

Incidence and outcome of neonatal tetanus in Enugu over a 10-year period

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Background. Tetanus is a preventable disease that can be eradicated by immunisation and improved obstetric practice.

Aim. To study the trend and outcome of tetanus admissions among children in the University of Nigeria Teaching Hospital (UNTH), Enugu, Nigeria.

Method. All cases of tetanus admitted into the children's ward of the UNTH over a 10-year period from July 1998 to June 2008 were analysed from the admission records.

Result. A total of 9 361 patient admissions were reviewed. Sixty-three (0.67%) of these patients had tetanus. Forty-one (65%) were neonates. Eighteen (28.6%) of the 63 patients with tetanus died, with mortality from neonatal tetanus (31.7%) not different from post-neonatal cases (22.7%) ($p=0.45$). Peaks of neonatal tetanus incidence were observed when immunisation of pregnant women was rejected by religious sects.

Conclusion. From this study, hospitalisation for tetanus over the period in review was generally low. There was no definite trend and mortality was unacceptably high. Indeed, there was no change in the mortality pattern from tetanus during the period under review.

Recommendations. There is a need to strengthen immunisation against tetanus during antenatal care and by giving booster doses beyond infancy.

Tetanus is a potentially fatal disease caused by the organism *Clostridium tetani*, a mobile Gram-positive spore-forming obligate anaerobe with soil or dust as its natural habitat. It occurs worldwide but is endemic in developing countries and has continued to be a significant public health problem in resource-poor nations.^{1,2}

The World Health Organization (WHO) estimated that tetanus accounts for about 7% of neonatal deaths globally.³ In Kenya, the mortality rate was reported to be 3.1/1 000 live births,⁴ while in Nigeria it was estimated that tetanus accounted for about 20% of neonatal deaths.⁵

In this study, we reviewed the trend and outcome of neonatal tetanus at the University of Nigeria Teaching Hospital (UNTH) over a 10-year period. We believe that such statistics will enable health care providers to appraise efforts that have been made towards the control of this often fatal infection with a view to identifying areas that need improvement.

Ethical clearance for the study was obtained from the ethical committee of the UNTH.

Methods

This was a retrospective study conducted at the UNTH, Enugu. Enugu is the capital of Enugu State, with a population of about 3 million people. The hospital offers tertiary-level medical care, has

a capacity of 700 beds, of which 70 are paediatric, and receives referrals from neighbouring states. The urban-to-rural patient ratio is approximately 1:1.

All cases admitted into the paediatric ward and newborn special care unit of UNTH over a 10-year period (July 1998 - June 2008) were reviewed from the ward register. All cases in which tetanus was the final diagnosis were analysed. Data obtained for each patient included the age, sex, address (rural or urban), duration of hospitalisation before discharge home or death, and overall mortality.

Data were analysed using EPI Info statistical package version 6.04.

Results

A total of 9 361 patient admissions were reviewed. Sixty-three had tetanus, representing 0.67% of admissions over the study period. The annual hospital incidence showed peaks in 2001/2002 and an increasing trend from 2005 to 2007/8. (Fig. 1) This coincided with an increased proportion of neonatal tetanus cases, except for 2002 when an increase in post-neonatal cases was observed (Fig. 2).

Table I shows the characteristics of our tetanus populations. Forty-one of 63 patients (65%) were neonates, presenting at a mean age of 8.77 days (range 5 - 28 days). Twenty-two cases (35%) were post-neonatal, with a mean age of 8.54 (standard deviation 4.4) years (range 1 month - 14 years).

TABLE I. CHARACTERISTICS OF TETANUS ADMISSIONS

	Neonatal (N=41)	Post-neonatal (N=22)
Age at onset	5 - 28 d (mean 8.77, SD 5.74 d)	1 mo. - 14 yrs (mean 8.5, SD 4.40 yrs)
Gender	Males 21, females 20	Males 15, females 7
Rural/urban	Rural 26, urban 15	Rural 17, urban 5
Length of admission before discharge home	14 - 33 d (mean 24.36, SD 5.01 d)	8 - 29 d (mean 18.8, SD 6.97 d)
Length of admission before death	1 - 12 d (mean 4.13, SD 4.01 d)	1 - 2 d (mean 1.67, SD 0.58 d)
Overall mortality	13	5

SD = standard deviation.

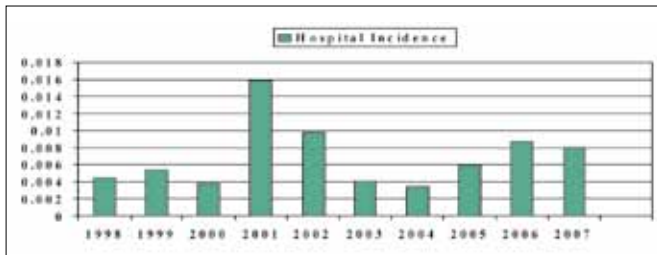


Fig. 1. Prevalence of tetanus as a proportion of hospital admissions.

