

## Cholera Outbreak in Far-western Region of Nepal

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### ABSTRACT

**Background:** There was an outbreak of diarrheal diseases in districts of far-western region of Nepal in late-2009 followed by massive outbreak in Jajarkot district of mid-western region in early-2009. The objective of this study was to explore the causative organism and analyse the sensitivity pattern of the antibiotics in the local context to suggest the use of medicine in future diarrhea outbreak in Nepal.

**Methods:** A descriptive study was conducted from three districts of Far-western region (Achham, Baitadi and Doti) from middle of the April to September 2009 to observe the trend of morbidity. Similarly, 51 stool samples were taken from the patients for the laboratory analysis using Cary Blair Transport Media and carried out microbiological analysis.

**Results:** Out of the total 51 stool samples tested, 27 were diagnosed as *Vibrio cholerae*. All the isolates were sensitive to commonly used antibiotics except Nalidixic acid and Cotrimoxazole. The highest number of cases was seen in the month of July-August.

**Conclusions:** Cholera was found to be the most important cause for the occurrence of outbreak in far-western region in 2009. The commonly used antibiotics can be prescribed along with the appropriate rehydration measures.

**Keywords:** cholera; diarrhea; epidemic; nepal; outbreak.

### INTRODUCTION

Nepal remains a place for frequent outbreak of diarrheal diseases and the outbreaks mostly go without identifying the causative agents. Few studies recognized *V. cholera* as a causative agent in diarrheal diseases outbreak among the adult population in Nepal.<sup>1</sup> Cholera is highly prevalent in developing countries where the condition of water, sanitation and hygiene are not well maintained and hence transmitted from person to person.<sup>2</sup> Fortunately, few studies on laboratory based surveillance data have been analyzed and reported the number of cholera cases identified. The susceptibility pattern of microorganisms to the antibiotics has also been studied.<sup>3</sup> But the susceptibility pattern has not yet been studied at the community or during outbreaks. Literature generating evidences on the causative agents

of diarrheal disease outbreak in Nepal along with the sensitivity pattern of the causative agents are rare in Nepal. In 2009, there was an outbreak of diarrheal diseases in far-western region of Nepal followed by a massive outbreak in Jajarkot and other districts of mid-western region of Nepal. The objective of this study was to identify the causative organism and analyse the sensitivity pattern of the antibiotics in the local context to suggest the use of drugs in future diarrhea outbreak in Nepal.

### METHODS

A descriptive study was conducted from three districts of Far-western region (Achham, Baitadi and Doti) from

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middle of the April to September 2009 to observe the trend of morbidity. The three districts were selected purposively due to the high mortality rate during the massive outbreak of cholera in mid-2009. A total number of 3080 cases of diarrheal diseases were identified from the record from April to September 2009 and were entered into a standard format and presented as a trend analysis to explore the pattern of cases whether it is increasing or decreasing.

Stool samples were taken from the patients for the laboratory analysis. The stool sample were collected in Cary Blair Transport Media and brought to the National Public Health Laboratory, Kathmandu, for further microbiological analysis. All together 51 samples from three districts were collected and could be used for final laboratory analysis. The data were entered using Microsoft Excel 2003. The statistical analysis was done in Statistical Package for Social Science. Proportions were calculated to find out the causative agents involved and microorganisms sensitivity pattern. Ethical approval was obtained from the Nepal Health Research Council. District Public Health Office granted permission to retrieve the medical records whereas a verbal consent was taken from each patient during collection of stool specimen.

## RESULTS

*Vibrio cholera* was isolated from 27 samples out of 51 samples collected from different districts of far-western region. All of the 27 *Vibrio* isolates were identified as *V. cholerae* O1 whereas none of the isolates were identified as *V. cholerae* O139. All 27 *Vibrio* isolates were found to be El Tor biotype, serotype O1, sub-serotype Ogawa strain. None of the serotypes were found to be Inaba and Hikojimain this study and none were found to be Non-aggultinable (NAG) *Vibrio*. Thus the only isolate found during this outbreak was *V. cholerae* O1 ElTor Ogawa which possibly describe the replacement of *V. cholerae* O139 (Table 1).

**Table 1. Organisms detected in the stool sample (n=51).**

SN	Organism	n (%)
1	<i>Vibrio cholerae</i>	27 (52.94)
2	<i>Escherichia coli</i>	24 (47.06)

The antibiotic sensitivity test showed that *Vibrio cholera* was sensitive to all tested antibiotics and has 100 percent resistant to the Nalidixic acid and Co-trimoxazole.

