Shigellosis in Zaria, Northern Nigeria

R. V. LAWANDE AND R. M. JOSHI
Dept of Medical Microbiology, Ahmadu Bello University Teaching Hospital, P.M.B. 1026, Zaria, Nigeria

Abstract

368 strains of Shigella were recovered from stool specimens in the Department of Medical Microbiology, Ahmadu Bello University Teaching Hospital, Zaria, during the period January 1980 to December 1984. S. flexneri was found to be the most common (60%) followed by S. boydii (20-7%), S. dysenteriae (14-1%) and S. sonnei (5-2%). Males were more frequently infected (61.4%) than females (38-6%). Maximum cases were seen in the 21 to 40 year age group (48-9%). Almost two-thirds of the cases of shigellosis (64-4%) were recorded during the rainy season. Antimicrobial resistance to four or more drugs was recorded in (38%) of the isolates.

Introduction

Shigellosis, an infectious disease of worldwide significance, is a major public health problem in developing countries of the tropics and subtropics. Shigellosis is common in Nigeria (SEN & COLLARD, 1960, 1961). However recent reports are lacking, especially from northern Nigeria, of the pattern of species and serotypes prevalent in this region. Very little information is available on the antimicrobial drug sensitivity of Shigella species from this environment. This study was therefore undertaken to provide baseline data for future observations on shigellosis in general, to delineate patterns of Shigella species from Northern Nigeria and to record the pattern of antimicrobial drug sensitivities by reviewing the laboratory records for five years.

The study reports isolations of Shigella species from 12150 stools or rectal swabs from dysentery or diarrhoea patients admitted to or attending different out-patient departments of Ahmadu Bello University Teaching Hospital, Zaria, during the period from January 1980 to December 1984.

Materials and Methods

Culture Media

All the culture media used in this work were prepared from dehydrated powders (Difco).

MacConkey's agar, deoxycholate citrate medium, Salmonella-Shigella agar and Selenite-F broth were used for primary isolations. Various other media were prepared as needed for biochemical characterization and identification of non-lactose and late lactose fermenting isolates.

Antisera

Shigella polyvalent and group antisera from Difco were employed for confirmation of biochemical identification of shigellae and speciation of strains.

Antimicrobial drugs

The disc diffusion technique (BAUER et al., 1966) was used for antibiotic susceptibility testing. Discs were obtained from Oxoid with the following concentrations: ampicillin (25µg), chloramphenicol (50µg), streptomycin (50µg), tetracycline (50µg), colistin (10µg), kanamycin (50µg). A standard of Escherichia coli (ATCC 25922) sensitive to all antimicrobial drugs used in this study was routinely tested as control.

Isolation and identification of Shigella

12150 stools or rectal swabs from patients with dysentery or diarrhoea at the Ahmadu Bello University Teaching Hospital were examined. Stool or rectal swabs were inoculated on to MacConkey's agar, deoxycholate citrate agar and into a tube of Selenite-F broth and incubated overnight at 37°C. Selenite-F broth was subcultured on Salmonella-Shigella agar. Non-lactose fermenting colonies on deoxycholate citrate agar and Salmonella-Shigella agar were subcultured and characterized biochemically following conventional procedures (COWAN, 1974).

Biochemically identified shigellae were serogrouped by slide agglutination with Shigella antisera.

Results

368 strains of Shigella species were isolated from the 12150 stool specimens during the period of study (January 1980 to December 1984).

In all, 1512 enteric pathogens were isolated during this period. Shigella therefore constituted 24.3% of the pathogens.

During each year of the study the common species isolated was S. flexneri (60.1%), followed by S. boydii (20.7%), S. dysenteriae (14.1%) and S. sonnei (5.2%) in that order (Table 1).

The pattern of serotypes of the different species is shown in Table 2. Of 164 strains of S. flexneri which were typed, 109 (66-5%) were S. flexneri type 2 and 35 (21.4%) strains were Shigella flexneri type 1.

Age and sex distribution of patients in whom Shigella were isolated is shown in Table 3. Males were more frequently involved (226: 61.4%) than females (122: 38.6%). Maximum incidence was recorded in the age group 21 to 40 years (180: 48.9%) followed by children under 10 years of age (106: 28.8%), whereas 51 (13.9%) cases were recorded in older children and adolescents between 10 and 20 years of age and only 31 (8.4%) cases were seen in those over 40 years old.

