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Shigellosis in the south-western Cape of Good Hope 1968-85

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SUMMARY

During the period 1968-85 shigella organisms were isolated from stool specimens of 1562 patients attending Tygerberg Hospital, situated in the south-western province of the Cape of Good Hope of the Republic of South Africa. *Shigella flexneri* (72% of patients) was the commonest subgroup identified. *Sh. sonnei* was the second-commonest isolate (20%), with smaller numbers of *Sh. boydii* (5%) and *Sh. dysenteriae* (3%). *Sh. dysenteriae* has not been isolated since 1979. In 1985 30% of isolates were resistant to ampicillin and 52% to trimethoprim-sulphamethoxazole. During this period 12 cases of shigellaemia were seen, 11 in young infants less than 13 months of age who were malnourished in 6 cases. The single adult had had a previous gastrectomy and splenectomy.

INTRODUCTION

Since the description of *Shigella dysenteriae* Type I (Shiga's bacillus) as a cause of dysentery (Shiga, 1898), shigellosis has been recognized throughout the world in both temperate and tropical climates. It is clear that the occurrence of shigella species varies from country to country and within a particular country over a period of time (Christie, 1968). Thus *Sh. dysenteriae* Type I was virtually unheard of between 1920 and its re-emergence in epidemic form in Central America in 1969 (Mata *et al.* 1970). In the United States of America *Sh. flexneri* was for long the dominant form of shigellosis until superseded by *Sh. sonnei* in 1966 (Reller, Gangarosa & Brachman, 1970). In the United Kingdom *Sh. sonnei* displaced *Sh. flexneri* as the dominant shigella species in 1937 and has remained unchallenged since (Taylor, 1957).

In this report we describe the occurrence of the different subgroups and serotypes of shigella in the south-western part of the province of the Cape of Good Hope of the Republic of South Africa for the period 1968-85 together with some of the clinical details of 12 cases of shigellaemia seen at our hospital during this period.

PATIENTS AND METHODS

The south-western Cape of Good Hope has a mediterranean-type of climate, with long dry summers and mild wet winters. Shigellosis is endemic in the area, and although the disease has never threatened to assume epidemic proportions, shigella

species contribute to the increased incidence of infant diarrhoea which is experienced each year in the period January–April.

Patient sources

Tygerberg Hospital, the teaching hospital of the University of Stellenbosch, is situated approximately 30 km from the centre of the city of Cape Town, adjacent to a densely populated low-income housing area, and admits patients not only from its immediate surroundings but also from throughout the south-western Cape of Good Hope. The number of patients presenting to the hospital during the relevant period from whose stool or blood specimens shigella organisms were isolated was derived from the records of the Department of Medical Microbiology, while the clinical records of those patients with shigellaemia were reviewed retrospectively to obtain details of clinical course and outcome.

Bacteriology

Shigella organisms were identified by standard microbiological laboratory techniques (Sonnenewirth, 1980) and antibiotic sensitivity by the impregnated paper-disk method (Stokes, 1975).

RESULTS

During the 18-year-period 1968–85 shigella organisms were isolated from stool specimens of 1562 patients. *Sh. flexneri* was the commonest organism identified and was recovered from the stools of 1124 patients (72 %) of whom 580 (52 %) were children less than 13 years of age. Within this subgroup there were 370 patients (33 %) from whom serotype 3 was isolated, 369 (33 %) with serotype 2(a), 166 (15 %) with serotype 4 and smaller numbers with other *Sh. flexneri* serotypes.

The second commonest subgroup, *Sh. sonnei*, was cultured from the stool of 315 patients (20 %) of whom 225 (71 %) were children. *Sh. sonnei* isolates were not routinely evaluated in the past in respect of phase 1 or phase 2 forms. However, of 78 more recent isolates, 69 (88 %) were phase 1 and only 9 (12 %) phase 2. *Sh. boydii* was isolated from 74 patients (5 %), of whom 39 (53 %) were children, and *Sh. dysenteriae* type 2 from 49 patients (3 %), of whom 25 (51 %) were children.

In Fig. 1 the number of patients from whom the different subgroups and serotypes were isolated each year is illustrated. Not only has the total number of patients from whom shigella were isolated varied from a maximum of 133 in 1980 to 21 in 1984, but the number from whom the different *Sh. flexneri* serotypes were isolated has also varied. From 1974 to 1976 serotype 4, dominated followed by serotype 2a in 1977 and 1978 and serotype 3 from 1979 to 1982. While *Sh. sonnei* and *Sh. boydii* have maintained a more or less constant low-profile presence, *Sh. dysenteriae* has not been isolated since 1979.

