



Original Research Article

A concurrent epidemiological investigation, immediate prevention and prompt management of cholera cases could reduce mortality and morbidity in Jabalpur cantonment, India

Rajendra Harnagle*

Professor and Head, Dept. of Community Medicine, Azeezia Institute of Medical Sciences and Research, Meeyanoor P.O., Kollam District-691537, Kerala

*Corresponding author

ABSTRACT

In 2007, a multidisciplinary team investigated acute gastroenteritis outbreaks affecting urban community in Jabalpur to identify aetiology, pathways of transmission, and factors affecting this outbreak. We defined “Suspected case as patients with severe watery loose motions as residents from affected communities admitted with ≥ 3 loose stools per day”. We listed all cases of loose motions patients, interviewed and examined them in dark ground illumination in Microscope for darting motility of bacteria, and collected rectal swabs. We visited the affected community to explore the water and sanitation infrastructure. We tested the microbial load of water samples from selected case household taps, tube wells, and pump stations including railway station. We admitted all suspected cases in whom conducted investigations & given treatment till confirmed and cured or ruled out for Cholera. A total of 39 cases of Cholera has been report amongst the civil population of Jabalpur city in the month of June 07. Out of this seven ended fatally. A total of four cases had reported from Cantonment Area. Epidemiological investigation could pinpoint the source, date and time of infection along with laboratory confirmation from two independent laboratories in two cases. In one case the source of infection was confirmed to be from a hand pump located near the Railway Station, Jabalpur. In addition, isolation of *Vibrio Cholera* Eltor from water tap located at Platform Number One of Railway Station. The rapid onset of severe diarrhoea predominantly affecting adults and the isolation of cholera in rectal swabs confirmed that these outbreak were caused by *Vibrio cholerae* Eltor was done. The detection of *Vibrio* in water samples from taps and pumps, suggested contamination within the pipes as well as ground water. A concurrent epidemiological investigation, immediate preventive measures and prompt management of cholera cases could reduce mortality & morbidity in Jabalpur Cantonment, India.

Keywords

Cholera;
epidemiological
investigation;
management;
morbidity;
mortality.

Introduction

Vibrio cholerae is responsible for approximately three to five million cases and an estimated 1,20,000 deaths per

annum worldwide (Ali *et al.*, 2012; WHO, 2003, 2009). Cholera remains a major public health problem in many

developing countries with poor access to safe water and proper sanitation, including India (Sánchez and Holmgren, 2005; Hashizume *et al.*, 2008). Reports of cholera from India have been commonly published in the scientific literature. However, cholera cases from many developing countries like Bangladesh were not reported to the World Health Organization until very recently.

A total of 39 cases of Cholera has been report amongst the civil population of Jabalpur city in the month of June 07. Out of this seven ended fatally. A total of four confirmed cases had reported from Cantonment Area. Epidemiological investigation could pinpoint the source, date and time of infection along with laboratory confirmation from two independent laboratories in all 4 cases. In one case the source of infection was confirmed to be from a hand pump located near the Railway Station, Jabalpur in addition to Isolation of *Vibrio cholerae* from water tap located at Platform Number One of Railway Station.

Materials and Methods

On receipt of the confirmed information from the hospital authorities about the cholera cases, a detailed epidemiological investigation were carried out and the cases were contacted in the Govt hospital ward and detailed history was taken. A spot map depicting their residential area, water supply, contacts etc was prepared as was used classically by John Snow (John Snow, 1965), and the entire distribution of water supply was checked, hygiene inspections of cook houses was completed and all the eating establishment inside market were investigated.

The transport medium “Alkaline peptone water” was collected from the hospital

laboratory. Water samples from the suspected sources and consumer ends were taken from water supply as well Cantonment water works, Railway Station and Corporation water works. All the samples were analyzed in hospital laboratory. Samples from outside Cantonment limit (i.e. City) and Railway Station was sent for additional cross check at a private laboratory. Liaison with Civil health authorities was made with the District Collector, Health officers of the Corporation, Railway and other concerned health agencies. Notification of the disease was made to all the concerned authorities and all preventive measures which were already taken in the Cantonment were further vigorously strengthened (Director General Armed Forces Medical Services, 1982). A constant surveillance as per existing instruction was maintained.

Results and Discussion

The case number one was admitted in Govt MH hospital on 23 June at 0900 hours for the complaints of loose motions, vomiting and fever since 23 June, 0300 hours onward. On Dark ground illumination of the stool, as a bed side method showed Darting motility inhibited by Cholera Anti-sera subsequently confirmed by laboratory as *Vibrio Cholera* 01 EI Tor.

Epidemiological investigation reveals that, on 19 June at about 1730 hours, he had gone out to a main market area where already cases of Cholera have been reported in the city. He had snacks and water from a roadside ‘Dhabha’. The water source was from a tube well fitted with hand pump near which an open Nalleh within range of cone of filtration (i.e. 15metre) was flowing. Which people are using it for open air defecation.

