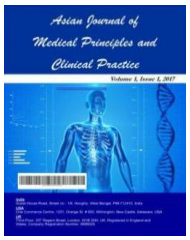

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A Primordial Killer Still on the Prowl: A Short Report on Paediatric Tetanus in North-Eastern Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author IAI designed the study, wrote the protocol, performed the statistical analysis and wrote the manuscript draft. Author HA designed the study and wrote the protocol. Authors MOY, HUM and TU collected the data. All the authors read and approved the final manuscript.

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ABSTRACT

Aims: To examine the clinical profiles and outcomes of neonatal and post-neonatal tetanus as seen at the Federal Medical Centre Azare, North-Eastern Nigeria.
Study Design: The study was cross-sectional retrospective.
Place and Duration of Study: Department of Paediatrics, Federal Medical Centre, Azare, Nigeria from 1st January to 31st December 2013.
Methodology: Hospital records of patients managed for neonatal and post-neonatal tetanus during the study period were retrieved and analysed. Information obtained included, history, physical examination findings, complications and outcome. SPSS version 17.0 was used for data analysis.
Results: A total of 19 cases were admitted during this period, 6 (31.6%) had neonatal tetanus, while 13 (68.4%) had post-neonatal tetanus. The male: female ratio for neonatal tetanus was 1:1, that of post-neonatal tetanus was 1.6:1. The case fatality rate of neonatal tetanus was 50% and 61.5% for post-neonatal tetanus. The mean age of the neonates who survived the disease differed significantly from that of those who did not survive the disease (*P*=.03). This was also true for incubation period (*P*= .01). Mean incubation period and onset time for post-neonatal tetanus was

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longer in survivors than non-survivors. However, these differences did not reach statistical significance (*P*= .59, .50 respectively). The portal of entry of post neonatal tetanus had a statistically significant relationship with the outcome (*P*= .02).
Conclusion: Mortality from tetanus remains high, the importance of preventive strategies in its management cannot be overemphasized in our environment.

Keywords: Primordial killer; clinical profile; outcome; neonatal tetanus; post-neonatal tetanus; Azare.

1. INTRODUCTION

Perhaps clinically the most easily recognisable disease, tetanus remains one of the most lethal. Its case fatality rate ranges from 20% to 50% [1]. Tetanus had been well recognised by prehistoric peoples, yet it remains an on-going problem mainly in the developing world [2,3]. It is a neurological disease caused by the exotoxin of Clostridium tetani and characterized by muscle spasms, rigidity and in severe cases autonomic dysfunction [4]. There are four clinical forms of the disease; generalized (the commonest), cephalic, localized and neonatal [4]. Of the current global burden of neonatal tetanus, 75% lie in the following countries; Bangladesh, China, India, Indonesia, Nigeria and Pakistan [5]. Post-neonatal tetanus is also a challenge in developing countries even as it has failed to attract as much attention as neonatal tetanus [6].

The diagnosis of tetanus is clinical, and its management entails the following principles; neutralisation of unbound toxins, elimination of the source of infection, control of spasms and rigidity, control of autonomic dysfunction and supportive care [4]. The disease is preventable by immunisation.

This study aimed to examine the clinical profiles and outcomes of the cases of neonatal and post-neonatal tetanus seen at the Federal Medical Centre (FMC), Azare, Bauchi state, Nigeria from 1st January to 31st December 2013. The FMC Azare provides tertiary health services for the populations of Bauchi, Yobe and Jigawa states of Northern Nigeria [7].

2. METHODOLOGY

Retrospective data for all patients managed for tetanus (including neonatal tetanus) in the department of paediatrics of the FMC Azare from 1st January to 31st December 2013 were analysed. Diagnosis of tetanus was confirmed by at least one paediatrician. Information namely, history, physical examination findings, complications and outcome were obtained from the records.

