* serotypes that were isolated from 19,983 cases of diarrhoea over a period of five years from January 1974 to December 1978.

MATERIALS AND METHODS

Stool or rectal swab specimens from cases of diarrhoea were sent to the Bacteriology Section, Central Laboratory, Queen Elizabeth Hospital, Kota Kinabalu. Specimens were transported from various hospitals throughout Sabah, namely Beaufort, Keningau, Kota Belud, Kota Kinabalu, Kudat, Lahad Datu, Papar Ranau, Sandakan, Semporna, Tambunan, Tawau, Tenom and Victoria (Labuan Island). They included cases of diarrhoea from both urban and rural areas.

A single stool or rectal swab specimen from 19,983 patients with diarrhoea from January 1974 to December 1978 was bacteriologically investigated. Stool or rectal swab specimens were sent either fresh (in cases where transport time was

minimal) or in Stuart's Transport medium.* Routinely, all specimens were plated directly onto MacConkey agar* (M), Hektope Enteric agar ** (HE) and into enrichment broths, alkaline peptone water and Selenite F broth* (SF). Subcultures from SF were made onto HE. Cultures were incubated at 37°C for 24 hours.

Suspicious colonies on M or HE were inoculated into Kligler's Iron agar* and Lysine Iron agar**, and thereafter subjected to biochemical tests as described by Edwards and Ewing (1972). Confirmed *Shigella* isolates were then serotyped with *Shigella* group antisera ** and *S. flexneri* type specific antisera ** (Edwards and Ewing, 1972). Other causative agents were also identified.

RESULTS

A total of 9 *Shigella* serotypes were encountered among 241 isolates over the 5 year period (Table I). *S. flexneri* was most frequently isolated from diarrhoea cases and accounted for 69.7% of all *Shigella* isolations, *S. flexneri* type 2 was very common amounting to 47% of the *flexneri* strains. *S. flexneri* types 5, 6 and Y were rarely encountered. Next in frequency was *S. sonnei* which accounted for 29.5% of the isolations. Two cases of *S. boydii* were isolated, one each in 1977 and 1978.

Not all the notified diarrhoea was investigated for bacterial pathogens (Table II). Nevertheless, the number of diarrhoea bacteriologically investigated increased steadily over the five-year period. The percentages bacteriologically examined in relation to the number notified ranged from 13.7% to 29.6%. Isolation rates for *Shigella* over this five years period ranged from 0.64% to 1.73%.

The geographical distribution of the various *Shigella* serotypes in Sabah was shown in Fig. 1. Most of the isolations were obtained from 3 major towns, Kota Kinabalu 50.6%, Tawau 21.2% and Sandakan 8.2%. No isolations of *Shigella* serotypes were made from Lahad Datu, Semporna and Victoria. All 3 isolates of *S. flexneri* type 5 were made from Sandakan whereas 2 isolates of *S. flexneri* type Y were encountered from Kota Kinabalu. *S. sonnei* was not isolated from Ranau and Tenom.

DISCUSSION

Over the five-year period 1974 to 1978, the most commonly encountered isolation of *Shigella* serotypes from diarrhoea cases in Sabah was the *flexneri* group followed by *S. sonnei*. Similar findings have been reported in Peninsular Malaysia (Institute for Medical Research Annual

TABLE 1 ANNUAL DISTRIBUTION OF SHIGELLA SEROTYPES IN SABAH, MALAYSIA 1974 — 1978.

Shigella Serotypes	No. Of Isolates For Year					Total
	1974	75	76	77	78	
Shigella flexneri type 1	1	5	9	8	13	36
" " " 2	5	6	1	16	51	79
" " " 3	2	2	5	2	18	29
" " " 4	2	3	3	1	6	15
" " " 5	—	2	1	—	—	3
" " " 6	1	—	2	1	—	4
" " " Y	—	—	—	2	—	2
" sonnei	8	11	19	10	23	71
" boydii	—	—	—	1	1	2
Total	19	29	40	41	112	241