The incubation periods of four and half days are well within range of few hours to five days (Park and Park, 2013). The case number two, located elsewhere, reached Jabalpur Railway Station on 06 Jul for attending course at College of Material and management, in the morning at about 1100 hours. He had water from a tap at Railway Platform number one and lunch at a hotel, outside the Railway Station before coming to the College of Material and Management. He developed loose motions about sixty times with typical "Rice water stool" till morning and effortless vomiting once. He also had signs of dehydration, when he was admitted next day. On Dark ground illumination of the stool, as a bed side method showed Darting motility inhibited by Cholera Anti-sera subsequently confirmed by laboratory as *Vibrio Cholera* 01 EI Tor.

The location of the handpump was outside road-side Dhabha very near to the edge of open "nallah" in which people used for open air defecation. This case developed symptoms on same day at about 2100 hours but was admitted on next day morning, water sample were collected immediately on Alkaline peptone water medium from the suspected sources including hand pump and Railway Station.

Water was also tested for free residual chlorine at Railway Station and was found to be negative. On presumptive coliform test the result was found to be "unsatisfactory" with bacterial count more than 10/500MI indicating fecal contamination.

Vibrio cholerae 01 was cultured in the service laboratory and from a private laboratory from water from above hand pump and also from Railway platform number one. Stool examinations of the

contacts were found to be negative for *Vibrio cholerae*.

The case number three, is Rigger by trade aged 46 years, working in ordnance Factory Khamaria, Jabalpur had developed symptoms of loose motions, fever and vomiting and was admitted initially at Ordnance Factory Hospital and latter transferred to Govt hospital on 28 Jul where he was diagnosed as a case of Cholera and was treated adequately and subsequently discharged to the home.

The case number four, (his son aged 5 years old, also been a confirmed case of Cholera a few days back). They had gone to meet their relative residing in a slum area, where many cases of Cholera have already reported. There at roadside Dhabha, they had 'Pakoda' and water drawn from a dug well which is located near the Nallah. However, the analysis of water sample did not reveal *Vibrio cholerae* because just before the day of collection of samples the local health authorities had started doing daily super-chlorination of well. However, all other evidences indicated strongly that the dug well water to be cause of cholera in these two cases as many cases in civilian had occurred in same area drinking from same source within a week. Also the surface contaminated water was found to be oozing from the lining of the well.

All the 4 cases occurred outside the limit of cantonment but were local cases and has acquired due to ingestion of fecal contaminated water containing *Vibrio Cholera* either from faulty located tube well with Hand pump or Dug well located near Nullahs used for open air defecation. The incubation period of first case being four and half days, in second case being about ten hours and 3rd case three days &

4th case two days are well with in conformity of established incubation period (Director General Armed Forces Medical Services, 1982; Park and Park, 2013). Further, timely collection of water samples in suitable transport media could confirms the otherwise suspected water sources (DGAMS, 1972; WHO, 1967).

The microbiological surveillance of intra neighborhood for Cholera transmission in rural Bangladesh (Spira *et al.*, 1980) shows similarly the apparent failure of hand pump tube wells to reduce the incidence of Cholera, which had indicated Cholera transmission was via contaminated surface water. In an another study in Rural Bangladesh, the importance of surface transmission was also emphasized (Buges *et al.*, 1982). In our case also were because of fecal contamination from cases (clinical & sub-clinical) of water oozing inside the tube wells or dug well (unsatisfactory) because of their location near open Nallah i.e. within range of cone of filtration being less than 15 meters (WHO, 1969; Seal, 1983; . DGAfMS, 1972; WHO, 1967; Spirs *et al.*, 1980; Huges *et al.*, 1982).

All preventive measures as mentioned in literature & existing instructions were implemented including Cholera vaccination of person staying in the Cantonment. All the cases were of Eltor *Vibrio* (WHO, 1969; Seal, 1983; Singh, 1988; . Sengupta *et al.*, 1989; Farhana Haque and Ahmed Sarani, 2013). The Municipal Corporation had plan to provide safe & potable water directly to the slums in addition to making the Dug wells sanitary if feasible or declaring it as unsafe for drinking purposes. The 32 fatalities among 1370 recorded cases (case fatality ratio, 2.3%) occurred throughout the course of epidemic. *V. cholerae* from

patients with cholera produced cholera toxin and were resistant to multiple antibiotics, though no resistance plasmids were found (Clark *et al.*, 1988). Cameroon has experienced recurrent cholera epidemics with high mortality rates. In September 2009, epidemic cholera was detected in the Far North region of Cameroon and the reported case-fatality rate was 12% (Cartwright *et al.*, 2013), we had 17.94% mortality rate.

