

## ORIGINAL RESEARCH

# Cholera Epidemic In Rural North Karnataka- A Retrospective Study

Sudheendra Kulkarni<sup>1</sup>, Chandrakanth Chillarge<sup>2</sup>, M A Jabbar<sup>3</sup>, Naveen Kumar G. Havale<sup>4</sup>

## ABSTRACT

**Introduction:** Cholera is an acute diarrhoeal illness caused by ingestion of food or water contaminated with the bacterium *Vibrio cholerae*. *Vibrio cholerae* serogroups O1 and O139 cause the disease. This Study is conducted retrospectively to report the outbreaks of cholera in rural areas of North Karnataka which occur every year during end of the summer season and beginning of the monsoon. The study also reported the incidence of cholera among different age groups, gender and antibiotic profile of the isolates in this region.

**Materials and Methods:** A total 208 stool samples of cholera outbreak from Year 2013 to Till July 2015 were collected and processed at Department of Microbiology, Bidar Institute of Medical Sciences (BRIMS) Bidar as per the routine microbiological investigations. The isolates were identified as *Vibrio cholerae* and confirmed by serological tests with Polyvalent O1, O139 and mono specific Ogawa and Inaba antisera. Antibiotic sensitivity testing was done as per the CLSI guidelines.

**Results:** *Vibrio cholera* biotype EITor grown in 78 samples (37.5%). Among 78 isolates, 63 (80.76%) were belonged to serogroup Ogawa, 10 belonged to Inaba (15.87%) and 5 to Hikozima (6.41%). Cholera confirmed isolates showed Multi drug resistant to Ampicillin and Nalidixic acid and uniformly sensitive to Tetracycline, Ofloxacin, Ciprofloxacin, Chloramphenicol and Gentamicin.

**Conclusion:** Our study revealed that, cholera cases in North Karnataka are found to be prevalent among age group of 15-25 and in females. This study highlights the need of improved water and sanitation and use of oral cholera vaccines (OCV's) to obtain a short term effect for an immediate response as outbreak occur every year in a particular season in this region.

**Keywords:** Cholera, EITor, Epidemic, Oral cholera vaccine, Surveillance, *Vibrio cholerae*.

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## INTRODUCTION

Acute diarrhoea is the second most prevalent communicable disease and the fourth leading cause of death in India with as many as 10762500 cases and 32218 deaths reported in 2013.<sup>1</sup> Cholera contributes a major part to these figures as it has a high epidemic potential.

Cholera is an acute diarrhoeal illness caused by toxigenic strains of *Vibrio cholerae* serotypes O1 and O139. The most common serogroup presently in India is *Vibrio cholera* O1 belonging to the EITor biotype. Cases of cholera have accelerated in India, from 1939 cases in 2006 to 5155 in 2010.<sup>2</sup> Recently, cholera is being reported regularly from all parts of India. Karnataka, the second largest state of south India by area, 301 cases of cholera have been reported in years during 2006-2010 and the incidence of the disease has also increased.<sup>2</sup>

North Karnataka, locally known as Uttara Karnataka is a geographical region consisting of mostly semi-arid plateau from 300 to 730 metres (980-2400 feet) elevation that constitute the northern part of the south Indian state of Karnataka.<sup>3</sup>

Status of the cholera in north Karnataka is unknown. Two reports of cholera, one from Bidar and other from Bijapur were reported.<sup>2,4</sup> In The present study, we report the outbreaks of cholera in North Karnataka comprising of Bidar, Gulbarga and Yadgiri districts from the year 2013 to 2015 retrospectively. The study helps creating awareness among District public health officials and district administration to help them prepare for such outbreaks in the future. The study also focussed on the incidence of cholera among age groups, sex and the antibiotic profile of the *Vibrio cholera* isolates from north Karnataka.

## MATERIALS AND METHODS

**Study area:** The study area includes rural parts of Bidar, Gulbarga and Yadgiri districts of north Karnataka. The cholera outbreaks have been frequently reported from one or the other parts of these districts every year especially during end of the summer and beginning of the monsoon season in the months of May, June & July months.

**Case definition of Cholera:** In an area where there is a cholera epidemic, a patient aged 5 years or more develops acute watery diarrhoea with or without vomiting was considered as suspected cholera case.<sup>5</sup>

A total of 208 stool samples from outbreaks occurred in 2013, 2014 & till July 2015 respectively in Bidar, Gulbarga & Yadgiri districts were collected from the patients admitted in Primary health centres and sent to Referral laboratory network, Integrated Disease Surveillance Project, (A Project of Health and Family welfare department, Government of Karnataka) Department of Microbiology, Bidar Institute Of Medical Sciences (BRIMS) Bidar, which is a referral laboratory for Cholera and enteric diseases of Bidar, Gulabrga and Yadgiri districts. (The cases which were admitted in Private hospitals and other tertiary care hospitals of that region are not included in this study.)

The samples were collected in a sterile universal container and transported in Cary Blair transport medium to the laboratory. The routine microscopy was done for stool samples for detection of parasites, RBC's, & Pus cells. All stool samples were enriched in alkaline peptone water (APW) for 8 hours and hanging drop preparation was done from APW to see the darting type motility of the *Vibrio cholerae* which gives presumptive identification. It was followed by culture on Blood agar, Mac Conkey agar, Thiosulphate citrate bile salt sucrose agar (TCBS) agar at 37°C for 18 to 24 hours. The colonies with the characteristic appearance of *Vibrio cholerae* were identified by biochemical tests and conformed by serological tests with Polyvalent O1, O139 and mono specific Ogawa and Inaba antisera (Becton Dickinson Company, India).

