

Post-neonatal Tetanus in Nigeria: A Need for Booster Doses of Tetanus Toxoid

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Summary

Fatunde OJ, Familusi JB. Post-neonatal Tetanus in Nigeria: A Need for Booster Doses of Tetanus Toxoid. *Nigerian Journal of Paediatrics* 2001; 28:35. Eighty-two (87 per cent) of the 94 cases of post-neonatal tetanus patients seen in the department of paediatrics, University College Hospital, Ibadan, over an 11-year period were aged five years and above. Persistent occurrence of this preventable condition for which an effective vaccine is available indicates deficiencies in the health system of the country. Although, a case fatality rate of 12 per cent compared favourably with those of centres employing more sophisticated treatment modalities, morbidity was high with patients spending an average of 23 days (range 3 to 76 days) in hospital. Although no reliable record of tetanus immunization was obtained in 37 of the patients, 34, 8 and 15 patients received doses of DPT immunization of 0, 1 – 2 and 3, respectively, during infancy. No patient had tetanus toxoid (TT) administered after infancy. The findings indicate that the current Expanded Programme on Immunisation (EPI) recommended by the WHO for developing countries, of which three doses of DPT are given during infancy with no provision for booster doses, is inadequate for tetanus prevention during childhood. It is suggested that a clause be added to the EPI schedule, advising two extra doses of TT between ages four to six years and 11 to 12 years (entry into primary school and secondary school, respectively) for all children. In order to ensure compliance, these booster doses of TT could be made prerequisites for entry into these schools.

Introduction

THE World Health Organisation (WHO) instituted the Expanded Programme on Immunization (EPI) in 1974 in a bid to provide vaccination to most of the children of the world before their first birthday.¹ In Nigeria, the EPI schedule was adopted in 1979 and modified in 1996 as the National Programme on Immunization (NPI).² In accordance with the EPI scheme,³ three doses of tetanus toxoid (TT) are given to infants (in combination with diphtheria and pertussis vaccines as DPT) at the ages of six weeks, 10 weeks and 14 weeks. Two decades after the introduction of EPI in Nigeria, tetanus continues to afflict several children, including some of those purported to have received three doses of DPT in infancy. While the majority of tetanus cases seen are in the neonatal age group,⁴ post-neonatal tetanus remains common. A review of all the cases of post-neonatal tetanus managed at the University College Hospital, Ibadan, in the last 11 years was carried out with a view to highlighting current predisposing factors and pos-

sible strategies for reducing the incidence of this potentially fatal but preventable disease.

Patients and Methods

Hospital records of all post-neonatal patients with a diagnosis of tetanus who were admitted into the Children's Emergency Ward and/or the paediatric ward of the University College Hospital (UCH), Ibadan, from September 1988 to May 1999 were examined. Where the case files were not available, note was taken of the information recorded in the ward admission books. Information extracted from the records included: age, sex, number of DPT doses received as part of routine infant immunization, probable portal of entry of the *Clostridium tetani*, incubation period, presence or absence of spasm on presentation, whether spasms were spontaneous or provoked, temperature on admission, mode of treatment, length of hospital stay, documented complications or sequelae and the outcome of the disease. The severity of the disease was classified as mild, moderate or severe, if there was no spasm, minimal provoked spasm only, or spontaneous spasms, respectively on presentation.⁵ To test the effect of one variable on another, correlation coefficient was determined using the *EPI 6 INFO* software. A *p* value of <0.05 was taken as indicative of a significant difference.

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Results

A total of 94 patients outside the neonatal age group were treated for tetanus during the designated period. Of these, limited information from ward records was available on 21 patients while adequate details from case notes were obtained on 73 patients. There were 56 males and 38 females giving a male: female ratio of 1.5:1. The mean age of the patients was 8.4 years with a range from six months to 13 years. Table I shows the details of the age distribution of the patients as well as the number of DPT doses received previously. Of the 12 patients under the age of five years, only one (aged six months) was less than one year old, while three others were less than two years. The majority of the patients (87 per cent) were aged five years and above. While there was no data on immunization status in 39 per cent of the patients, 34 (36 per cent) definitely received no immunization against tetanus. A

Table I

Age Distribution and DPT Doses received by 94 Post-neonatal Tetanus Patients

Age (yrs)	No data	No of DPT doses			No of cases	Per cent Total
		0	1-2	3		
<5	5	3	2	2	12	(13)
5-10	16	15	3	6	40	(42)
>10	16	16	3	7	42	(45)
Total	37(39)	34(36)	8(9)	15(16)	94	(100)

Figures in parentheses are percentages of total

Table II

Severe Disease and Mortality Among 73 Tetanus Patients Categorized by Number of DPT Doses Received

DPT Doses	No of Patients	Patients with Severe Disease	Mortality
Unknown	16	5	5
0	34	13	5
1-2	8	2	0
3	15	4	1
Total	73	24 (33)	11 (15)

Figures in parentheses represent per cent of total

Table III

Portal of Entry for Tetanus in 68 Patients

Portal of Entry	No of Cases	Per cent of Total
Puncture wound	9	13
Trauma from RTA	3	4
Other traumas	23	34
Otitis media	18	27
Unknown	15	22
Total	68	100

RTA = Road Traffic Accident

smaller proportion of the under-fives {3(25 per cent) out of 12} had no immunization compared to children in the age range five to 10 years (28 per cent) and those older than 10 years (38 per cent). Of 61 patients in whom enough data were available for classification of disease severity, 13 had mild disease, 24 moderate and 24 severe disease.

