

**Diphtheria, a Case Series Analysis in a Tertiary Care Hospital of Assam.**Sarma D<sup>1</sup>, Sangma R<sup>2</sup>, Mahanta Goswami T<sup>3</sup>, Borah S<sup>4\*</sup><sup>1</sup> Assistant Professor, Department of ENT, Assam Medical College, Dibrugarh<sup>2</sup> Professor & Head, Department of ENT, Assam Medical College, Dibrugarh<sup>3</sup> Professor & Head, Department of Community Medicine, Assam Medical College, Dibrugarh<sup>4</sup> Medical Officer, Sonari District Hospital**Received: 23-09-2023 / Revised: 28-10-2023 / Accepted: 26-11-2023****Corresponding Author: Dr. Shankhadhwaj Borah.****Conflict of interest: Nil****Abstract:****Background:** Diphtheria, an acute, toxin-mediated, fatal, highly infectious disease, caused by *Corynebacterium Diphtheria*, which is a gram positive bacilli, with incubation period of 3-4 days. Various sites of infection include faucial, laryngeal, nasal, otitic, conjunctival, genital, and cutaneous.**Methods:** Case series analysis was done amongst patient hospitalized in ENT department. Nine cases were investigated.**Results:** Gender ratio was 2:1 with CFR of 11.11%, majority hailing from tea garden community with partial immunization status. Delay in referral was evident. Immunization coverage was partial.**Conclusion:** There is a need to prevent vaccine preventable diseases with complete immunization, better surveillance for early detection and referral and improved quality of care to prevent such occurrence.**Key words:** Pharyngitis, fatality, communicable, vaccine preventable disease, surveillance.

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**Introduction**

Diphtheria a fatal, highly infectious disease. Affecting the various mucocutaneous sites, Faucial diphtheria bears the higher case fatality rate. According to clinical severity, diphtheria can be classified as – malignant/ hypertoxic, with severe toxemia and marked adenitis (bullneck), septic which leads to ulceration, cellulitis, haemorrhagic manifestations like epistaxis, conjunctival haemorrhage, bleeding from edges of membrane. Complications leading to death include- myocarditis, asphyxia due to pseudomembrane formation, post diphtheritic paralysis, sepsis. [1] The Universal Immunization Program in India, recommends pentavalent which contains antigen against five diseases including diphtheria. India alone accounted for 83.3% of the global burden of diphtheria which showed age shifting also affecting more older children and adults. [2] Illiteracy, poor socio-economic status of the people, ignorance, Vaccine hesitancy in some remote areas in Assam still prevailing, have led to poor immunization status of certain parts with further worsening of situation during COVID Pandemic. Traditional beliefs and practices, lack of accessibility and utilization of services offered by Community Health Department, also leading to continuing admission of hospital and suffering by vulnerable community. Therefore this study is undertaken to assess the clinico-epidemiological profile of Diphtheria cases admitted in a tertiary care Hospital.

**Materials and Methods:**

Record based study of cases detected in a tertiary care teaching hospital of Dibrugarh district, Assam was done following ethical clearance from Institutional Ethical committee(H) No-AMC/EC/263. Recent cases admitted was assessed using the same formats and outbreak investigation was conducted in community. Throat swab samples were collected and inoculated in Loeffler's Serum Slope(LSS). Microscopic examination and antimicrobial susceptibility testing was done by Kirby-Bauer disc diffusion method. Last five years data were analyzed using MS Excel. Collected data using standard case reporting formats were analyzed. All case record forms from Medical Records Department were also analyzed along with laboratory record review. Data triangulation was done between IDSP collected data, hospital records and laboratory formats. Home visits of all cases were conducted to collect some epidemiological data with support from IDSP team. Treatment history and referral services along with immunization status was assessed. Treatment was provided as per standard protocol.

