

2. DIARRHOEAL DISEASES

2.1. Outbreak of rotaviral diarrhoea in a relief camp for tsunami victims at Car Nicobar

An outbreak of diarrhoeal disease occurred among the residents of a relief camp for tsunami affected people in Mus village of Car Nicobar Island. The outbreak was due to rotavirus probably spread from contaminated wells. With public health intervention measures including chlorination of water sources, IEC activities etc. the outbreak was contained.

The earthquake and tsunami wave that occurred in 26 December 2004 severely affected the islands, particularly the southern group of islands constituting the Nicobar District. The Nicobar group of islands are inhabited predominantly by the Nicobarese tribe. Car Nicobar is the headquarters of Nicobar District and is the most populated island of the District. The Nicobarese of Car Nicobar live in 17

villages situated along the shore and all these villages were connected by the Circular Road that runs around the island along the coast.

Most of the villages suffered losses in the tsunami. Several hundred people died and thousands are still missing. A large number of houses, constructed with timber and corrugated iron sheets, were destroyed. As the tsunami



The road from headquarters to Mus, which was damaged by the tsunami



Relief camp at Mus village, where the outbreak of diarrhoeal disease occurred

waves started hitting the villages, the people fled interior into the jungles. Within a couple of days temporary camps were set up by the survivors of each village. Each village had several camps that shelter 100 – 200 inmates. Within each camp, each family built separate tents. The camp of Mus village, situated on the northern tip of the island (fig. 2.1) was the largest one.

functioning at the camp right from the day of the disaster itself. Our team stationed at Car Nicobar was working at camps of other villages. On 11 January 2005, we visited the camp of Mus village. It was observed that there were a large number of cases of diarrhea. From the register kept at the medical tent, it was found that this increase in the number of diarrhea had started on 7

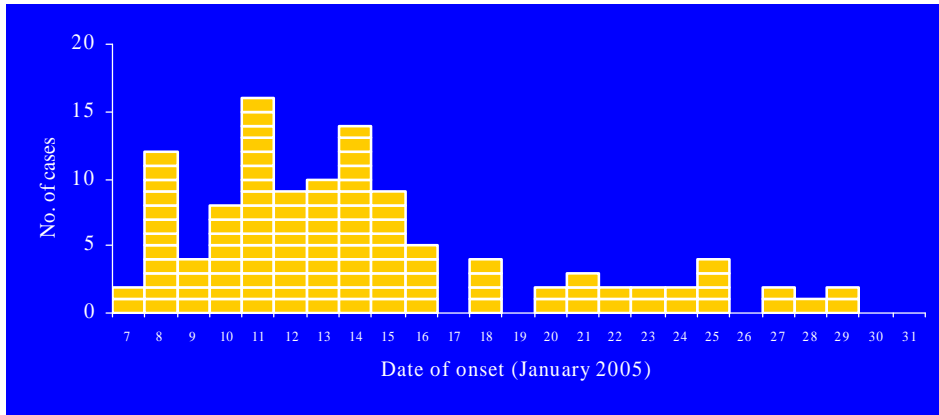


Fig. 2.1. Distribution of cases of diarrhea at Mus Village Camp, Car Nicobar by date of onset

It was a large conglomeration of tents built on a football ground, in which more than 1,500 people were staying.

The Circular Road was washed away in various places and there was no access to Mus village for several days. A jungle track was cleared later that gave access to the village. A temporary medical tent manned by paramedics, who were residents of the villages, was

January. Stool samples were collected from patients with diarrhea. These samples were processed for bacterial enteric pathogens at the temporary laboratory set up at the District Hospital, Car Nicobar. Samples were also sent to National Institute of Cholera and Enteric Diseases, Kolkata for testing for rotavirus. The drinking water source for the inhabitants of the camp was six wells, viz. ALHW,

