



DIPHTHERIA VACCINE AWARENESS SURVEY AMONG THE GENERAL POPULACE OF KADUNA STATE

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ABSTRACT

Aim: The aim of the study is to find the knowledge of Kaduna state populace on diphtheria vaccine which is the most effective way of tackling the disease as the Diphtheria antitoxin is not readily available for use in the country

Method: A survey conducted with a designed questionnaire at a confidence level of 95%, confidence interval of 12.5 showed Kaduna State populace's responses on diphtheria, its vaccine and booster doses, the questionnaire was self administered and responses were collated using simple descriptive statistics.

Results: A total number of 64 people responded; majority (37 of 64) were from the child bearing age fifty six, 56(88%), fifty nine, 59 (92%) were vaccinated against diphtheria but only eighteen, 18 (28%) knew about its booster doses. Twenty eight, 28 (45%) took their children for vaccine but only fourteen, 14 (11%) ever took them to receive the booster dose from among the respondents.

Conclusion: Kaduna state residents have generally inconsequential awareness on diphtheria, its prevention and management.

Key words: Diphtheria toxin, Diphtheria toxoid, Vaccine, Knowledge, Populace

INTRODUCTION

Corynebacterium diphtheriae is a Gram positive, non-spore forming, non-motile, pleomorphic rod belonging to the genus *Corynebacterium* and the actinomycete group of organisms causing the disease diphtheria. The organism produces a potent bacteriophage encoded protein exotoxin, diphtheria toxin (DT), which causes the symptoms of diphtheria with pharyngitis inclusive. This potentially fatal infectious disease is controlled in many developed countries by an effective immunisation programme with a vaccine called Diphtheria toxoid (DTaP). Diphtheria is a potentially life-threatening upper respiratory infection characterised by serious bacterial infection that affects the mucous membranes of the throat and nose. If left untreated, diphtheria can cause severe damage to the kidneys, nervous system, and heart and it is fatal in about 3% of cases (Marx and John, 2011). The genome of *C. diphtheriae* consists of a single circular chromosome of 2, 5 Mbp, with no plasmids.

The genome shows an extreme compositional bias, being noticeably higher in G+C near the origin than at the terminus (Marx and John, 2010; Acerra, 2010).

A research of this nature has not been carried out in Kaduna state; Nigeria according to the available literatures used for this purpose. Unfortunately in Nigeria; data and reports on Diphtheria has only been submitted 3 times in 14years with the last report of 312 cases in 2006, 790cases in 2002 and 2,468 in 2001 (WHO, 016). It has been estimated that globally; 4,767 cases of diphtheria were reported in 2015 and an average of 4,500 cases annually (WHO, 2016). In 2016, at least 5-10/people die of diphtheria daily in India (The New India Express, 2016)

Diphtheria has been a major silent killer disease almost all over the world and it is estimated that the disease is fatal in 5% and 10% of cases with children and adults above 40 years having a fatal rate of up to 20% (Atkinson *et al.*, 2007).

This is caused by the toxigenic strains of *Corynebacterium* spp. currently there are 4 known biovars (Marx and John, 011) but the lack of knowledge about which of the strains that's endemic in Kaduna state poses a serious problem in managing it.

However; diphtheria became a medical rarity after the advent of vaccine (Long, 2000); its screening, management, clinical clerking of patients, knowledge about the disease by the general public and administration of booster doses to increase immunity have been discontinued, taken lightly or forgotten by health practitioners especially in developing nations (Long, 2000). This is serious now that there is a striking resurgence of diphtheria in the Newly Independent State and sporadic occurrences across the globe which demands for urgent need of revival.

In Nigeria; mortality rate of 33.3% in Benin City; Edo state (Sadoh and Sadoh, 2011) and a recent outbreak that claimed many lives in Kimba village; Borno State (Besaet *al.*, 2011) have been recorded with poor management and lack of antitoxin to treat the patients.

Diphtheria can be considered as one of the neglected tropical diseases and therefore the need for its further studies which is why finally; as long as the disease continues to play a major role as a lethal resurgent infectious disease (Galazka and Robertson, 1995; Dittman, 1997), studies on Diphtheria from every angle is fundamental in managing it.