**Results :**

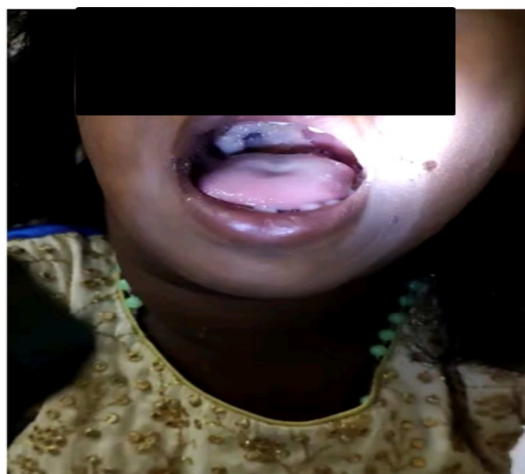
A total of 9 cases of diphtheria were reported. Majority belonged to age group of 16-20 years of age (33.3%). A case fatality ratio of 11.1%. Gender

ratio was 2:1 ( Female : Male) . Most common symptom was throat pain (55.5%) , followed by dysphagia (33.3%) and fever with sore-throat (11.1%) . All cases were laboratory confirmed. Highest occurrence was reported from urban slum (55.5%). Secondary attack rate was 44.44%. Month-wise distribution showed highest incidence of cases in the month of October & December ( 33.3%) . Yearwise distribution showed highest occurrence in 2019 [3 cases ; ( 33.33%)] with a recovery rate of 88.88% . Out of 9 patients , 8 recovered and 1 expired. 4 had contact history , and 1 received 3 doses of DPT vaccine.

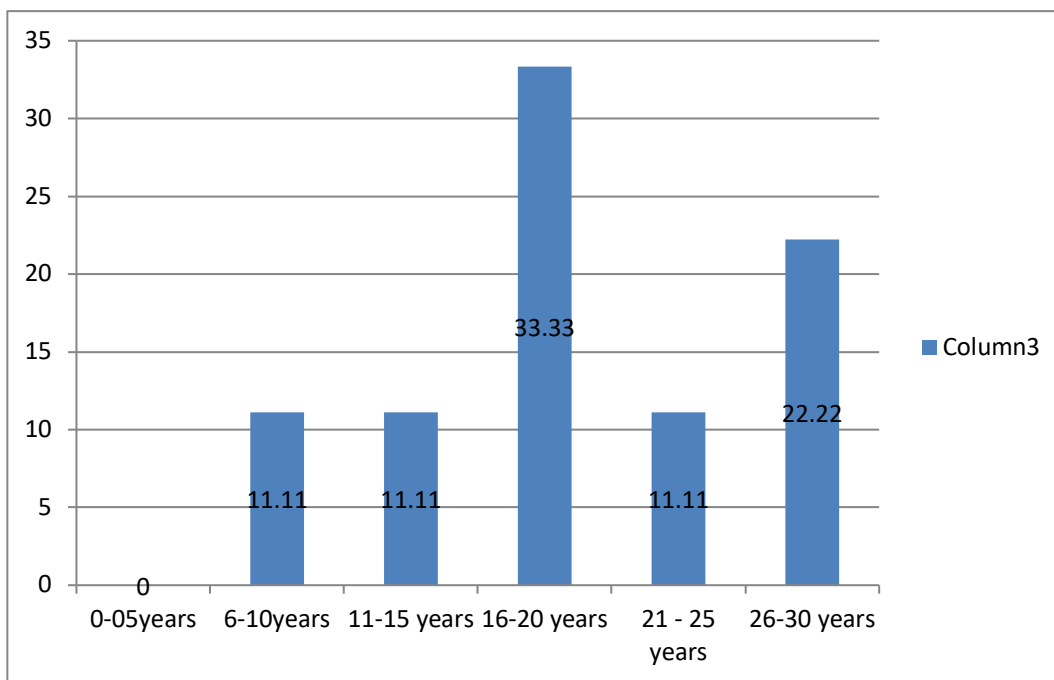
Treatment included- injectable antibiotics- mostly benzathine penicillin, azithromycin syrup and tablets, anti microbials like metronidazole, besides Diphtheria antitoxin , i.v fluids for proper hydration , povidone iodine and 3% Hydrogen peroxide

gargle . Symptomatic treatment like analgesics, antipyretics and short acting beta agonists , were also used.

