

A 5-Year Review of Tetanus Cases Among Adults in a Tertiary Hospital in South East Nigeria

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ABSTRACT:

Background: Tetanus remains an important cause of preventable morbidity and mortality in developing countries. There is paucity of data on the pattern of tetanus among adults in south east Nigeria.

Objective: The aim was to review the patient characteristics, risk factors, clinical features, treatment and mortality among adult patients with tetanus in Nnamdi Azikiwe University Teaching Hospital (NAUTH) Nnewi, with a view to reinforcing measures to address any identified risk and poor prognostic factors.

Methods: This is a retrospective study of all adult patients managed for tetanus in the medical wards of the NAUTH Nnewi between 1st January 2005 and 31st December 2009.

Results: Nineteen patients were managed for tetanus in the medical wards of NAUTH out of a total of 5336 patients admitted in these wards during the study period. The male: female ratio was 2.8:1. Their ages ranged from 20-75 years with a mean of 44.8 ± 18.4 years. The lower limb was the commonest site of injury ($n=6$; 31.6%). None of the patients was fully vaccinated against tetanus. Case fatality rate (CFR) was 52.6%. There was a trend towards increasing CFR with increasing age ($t= -1.8$, $p=0.09$). Duration of hospital admission was significantly shorter among patients who died when compared to those who survived ($t=4.8$, $p<0.001$)

Conclusion: Tetanus, a vaccine-preventable disease remains a public health challenge in Nigeria with a high CFR. Health education of the public and health care provider action to ensure full and up-to-date vaccination of all adults, as being done in most developed countries, should be vigorously pursued to prevent further avoidable deaths from tetanus.

Key Words: Tetanus, adults, south east, Nigeria.

INTRODUCTION

Tetanus is a vaccine-preventable neurological disease caused by toxin of the bacterium *Clostridium tetani*.¹ The bacterium is an anaerobic spore-forming gram positive rod found worldwide in the soil, animal/human

faeces and as a contaminant of virtually any object.¹ It frequently causes disease through the infection of wounds by spores especially following acute injury.^{1, 2} The disease occurs sporadically, usually affecting nonimmunized persons, partially immunized individuals or fully immunized persons who do not sustain their immunity with booster doses of the tetanus toxoid vaccine.¹

The efficacy of the tetanus toxoid in protecting individuals from tetanus has been recognized for many decades now. Consequently, international and national health bodies have developed programmes aimed at substantially reducing the burden of the disease through the active immunization of all individuals at risk. These programmes have had varying degrees of success in different countries judging by the population rates of protective antibodies levels and the reduction in the number of reported cases of tetanus over time.^{1, 3, 4} The incidence and case fatality rate (CFR) of tetanus are generally low in most developed countries but unacceptably high in the developing countries.^{1, 3, 5-8} This situation is attributable to the better vaccination of the population in the former countries coupled with earlier presentation and better in-hospital care.

There are limited national or regional surveys on the incidence/outcome of tetanus in Nigeria. There are nonetheless quite a number of hospital-based studies, mainly in tertiary hospitals across Nigeria, which had documented the patterns and outcome of this disease at various times. These studies generally report a poor outcome of tetanus in Nigeria characterized by high CFR.^{5-7, 9} There is however a paucity of studies of tetanus in adults in the south east region of Nigeria and one study carried out in a tertiary hospital in the region reported no mortality.¹⁰ The aim of this study was to review the incidence, patient characteristics, prior vaccination status, clinical features, treatment and outcome of tetanus among adult patients in the Nnamdi Azikiwe University Teaching Hospital (NAUTH) Nnewi, south east Nigeria over a recent 5-year period.

PATIENTS AND MATERIALS

All the patients admitted and managed for tetanus in the medical wards of NAUTH Nnewi between January 2005 and December 2009 were retrospectively studied. Data was extracted from the admission and discharge registers in the medical wards as well as from the patients' case records. Information retrieved from the records included patient's age, sex, occupation, place of domicile, prior tetanus vaccination status, nature and site of antecedent injury, incubation period, onset time,

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clinical features, treatment received, duration of hospital admission, and outcome.

Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 16.0 software (SPSS Inc., Chicago, IL, USA). Simple descriptive statistics was used to present the demographic characteristics. Continuous variables were presented as mean \pm standard deviation. Differences between groups were compared using the student t-tests for continuous variables and Chi-square (χ^2) tests for categorical variables. A p value of < 0.05 was considered statistically significant.

