

Original Research Article

A clinical study of complications of diphtheria

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ABSTRACT

Background: Diphtheria is an acute infectious preventable disease of childhood caused by *C. diphtheriae*. Diphtheria is a localized infection of mucous membrane or skin.

Methods: The present study was carried out in the Department of Otorhinolaryngology S.P. Medical College and associated group of hospital. In this study all cases of diphtheria and all age groups which attended ENT OPD and emergency department during period from 1/1/2010 to 31/12/2010 were included.

Results: In the present study highest numbers of cases were recorded among 5-10 years of age followed by 0-5 year of age group. 57.59% patients were male and 42.41% patients were female. It was found that occurrence of diphtheria was highest in month November and October and was quit frequent during September and December. No cases during April, June and July. It was observed that most common post diphtheria complication was myocarditis (23.42%) followed by neurological complication.

Conclusions: In order to prevent complication of the disease active immunization is customary and in order to detect the disease at early stage and for prompt treatment masses should be educated regarding the dreadful nature of the disease.

Keywords: Diphtheria, Outcomes, Cardiac involvement, Neurological involvement

INTRODUCTION

Diphtheria (Greek) means “pair of leather scrolls”. Hence Bretonneau in 1926 named the disease “la diphtheria”, a word shortened many years later (possibly in 1855) to “diphtheria”.

Diphtheria is an acute infectious preventable disease of childhood caused by *C. diphtheriae*. Diphtheria is a localized infection of mucous membrane or skin. A characteristic pseudomembrane may be present at the site of infection. Some strains of *C. diphtheriae* produce toxin, a protein that can cause myocarditis, polyneuritis and other systemic toxic effects.

Most of the vaccine preventable diseases showed a decline after introduction of Expanded Program of

Immunization in 1978 and Universal Immunization Program in 1985. The reported incidence of diphtheria in the country during 1987 was about 12,952 whereas during the year 1999, there were only 2,725 cases showing a decline of about 79%.¹ It is still endemic in our country. The last decade has seen resurgence of diphtheria in both developed and developing countries where it was previously well controlled.²

Poor immunization coverage is the main factor for the persistence of diphtheria. National Family Health Survey-4 found 62% children between the ages of 12 and 23 months fully immunized nationwide, and immunization coverage was as low as Rajasthan, India. There is also tremendous heterogeneity in state- and district-level immunization in the country.³

At our Sardar Patel Medical College, in recent past we noted sudden upsurge in incidence of diphtheria cases not only from rural areas but also from urban slums. Beside Bikaner District, patient poured in from neighbouring district of Nagour, Churu, Ganganagar and Hanumangarh. This prompted us to conduct study on complications of diphtheria.

METHODS

The present study was carried out in the department of otorhinolaryngology S. P. Medical College and associated group of hospital. In this study all cases of diphtheria and all age groups which attended ENT OPD and emergency department during period from 1/1/2010 to 31/12/2010 were included. A detailed history and physical examination was done in all the cases soon after their admission and all relevant finding was recorded in the specially prepared proforma. The case were divided into confirmed case, probable case and suspected case as per WHO guideline. Informed consent was obtained from parents of all patients participating in the study. The protocol of study review and approved by ethical committee of hospital that represent the local institution review board.

Inclusion criteria

Confirmed case

Histopathological confirmed or culture positive.

Probable case

Upper respiratory tract infection (nasopharyngitis, laryngitis and tonsillitis) with or without a nasal, tonsillar, pharyngeal and laryngeal membrane, plus at least one of following:

- Gradually increasing hoarseness or stridor.
- Cardiac (myocarditis) and/or neurological involvement (motor and/or sensory palsies) one to six weeks after onset.
- Death with no other known cause.

Exclusion criteria

Not willing to participate in study.

The following points were taken into consideration during study.

Detailed history of the patient was collected. All patients underwent complete ENT and local examination. Relevant investigations were done whenever required. Special investigations which includes throat swab for c/s, KLB staining and echocardiography was done in necessary cases.

Data analysis

Statistical analysis was performed with the SPSS, trial version 20 for windows statistical software package (SPSS inc., Chicago, IL, USA). The categorical data were presented as numbers (percent) and were compared among groups using chi square test. Groups were compared for demographic data. Concordant rate were calculated to evaluate the agreement between two diagnosis test. The diagnostic accuracy (specificity SP, positive predictive value PPV and efficiency) were calculated. Probability p value <0.05 was considered statistically significant.

RESULTS

The following observations are based on clinical study conducted on 158 cases of diphtheria who attended ENT OPD and were admitted in isolation was of P.B.M. Hospital, Bikaner during the period from January 2010 to December 2010.

Table 1: Age incidence.