* OXOID ** DIFCO

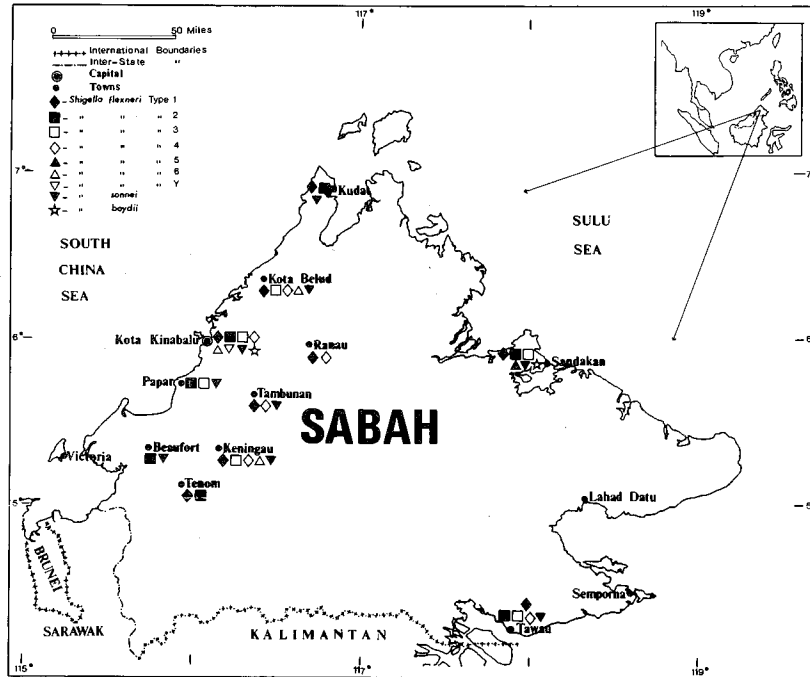


Fig. 1. Geographical distribution of *Shigella* serotypes in Sabah, Malaysia 1974 - 1978.

TABLE II NUMBER OF DIARRHOEA NOTIFIED AND BACTERIOLOGICALLY EXAMINED AND POSITIVE SHIGELLA ISOLATION RATES IN SABAH, MALAYSIA 1974-1978.

	No. (%) of cases for year				
	1974	75	76	77	78
Notified diarrhoea cases for whole state of Sabah	— ^a	— ^a	22,916	21,578	23,573
Diarrhoea cases bacteriologically investigated	1,510	2,484	3,143 (13.7)	6,387 (29.6)	6,459 (27.4)
Shigella cases from bacteriological investigations	19 (1.26)	29 (1.17)	40 (1.27)	41 (0.64)	112 (1.73)

Report, 1974, 1975, 1976, 1977; Lim *et al.*, 1970, Jegathesan *et al.*, 1976). No attempts were made to separate serotypes of *S. flexneri* into serotypes a, b and c. Only two cases of *S. boydii* were found in Sabah, one in Sandakan and the other in Kota Kinabalu whereas only one case of *S. boydii* type 3 was encountered in Peninsular Malaysia over a period of 4 years from 1974 to 1977 (I.M.R. Annual Report, 1974, 1975, 1976,

1977). It appeared that infection with this serotype had been recently introduced into Sabah but had not been firmly established in and spread to the community. No *S. dysenteriae* was isolated in Sabah whereas only 2 strains had been detected in Peninsular Malaysia, one each in 1976 and 1977 (I.M.R. Annual Report, 1976, 1977).

The isolation rates for *Shigella* for the first 3 years from 1974 to 1976 were fairly uniform. In 1977 in spite of the two-fold increase in the number of bacteriologically investigated diarrhoeal cases the isolation rate decreased to half that of the previous year suggesting that in 1977 *Shigella* was probably not an important cause of diarrhoea. The sudden increase in 1978 was due to outbreaks in Tawau and Kota Kinabalu by *S. flexneri* type 2 and 3 respectively. Our isolation rates ranging from 0.64% to 1.73% were comparable to that of a study in Peninsular Malaysia where 56 *Shigella* isolates were obtained from 3,809 diarrhoeal cases giving an isolation rate of 1.47% (Jegathesan *et al.*, 1976). The apparent low isolation rates might suggest that *Shigella* was not the major and important causes of diarrhoeas in Sabah.

The number of notified diarrhoeas in Sabah from 1976 to 1978 was a conservative figure and was under-reported as cases treated in private clinics and in some remote dispensaries were not available for inclusion in our data. In the absence of a vigilant system for the notification of diarrhoeal diseases in the State the magnitude of the problem could only be guessed.

Data on the annual distribution of *Shigella* serotypes over the five-year period did not probably reflect the true prevalence of shigellosis in Sabah, because, firstly, not all cases of diarrhoeas were examined bacteriologically. Selection of cases was largely left to the discretion of clinicians. Secondly, no suitable enrichment medium was available for *Shigella* and this could result in some of the cases being missed. Thirdly, only a single stool or rectal swab specimen from each diarrhoeal case was examined. Had multiple stool or rectal swab specimens from each diarrhoeal case been examined isolation rates could have been higher.

Kota Kinabalu, Sandakan and Tawau are major cosmopolitan towns with good airport and seaport. There are frequent movements of people between these towns and neighbouring states and countries. With progressive urbanization and improvement in rapid communications both

within the State and between neighbouring countries result in rapid movement of people, some of whom might be carriers, and with the increase in number of communal restaurants involving carriers connected with food preparation, all these are conducive to the introduction and spread of new serotypes in these towns.

The failure to isolate *Shigella* strains in Lahad Datu, Semporna and Victoria was probably due to the relatively fewer specimens that were sent in Stuart's Transport medium. Over this five-year period 145, 325 and 119 specimens from Lahad Datu, Semporna and Victoria respectively were sent in medium suitable for *Shigella* isolation. Most of the specimens from these three towns were sent only in alkaline peptone water for cholera investigation.

During the surveillance period there were sporadic outbreaks of cholera in the various districts of Sabah (Kan and Chan, *in preparation*) and because an outbreak of this nature would not reflect the true distribution of *Shigella*, all those specimens sent only in alkaline peptone water from all the hospitals were excluded from this study.

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