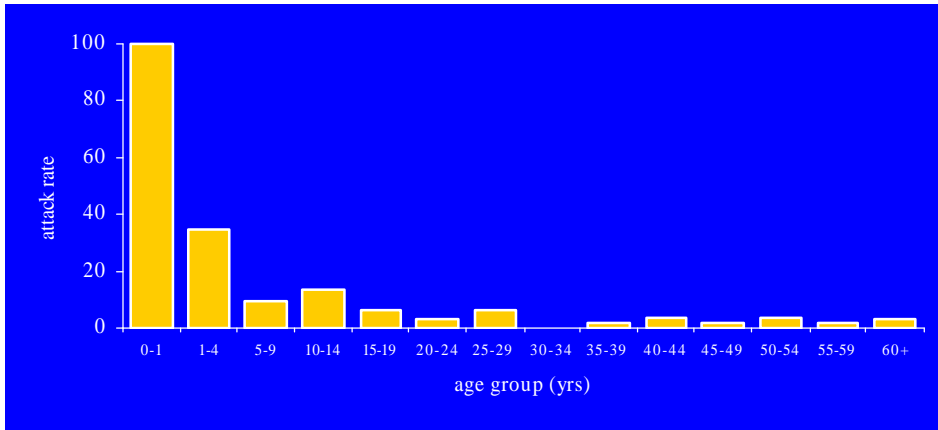


Fig. 2.2. Age specific attack rates during the outbreak of diarrhea at Mus Village Camp, Car Nicobar, January 2005

Roch, Hoy, Otak, Temple and Viper, situated at different places behind the football ground. Samples were collected from all these wells and tested for presence of coliforms using H₂S coliform test kits. All the wells were super-chlorinated. We visited the camp daily since 11 January and recorded new cases. Population of the camp was enumerated and all the recorded patients were interviewed for the source of drinking water. Attack rates among people using different well water were calculated. Well water samples were daily tested for residual chlorine and daily chlorination was done. Besides, halogen tablets were distributed and the people were motivated to use boiled water for drinking. Later, with the help of other aid agencies and the local

Administration pit latrines were constructed.

There were a total of 1,346 people (654 males and 692 females) staying at the relief camp of Mus village. During the period 7 January to 29 January 2005, a total of 113 cases of diarrhea were treated at the medical tent giving an overall attack rate of 8.4%. There was one death giving a case fatality ratio of 0.88%. The epidemic curve (fig. 2.1) showed a sharp increase from 7 January and a slow decline after 15 January. There were multiple peaks indicating secondary cases. Stool samples were collected from 25 patients. No bacterial enteric pathogen was isolated from any of the samples. RNA electrophoresis was done on 20 samples and 19 of these showed

presence of Group A rotavirus. Attack rate was 100% among infants (fig. 2.2) and it showed a decline with increasing age, the only exception being a higher attack rate among those aged 10-14 years compared to those in the age group of 5-9 years.

Attack rates among people using different wells ranged between 0% to 15%. There were no case of diarrhea among the eight people using the

water of the well named Viper. People using the water of all other five wells were affected indicating that either all these wells were contaminated, or the source of infection was not well water. However, once daily chlorination of wells was started, number of cases started decreasing. No other specific cause could be identified as the source of infection.

2.2. Hospital based surveillance of childhood diarrhoeas in South Andaman

A hospital based surveillance on childhood diarrhoeas is being carried out since 1994. During the current year 88 stool samples were processed and 13 isolates of Shigellae were obtained. Resistance to nalidixic acid is rapidly increasing among the Shigella isolates.

Hospital based surveillance of childhood diarrhea cases was continued during the reporting period 2004-2005. Paediatric diarrhoeic patients in G.B.Pant Hospital, Port Blair, were investigated for bacterial enteric pathogens. Stool samples/rectal swabs were collected from the patients and are processed to isolate bacterial pathogens. Isolated organisms were serotyped using commercially available antisera. Antibiotic sensitivity of the isolates was tested using disc diffusion technique.

The commonest bacterial pathogen isolated from the hospital over the years has been *Shigella spp.* Isolation rate of Shigella varied between 4.2% to 27.9%. During most of the years, *Shigella flexneri* has predominated as the most frequently isolated species. During the past three years, *Shigella sonnei* is accounting for a higher proportion of cases than it used to be before. In 2001-2002 Shigella sonnei was the predominant infecting strain. In this reporting period (2004-2005), 88 stool samples were processed and 13 Shigella isolates were obtained.

