

INVESTIGATION OF AN OUTBREAK OF DIPHTHERIA IN DABELA VILLAGE OF AMIRGAGH TALUKA AND CHC, BANASKANTHA, GUJARAT (CURRENT SCENARIO)

Niti Talsania¹, Jignesh Chauhan², Himanshu Nayak³, Chintul Shah⁴, Krunal Modi⁵, Jaydeep devaliya⁵

¹Professor ²Associater professor ³Tutor ⁴Assistant Professor ⁵Resident, Community Medicine Department, B. J. Medical College, Ahmedabad- 380016

Correspondence:

Dr. Niti Talsania

Professor, Community Medicine department,

B. J. Medical College, Ahmedabad- 380016

Email: nitibenok@gmail.com Mobile- 9879843918

ABSTRACT

As outbreak of diphtheria reflects the impact of immunization outbreak investigation was carried out to assess the diphtheria outbreak pattern and case fatality rate in Dabela Village of Amirgagh Taluka and CHC, District, Banaskantha, Gujarat in 2007. Population stabilization, poverty alleviation, life-style modification, surveillance and control of communicable and non-communicable diseases constitute the major challenges demanding urgent attention in the future. Vaccine was efficacious among those who received >4 doses. The proportion of the population receiving boosters was low, especially among Muslims. We recommend increasing booster dose coverage. We investigated epidemic to 1) describe the epidemiology of diphtheria in terms of time, place, and person; 2) estimate vaccine coverage; and 3) to do SWOT analysis in Immunization services.4) To suggest successful vaccination.

Key Words: Diphtheria, epidemic Investigation, case fatality ratio, Current scenario

INTRODUCTION

Corynebacterium diphtheria is responsible for both endemic and epidemic diseases, and manifests as either an upper respiratory tract or cutaneous infection. A disease caused by the exotoxin produced by Gram positive Corynebacterium diphtheria. Humans are the only reservoir of infection, transmission occurs primarily by close personal contact with a case or carrier. The infective material may comprise of nasopharyngeal secretions, discharges and skin lesions, contaminated fomites etc. Cases range from sub clinical to frank clinical cases, the former being more common source of the agent It is communicable for 2-6 weeks without antibiotic treatment. ¹⁻² People who are most susceptible to infection are those who are not completely immunized or have low antitoxin antibody levels and have been exposed to a carrier or diseased individual.

In 2008, India contributed 6081(86.66%) of the 7017 diphtheria cases reported globally.³ There were no reports of outbreaks of diphtheria in Gujarat since last few years, though sporadic cases were reported in UIP monthly report, which were never investigated and documented. Ahmedabad District of Gujarat State in 2008–2009, administrative data shows coverage of 90%, while the evaluated data from Regional Resource Centre shows coverage of 78%. ⁴ As outbreak of diphtheria reflects the impact of immunization, with this view the outbreak investigation was carried out to assess the diphtheria outbreak pattern and case fatality rate Amirgagh block of Banaskantha district of Gujarat and compared with current scenario.

MATERIAL AND METHODS

Outbreak investigation was done with the use of operational definition.⁵ All epidemiological data were collected. Active search of cases and deaths was done by doing house-to-house survey in Dabela village by M.O, ANM and Rapid Response Team. Admissions and deaths in Palanpur District Hospital were also inquired and notified as routine surveillance record. Treatment protocol was implemented from the second week with erythromycin tab through ANMs, for all the symptomatic cases. Community-wise awareness programs were carried out regarding respiratory etiquette, use of homemade mask, hygiene and cleaning the environment. Health workers were also trained to protect themselves by use of mask, hand hygiene. Early diagnosis and prompt treatment protocol was implemented. Laboratory investigation was done in 44 symptomatic cases, where the C. diphtheria shows sensitivity to erythromycin.

Further data of diphtheria cases was collected from New Civil Hospital, Ahmedabad which is one of the apex referral center for Gujarat and neighbor state and similarly data was collected from Infectious diseases hospital, Behrampura which is also leading referral center for Gujarat state. We had also inquired for any diphtheria cases or death in Palanpur district since last outbreak. All of this information was collected and compiled to conclude current situation of diphtheria in Gujarat.

RESULTS AND DISCUSSION

A total of 60 clinically diagnosed cases of diphtheria and 3 deaths in under five were reported. Majority of cases 28(46.7%) belonged to 10-19 years of age group, while 11.7% belonged to 1-4 years of age. Males 61.7% were affected more than females 38.3% [Table I]. There was no any statistically significant association found between age group and sex ($X^2=2.7, P>0.05$). Out of 60 cases which were epidemiologically linked, laboratory investigation was done in 44 cases and lab confirmed cases were eight in numbers (18.18%). Of the eight confirmed cases, 62.5% were below 10 years of age group, and 37.5% were 10-19 years of age group. In addition, five cases were males (62.5%) and three cases were females (37.5%). Precipitates were found in some vials of DPT.