RESULTS

During the 5-year period, 19 patients were managed for tetanus in the medical wards of NAUTH, Nnewi out of a total of 5336 patients admitted in these wards (i.e. 0.36% of all admissions in the medical wards during the period). All the patients had generalized tetanus. Fourteen (73.7%) of them were male while 5 (26.3%) were female, giving a male to female ratio of 2.8:1. The ages of the patients ranged from 20-75 years with a mean of 44.8 ± 18.4 years. Table 1 summarizes the socio-demographic characteristics of the patients.

The number of tetanus admissions in the medical wards in each of the 5 years is depicted in Figure 1. The highest annual incidence was recorded in 2008 ($n=9$; 47.4%), while the least was in 2006 where only one case was recorded. There was no progressive increase or decrease in the annual incidence of tetanus during the period.

The most common form of injury associated with tetanus in the patients were pricks or puncture wounds (from various objects such as thorns, nails, broomstick, knife, piece of wood, trap, cow horn) being reported by 11 subjects (57.9%). Four subjects (21.1%) reported injuries from road traffic accidents (RTAs), while 3 subjects (15.8%) had surgical/obstetric procedures (1 appendectomy carried out in a doctors residence, 1 episiotomy carried out by a midwife during home delivery, and 1 tonsillectomy carried out by a traditional practitioner). One patient (5.3%) had no obvious antecedent injury. The commonest site of injury was the lower limbs ($n=6$, 31.6%), followed by the head

and neck ($n=5$; 26.3%), the upper limb ($n=3$; 15.8%), surgical/obstetric wounds in the trunk ($n=2$; 10.5%) and multiple sites ($n=2$; 10.5%).

The most frequent clinical features of tetanus in the subjects were trismus and dysphagia, seen in all the cases. Other features recorded include (Table 2): spasms ($n=16$; 84.2%), neck stiffness ($n=11$; 57.9%), abdominal rigidity ($n=8$; 42.1%), risus sardonicus ($n=6$; 31.6%), hypertonia ($n=5$; 26.3%), pyrexia and opisthotonus (each $n=3$; 15.8%), headache ($n=2$; 10.5%) and inability to void urine ($n=1$; 5.3%).

All the patients received antitetanus serum, intravenous diazepam, and antibiotics. Four patients (21.1%) received chlorpromazine in addition. Patients with obvious wounds had wound debridement and dressing. All the patients were managed in the medical wards and none had gastrostomy, tracheostomy or mechanical ventilation. The mean duration of hospital admission was 10.6 ± 11.8 days with a range of 1-39 days.

Review of the subjects' prior tetanus vaccination status showed that none of them was fully vaccinated. Five subjects (26.3%) had received tetanus toxoid sometime in the past without subsequently completing the vaccine regimen, 3 (15.8%) did not know their vaccination status, while 11 (57.9%) had no prior tetanus toxoid injection. Table 3 shows the vaccination status of the patients prior to the tetanus.

Ten of the 19 subjects died, giving an overall case fatality rate (CFR) of 52.6%. The CFR was higher among rural dwellers (70%) than among their urban counterparts (33.3%) though the difference was not statistically significant ($\chi^2 = 2.6$, $p=0.1$). CFR was also higher among males (57.1%) than females (40.0%), again without statistical significance ($\chi^2 = 0.4$, $p=0.5$). The mean age of subjects who survived was 37.3 ± 17.4 years while the mean age of those who died was 51.5 ± 17.4 years. There was a trend towards increasing CFR with increasing age ($t = -1.8$, $p=0.09$). The mean duration of hospital admission was significantly shorter for patients that died (2.4 ± 1.6 days) than for those that survived (19.8 ± 11.4 days) ($t=4.8$, $p<0.001$)