MATERIALS AND METHODS

DESCRIPTION OF THE STUDY AREA

This study was conducted in BarauDikko Specialist Hospital; Kaduna State, Nigeria. Kaduna State is located at Northwest of Nigeria; it covers a total area of 46,053km² (17,781 sq mi) and an area rank of 4th of the 36 states of Nigeria. It has a population of 6,066,562 people going by 2006 census leaving it the 3rd of the 36 states of Nigeria in rank and a density of 130km² (340/sq mi). Its coordinates are 10°20¹N and 7°45¹E;

these coordinates clearly indicate that the location is centralised and connects the major routes reaching most of the states of the Nation. Kaduna State, north central Nigeria, is politically classified as belonging to the now 'North - West' zone of the current six (6) Geo - political zones. It is populated by about 59 to 63 different ethnic groups if not more (Fletcher *et al.*, 1996; NOG, 2007); where Gwari, Hausa and Fulani are the dominant ethnic groups. Its water supply is sourced through damping of rivers and digging of wells and boreholes. Kaduna State consists of twenty-three (23) Local Government Areas.

SAMPLE POPULATION

The populace included apparently literate individuals including both males and females.

QUESTIONNAIRE

A questionnaire was designed and distributed to the respondents attending the hospital. The total number of people that responded was used in calculating the confidence interval at www.surveysystem.com at confidence level of 95% and population of approximately 6,000,000 people of Kaduna residents according to the 2006 last census.

STATISTICAL ANALYSIS

Response to the questionnaires were analysed using simple descriptive statistics involving frequency and percentages

RESULTS

A total number of 64 people responded to the questionnaire out of which 37(58%) were from the range of 20-29, 19(30%) from 30-39, 6(%) from 40-49 and 2(3%) from 60-69 age group. 41 out of the 64 respondents (64%) were females and 23(36%) were males. Other figures of the results are: 59(92%) have remembered taking the diphtheria vaccine, 18(28%) knew about the booster doses and only 9(9%) took it. 18(28%) of the respondents had pharyngitis in the last 10years. Consequently; 28(45%) vaccinated their children and only 14(11%) ever gave their children the booster dose.

On the other hand, 5(8%) did not take the diphtheria vaccine, 46(72%) did not know about the booster dose, 55(91%) of the respondents did not take the booster dose.

Finally; 46(72%) had pharyngitis in the last 10years; 36 (55%) did not vaccinate their children and 50(89%) of the respondents did not take their children for the booster dose.

Table 1: Representing the Age Distribution of Respondents to the Questionnaire

Age group	Number of Respondent	Percentage (%) Occurrence
0-9	0	0
10-19	0	0
20-29	37	58
30-39	19	30
40-49	6	9
50-59	0	0
60-69	2	3

TABLE 2: Respondents Response to Questionnaire.

Sex	Questions from Questionnaire	No. Of Positive Responses	No. Of Negative Responses	Percentage (%) of Positive response	Percentage (%) of Negative response
64% F and 36% M					
38F 21M	Have you ever taken Diphtheria vaccine before?	59	5	92	8
11F 7M	Do you know about diphtheria booster immunization doses	18	46	28	72
6F 3M	Have you taken the booster dose	9	55	9	91
11F 7M	Have you ever had pharyngitis in the last 10 years	18	46	28	72
18F 10M	Do you vaccinate your children	28	36	45	55
9F 5M	Have you ever given them the booster dose	14	50	11	89

Note: F stands for Female and M for Male

DISCUSSION

A total of 64 people responded to the questionnaire, out of them 37 (57.8%) of them belong to the age group 20-29; 19 (29.6%) belonged to 30-39; 6 (9.38%) belonged to 40-49 and 2 (3.13%) belonged to 60-69 years; this clearly indicate that

majority of the people are from the child bearing age and 41 (64%) were females. Exactly the findings of (Young-Hoon *et al*;2012; where a total of 64 ED directors completed the questionnaire among the 95 hospitals surveyed in the year 2012 in Korea (Young-Hoon *et al*; 2012).