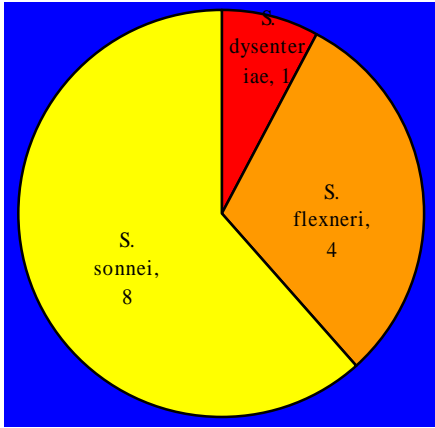


Fig. 2.3. Fig. Relative proportions of the different species of *Shigella* isolated during 2003-2004.

Shigella sonnei again emerged as the most dominating species amongst the isolates (fig. 2.3) accounting for 61.5% (n=8). The dominance of *Shigella sonnei* during the past few years appears to be an unusual phenomenon particularly in developing countries

where *Sh. flexneri* is the commonest isolate. Dominance of *Sh. sonnei* is observed in the developed countries. The shift in the most common isolate from *Sh. flexneri* to *Sh. sonnei* might be an indication of changing socioeconomic situation in the islands.

Antibiotic sensitivity tests revealed that a large proportion of *Shigella* isolates continue to be resistant to ampicillin and most to co-trimoxazole (fig. 2.4). Emergence of Nalidixic acid resistance in *Sh. sonnei* isolates were reported last year. All *Sh. sonnei* isolated during this year were found to be resistant to nalidixic acid. Nalidixic acid resistance has been acquired by the endemic *Sh. flexneri* also, as this year, two out of four isolates were resistant to this antibiotic.

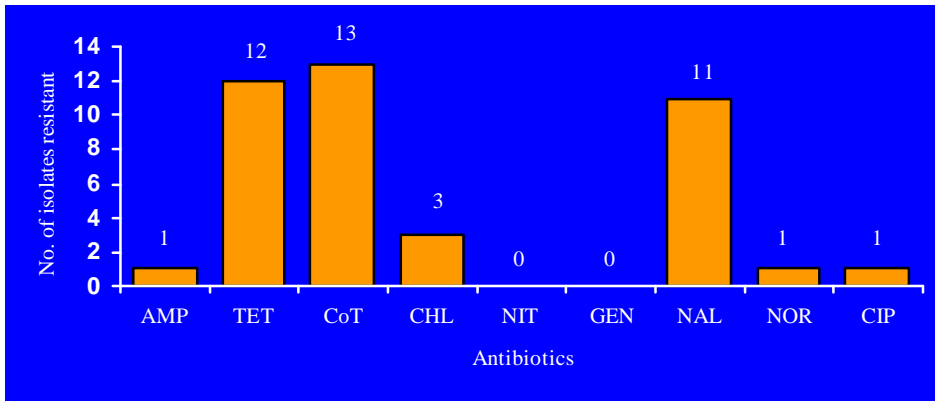


Fig. 2.4. Number of isolates of *Shigella* spp. resistant to various antibiotics during 2003—04

The first ciprofloxacin and norfloxacin resistant *Shigella* was isolated during this reporting period. The isolate was a strain of *Sh. dysenteriae* type 1, which made an appearance after a gap of four years. Over the years, resistances to new antibiotics have been observed first in *Sh. dysenteriae* 1, from which it

had spread to other species and serotypes. Although the case was an isolated one and no other *Sh. dysenteriae* was isolated during the reporting period, isolation of this strain perhaps forecasts the impending resistance of shigellae to these fluoroquinolones.

2.3. Molecular epidemiology of shigellosis in Andaman and Nicobar Islands

During the current year, several new molecular tools such as REP, BOX and ERIC PCR and PFGE were used to study the clonal relatedness of the nalidixic acid resistant and nalidixic acid sensitive strains of *Shigellae*. The nalidixic acid sensitive strains isolated in 1990s were of four different clones whereas the recent nalidixic acid sensitive strains belonged to two different clones.

To understand the epidemiology of shigellosis, a common cause of childhood diarrhoea in the islands, isolates obtained during the hospital based surveillance have been characterized using various molecular tools and their genetic relatedness was studied. *Shigella flexneri* was the dominant isolate over the years. *S. dysenteriae* became predominant in 1995 when there was an outbreak of shigellosis. *Shigella sonnei* replaced *S. flexneri* in 2001-2003 as the commonest species. Results of characterization

using plasmid profile and RAPD were reported earlier. During the current year further characterization was performed using REP (fig. 2.5), BOX and ERIC-PCR.