Management of the patients was achieved with the following: use of anti-tetanus serum (ATS) to neutralize unbound toxins (human tetanus immune globulin is unavailable in our facility), control of spasms, rigidity and adequate sedation of the patients was achieved with the administration of phenobarbitone, and chlorpromazine given parenterally until spasms were fully controlled before changing to the oral formulations. Breakthrough spasms were managed with parenteral diazepam, and intravenous metronidazole was used to eradicate the source of infection. Nutrition was maintained with nasogastric tube feeding until patients could tolerate orally. With severe spasms, intravenous fluids were administered until spasms subsided before commencing feeding. Tetanus toxoid (TT) was administered to the patients for active immunization before discharge. We do not have access to paediatric intensive care management.

The collected data were analysed using statistical package for social sciences (SPSS) version 17.0. Student t-test was applied for the comparison of means. For comparison of categorical variables, the chi-square test was used applying the Fisher exact test and the Yates correction for continuity where appropriate. A *P* value <.05 was taken has been statistically significant.

3. RESULTS

A total of 19 cases of tetanus were managed in the period under review, 6 (31.6%) of these had neonatal tetanus (NT).There were 2 (10.5%) cases of cephalic tetanus and 11 (57.9%) cases of generalized tetanus (Table 1). The mean age at presentation for NT was 9.5 ± 3.6 days, and the male to female ratio was 1:1. The case fatality rate (CFR) of NT in this study was 50% (see Table 2). The mean age of the newborns who survived (12.7 ± 1.2 days) differed significantly from that for those who died (6.3± 1.2 days), *P* = .03. There was also a scientifically

significant difference between the incubation period of those who survived and that of those who died, *P*=.01.

Table 1. Types of tetanus

Types of tetanus	Number	%
Neonatal	6.0	31.6
Cephalic	2.0	10.5
Generalized	11.0	57.9
Total	**19.0**	**100.0**

Three (50%) of the cases of NT acquired the disease via traditional uvulectomies while the others resulted from poor umbilical cord care. One (16.7%) of the babies had a mother who had a dose of tetanus toxoid during pregnancy. She was also the only mother who delivered in a hospital, the other babies (83.3%) were delivered at home, and their mothers did not have any dose of tetanus toxoid. The mean incubation period for NT in this study was 9.5 ± 3.6days; mean onset time was 1.7 ± 0.5 days. All the babies with NT presented with complaints of inability to suck and generalized body stiffness.

Post-neonatal tetanus (PT) accounted for 13 (68.4%) of the cases in this study, with a CFR of 61.5% (Table 2). Eight males and five females were affected, giving a male to female ratio of 1.6:1.

None of the children had any form of tetanus immunization and the majority either had puncture wounds/ulcers (38.5%) or chronic suppurative otitis media (46.2%). This is displayed in Table 4. The relationship between the outcome of PT and portal of entry in the present study was statistically significant (*P*= .02). The mean age of the children with tetanus in this review was 4.2 ± 3.1 years, that for those who died from the disease (4.8 ± 3.7 years) differed significantly from that of those who survived (3.2± 1.6 years), *P* <.001.

The mean incubation period of PT in this study was 15.6 ± 16.5 days, that for those who survived (though longer) did not significantly vary from that of those who died from the disease, *P*=.59 (Table 3). The mean onset time was 2.4± 1.3 days, and the difference between the mean onset time for those who died and those who survived were not statistically significant, *P* = .50, this is shown in Table 3. The complications documented in this study were hypoglycaemia, apnoea, pneumonia, rhabdomyolysis, and acute kidney injury (Table 4).

4. DISCUSSION

The total number of cases of tetanus seen over the 12-month period was 19. This figure is significantly less than the 1681 cases seen over a 3-year period in a tertiary hospital in Oshogbo, South-western Nigeria in 2008 [6]. A Nepali study reported 24 cases over a 2-year period [8], considerably higher figures than are seen in the developed world; 0.10 cases per 1 million population in the USA [9]. The higher figures in the developing world (including this study) underscores the fact that tetanus is a disease of poverty, ignorance and the inadequately vaccinated.