**Table 2. Sensitivity pattern of *V. cholerae* isolates (n=51).**

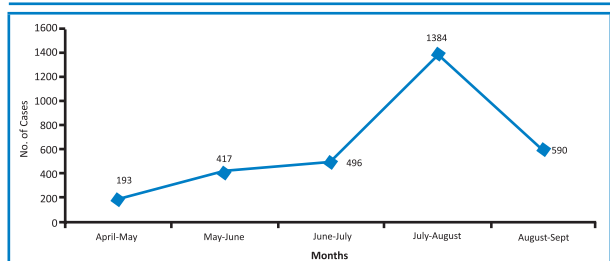
SN	Antibiotics	Sensitive n (%)	Resistant n(%)
1	Nalidixic acid	0 (0)	27 (100)
2	Ciprofloxacin	27 (100)	0 (0)
3	Ampicillin	27 (100)	0 (0)
4	Chloramphenicol	27 (100)	0 (0)
5	Cotrimoxazole	0 (0)	27 (100)
6	Tetracyclin	27 (100)	0 (0)
7	Ofloxacin	27 (100)	0 (0)
8	Norfloxacin	27 (100)	0 (0)
9	Erythromycin	27 (100)	0 (0)

All age groups were affected, but 5-44 age groups were mostly affected which is a common features of outbreak where the adult population are mostly affected.

**Table 3. Age wise distribution of confirmed cholera cases (n=51).**

Age group	n (%)
0-4	9 (17.6)
5-14	13 (25.5)
15-44	17 (33.3)
45-59	9 (17.6)
≥60	3 (5.9)
Total	51(100)

(Figure 1) showed the trend analysis of diarrheal cases in the three districts of Far-western region. From April the number of cases started escalating and the highest number of cases was seen in the months of July-August which was the prime time for diarrheal disease outbreak.



**Figure 1. Monthly trend of diarrheal cases in Far-western region (n=3080).**

## DISCUSSION

Cholera was declared in Jajarkot diarrheal outbreak in July 2009 by Nepal Health Research Council.<sup>1</sup> Immediately after the declaration, the outbreak started to flare up in Far-western region. So, it was not difficult to presume that the outbreak in far-western region was probably due to Cholera. Moreover, finding of around 53% stool samples positive for cholera imparted a strong suggestion to consider far-west diarrhea as a case of

Cholera epidemic. This analysis was mainly focused on trend analysis and sensitivity pattern of *Vibrio cholera*.

In a study conducted in Jajarkot district of mid-west region of Nepal, about 39% of the reported cases were found to be *Vibrio cholera* and all of them were *Vibrio cholera*01 biotype *El Tor* serotype *Ogawa*.<sup>1</sup> In Kavre district in the year 2005, 31% of the cases out of 148 were reported as *Vibrio cholera* and only strain 01 (*El Tor*, *Ogawa*) was reported.<sup>4</sup> Similarly, the same strain was detected during another outbreak of cholera in Kathmandu valley.<sup>5</sup> Similar strain of *Vibrio cholera*01 biotype *El Tor* serotype *Ogawa* was predominant in our findings. This finding strongly suggests the presence of single strain of *Vibrio cholera* in Nepal. However a large scale study needs to be conducted at national level to validate the findings from this study and other *Vibrio cholera* related studies.

This investigation showed that the peak morbidity was in July-August. In another study, outbreak of cholera was reported in Kathmandu with a similar seasonal period, but with higher isolation rate of *V. cholerae*.<sup>6</sup> Similar pattern of seasonal peak has been observed in a study conducted in Kathmandu valley by Shrestha et al.<sup>7</sup> The peak seasons are rainy season with high temperature and there is a high possibility of contamination of water as we know that government water supply system is unsafe/poor/unavailable. So there is a necessity to carry out a study to explore the attribution of unsafe/poor/unavailable water to the cholera outbreak.

*Vibrio cholera* was found to be sensitive to all antibiotics. However it is cent percent resistant to Nalidixic acid and Cotrimoxazole. Tamang et al had similar findings of resistant to Cotrimoxazole whereas sensitivity for Nalidixic acid was not performed in their study.<sup>4</sup> Similar pattern of resistance was found in a study conducted by Karki et al.<sup>8</sup>

With this study in three districts of far-western region and studies conducted in Jajarkot and other studies from Kavre and Kathmandu districts demonstrated that cholera was responsible in all diarrhea outbreaks in adult population. This epidemic suggests existence of cholera endemicity in Nepal, which needs further longitudinal study to confirm the endemic zones.

## CONCLUSIONS

Nepal remains a place for frequent outbreak of diarrheal diseases and the outbreaks mostly go without identifying the causative agents. *Vibrio cholera* was responsible agent for the occurrence of outbreak in far-west region of Nepal. The organism isolated was sensitive to all the commonly used antibiotics.

This study and findings from other studies clearly shows that diarrheal disease outbreak in adult population are mostly caused by *Vibrio cholera*.

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