Out of 64 respondents; 59 (92%) were vaccinated against diphtheria along with pertussis and tetanus in the DPT vaccine formulation administered since childhood, this is because immunization awareness is high among mothers. Similarly; a study conducted by (Sailaja et al; 2006) there was 90% primary vaccination coverage from 2003-2006 (Sailaja et al; 2006) amongst which 18 (28%) knew about the booster doses of DPT and 6 (9%) of them ever took the 10year-booster doses for diphtheria, in the same vein, lack of awareness and nonchalant attitude towards being up to date with their vaccine could be the underlying factor; compared to the only finding in Hyderabad in the year 2005 through 2006 on booster doses of diphtheria; 60%(95% CI:54-66) and 36%(95% CI:27-40) took the 2nd and 3rd booster respectively (Manoj, 2016). 18 (28%) of them had pharyngitis at least once in the last 10 years, this could be as a result of infection, allergy or injury; in the same vein; the 2000 National ambulatory Medical care Survey found that acute pharyngitis accounts for 1.1% of visits in the primary care setting and is ranked in the top 20 reported primary diagnoses (Cherry et al, 2000). 28 (45%) of the responders take their children for vaccine but only 14 (11%) ever take them to receive the booster dose of diphtheria, the reason being same as stated above. Not Applicable (NA) was 12 (19%) for children that were vaccinated and 18 (28%) for children that receive booster doses; this indicates that their children are not old enough for the 10year booster dose or they have no children at all. Similarly in America, a study where confidence interval was involved in an analysis is the three studies involved for the Alzheimer's disease (AD) knowledge test, it has been suggested that community awareness of AD has increased over recent years. This claim has been difficult to evaluate given the lack of systematic research in this area, however, despite some recent attempts at monitoring changes in knowledge about AD, the present study compared results from three studies that have investigated the level of AD

knowledge among undergraduate students, using confidence intervals (Sullivan et al., 2003).

In correlation to the above findings; the WHO and UNICEF (2014) estimates of national immunization in Nigeria DTP 1 survey of 12-23 months, card or history was 64m (40%), administrative coverage was 102m (64%) and official government estimate was 76 (48%). Estimate was based on survey but official government estimate was based on an adjustment to the administrative data derived from a correction factor of 75% that was derived from observation of a community survey showing that 69% of infants were fully immunised (WHO;2016). In 2015; survey was not applicable but administrative coverage was 103m (64%), official government estimate of 76m (48%) while WHO and UNICEF estimate was 70m (44%). Generally; on a country by country basis, about two-thirds of WHO's 194 member-states achieved immunization coverage of 90% or higher for the commonly used diphtheria (DPT) vaccine measurement; the figures showed are data derived from official reports by national authorities; as well as survey from the published and grey literature (WHO; 2016).

CONCLUSION

Based on the survey conducted with confidence level of 95% and confidence interval of 12.5, Kaduna state residents have generally inconsequential awareness on the prevention and management of diphtheria which leaves them at a risk of counteracting the disease which can be very fatal; but nevertheless immunization in infants is promising and has a better coverage than the booster doses of adults.

RECOMMENDATION

Awareness should be made to the general public on the effect of diphtheria and ways to prevent it; awareness should also be made on the protocols to be followed in achieving full immunity against disease; especially the booster immunization that is supposed to be routinely taken every 10 years.

The revival of routine screening of all throat swabs is ought to be done to patients presented with pharyngitis and/or other respiratory symptoms for detection of the organism using sophisticated technology; portent and viable reagents; Hoyle's tellurite medium and Eleks's test among others by well trained and skilled Laboratory Scientist. At the State and Federal level; it is recommended that encouragement; empowerment and sponsor to be given to vaccine production within the state and country as a whole as like humans; every organism not only *Corynebacteriumdiphtheriae* is different and indigenous to every geographical location and vaccines imported could be less effective and portent than the ones

formulated using the local and indigenous strain.

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Conflict of Interest

The authors declared there is no conflict of interest throughout this research.

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