



Diphtheria – A “Strangling Angel” Enjoying Resurgence in Older Children and Adolescents in Developing Countries

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Diphtheria is an infectious disease caused by the exotoxin produced by *Corynebacterium diphtheriae*. The organisms are locally invasive and secrete exotoxins which leads to myocarditis, paralysis and death. Despite the success of mass immunization in many countries worldwide, diphtheria recently been enjoying a minor resurgence due to waning immunity and inadequate coverage with booster vaccination, has led to the epidemiologic shift in the vulnerable age group to adolescents and young adults.

Diphtheria may manifest as an upper respiratory tract infection (pseudomembrane), a cutaneous infection or as an asymptomatic carrier state. Prior to the introduction of effective vaccination, diphtheria was a major cause of morbidity and mortality worldwide, particularly among children. Exotoxin production is dependent on the presence of a lysogenic β -phage, which carries the gene encoding the toxin (tox+). The toxin acts by inhibiting protein synthesis by combining with NAD⁺. The toxin released is absorbed into the circulation subsequently causing other organ damage mainly myocarditis, descending paralysis and ultimately death. It is spread by droplet infection from acute cases as well as asymptomatic carriers, where later being instrumental in transmission of diphtheria as much as clinical cases.

An accurate microbiological diagnosis of diphtheria is crucial and is always regarded as being complementary to clinical diagnosis because diphtheria is often confused with other conditions, such as severe streptococcal sore throat, Vincent's angina, or glandular fever. Detection of the lethal and potent exotoxin produced by the causative organism is considered to be the definitive test for the diagnosis of toxigenic *C. diphtheriae*. Early diagnosis and timely intervention reduce the incidence of the disease and controls the infection in the community and decreasing morbidity and mortality in the affected individuals.

As per World Health Organization (WHO) data from 2000 to 2016, over 82% of diphtheria cases occurred in children above 5 years and over 40% occurred in individuals over 15 years of age. This second shift is due to the waning immunity as the child grows older and is the reason why regular booster doses are recommended. India has the maximum number of diphtheria cases in the world. From 2011 to 2015, India had a total of 18,350 cases of diphtheria. Over 40% of cases reported in India are from individuals over 15 years and about 20% cases are reported from children under the age of 5 years.

Reasons for poor immunization coverage in India

1. A short supply of vaccines, poor logistical organization
2. Poor screening facilities and postponing vaccination because of minor childhood illnesses.
3. Widespread illiteracy and low awareness about the utility of vaccination and vaccine preventable diseases.
4. Ignorance about the total doses required
5. Improper or absent counselling
6. Vaccine side-effects
7. Migration of families
8. Lack of effective surveillance system for diphtheria.

Childhood immunization programs, especially follow up and administration of booster doses, must be prioritized. In view of the high case fatality rate and the high incidence of severe complications, it is imperative that high levels of immunity are maintained in the community through primary as well as booster immunisation to prevent a resurgence of diphtheria. A high degree of suspicion and early initiation of appropriate management as well as close monitoring for development of complications are key factors in successful management of individual cases. The antigen content

of the current diphtheria vaccines, especially the low antigen content of the booster vaccines, must be evaluated. Based on review of the literature, the immunization coverage against diphtheria is far from satisfactory in India. Therefore, serious efforts have to be made to increase immunization coverage and good surveillance systems ought to be put into place to enable optimum reporting of disease.

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