In Fig. 2 the monthly incidence of shigellosis cases is illustrated and for *Sh. flexneri* shows a predominance of cases in the late summer and autumn months. No clear seasonal influence is evident for the relatively small numbers of *Sh. boydii* and *Sh. dysenteriae* cases, while *Sh. sonnei* was more frequently isolated in the late autumn and winter months of May and July.

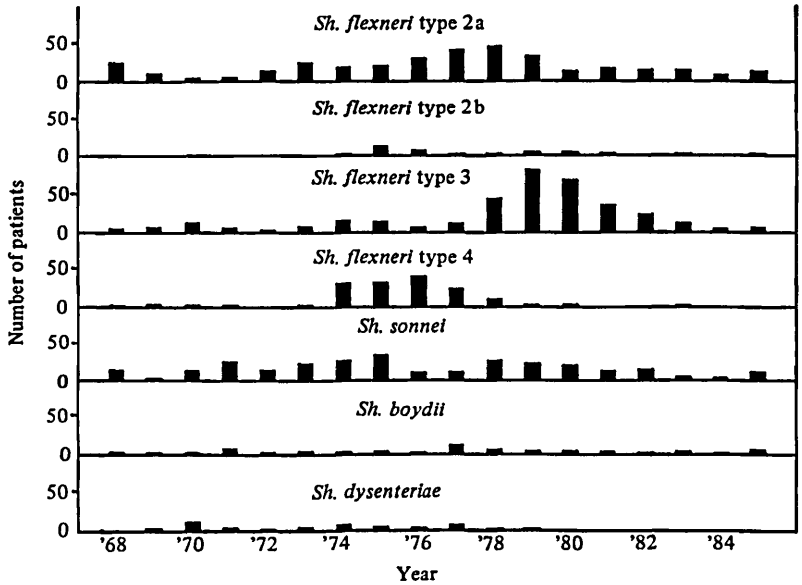

Fig. 1. Number of patients from whom the different shigella subgroups and serotypes were isolated annually, 1968–85.

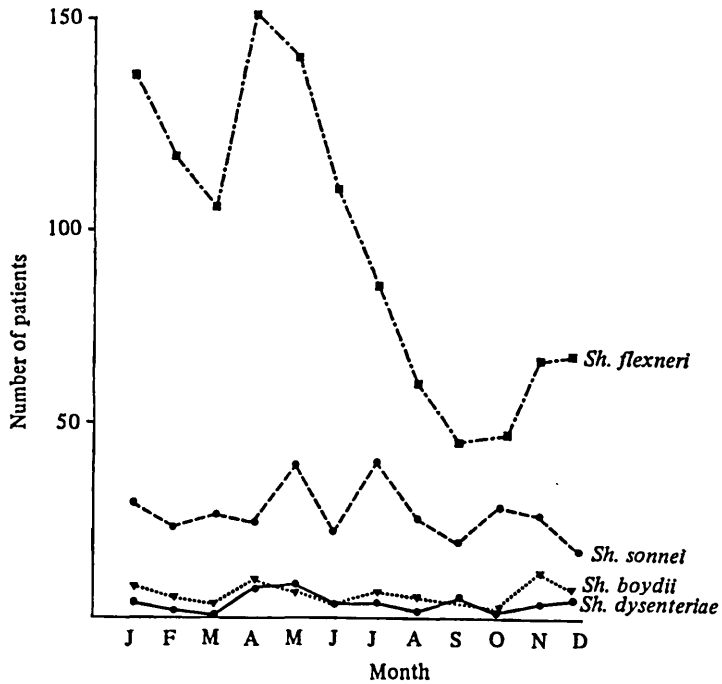

Fig. 2. Number of patients from whom shigella organisms were isolated each month, 1968–85.

During 1985, 31 % of isolates were resistant to ampicillin, 18 % to chloramphenicol, 52 % to trimethoprim-sulphamethoxazole and 31 % to tetracyclines. The aminoglycosides encountered far less resistance and only 3 % of organisms were resistant to gentamicin and tobramycin, 10 % to kanamycin and 10 % to neomycin.

