



## STUDY OF DIPHTHERIA IN A TERTIARY CARE HOSPITAL OF DIBRUGARH DISTRICT OF ASSAM

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**ABSTRACT** **Background:** Diphtheria is a vaccine-preventable respiratory illness caused by *Corynebacterium diphtheriae*, gram-positive non-motile bacteria; acute highly contagious, may cause life-threatening disease. **Objective:** To assess the clinic-epidemiological profile of diphtheria cases attending a tertiary care Hospital from 2018-2023. **Methods:** Case series analysis was done for the last 6 years including 10 patients admitted in the ENT Department, Assam Medical College and Hospital followed by home visits of affected individuals. **Results:** Gender ratio was 2:1 for females and males respectively with a CFR of 10%, majority hailing from slum areas (6 cases, 60%) with partial immunization status (80%). Majority of cases were aged between 11-20 years (40%). Common symptoms were throat pain (40%), fever with sore-throat (40%) and dysphagia (20%). All cases were laboratory-confirmed. Highest incidence of cases was found between Oct- Dec (40%). **Conclusion:** Strengthening both accessibility and utilization of Immunisation services as well as supervision of cold chain and implementation of adult booster doses along with early identification and prompt treatment is required. Also, community-based antibody titre detection is an effective tool to determine vaccine efficacy.

**KEYWORDS :** *Vaccine-preventable diseases, Diphtheria, Immunisation, Dibrugarh, Assam.*

#### INTRODUCTION-

Diphtheria is an acute, fatal highly infectious respiratory illness caused by *Corynebacterium diphtheriae*, usually occurs in children and occasionally adults and transmitted through respiratory route, affecting faucial, laryngeal, nasal, conjunctival, genital and cutaneous sites.<sup>1</sup> It releases an exotoxin that causes fever, pain, odynophagia, dysphagia, pseudo-membrane formation in faucial pillars and bull-neck appearance.<sup>2</sup> Complications include myocarditis, Asphyxia, paralysis, nerve damage, and sepsis.<sup>2</sup> Globally, 5856 cases were reported in 2022 of which 3286 (56%) cases were from India.<sup>3</sup> As per the Universal Immunization Programme, Pentavalent vaccines including DPT-3 primary doses and 2 booster doses are given for protection against Diphtheria. Vaccine coverage of diphtheria in India in 2022 is 1<sup>st</sup> dose (95%) and 3<sup>rd</sup> dose (93%).<sup>4</sup> NFHS-5 for Assam shows vaccine coverage of DPT as 81.7%; which has increased from 66.5% in NFHS 4, while in Dibrugarh coverage was 93%.<sup>5</sup> Despite better vaccine coverage, sporadic cases have been reported from time to time. An outbreak of 60 cases of diphtheria was reported in 2010 in Borboorah block of Dibrugarh District.<sup>6</sup>

Illiteracy, poor socio-economic status, ignorance, and vaccine hesitancy are still prevalent in isolated areas of Assam, which contributes to low immunization rates in some places and the worsening of the situation during the COVID-19 pandemic. Also, a substantial amount of research has shown that immunity levels have changed in pre- and post-vaccination eras for different age groups. Therefore, this study has been undertaken to assess the clinic-epidemiological profile of Diphtheria cases admitted in a tertiary care Hospital.

#### METHODOLOGY:

A cross-sectional study of cases admitted in the last 6 years from hospital and IDSP records and active investigation of all cases was done in a tertiary care teaching hospital of Dibrugarh district, Assam following ethical clearance from the Institutional Ethical Committee (H). Recent cases admitted were assessed using the WHO case reporting formats and outbreak investigation was conducted in the community. Throat swab samples were collected and inoculated in Loeffler's Serum Slope (LSS). Microscopic examination for culture sensitivity and antimicrobial susceptibility testing was done by Kirby-Bauer disc diffusion method.