Age (in years)	No. of cases	Percentage (%)
0-5	39	24.68
5-10	84	53.16
10-15	28	17.72
15-20	6	3.80
>20	1	0.63

Table 2: Sex incidence.

Sex	No. of cases	Percentage (%)
Male	91	57.59
Female	67	42.41

Table 3: Seasonal incidence.

Month	No. of cases	Percentage (%)
January	3	1.89
February	0	0.0
March	3	1.89
April	0	0.0
May	1	0.63
June	0	0.0
July	0	0.0
August	3	1.89
September	18	11.39
October	53	33.54
November	56	35.44
December	21	13.29

Table 4: Toxaemia.

Toxaemia	No. of cases	Percentage (%)
Mild	98	62.03
Moderate	35	22.15
Severe	25	15.82

In the present study highest numbers of cases were recorded among 5-10 years of age followed by 0-5 year of age group.

Table 5: Anatomical distribution of membrane.

Anatomical site	No. of cases	Percentage (%)
Anterior nasal	13	8.23
Pharyngeal	158	100.00
Laryngeal	35	22.15
Cutaneous	2	1.27
Ocular	1	0.63
Genital	0	0.00

Table 6: Complication.

Complication	No. of cases	Percentage (%)
Myocarditis	37	23.42
Palatal palsy	29	18.35
Pharyngeal palsy	13	8.23
Broncho pneumonia	13	8.23
Motor Weakness	7	4.43

Table 7: Distribution of presenting symptoms.

Symptoms	No. of cases	Percentage (%)
Fever	158	100.00
Sore throat	158	100.00
Bull neck	37	23.42
Respiratory distress	33	20.89
Epistaxis	14	8.86

57.59% patients were male and 42.41% patients were female. It was found that occurrence of diphtheria was highest in month November and October and was quit frequent during September and December. No cases during April, June and July.

It was observed that severe toxemia developed in 25 patient moderate toxemia in (22.15%) 35 and mild toxemia in (62.03%) 98 cases.

It was found that 100% cases were pharyngeal diphtheria involving tonsillar region. Anterior nasal diphtheria occurred in 8.23% of cases. Cutaneous diphtheria occurred in only 2 cases while ocular diphtheria found in only one case.

It was observed that most common post diphtheria complication was myocarditis (23.42%). In neurological complication most common was palatal palsy followed by pharyngeal palsy and motor weakness. It was found that 100% cases presented with fever and sore throat only 8.86% of cases presented with epistaxis. Bull neck occurred in 23.42% of cases.

DISCUSSION

In the present study highest numbers of cases were recorded among 5-10 years of age followed by 0-5 year of age group. 57.59% patients were male and 42.41% patients were female. It was found that occurrence of diphtheria was highest in month November and October and was quit frequent during September and December. No cases during April, June and July.

Jain et al found diphtheria in 54% of unimmunized children. It was commonly seen in male patients and during the months July to September.⁴

Myocarditis was the most common complication observed followed by neurological complication. Majority of the patients with myocarditis were asymptomatic, had only ECG changes, SGOT elevation, and had a favorable outcomes. Another observation was that almost all patients developed cardiac involvement within first week of onset of respiratory symptoms and patients who had bull neck and extensive facial patches had more incidence of cardiac involvement.⁴⁻⁶ The patients who were adequately immunized and received ADS earlier, improved with less complications in comparison to unimmunized/partially immunized patients who received ADS late/inadequate doses.⁷ It had been observed that patients who had developed frank features of heart failure showed persistently elevated SGOT level which was closely parallel to the intensity of myocarditis and this may be used to monitor its course.⁸

Diphtheritic polyneuropathy is recognized as one of the most severe complications of diphtheria caused by exotoxin of *C.diphtheriae*. The term “diphtheritic polyneuropathy” encompasses all neurological symptoms with the onset of palatal paralysis as the first symptom. Palatal paralysis is a very common neurological complication, which may occur alone or in association with bulbar palsy. Manikyamba et al reported isolated palatal palsy in 56% cases.⁹ Mateen et al found palatal palsy only in 13% cases.¹⁰ The onset of neurological complications in our series was seen from 6–51 days after respiratory symptoms. Similarly, in the Latvian study of 50 adult patients with diphtheritic paralysis, neurological complications appeared in 2–50 days (median, 10 days) after the onset of respiratory diphtheria.¹¹ It was a bit early in our series as compared to other studies in which a latent period between the appearance of first symptom of diphtheria and the development of palatal palsy varied from 10 days to 3 months.¹² This could be attributed to the severity of diphtheria at the time of presentation.

CONCLUSION

In order to prevent complication of the disease active immunization is customary and in order to detect the disease at early stage and for prompt treatment masses should be educated regarding the dreadful nature of the disease. The health workers should be aware of

complications of diphtheria and refer the case to higher centre as early as possible.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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