Maximum 31 (53.33%) numbers of cases were found during the first week of outbreak, 26(43.34%) of cases were found in second week, thereafter cases started declining reaching zero level at the end of fourth week (Routine Surveillance data). Out of these 60 cases of diphtheria, three cases died (case fatality rate 5.0%) The first and second case of this outbreak was the only fatal cases, where there was delay in getting treatment and referral. Detail information regarding Immunization coverage of the Dabella village and Dhanpura PHC was not available with health authority. Diphtheria mainly affects children aged between 1 to 5 years, however due to good vaccine coverage worldwide, a shift in age incidence has been observed from preschool to school age (5-15 yrs) with more and more cases being reported even in adults. Attack rates were lowest among infants, increased with age, and reached a maximum among children 10-14 years of age.

Rates were higher among males. In this study, it was evidenced that early diagnosis and prompt treatment can reduce fatality. The case fatality rate was found to be almost similar, consistent with the findings of Kadirova *et al.*⁶ while, diphtheria outbreak in Cali, Colombia, August-October 2000, reported case fatality rate as 12.5%.⁷

Table II shows the reasons for partial or non immunization among village children. Majority 88(75.9%) were unaware regarding DPT vaccination of 2nd & 3rd dose. IEC activities found inadequate in the area. In India 75%, 58%, 57% and 56% of the children age 12-23 months received the BCG vaccine, three doses of DPT, Polio and Measles vaccine respectively. The Expanded Programme of Immunization of the World Health Organization recommends 3 doses of the diphtheria, pertussis, and tetanus (DPT) vaccine starting at 6 weeks of age. After 3 doses of primary vaccine, protective levels of antitoxin develop in 94% to 100% of children.⁸⁻⁹ However, without booster doses, over time toxoid-induced antibody drops below protective levels.⁹⁻¹⁰

Table III depicts, diphtheria cases situation at New Civil hospital, Ahmedabad which is apex referral institute for Gujarat and neighbor states. Almost equal numbers of male and females were affected with Case fatality rate declined in 2010 with no statistical significance ($X^2=0.09, P>0.05$). While diphtheria situation at ID hospital explained in table IV.

The infection usually occurs in the spring or winter months. Diphtheria outbreak occurs in the month of July to August in our study. Several studies¹¹⁻¹³ carried out over the last 30 years at different places in this country also reported that diphtheria occurs more frequently during the month of August to November [Fig-1].

Immunization coverage of the Ahmedabad district of Gujarat during the year 2008-2009 was as follows: BCG-82%, DPT1-82%, DPT3-67%, Measles-61%. Fully immunized 69% with a dropout rate of DPT1 and DPT3 is 15 %.(Ahmedabad Municipal Corporation).

Immunization Card was issued and seen in 47.1%, 53.5% &49.5% in Rural, Urban and Total infant population respectively. In the present study, diphtheria was diagnosed mainly on clinical findings and confirmed by epidemiological linkage with lab confirmed cases and microbiological confirmation was available in 18.18% of cases. Ray *et al.*¹³ (in their study conducted in rural medical college hospital near Kolkata) also observed the low microbiological confirmation rate and suggested that that clinical diagnosis of diphtheria should be given due consideration.

