Epidemiology of Salmonellosis and its Sensitivity in Karachi

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Saleem Hafiz, Tahira Hafiz (Zafar Research and Diagnostic Centre, Karachi.)
S. Wali Khan (Ziauddin Hospital Laboratory, Karachi.)
Rizwan Shariff, Iffat Yazdani, Yasmeen Syed (Liaquat National Hospital, Karachi.)

Abstract

Over the past five years 25,000 blood cultures were screened for septicoemia. Of these 6.7% were positive for salmonella species, the commonest being salmonella typhi accounting for 92% of total salmonella isolates. Over the years, S. typhi showed a gradual decline ranging from 96.7 to 87%. WhIle salmonella paratyphi A has shown a gradual Increase ranging from 2.5% to 11.4%. Salmonellosis peaked In the year 1990 suggesting an epidemic. The antibiotic sensitivity pattern showed a gradual increase in resistance over the-years and even resistance to the new quinolones has emerged. Thus salmonellosis ‘poses a major threat to the community and we must look into the alternative antibIotIcs to combat the threat (JPMA 43:178, 1993).

Introduction

Salmonellosis is an important disease in the developing countries where potable water which plays a major role in the spread of enteric diseases[1] is still a rare commodity. Salmonella strains cause a wide range of human enteric disease ranging from self- limited gastroenteritis with mild symptoms of shprt duration to severe gastroenteritis with or without bacteremia to typhoid fever, a severe, debilitating and potentially life threatening illness. Sahnonellatyphi, S. paratyphi A and B are important because of their frequent association with severe disease and bacteremia. These serotypes are endemic in developing countries and result in high morbidity and mortality. The organisms invade the bowel mucosa and multiply in the submucosa[2-4]. Depending on the virulence of the strain and the host response, they may invade the blood stream, lymphatic tissue or both. A study lasting over 5 years (1987-1991) was carried Out to determine the frequency and sensitivity pattern of salmonella species in Karachi.

Material and Methods

Five mililitre of blood was collected in thioglycolate broth from patients presenting with septicemia. Blood culture bottles incubated at 35-36°C for 10 days were examined every day for evidence of growth. All suspected positive cultures were subcultured on blood and MacConkey’s agar. Positive growth was gram stained and identified by standard recommended methods including serology and biochemical reactions[5]. All salmonella strains were tested for sensitivity by Kirby Bauer method[6] and resistant isolates were further confirmed by MIC method incorporating antibiotics in Brain heart infusion agar.

Results

Table I. Frequency of bacteremia due to salmonella.

Year	Total blood cultures	No. positive for salmonella	(%)
1987	3,875	279	(7.2)
1988	4,758	219	(4.6)
1989	4,650	279	(6.0)
1990	6,153	593	(9.64)
1991	6,292	357	(5.67)
5 years	25,728	1,727	(6.71)

Table I shows the frequency of salmonellosis in Karachi over five years. A rise in the frequency of salnionellosis was seen in the year 1990 which is suggestive of an epidemic. An increase of 50% was noted in blood culture due to salmonella.

Table II. Salmonella isolates.

Year	Total salmonella	Sal. typhi No.	(%)	Sal. paratyphi A No.	(%)	Sal. paratyphi B No.	(%)
1987	279	270	(96.7)	7	(2.5)	2	(0.7)
1988	219	202	(92.2)	17	(7.7)	-	-
1989	279	259	(92.8)	19	(6.8)	1	(0.3)
1990	593	550	(92.7)	38	(6.4)	5	(0.8)
1991	357	311	(87.1)	41	(11.4)	5	(1.4)
5 years	1,727	1,592	(92.1)	122	(7.0)	13	(0.7)

Table II gives the breakdown of species of salmonella responsible for bacteremia. Over the years there was a gradual increase in the frequency of salmonella paratyphi A causing septicemia and in the year 1991, 11.4% of septicemic cases were due to salmonella paratyphi A.

Table III. Salmonella sensitivity pattern.

Antibiotic	1987 Sensitive Total (%)	1988 Sensitive Total (%)	1989 Sensitive Total (%)	1990 Sensitive Total (%)	1991 Sensitive Total (%)
Total tested	279	219	279	593	357
Ampicillin/amoxil	221 (79.5)	161 (74.0)	220 (79.2)	252 (42.8)	242 (67.7)
Augmentin	277 (99.7)	218 (99.5)	279 (100)	542 (92.1)	349 (97.7)
Chloramphenicol	267 (96.1)	165 (75.9)	265 (95.4)	458 (77.8)	327 (91.5)
Septran	258 (92.8)	157 (72.2)	216 (77.7)	254 (43.1)	149 (41.7)
Tobramycin	279 (100)	219 (100)	279 (100)	582 (98.9)	351 (98.3)
Fosfomycin	279 (100)	215 (98.1)	239 (86.0)	499 (84.8)	291 (81.4)
Tetracycline	249 (89.6)	168 (77.2)	221 (79.5)	412 (70.0)	234 (65.5)
Ofloxacin	279 (100)	219 (100)	279 (100)	569 (96.7)	355 (99.4)
Azactam	279 (100)	219 (100)	279 (100)	589 (99.3)	356 (99.7)
Ceftrioxone	279 (100)	219 (100)	279 (100)	591 (99.6)	356 (99.7)

Table III gives the sensitivity pattern of the isolates. Highest resistance was seen in the year 1990

including resistance to quinolone group of antibiotics.

Discussion

Salmonellosis is one of the commonest cause of septicemia in the developing countries. It is endemic in Pakistan and has a high morbidity and mortality. During the five years period of study the frequency ranged from 4.6% to 9.6% peaking in 1990 which points to a small epidemic. Although salmonella typhi accounts for more than 90% of salmonellic septicemia, the incidence of salmonella paratyphi causing septicemia has shown a gradual increase. The resistance of all salmonella species to the three antibiotics of choice, i.e., ampicillin, chloraxnphenicol and septran has also shown a gradual increase. Multiple resistant salmonella including salmonella typhi were first seen in 1987[7] and since then has been on increase; more than 50% of the isolates have now become resistant to cotrimoxazole. The highest drug resistance among the salmonella isolates was seen in the year 1990 where 24 isolates which included 20 of salmonella typhi, 3 salmonella paratyphi A and one salmonella paratyphi B were resistant to quinolones (ofloxacin) The overall resistance to quinolones was 3.3%. The MIC of the isolates exceeded 64 uG/ml to ofloxacin. In 1991 quinolone resistance marginally declined. The general increase in resistance is very alarming because if the isolates show extensive resistance to the three drugs of choice then we would be limited in choice for ideal antibiotics. Quinolones are not recommended in children, other alternatives include cephalosporins and fosfomycin which again are showing increasing resistance; this leaves the possibility of attempting to use amoxicfflin culvanalic acid combination which shows a high sensitivity.

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