Table 2. An outcome of tetanus

Outcome	Neonatal tetanus		Post-neonatal tetanus	
	Number	%	Number	%
Discharged	3.0	50.0	5.0	38.5
Death	3.0	50.0	8.0	61.5
Total	6.0	100.0	13.0	100.0

Table 3. Association between clinical parameters and outcome of Post neonatal tetanus

Parameters	Survivors n=5	Non- survivors n-8	P
Mean age	3.2±1.6years	4.8±3.7years	0.00
Mean onset time	2.6±1.3days	2.3±1.3days	0.50
Mean incubation period	19±24days	13±10.9days	0.59

Table 4. Portals of entry of tetanus

Portals of entry/ Complications	Neonatal tetanus (%) N=6	Post neonatal tetanus (%) N=13
Uvulectomy	3(50)	0(0)
Omphalitis	3(50)	0(0)
Infected circumcision	0(0)	1(7.7)
CSOM	0(0)	6(46.2)
Puncture wounds/ulcers	0(0)	5(38.5)
Fractures	0(0)	1(7.7)
Hypoglycaemia	4(66.7)	1(7.7)
Apnoea	2(33.3)	0(0)
Pneumonia	2(33.3)	5(38.5)
Rhabdomyolysis	0(0)	1(7.7)
Acute kidney injury	0(0)	2(15.4)

CSOM= Chronic suppurative otitis media

Six cases of NT were seen in this study, comparable to the 20 cases seen in a 4-year period in Zaria, North-western Nigeria [10], but significantly less than the 30-50 patients seen annually in a teaching hospital in Port Harcourt, Southern Nigeria [11]. These dissimilarities could be explained hypothetically as arising from differences in rates of uptake of tertiary healthcare facilities in these communities, as well as a reflection of the positive impact of on-going strategies aimed at eradicating NT.

The pervasive practice of cutting the uvulae of newborn babies in most parts of Northern Nigeria may justify 50% of our cases having traditional uvulectomies as their portal of entry. The rest were associated with poor umbilical cord management. These are similar to findings from previous studies in this vicinity [10]. The CFR for NT in this study of 50% was lower than the 75% deduced from the Zaria study but higher than the 16.97% from Oshogbo, the 40% from Nepal and 13.2% from the USA [6,8-10]. Differences in patients' characteristics and modalities of treatment may account for these variations in CFR as there are indications that access to intensive care management (which is not available in our setting) positively impacts the outcome [4].

The present study demonstrated that survival from NT is more likely with a longer incubation period and with a greater age at presentation. This is similar to findings from earlier studies, however, Arogundade et al. did not demonstrate a significant association between these variables as well as with onset time and survival [4,8 12,13]. Our study also did not demonstrate a significant relationship between onset time and survival. This is at variance with findings from other studies [4,8].

A significant number of post-neonatal subjects (46.2%) had Chronic suppurative otitis media (CSOM) as the portal of entry (accounted for the highest number). This is similar to the findings from other studies. [6,8,14] Our findings also demonstrated a statistically significant relationship between the risk of death and portal of entry. We, therefore, recommend that CSOM should be regarded as a danger sign warranting heightened monitoring in children seen in Azare with tetanus.

The CFR in our study (61.5%) was similar to that documented by Adegboye et al. (62.1%) [15]. However, it is lower than those reported from other parts of Nigeria and from Nepal [6,8,14]. This may be due to the relatively high discharge against medical advice rates in these studies. Nevertheless, it is widely reported that mortality in tetanus is high in developing countries.

The mean age of survivors was significantly lower than that of non-survivors in our study. This is not in conformity with previous studies [14]. The reason for this finding is not readily obtainable. However, the task of drawing a satisfactory conclusion from our study is made arduous by the small sample size. The mean incubation period and onset time were longer in survivors than non-survivors conforming to widely published literature.

5. CONCLUSION

Even though tetanus is entirely preventable, it has remained a significant cause of mortality in our environment. Surmounting the therapeutic challenges in the area of spasm control will go a long way to stemming this tide. However, the importance of preventive strategies specifically, health education on the value of immunization

and the need to eschew harmful traditional practices cannot be over emphasized.

CONSENT

It is not applicable.

ETHICAL APPROVAL

Approval was obtained from the research ethics committee of the Federal Medical Centre Azare, Nigeria before the commencement of the study.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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