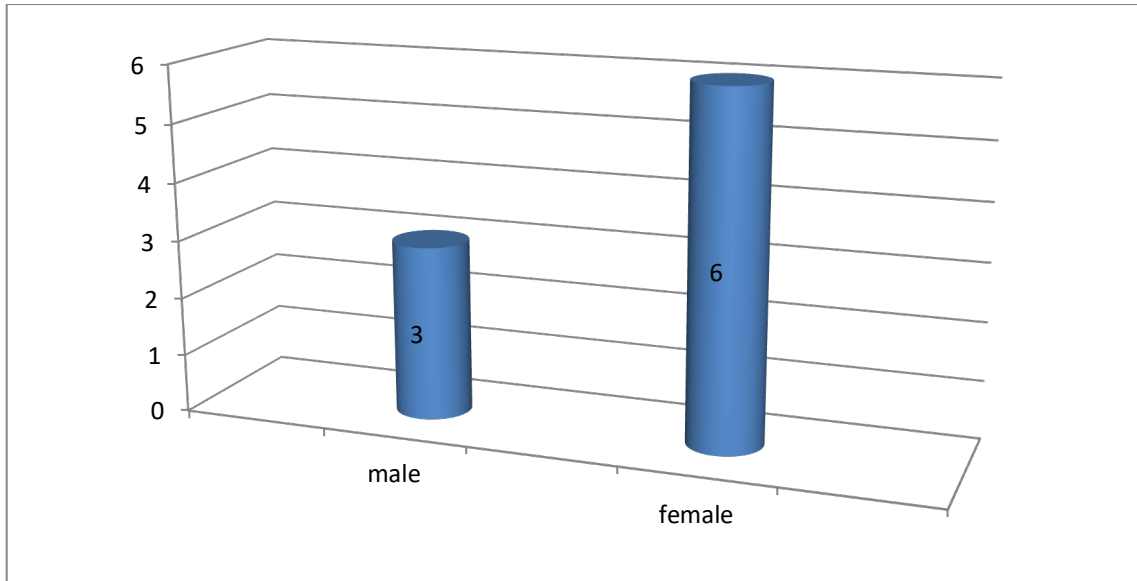
The case investigation findings of the recent case was as follows: she was a girl aged 8 yrs hailing from a tea estate. She presented with dysphagia, odynophagia, respiratory distress. A dirty greyish white membrane , (as shown in figure 1), was seen covering the faucial tonsils suggestive of diphtheria infection. Patient expired on 16/7/22 even after receiving treatment as per protocol which was the first fatality in the hospital. Many causes attributed to death. Cardiovascular abnormalities- like Right Bundle Branch Block with sinus tachycardia, raised troponin suggestive of myocarditis, not taking Booster dose of DPT is another reason for low immunity.