Table II shows the number of doses of DPT, which were reportedly given to 73 children in infancy, and compares the rate of severe disease and eventual death among the different categories of patients. In patients for whom data were available, an increasing number of DPT doses received are inversely correlated with development of severe disease ($r = -0.077$, $p = 0.5255$) and eventual death ($r = -0.1718$, $p = 0.1519$) although the differences are not statistically significant. While most of the 73 patients either had questionable history of immunization (16) or no immunization (34), it is notable that as many as 15 patients claimed to have received three doses of DPT. Thirteen of these 15 patients developed tetanus after the age of five years and death occurred in one, an eight-year old girl.

Table III shows the probable portal of entry of *C. tetani* in 68 patients for whom this was documented. Deep puncture wound accounted for only 13 per cent of cases while most cases (38 per cent) were secondary to wounds caused by other trauma usually to the lower limb. In 22 per cent of cases, no portal of entry could be identified. Of the 18 cases secondary to otitis media, five were in children under the age of five years. Since there were only 12 children in this age group, otitis media was the most prevalent source of tetanus in the younger age group, accounting for 42 per cent of cases in this group. Overall, 11 patients died, giving a case fatality rate of 12 per cent. Nine of the dead patients had severe disease; one was classified as having a mild disease while inadequate data prevented the categorisation of the remaining patient. Case fatality rate among patients with severe disease was 37.5 per cent (9 out of 24). Death occurred in the first three days of hospitalisation in all but one of the dead patients. The exception was an eight-year old child with an additional diagnosis of possible tuberculous

meningitis who died on the 16th day of admission. The average duration of hospitalisation in surviving patients was 23 days (range 3 to 76 days).

Discussion

At the UCH, Ibadan, routine management of the child with tetanus includes intramuscular administration of equine antitetanus serum (ATS) 10,000 units, intramuscular procaine penicillin on daily basis for 10 days and sedation with oral diazepam 2–6 mg/kg/day and chlorpromazine 3–6 mg/kg/day which are given in four divided doses daily and administered via a nasogastric tube, which is also used for feeding. Initial drugs are given parenterally in severe cases when the nasogastric tube is difficult to pass. Other medications sometimes added include intramuscular paraldehyde 0.01 ml/kg/dose, oral pyridoxine 100mg three times daily and other antibiotics as required. Active immunization is started in the form of administration of tetanus toxoid before the patient is discharged. Lack of appropriate equipment makes it impossible to put patients on artificial ventilation even when they are judged to need such intensive therapy. However, in this study, the case fatality rate of 12 per cent in post-neonatal tetanus compares favourably with figures of 12 per cent to 50 per cent obtained in centres where intensive care facilities were used for the management of severe cases.^{6,7} A mortality of 37.5 per cent among the severe cases also compares favourably with that of 23 per cent obtained by Udawadia *et al*⁶ and 30.7 per cent by Camacho *et al*⁷ but is much higher than the 14.5 per cent reported by Wesley *et al*⁸ with more sophisticated management. Our overall mortality figure of 12 per cent is much lower than the 39.3 per cent reported by Oyelami *et al*⁹ practising at a nearby teaching hospital and using the same kind of management techniques. These same management techniques have not however, been so successful for treatment of neonatal tetanus, which continues to be associated with a very high case fatality rate.

Tetanus is a vaccine-preventable disease, which is now rare in industrialised countries with well-established immunization policies. It is unfortunate that the disease remains so common in developing countries and occurs in some patients who were otherwise appropriately immunised according to the EPI schedule. Fifteen of the 94 patients in this study claimed to have had three doses of DPT in infancy as primary vaccination. It is pertinent to note that the majority of the afflicted patients were aged above five years. Peeble *et al*¹⁰ found the interval of protection after four or more injections of TT to be greater than 12 years from the last injection. Most developed countries will give four or five TT vaccinations as part of primary immunization (three in infancy, one at age 15–18 months and 1 at age 4–6 years) and follow with booster doses every 10 years thereafter.^{11,12} This is also practised in some developing countries.¹³ The United States of America has recently added yet another dose of tetanus toxoid to be given at age 11–12 years.¹⁴ It has been

shown that while three doses of DPT administered in infancy give protective levels of antibody up to three to four years of age¹⁵ the antibody level tends to wane with time.¹⁶ The observation that 15 patients who had three DPT injections as primary immunization developed tetanus is notable. Interval between the last dose of vaccination and the development of tetanus was more than five years in most of them. La Force *et al*¹⁷ also reported tetanus in eight patients who had received primary course of immunization in the 10 years before injury. It is notable that the majority of the patients in this study (87 per cent) were aged five years and above, a period when antibody levels from primary immunization given in infancy, may have dwindled to non-protective levels. Vaccination of children at age four to six years (primary school entry) and at 11 to 12 years (secondary school entry) as practised in many countries,^{11,14} may give the necessary boost to the immune status of the children to help prevent tetanus at these particularly susceptible periods in their lives.

In many developing countries, children are given only the recommended three doses of DPT in infancy. None of our patients had more than three doses of TT. Even enthusiastic parents, who would have willingly taken their children for a full five-dose regimen if asked, do not do so because they are not told of its necessity. The findings of this study indicate that the current WHO recommendation (EPI schedule) of three doses of DPT during infancy with no provision for booster doses is inadequate for tetanus prevention in childhood. It is suggested here, as has been suggested for some other developing countries¹⁸ that booster doses of tetanus toxoid are important. A clause should be added to the EPI schedule specifying at least two additional doses of TT at age 4–6 years (primary school entry) and 11–12 years (secondary school entry) where possible. These may even be made prerequisites for admission into such schools in order to ensure compliance.

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