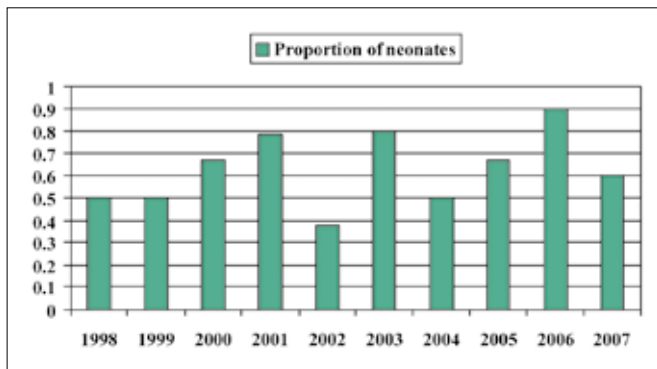


Fig. 2. Neonatal cases as a proportion of all tetanus cases.

There were more rural (43/63, 68.3%) than urban (20/63, 31.7%) patients, and twice as many males as females were affected in the post-neonatal age group (ratio 2.1:1). Subjects with neonatal tetanus had longer hospital admissions before death than did post-neonatal patients.

Eighteen patients with tetanus died, 13 of the 41 neonates (31.7%) and 5 (22.7%) of the 22 post-neonatal patients ($p=0.45$, odds ratio 0.63, 95% confidence interval 0.45 - 6.46).

Discussion

This study shows no definite trend in the incidence or outcome of hospitalised tetanus patients at UNTH, Enugu, in contrast with other countries such as the USA⁶ and India.⁷

A decline in the rate and trend of neonatal tetanus admissions was reported by Oruamabo *et al.* in Port Harcourt, Nigeria, between 1984 and 1988 after the introduction of the Expanded Program on Immunization, highlighting the impact of immunisation on the incidence of the disease.⁸ Our study showed an upsurge of neonatal tetanus cases in Enugu in 2001 and from 2006, during which time there was a rejection of tetanus toxoid vaccination by pregnant women owing to misconceptions about the vaccine by some religious sects. An increase in neonatal tetanus was also reported in Benin City, Nigeria, between 1997 and 2001, one of the contributing factors being the absence, or incomplete tetanus toxoid vaccination, of mothers during pregnancy.⁹

Admissions of patients with tetanus over the period under review were low when compared with the report by Gbadegesin *et al.*,¹⁰ in which 57 patients with post-neonatal tetanus were hospitalised over a 3½-year period between January 1989 and June 1992 in Ibadan.

Twice as many males as females in the post-neonatal group were affected, a finding similar to reports by some other authors.^{4,10,11} This could be explained by the adventurous and risk-taking behaviour of boys, which predisposes them to injuries, many of which may not be reported to parents until tetanus sets in. Those in rural areas are worse affected than their counterparts in urban areas. This could be explained by ignorance and poor access to appropriate and timely healthcare, which applies more to rural than urban areas. In addition, most rural children are from farming families, which may predispose them to frequent cuts and puncture injuries. The greater frequency of tetanus in children from the rural area could be a result of the distance the caregivers may have to walk before obtaining immunisation services, which may not even be regular. Irregular immunisation may lead to low vaccination coverage of rural dwellers.

The mean age of onset of 8.54 years for post-neonatal tetanus is similar to that reported by Gbadegesin *et al.*,¹⁰ suggesting a decline in the protective level of antibodies to tetanus at this age. This is further supported by Aboud *et al.*,¹² who reported low levels of protective antibodies to tetanus in Tanzanian children aged 6 - 15 years following immunisation in infancy. The administration of routine boosters every 10 years that has reduced the morbidity and mortality from tetanus in the USA is not routinely practised in Nigeria.

The case fatality rate from tetanus over the initial 5 years (9/36, 25%) does not appear to be significantly different from that of the later 5 years (9/27, 33.3%) of this review ($\chi^2=0.534$; $p>0.1$) indicating the probability that not much impact was made in terms of controlling this preventable disease. This calls for a re-appraisal of our control programme on tetanus.

This study also showed that affected neonates who survived the first 5 days of illness and post-neonatal patients who survive the first 2 days are unlikely to die in the absence of complications.



Tetanus accounts for about 7% of neonatal deaths globally.

Conclusion

We conclude that tetanus remains a public health problem in our environment and that all stakeholders must work to achieve complete eradication of this disease by immunisation.

We recommend that vaccination during pregnancy and in infancy, as recommended in the National Program on Immunization (NPI), should be strengthened and sustained and that booster vaccination at school age be introduced and enforced so as to reinforce the waning immunity that may occur at this age.

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