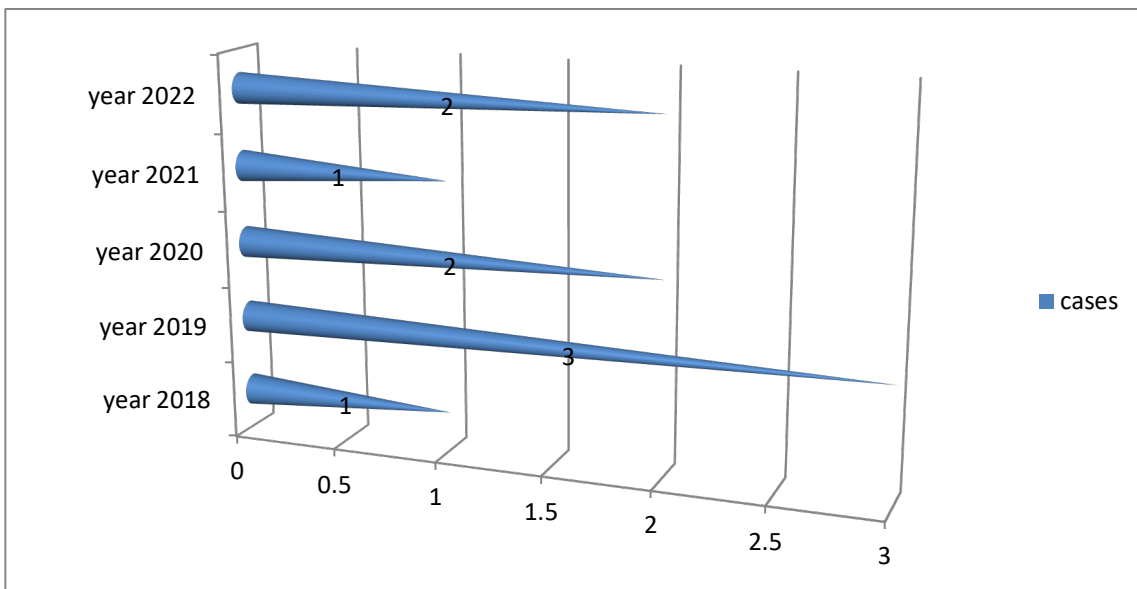
Original Picture 1. showing Greyish white patch on faucial tonsils , suggestive of Diphtheria.



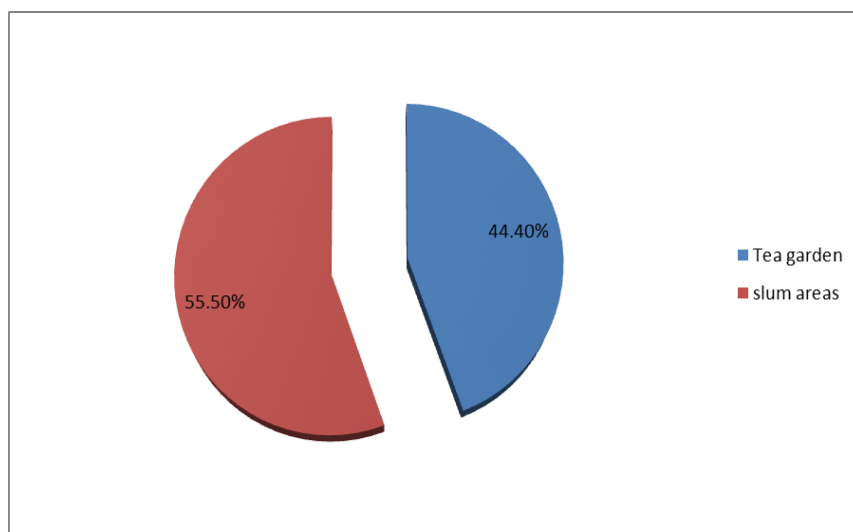
Original Figure 2: Showing age-wise distribution of Diphtheria cases in percentage.