On the basis of genetic differences obtained using these techniques, isolates were grouped and isolates representing each group were further characterized using PFGE (fig. 2.6). Comprehensive molecular typing using these techniques revealed that NAL sensitive *S. sonnei* isolated during 1994-1999 belonged to 4 clonal types with 2

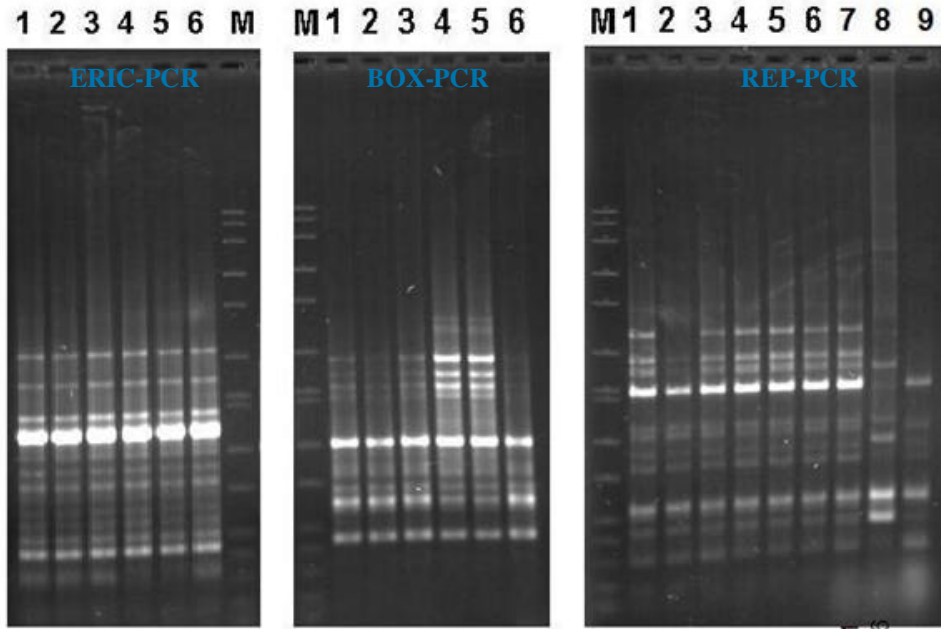


Fig. 2.5. Comparison of rep-based fingerprints of *Shigella sonnei* (Lane 1-Nal resistant local isolate, Lanes 2-6-different isolates from mainland, Lane 7-Local *Shigella sonnei* belonging to other clones isolated recently)

types predominating. The *S. sonnei* strains isolated immediately after the appearance of resistance to NAL during 1999-2001 also showed 2 clones that were identical with the predominating NAL sensitive clones. However PFGE did not reveal any difference between the sensitive and resistant clones. However those strains isolated later during 2002-2004 belonged to at least 4 other clones. The predominant clone was also found in isolates from mainland and might point towards epidemiological links.

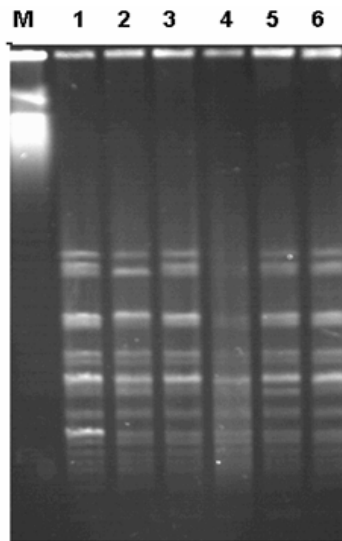


Fig. 2.6. Fig. Xba I digested PFGE fingerprints of Nalidixic resistant (1-3) and sensitive (4-6) strains (M-Marker)



I am very pleased to visit your Centre, which has progressively developed thanks to your hard work and dedication. We are privileged to be associated with you as collaborating centre. Thank you for your warmth, hospitality and perseverance. Congratulations on your fine leadership.

Dr. S.J. Habayeb
WHO Representative



I was very impressed to learn about the contribution made by this Institution in the field of medical research. My best wishes to the entire staff. May this Institution grow from strength to strength in the years ahead,

Lt. Gen. B.S. Thakur
Commander-in-Chief,
Andaman and Nicobar Integrated Command