Safe water provision is difficult in municipalities where supply is intermittent, and where pipes commonly leak. The rapid onset of severe diarrhoea predominantly affecting adults and the isolation of cholera in rectal swabs confirmed that these outbreak were caused by *Vibrio Cholera* Eltor .The detection of *Vibrio* in water samples from taps and pumps, suggested contamination within the pipes as well as ground water. A concurrent epidemiological investigation, immediate preventive measures and prompt management of cholera cases could reduce mortality & morbidity in Jabalpur Cantonment, India.

References

- Ali M, Lopez AL, You YA, Kim YE, Sah B, *et al.* 2012. The global burden of cholera. Bull World Health Organ 90: 209-218A.
- Buges, J.M., Boyce JM, Levino RJ, Khan M, Aziz KMA, Hug MI, and Curlin GI, 1982. Epidemiology of EITOR Cholera in rural Bangladesh.Importance of surface water in transmission, WHO, Bulletin. 60 (3): 395-404.
- Cartwright, E. J. , Patel M. K., Mbopi-keou F. X , and Ayers,T., 2013. Recurrent epidemic cholera with high mortality in Cameroon: persistent

- challenges 40 years into the seventh pandemic, *Epidemiology and Infection* , 141(10):2083-2093
- Clark, C.G., Kravetz AN, Alekseenko VV, krendelev D and Johnson, 1998. Microbiological and epidemiological investigation of cholera epidemic in Ukraine during 1994 and 1995, *Epidemiology and Infection* Cambridge University Press, 121(1):1-13.
- DGAFMS, 1972. Medical Memorandum No 91, Cholera, 2.
- DGAMS, 1972. Medical Memorandum No. 91, Cholera, Page No.2.
- Director General Armed Forces Medical Services, Manual of Health, 1982, 815-820.
- Farhana Haque, and Ahmed Sarani, M., 2013. Cholera Outbreaks in Urban Bangladesh In 2011 *Epidemiol.* 3:2,43-47.
- Hashizume M, Armstrong B, Hajat S, Wagatsuma Y, Faruque AS, *et al.* 2008. The effect of rainfall on the incidence of cholera in Bangladesh. *Epidemiology*, 19: 103-110.
- Huges, J.M., Boyce, J.M., Levine, R.J., Khan, M. Aziz, K.M.A., Hug, M.I., and Curln, G.I. 1982. Epidemiology of EITOR cholera in rural Bangladesh. Importance of surface water in transmission, *WHO Bull.*60 (3): 395-404.
- John Snow, 1965. on the mode of communication of Cholera 2nd edition London, John Churchill, Nav Durlinganton stre 1854 (Reprinted in India Mar 1965 & issued by National Institute of communicable Disease, New Delhi.)
- Park, J.E., and Park K. A, 2013. Textbook of Preventive and Social Medicine. 22th Edition.
- Sánchez, J., and Holmgren, J. 2005. Virulence factors, pathogenesis and vaccine protection in cholera and ETEC diarrhea. *Curr Opin Immunol* 17: 388-398.
- Seal, S.C, 1983. Canto of Discovery of cholera Vibrio, Vol. XXXII, No.1, Jan-Mar. Page 3.
- Seal, S.C., 1983. Centinary of Discovery of cholera vibrio, vol XXVII, No 1, Jan-Mar. Page3.
- Sengupta, P.G., Sircas B.K., Mondals, Gupta DN, and Pal SC, 1989. An EITOR cholera outbreak in an endemic community of Calcutta. *Indian Journal of Public Health*, Vol XXXIII, No 1, Jan-Mar .21-26.
- Singh, P.G. 1989. Cholera outbreak in Delhi in 1988, *I communicable Diseases* 22 (1):10-11.
- Spira, W.M., MU Khan, Sneed YA, and Satiar MA, 1980. Microbiological surveillance of Intra-neighborhood EL Tor Cholera Transmission in rural Bangladesh, *WHO, Bulletin*, Vol. 58, No. 5:731-740.
- Spirs, W.M., Khan, M.U., Saeed, Y.A., and Sattar, M.A., 1980. Microbiological surveillance of intra-neighborhood EITOR cholera transmission in rural Bangladesh, *WHO Bulletin*, Vol 58(5):731-740.
- WHO, 1967. TRS No. 352, WHO Expert Committee on Cholera, 2nd Report, 10.
- WHO, 1967. TRS No 352, WHO Expert Committee on cholera, 2nd report, 10-14.
- WHO, 1969. TRS Nkm414, Cholera Immunology. 15-17.
- WHO, 1969. TRS No 414 Cholera Immunology, 15.
- WHO. 2003. Cholera unveiled. Global Task Force on Cholera Control.
- WHO. 2009. Diarrhoeal diseases.