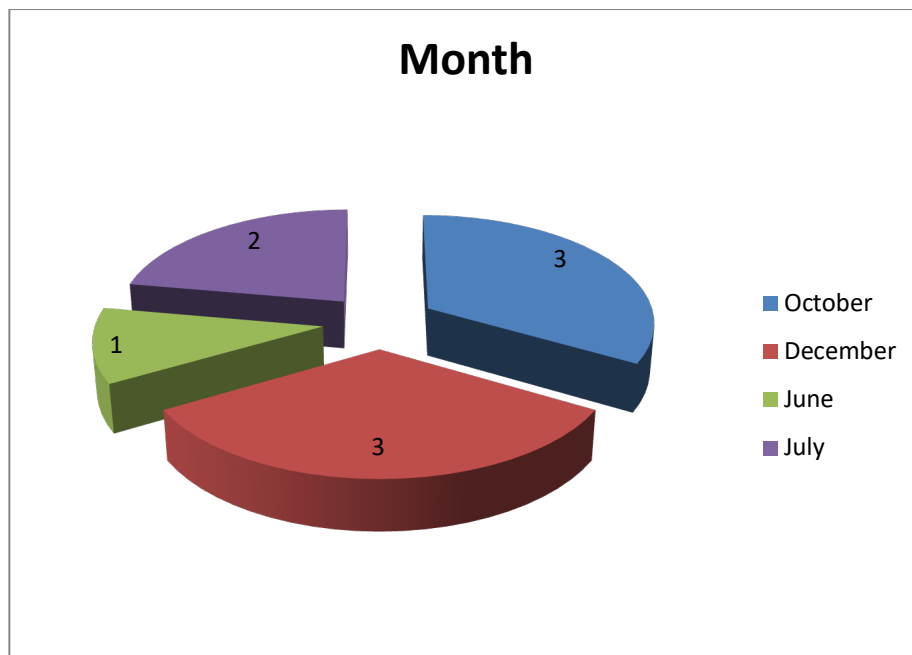
Original Figure 3: Showing gender - wise distribution of cases in number



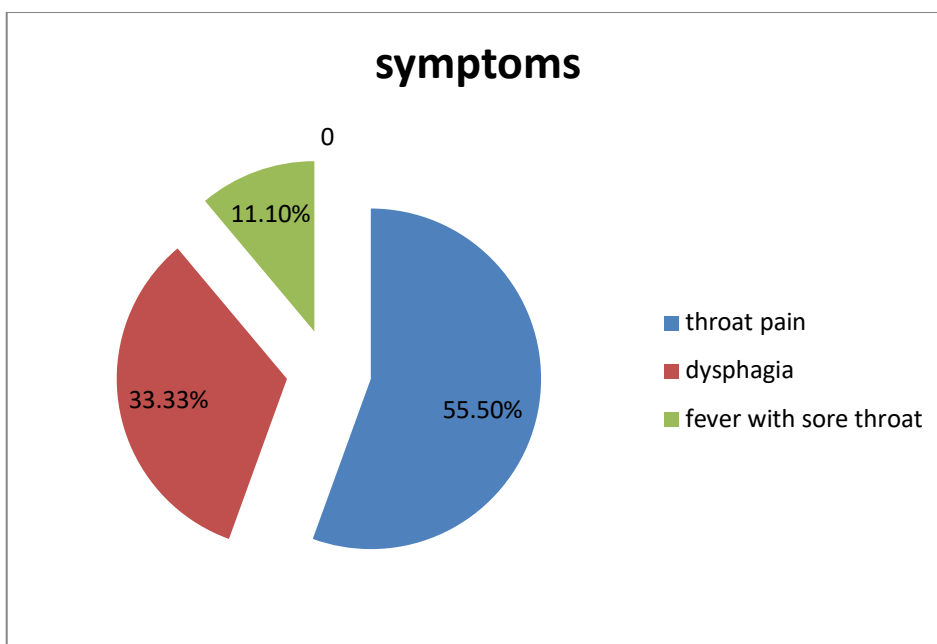
Original Figure 4: Showing Year-wise distribution of cases in number.



Original Figure 5: Location wise distribution of cases in percentage



Original Figure 6: Showing month wise distribution of diphtheria cases in number



Original Figure 7. Showing distribution of cases as per symptoms in percentage

Original Table I: Master Chart.

Year	Cases	Affected age-group ( in years)	Vaccination status	Mortality	Symptoms	Contact history	Month
2018	1	30	Unknown	0	Throat pain	0	June
2019	3	11 , 17 , 30	Unknown	0	Dysphagia	2	December
2020	3	16 , 23 , 30	1	0	Throat pain	2	October
2021	3	32	Unknown	0	Throat pain	0	July
2022	1	8	Unknown	1	Fever with sore throat	0	July

Inference of table 1: Out of 9 patients , 8 recovered and 1 expired. 4 had contact history , and 1 received 3 doses of DPT vaccine.