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Table 1. *Clinical features of shigellaemia cases*

Organism*	Age (months)	Sex	Nutrition percentile of mass for age/ serum albumin (g/l)	Clinical features	Outcome
1. *Sh. flexneri* (S)	1	F	> 50/37	Convulsion, dysentery	Survived
2. *Sh. flexneri* (S)	2	M	> 3/35	Convulsion, dysentery	Died
3. *Sh. sonnei* (R)	6	F	> 50/29	Biliary atresia, dysentery	Survived
4. *Sh. flexneri* (R)	6	M	> 50/27	Diarrhoea	Died
5. *Sh. flexneri* (S)	6	M	> 3	Dysentery	Survived
6. *Sh. flexneri* (S)	7	F	< 3/26	Dysentery	Survived
7. *Sh. sonnei* (S)	8	M	> 50/37	Convulsion, dysentery, intussusception	Survived
8. *Sh. flexneri* (S)	9	M	> 3/35	Diarrhoea, *S. aureus* septicaemia	Survived
9. *Sh. boydii* (S)	13	F	< 3/25	Dysentery, Gram-negative shock	Died
10. *Sh. flexneri* (R)	13	F	< 3	Dysentery, klebsiella septicaemia	Survived
11. *Sh. flexneri* (S)	13	F	< 3	Down's syndrome, dysentery	Survived
12. *Sh. flexneri* (S)	61 yr	F	—	Previous splenectomy and gastrectomy, diarrhoea	Survived

* S, sensitive to ampicillin; R, resistant to ampicillin.

In Table 1 some of the clinical features and outcome in the 12 cases of shigellaemia identified at our hospital between 1968 and 1985 are summarized. With a single exception, all cases were from children 13 months of age or younger, six of whom were malnourished (< 3rd percentile of mass for age and/or serum albumin < 30 g/l). Three children in classical fashion experienced a convulsion, one child developed intussusception, while two children developed septicaemia shortly afterwards, owing to a *Klebsiella* sp. in one case and a *Staphylococcus aureus* in the other. The single adult case was a 61-year-old woman who had had a previous partial gastrectomy and splenectomy, thus possibly predisposing to shigellaemia.

DISCUSSION

The predominance of *Sh. flexneri* in this study is common to other parts of the developing world and similar to the situation in the United States of America prior to 1966 (Reller, Gangarosa & Brachman, 1970) and the United Kingdom up to 1937 (Taylor, 1957). In previous series from South Africa 70% of shigella isolates in Johannesburg in 1951 were *Sh. flexneri* (Kahn, 1957), as were 74% of isolates in Durban between 1960 and 1975 (Scragg, Rubidge & Appelbaum, 1978). The fact

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that the majority of *Sh. flexneri* isolates were obtained in the late summer and autumn months is in accordance with experience in other countries (Reller, Gangarosa & Brachman, 1970).

The second commonest isolate was *Sh. sonnei*. This is said to affect mainly children (Taylor, 1957) and 70% of our *Sh. sonnei* isolations were from children compared to approximately 50% of isolates in the case of the other subgroups. In Britain *Sh. sonnei* is responsible for winter episodes of diarrhoea (Christie, 1968) and it is of interest that, although the trend is not clear-cut, our peak incidence of *Sh. sonnei* isolations was in the late autumn and winter months of May and July.

Only relatively small numbers of *Sh. boydii* and *Sh. dysenteriae* were isolated and it is noteworthy that the latter organism, often the second commonest shigella isolated in the developing world (Mabadeje, 1974; Gadebou & Tassew, 1982; Struelens *et al.* 1985), has not been isolated since 1979.

Resistance to ampicillin is common amongst shigella organisms (Gadebou & Tassew, 1982; Struelens *et al.* 1985; Frost *et al.* 1985), so that the 30% incidence of ampicillin resistance found by us in 1985 is not unexpected. Trimethoprim-sulphamethoxazole has been recommended by some for use in shigellosis (Mabadeje, 1974; Gadebou & Tassew, 1982). However, recent experience in Central Africa (Frost *et al.* 1985) and our own findings suggest that even this drug cannot necessarily be relied on, and nalidixic acid was advocated by the last-named authors as an alternative. Unfortunately, in view of our findings, our isolates were not evaluated for resistance to nalidixic acid.

Shigellaemia is a relatively rare occurrence and only 248 cases are recorded in the literature (Struelens *et al.* 1985). Our 12 cases, seen over 18 years, confirm the relative rarity of the condition and its association with the young, frequently malnourished infant, but do not support an association between poor outcome and ampicillin resistance (Duncan *et al.* 1981). Two of the three children who died were in fact infected by ampicillin-sensitive organisms. Klebsiella septicaemia occurring in conjunction with shigella septicaemia has been described previously (Neglia, Marr & Todd Davis, 1976).

Sh. boydii septicaemia was described for the first time in 1969 (Barrett-Connor & Connor, 1969) and infrequently since then. This is perhaps related more to the infrequency with which *Sh. boydii* causes shigellosis than to any inherent property in the organism.

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