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE PATIENTS

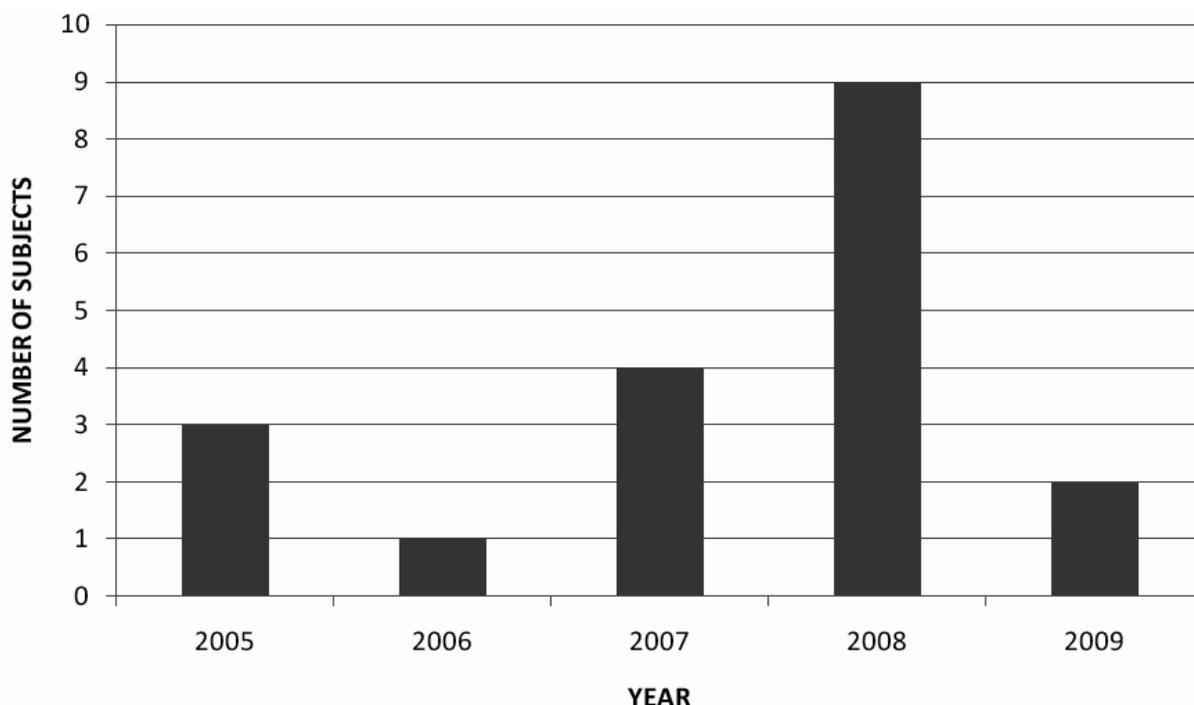
Characteristic	n (%)
Sex:	
Males	14 (73.7)
Females	5 (26.3)
Age (years):	
< 50	12 (63.2)
≥ 50	7 (36.8)
Residence:	
Rural	10 (52.6)
Urban	9 (47.4)
Occupation:	
Artisans	5 (26.3)
Farmers	4 (21.1)
Traders	2 (10.5)
Students	2 (10.5)
Retired persons	2 (10.5)
Housewives	1 (5.3)
Butchers	1 (5.3)
Civil servants	1 (5.3)
Cleaners	1 (5.3)

TABLE 2: CLINICAL FEATURES MANIFESTED BY THE PATIENTS

Clinical feature	n (%)
Trismus (lock jaw)	19 (100)
Dysphagia	19 (100)
Spasms	16 (84.2)
Neck stiffness	11 (57.9)
Abdominal rigidity	8 (42.1)
Risus sardonicus	6 (31.6)
Hyperreflexia	6 (31.6)
Hypertonia	5 (26.3)
Opisthotonus	3 (15.8)
Fever/pyrexia	3 (15.8)
Tachycardia	3 (15.8)
Headache	2 (10.5)
Inability to void urine	1 (5.3)

TABLE 3: VACCINATION STATUS OF THE PATIENTS

Vaccination status	n (%)
Fully vaccinated	0 (0)
Partially vaccinated	5 (26.3)
No vaccination	11 (57.9)
Vaccination status unknown	3 (15.8)

FIGURE 1: NUMBER OF TETANUS ADMISSIONS PER YEAR

DISCUSSION

The socio-demographic characteristics and clinical profile of the patients were similar to those reported in earlier studies in Nigeria and other developing countries.^{2, 5-7} The incidence of tetanus in the present study was lower than those reported in most previous studies in Nigeria, in line with the recent report indicating a decline in tetanus admissions.⁹ The mean age of our patients reveals that most of them were relatively young. In developing countries, tetanus tends to occur more commonly in younger patients possibly due to inadequate baseline vaccination.^{2, 5, 6, 9-11}

In the developed world the majority of patients are 50 years or older and this has been attributed to loss of protective levels of tetanus antibodies over time, possibly a consequence of inadequate booster vaccination.^{3, 12, 13} The higher frequency of male patients as was seen in the present study is a well known and widely reported pattern in developing countries.^{2, 5, 6, 9, 10}