**Discussion:**

Diphtheria, a vaccine preventable disease resurgence & Its impact on health is a matter of concern since time immemorial.

The results of gram stain showed presence of gram positive bacilli and Albert's stain showed Klebsiella's bacilli indicative of diphtheria causing bacilli. [3] Since time immemorial diphtheria is considered as one of the most serious childhood diseases, due to infectivity and case fatality.

Before the discovery of diphtheria toxoid, nearly 70% of cases were children, younger than 15 years of age. With the advent of EPI (Expanded Programme on Immunization) in 1978, and UIP (Universal Immunization Programme) in 1985, most of the vaccine preventable diseases showed a decline but diphtheria was still endemic in our country. [4]

Diphtheria in last 5 years in Dibrugarh district showed maximum cases in 16-20 years of age group (as shown in figure 2); (33.33%). Sangal et al in their study, "resurgence of Diphtheria in North Kerala," India, 2016 showed that incidence of diphtheria was highest in the age group of 10-20 years, nearly 80%, which was similar to our study. [5]

But in contrary to other studies, female: male preponderance is 2:1 (as shown in figure 3). Khan et al, in their study on "resurgence of diphtheria in vaccination era" observed that females were mostly affected than males. [4]

In our study; cases were diagnosed based on clinical spectrum, lab investigations and confirmation of throat swabs in culture/ sensitivity in microbiological department. Ray et al, (in their study conducted in rural medical college and hospital near Kolkata) also observed the low microbiological confirmation rate and suggested that clinical diagnosis of diphtheria should be given due consideration. [6]

Diphtheria cases showed year wise variation with maximum no of cases in 2019 (as shown in figure 4). Slum areas reported highest no of cases (as shown in figure 5). Diphtheria cases showed seasonality with more reporting between July- October (as shown in figure 6). Several studies conducted in our country over last 30 years at different places also reported diphtheria in the months of August to November. Patel et al in their study, showed that diphtheria cases were found mostly in the months of August to October. [7] The seasonal variations like early monsoon in North Eastern region might also be a factor. The case fatality rate was found to be 11.11% which is consistent with the findings of Kadirova et al, while, diphtheria outbreak in Cali, Columbia in August- October 2000, reported case fatality rate as 12.5%. [8-9] The most common symptom amongst the patients was recorded as

throat pain (55.5%), which was similar to the study done by John O Otshudiema et al (as shown in figure 7). [10]

Though National Immunization Programme, public awareness programmes by Community Health Care workers has immensely helped to reduce the fatality rate as evident from different coverage evaluation survey and vaccine preventable disease surveillance report, still continuous reporting of cases in tertiary care hospitals need further strengthening of surveillance system for early detection of cases and adequate and timely management to avert fatality. Vaccine hesitancy, negligence on the part of the guardians also need to be tackled at community level. Further studies can be planned to see population immunity in different communities of Assam. Original table. 1 contains the elaborations of the study in a single frame as Master Chart.

**Conclusion:**

Our case series study indicates the need to continue and strengthen surveillance system with early referral and adequate referral system along with better vaccination and treatment facility at all level of health facility to improve accessibility and utilization of service so that such preventable morbidities and mortalities can be prevented.

**Acknowledgement:** We are grateful to Mrs. Moutree Lahon, DSO, Dibrugarh district for her valuable help.

**Contribution of Authors :**

1) All author(s) have contributed. 2) The article is original with the author(s) and does not infringe any copyright or violate any other right of any third party. 3) The article has not been published (whole or in part) elsewhere in any form, except as provided herein. 4) All author(s) have reviewed the final version of the above manuscript and approved it for publication.

Compliance with Ethical Standards : Done

Ethical Approval : Taken from Institutional Ethics Committee (AMC/EC/263)

Conflict of interest : None declared.

Source of funding: None declared.

Informed consent in the manuscript: Taken.

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