The collected data were entered and analysed using MS Excel in terms of rate, ratio and proportion. All case record forms from MRD were also analysed along with laboratory record review. Data triangulation was done between IDSP collected data, hospital records and laboratory

formats. Home visits of all cases were done to collect some epidemiological data with support from the IDSP team. Treatment included IV fluids for proper hydration, injectable antibiotics-benzathine penicillin, Azithromycin syrup, tablets, Metronidazole, besides symptomatic medications for fever, sore throat along with gargle etc. Diphtheria antitoxin was given to all the cases upon clinical diagnosis.

#### RESULTS:

A total of 10 cases of diphtheria were assessed. Majority belonged to the age group of 11-20 years of age (40%). Case fatality rate was 10%. Gender ratio was 2:1 (7 Females, 3 Males). Most common symptom was throat pain (40%), fever with sore-throat (40%) followed by dysphagia (20%).

All cases were laboratory-confirmed. Highest occurrence was reported from urban slums (60%) followed by tea gardens (40%). The attributing factors may be due to overcrowding, unhygienic water and sanitation conditions, poverty etc. Month-wise distribution showed the highest incidence of cases between October to December (40%) followed by 30% between July to September. Year-wise distribution showed the highest occurrence in 2019 [3 cases; (30%)].

Out of 10 patients, 9 recovered, recovery rate was 90% and 1 patient expired due to cardiovascular abnormalities suggestive of myocarditis. Delay in seeking medical treatment was also a contributory factor. Four of the cases had contact history with similar illness which could not be traced. Regarding immunization history, 2 had received 3 doses of DPT vaccine, others were either partially immunised (7 cases) or not immunised at all (1 case). Fear of side-effects was the most common reason for partial immunisation.



**Fig 1– Majority (40%) of the reported cases belong to the age group 11-20 years**

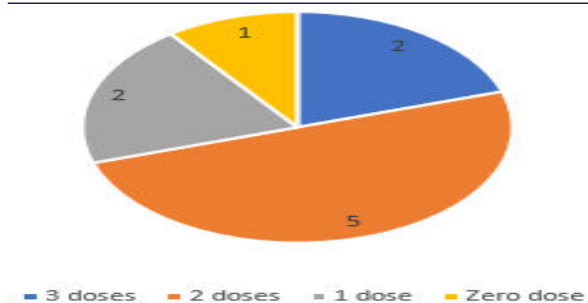


Fig 2- Majority of cases (50%) had taken 2 doses of DPT vaccine



Fig 3- Year-wise distribution of cases of Diphtheria

### DISCUSSION:

Diphtheria has been considered as one of the re-emerging diseases due to sporadic cases occurring occasionally.<sup>7</sup> In our study, 40% of cases were in the age group 11-20 years, which may indicate a waning of immunity. Sangal et al. mentioned in 'Resurgence of Diphtheria in North Kerela' that almost 80% of cases of diphtheria occurred in people between 10-20 years.<sup>8</sup> In another study conducted by M Kutty et al for-Diphtheria IgG antibody detection in healthy adults above 18 years found 86% antibody levels.<sup>9</sup> Documenting changes in age distribution requires long-term surveillance studies from various geographic areas. In our study, females were affected more than males. This may be because of more indoor staying habits in those overcrowded houses as all cases were hailing from urban slums and tea garden labour lines with poor living conditions. Similarly, in a study on "Resurgence of diphtheria in vaccination era", Khan et al observed that females were more affected than males.<sup>10</sup> Most of the cases in the present study were from slum areas. A similar finding was observed by Lodha et al in their study 'Diphtheria in urban slums of North India'.<sup>11</sup> The vaccination status was incomplete in most which reflects poor vaccination coverage. Antibody titre could not be assessed in all cases due to lack of accessibility. Vaccine and cold chain points could not be assessed to identify the quality of vaccines.

### CONCLUSION:

Occurrence of adult diphtheria indicates low immunity amongst the adult population. There is a need to increase the coverage of the primary and booster diphtheria immunisations given as part of the Universal Immunization Program, especially in deprived areas along with addressing other determinants like improvement of housing quality, indoor air pollution, overcrowding etc. Secondly, timely diagnosis, referral and treatment can prevent further complications and reduce deaths. Also, Community-based antibody titre detection is required to determine the vaccination efficacy against *C. diphtheriae* and emphasis can also be given to introduce adult doses of vaccine based on scientific evidence.

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