**Antibiotic sensitivity tests:** Antibiotic sensitivity tests were carried on Muller Hinton agar (MHA) plates by Kirby Bauer disk diffusion method<sup>6</sup> using antibiotic discs (Himedia, Mumbai) Ampicillin (Amp 10mcg), Nalidixic acid (NAL 30mcg), Norfloxacin (NOR 30mcg), Ofloxacin (OFX 5mcg), Tetracycline (TET 30mcg), Chloramphenicol (CHL 30mcg), Gentamicin (GEN 10mcg) as per CLSI guidelines.<sup>7</sup>

## STATISTICAL ANALYSIS

SPSS version 21 was used to generate graphs. Only descriptive statistics was used to generate results.

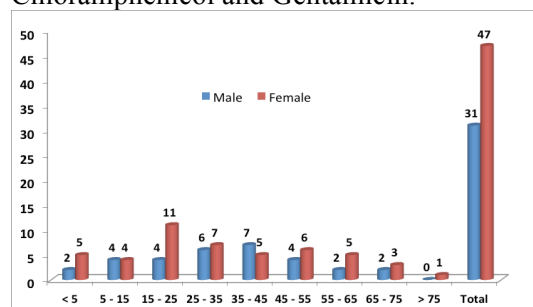
## RESULTS

Among 208 stool specimens processed, 78 samples (37.5%) were found to be positive for *Vibrio cholerae* O1, Biotype ElTor. Among 78 isolates, 63(80.76%) were belonged to serogroup Ogawa, 10 belonged to Inaba (15.87%) and 5 to Hikozima (6.41%).

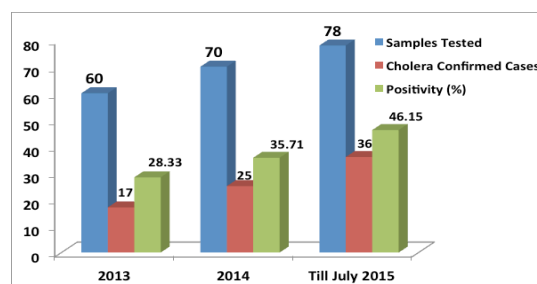
Majority of cases are found in age group of 15-25 and in females. And it is also found that the incidence of cholera also increased year wise from 2013 to July 2015.

The study focussed only on samples received for outbreak investigation and not on routine sample study.

**Antibiotic sensitivity:** The antibiogram profile revealed that, among 78 *Vibrio* isolates, all isolates showed Multi drug resistant to Ampicillin and Nalidixic acid. However, they were uniformly sensitive to Tetracycline, Ofloxacin, Ciprofloxacin, Chloramphenicol and Gentamicin.



**Figure-1:** Bar graph showing Age, and gender distribution of Cholera positive cases.



**Figure-2:** Bar graph showing year wise distribution of samples tested, cholera confirmed cases and positivity percentage.

## DISCUSSION

Cholera is an infection in the small intestine. A person can get cholera by drinking water or eating food contaminated with cholera bacterium. It can kill within hours if left untreated. It continues to remain

an important public health concern in developing countries. There are an estimated 3-5 million cholera cases and 100000-120000 deaths due to cholera every year.<sup>8</sup> Globally, the true numbers of cholera cases is unknown to be much higher than reported. The potentiality of explosive pattern of outbreaks is due to short incubation period of 2 hours to five days.

Many epidemics and pandemics occurred in India till to date. The first cholera pandemic occurred in Bengal and spread all over India by 1820.<sup>9</sup> *Vibrio cholera* remains in the environment and infect human beings whenever there is a breakdown in public health facilities like unsafe drinking water and poor sanitation.<sup>10</sup> Climatic conditions also play a major role in spread of cholera. It has been observed that, the epidemics always occurred during end of the summer, pre monsoon and monsoon period of every year in different rural parts of the north Karnataka and the source always been the contaminated water. The change in serotypes of the organism is also a reason for outbreaks. The change in the serotypes of *Vibrio cholerae* changes the virulence which helps survival of the organism in environment affecting all age groups including children.

This Study revealed that the cholera is prevalent among age group of 15-25 with 15 cases and females have suffered more by this disease as compared to male in this region. Total 47 cases of female and 31 male among 78 (Figure-1). This study also reports the outbreaks of cholera year wise with the percentage of 28.33 cases of cholera tested in 2013 and 35.71 in 2014 and 46.15 in 2015 till month of July which shows that there is rise in the cholera cases every year. (Figure 2).

In every outbreak, the district surveillance unit of the headquarters alerted immediately and made a visit to the site of outbreak and managed the epidemics efficiently and successfully by the district Rapid response team (RRT) ensuring all control measures including chlorination of water supplied to villages and distribution of halogen tablets, packets of Oral rehydration salt (ORS) were carried out along with institution of information, education and communication (IEC) activities. Education on personnel and public health and hygiene was also instituted for the next few days after epidemics.

## CONCLUSION

This study reports outbreaks of cholera in rural areas of North Karnataka and also revealed incidence of cholera among age groups, sex and the antibiotic profile of the *Vibrio cholera* isolates. As per our knowledge, no studies have been done earlier on these objectives.

The study shows that control of cholera as priority. Since outbreaks of the disease can disrupt health system, long term intervention to improve water and sanitation showed to be the mainstay of cholera control measures. The study highlights and recommends the use of oral cholera vaccines (OCV's) to obtain a short term effect for an immediate response as outbreak occur every year in a particular season in north karnataka region.

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