Analyses of the data on the seasonal variation of cases of shigellosis for the five year period showed maximum incidence during the rainy season for the five year period showed maximum incidence during the rainy season for the five year period showed maximum incidence during the rainy season are shown in Table 4. Of 368 isolates during the period of study, 237 (64.4%) occurred during the rainy season (May to September) and only 131 (35.6%) were recorded during the dry cold harmattan season (October to April).

The results of the in vitro sensitivity to different drugs are shown in Table 5. The maximum number of Shigella isolates were resistant to streptomycin (223: 76.9%) followed by tetracycline (242: 66.8%), chloramphenicol (182: 53.2%), ampicillin (135: 48.4%), kanamycin (122: 8%) and colistin (13: 5%). Multiple
The finding of *S. flexneri* as the most frequent isolate (60.1%) in the present study has revealed that this species was predominant in the aetiology of shigellosis in Northern Nigeria, during this period. These observations conform with reports from Western Nigeria, and from other parts of Africa (*Sen & Collard, 1960, 1961; Afoakwa, 1973; Mutanda et al., 1979; Gebre-Yohannes & Limenih, 1980*). Second in frequency in the present study was *S. boydii* (20.6%). Other workers have reported *S. sonnei* as the next most common (*Afoakwa, 1973; Mutanda et al., 1979; Gebre-Yohannes & Limenih, 1980*). In developed countries *S. sonnei* is the most common *Shigella* isolate as infection with this species generally occurs through personal contact. In developing countries, on the contrary incidence of *S. sonnei* is rather low and dysentery or diarrhoea cases caused by *S. flexneri, S. boydii and S. dysenteriae*...
predominate because of poor standards of hygiene and sanitation. This has been well documented in the present study.

Out of the typed Shigella sp., S. flexneri type 2 was the most common in our experience and accounted for more than half of the typed S. flexneri strains (66.5%). These observations agree with reports from Western Nigeria and other parts of Africa (SEN & COLLARD, 1960, 1961; MUTANDA et al., 1979).

Although S. flexneri does not produce as severe an infection as S. dysenteriae in general, some of the strains of S. flexneri type 2a have recently been shown to produce an enterotoxin like that of S. dysenteriae type 1 (O'BRIEN et al., 1977).

Males were more frequently involved than females. The maximum incidence between 21 and 40 years of age may be largely due to the more ambulatory nature of work in this age group necessitating frequent eating outdoors.

The maximum incidence during the rainy season in this study is well documented.

During the rainy season the epidemiological cycle of five Fs (flood, faeces, flies, fingers and food) operates and is responsible for maximum incidence of shigellosis during this period. In Africa another F may well be remembered since S. flexneri is the most common species prevalent in Africa, except in certain countries like Morocco, where S. boydii is known to be recorded more frequently.

The multiple drug resistance in shigellosis in the present study is not unusual as it is classically known from earlier reports from Ethiopia, Somalia, England and Wales, India, and Bangladesh (GEDEBOU & TASSEU, 1982; MERO, 1976; GROSS et al., 1981; AURORA et al., 1982, RAHMAN et al., 1974). Shigella species are also notorious for their ability to develop multiple drug resistance; these findings may indicate the need for better control of antibiotic use, especially in developing countries like Nigeria, where antibiotics are freely available, often without prescription.

Table 5—**In vitro antimicrobial sensitivity of Shigella strains from Zaria**

<table>
<thead>
<tr>
<th>Drugs &amp; concentration</th>
<th>Total no. of strains tested</th>
<th>Sensitive (%)</th>
<th>Intermediate (%)</th>
<th>Resistant (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin (25µg)</td>
<td>320</td>
<td>135 (42.2)</td>
<td>30 (9.4)</td>
<td>155 (48.4)</td>
</tr>
<tr>
<td>Chloramphenicol (50µg)</td>
<td>342</td>
<td>122 (35.6)</td>
<td>38 (11.1)</td>
<td>182 (53.2)</td>
</tr>
<tr>
<td>Streptomycin (50µg)</td>
<td>290</td>
<td>21 (7.2)</td>
<td>46 (15.9)</td>
<td>222 (76.9)</td>
</tr>
<tr>
<td>Tetracycline (50µg)</td>
<td>362</td>
<td>88 (24.3)</td>
<td>32 (8.8)</td>
<td>242 (66.8)</td>
</tr>
<tr>
<td>Colistin (10µg)</td>
<td>260</td>
<td>117 (45.0)</td>
<td>130 (50.0)</td>
<td>13 (5.0)</td>
</tr>
<tr>
<td>Kanamycin (50µg)</td>
<td>275</td>
<td>93 (33.8)</td>
<td>160 (58.2)</td>
<td>22 (8.0)</td>
</tr>
</tbody>
</table>

References


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