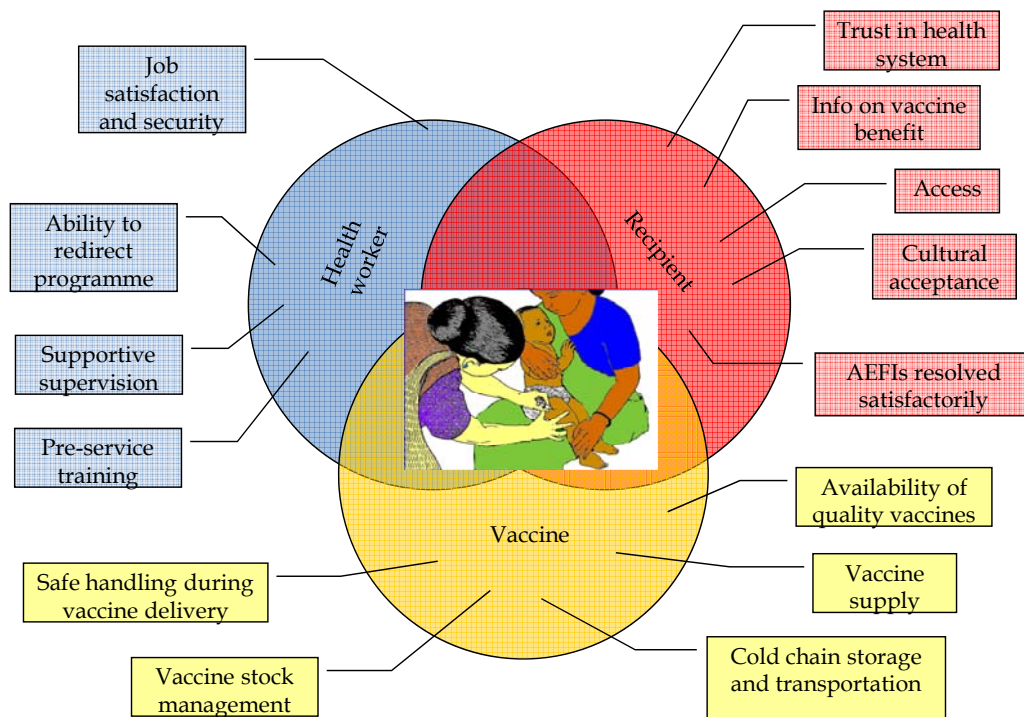


Figure 1: Key factors for Successful Immunization

Our results indicate that in Banaskantha District, diphtheria mainly affected children 5-19 years of age, girls and boys, and the Muslim population. Receiving a fourth and fifth doses of the vaccine was needed for protection against the disease. Coverage of primary vaccination was in adequate in the Ahmedabad city whereas, coverage for the boosters was low in admitted patients at IDH.

Our study had 2 main limitations. First, we only included patients admitted to Infectious Diseases Hospital and large New Civil Hospital, Ahmedabad. Second, a large proportion of children did not have vaccination cards.

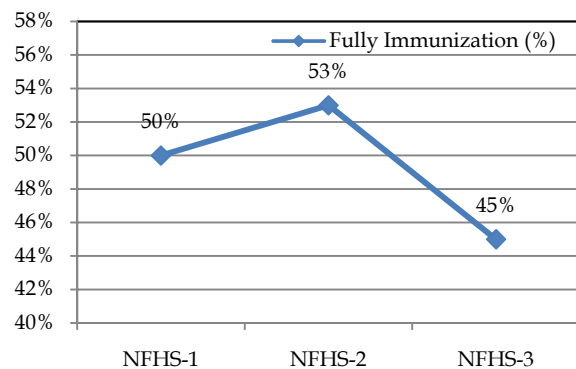


Figure 2: Trend in Vaccine Coverage

Immunization: This is a serious area of concern because in full immunization Gujarat has gone down to 45% from 53% (NFHS-II to NFHS-III). To address this area intensive monitoring have been planned with the help of 'Satellite Monitoring' and micro planning for low performing areas. With the help of maps generated by GPS system monthly review used to be conducted at state level. More morbidity and mortality among younger age group may reflect poor immunization coverage in last few decades against diphtheria and also waning immunity. This is a matter of concern for public health. It was evidenced from this study that early diagnosis and active treatment of cases have the potential to reduce the CFR. A good surveillance system is essential to detect the possible outbreak of diphtheria as early as possible.

SWOT Analysis of Gujarat state: 2010, AD

Strengths

- Accessible to the Health Services
- High Quality Health information systems
- Few Motivated staffs, Mamta-day.
- Decline in health indicators
- Improved infrastructure of health system

Weakness

- Lack of Manpower (ANM,AWW, ASHA) at the grass root level
- Poor motivation and support at the lower levels of the system and Community.
- Poor monitoring and supervision
- Lack of Reorientation training
- Lack of cold-chain maintenance /recording

Opportunities

- Improved roads and connectivity
- Literacy is given emphasis
- More emphasis on the availability of the Resources and improvement of the infrastructure
- Encouraging private investors in the state and public- private partnerships

Threats

- Declining sex ratio
- Malpractice and corruption is being practice at the micro levels which includes MTP

On the basis of our investigation report, we propose recommendations for control of diphtheria in Gujarat. **First**, coverage for boosters must be improved, in areas with high

attack rates. Such efforts should be conducted among the Muslim community in particular. **Second**, mothers must be made more aware of the importance of booster doses. **Third**, because attack rates were high among adolescents, tetanus toxoid (administered to school children at 10-15 years of age) could be replaced with a combined tetanus-diphtheria vaccine. **Fourth**, coverage of boosters could be considered as performance indicators to improve the immunization program.

Key Points: Depending on SWOT analysis, the following factors may predispose to diphtheria infection:

- Incomplete or absent immunization. In some cases, immunity does not prevent infection but lessens the severity of the disease.⁹
- Antitoxin titers decrease over time and immunity wanes, thus older people who have not received booster vaccination are more susceptible to contract the disease from carriers. Studies suggest if titer level is greater than 0.1 UI/ml, then an individual is characterized as immune from infection.
- Low herd immunity, possibly leading to increasing prevalence of diphtheria infections
- Travel to endemic areas or regions with current epidemics Immunocompromised states
- Low socioeconomic status
- Large-scale population movements - Implicated in the spread of the epidemic.
- Poor healthcare care system infrastructure.

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