The vaccination of pregnant women during antenatal care may provide a protective immunity that makes them relatively protected from tetanus when compared to men. Indeed, a report from Kenya indicated that titres of antibodies to tetanus toxoid greater than the protective level of 0.01 IU/ml were found in a larger number of women who had been at childbearing age since the onset of the Expanded Programme on Immunization (69%) than in men or the general population (47%).⁴ Another possible reason for the male preponderance is that men tend to be more

frequently involved in occupations/vocations that are associated with predisposing injuries. The occupational groups most commonly affected in the present study were artisans and farmers - a pattern that has been reported by previous investigators in Nigeria.^{6, 7} The constant exposure of artisans and farmers to various potentially spore-contaminated and injurious tools, materials and obstacles coupled with the mechanical force often required in carrying out their vocation undoubtedly put these individuals at especial risk of antecedent injuries. Some reports however exist in which students⁸ and/or civil servants¹⁴ constituted the greatest number of tetanus patients. These reports came from highly urbanized environments with large populations of civil servants and students and the authors rightly pointed out that it could be explicable by the fact that farmers constituted a small proportion of the general population of their study area.

The finding of prick/puncture wounds as being the commonest antecedent injuries in tetanus patients had also been reported in previous studies.^{6, 15} This is possibly a result of the fact that *Clostridium tetani* being an obligate anaerobe thrives particularly in poorly aerated (e.g. deep-seated) wounds such as puncture wounds and in the presence of large amounts of devitalized tissue which favour its growth and toxin production.¹ The commonest site for these injuries has been reported to be in the lower limbs in virtually all previous studies and that was also the case in the

present study.^{2, 6, 8, 10, 16} The high frequency of lower limb injuries is likely to be related to the higher risk of injury to this part of the body especially when, as is commonly practiced in this part of the world, appropriate protective footwear are not worn. Lower limb injuries may also be more prone to contamination from potentially spore-containing soil and dirt.

The mean duration of hospital admission in the present study (mean 10.6±11.8 days, range 1-39 days) is comparable to that reported by Fawibe in Ogbomoso (mean 12.3±9.0 days, range: 3-34 days).⁶ Also the positive association between longer duration of hospital admission and higher chance of survival as found in the present study, has similarly been reported by previous workers.^{5, 6}

The overall CFR was 52.5% in the present study. This high CFR is comparable to the reported experience of other researchers in Nigeria (the CFR in Nigeria has been reported to be in the range 26.2-64%).^{6, 7, 8, 11, 14, 17} A similar scenario also exists in other developing countries.^{2, 18} The CFR of tetanus is generally lower in most developed nations. Prospero et al reported 11% CFR in the Marches region of Italy between 1992 and 1995³, Edmondson and Flowers reported CFR of 10% in Leeds, England about 3 decades ago¹⁹, while in the United States of America, the Centre for Disease Control and Prevention (CDC) reported CFR of 11% and 16% during the periods 1995-1997 and 1998-2000, respectively.¹ Interestingly, one study with a small population of patients (n=12) in Enugu south east Nigeria however reported no fatality.¹⁰

High CFR as commonly seen in developing countries has been attributed to low immunization status, late presentation of patients and a paucity of intensive care resources in these countries when compared to the Western countries that generally report low CFR.^{2, 3, 16} Studies in Lagos south west Nigeria however, have shown that unlike the experience in developed countries, management in the Intensive Care Unit did not result in a decrease in CFR.^{8, 9} This alarming reality when juxtaposed with the eminent vaccine-preventability of tetanus clearly supports the need for more efforts by health care administrators and workers to ensure optimal vaccination of every individual.

LIMITATIONS

The main limitation was the poor recording of some required information in patients' case notes which made the retrieval of data unnecessarily difficult.

CONCLUSION

The findings from this study show that tetanus remains an important public health challenge among adult Nigerians and that it continues to be associated with a high CFR. The level of prior tetanus vaccination was low among the patients, suggesting that a lack of protective immunity played a major role in the incidence of the disease. This implies that there is an urgent need for increased efforts aimed at ensuring full and up-to-date immunization of all individuals. This can be achieved by vigorous enlightenment of the populace on the need and regime for tetanus vaccination as well as ensuring the preparedness of healthcare facilities to meet the vaccination needs of the populace at all times. There is need for assessment of tetanus toxoid vaccination status of individuals upon any contact with the health care providers, with subsequent vaccination as necessary. If these and other measures are implemented, unnecessary morbidity and mortality from this preventable disease will, hopefully, be reduced to the barest minimum.

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