

Characteristics of adult tetanus in Accra

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Summary

Background: Tetanus is a life threatening infection with an estimated annual global incidence of about 1 million cases and a mortality of 50%. It is very common in developing countries. The prevalence in Ghana is not known, however, cases continue to be admitted in hospitals in the country. This retrospective study was undertaken to define the characteristics of cases of tetanus in adults admitted to the Korle-bu Teaching Hospital, Accra, Ghana, from 1 January 1994 to 31 December, 2001.

Methods: Information was extracted from the admission and discharge registers of the Isolation Unit of Korle-bu Teaching Hospital, Accra and case notes were examined and analysed.

Results: There were 158 (76.6% males) cases of tetanus with mean age of 32.7 ± 15.0 years. The peak age was in the 20 – 29 year group. Admission rate was lowest during the raining season months of June–August. Traumatic injury occurred outdoors (56.9%) and was caused by deep prick (24.3%), or cut (16.2%). The most common site of injury was on the lower (44.6%) limbs. The time interval between injury and admission was 8.3 ± 22.4 weeks (range 1 – 156 weeks) and the duration of symptoms was 2.9 ± 2.7 days (range 1.0 – 21.0 days). The most common presenting features were locked jaw (82.4%), general spasm (62.2%), presence of a wound (53.7%) and neck stiffness (50.0%). Hospital admission was 11.4 ± 11.6 (range 0 – 53) days. The case mortality was 50% (79/158).

Conclusion: These results confirm that adult tetanus is still very prevalent in Ghana and is occurring in a younger age group compared to that in the developed countries. The case mortality is still very high.

Keywords: Adult tetanus, Infections, Hospital admission.

Résumé

Introduction: Tétanos est une maladie infectieuse qui peut être mortelle avec une incidence d'une estimation annuelle globale d'environ 1 million cas et une mortalité de 50%. Cette maladie est très courante dans les pays développés. On ne sait pas au juste sa fréquence au Ghana. Toutefois, des cas de tétanos continuent d'être admis dans des hôpitaux dans le pays. Cette étude rétrospective a été effectuée afin de déterminer les traits caractéristiques des cas de Tétanos chez des adultes admis au centre hospitalo universitaire de Korle-bu, Accra, Ghana de 1 janvier 1994 au 31 décembre 2001.

Méthodes: Des informations ont été tirées de registre d'admission et du décharge de l'hôpital du service de l'isolation du centre hospitalo univarsitaire de Korle-bu, Accra et les dossiers médicaux ont été étudiés et analysés.

Résultats: Il y avait 158 soit 76,6% des hommes atteints du

tétanos avec l'âge moyen de $32,7 \pm 15,02$ ans. L'âge maximum était de 20 à 29 ans. Taux d'admission était très bas pendant les mois de la saison de pluie juin – aout. Blessure traumatique a eu lieu en plein air (56,9) et provoquée par une piqure profonde (24,3) ou coupe (16,2%) le lieu de la blessure le plus fréquent était dans les membres inférieurs (44,6%). L'intervalle entre la blessure et l'admission était $8,3 \pm 22,4$ semaines (de 1–56 semaines) et la durée des symptômes était $2,9 \pm 2,7$ jours (de 1,0 – 21, jours) Les cas les plus fréquents vus étaient les dents serrées (82,4%), spasme général (63,2%), présence d'une blessure (53,7% et courbatures dans le cou ou bien engourdissement du cou. Admission à l'hôpital était $1,4 \pm 11,6$ (de 0 à 53) jours. Les cas de la mortalité était 50% (79/158).

Conclusion: Ces résultats confirment que la maladie du tétanos chez des adultes est encore très répandue au Ghana et elle se produit chez les jeunes, par rapport au ce qui est arrivé aux pays développés. Le cas de la mortalité est encore très élevé.

Introduction

Tetanus is an infectious disease that results from wound contamination with the gram-positive, anaerobic bacilli *Clostridium tetani*. The organism and its spores are ubiquitous in nature, being found in soil and in the faeces of animals and humans¹. Tetanus is a life threatening infection that is relatively common in developing countries. Globally, an estimated 578,000 infant deaths occurred in 1992 due to tetanus². The overall annual incidence worldwide is estimated to be 0.5 – 1 million cases². This is high because of poorly developed immunisation programs in developing nations. Tetanus is therefore one of the target diseases of the World Health Organisation (WHO) Expanded Program on Immunisation (EPI). This programme is producing positive effects as the global annual incidence of total tetanus has been steadily decreasing since the early 1980s³. The prevalence of tetanus on Ghana is not known, however, the total number of reported cases of tetanus (neonatal and others) has been gradually decreasing from 1232 in 1974 to 219 in 2000³. This should be attributed to the Ghana Ministry of Health's hard work immunizing most children against tetanus before their school going age in the EPI. The tetanus vaccination coverage (as DPT) in Ghana has improved over the years; it averaged 20% in the 1980s, was over 70% from 1994 and was 84% in 2000³. However, as the EPI is targeted at children there is a large herd of non-immune adults who affected by tetanus present to hospital.

In order to find out the characteristics of adult patients with tetanus in Accra we conducted a retrospective study of all patients admitted to the Fever's (isolation) Unit of the Korle-Bu Teaching Hospital (KBTH), Accra, Ghana, from 1st January 1994 to 31st December 2001.

Methods

Study site and population

The study was conducted in the Fevers Unit of the Korle-

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bu Teaching Hospital, Accra, Ghana. KBTH is the largest hospital in Ghana (1,500 + beds and cots) and serves the city of Accra (population of 2 million), the surrounding urban population and the southern part of Ghana. The Fevers Unit admit most of the cases of tetanus in the southern half of Ghana.

Materials

In this retrospective study, information on all patients with tetanus admitted during the period of 1 January 1994 to 31 December 2001 was extracted from the admissions and discharges registers of the Fevers' Unit of the KBTH. Available

Table 1 Characteristics of patients and admission patterns of tetanus in adults in Accra.

	Gender		Total	Mean age (Years)*	Duration of Admission (Days)*
	Male	Female			
1994	9	2	11	38.0 ± 19.7	11.1±10.7
1995	14	8	22	33.3 ± 14.1	8.0± 9.1
1996	24	11	35	33.4 ± 14.3	14.6±13.6
1997	24	5	29	28.0 ± 11.2	12.7±13.4
1998	6	3	9	35.9 ± 18.0	14.4±14.3
1999	19	1	20	34.1 ± 18.8	13.6±10.7
2000	16	5	21	34.3 ± 16.8	10.9±21.2
2001	9	2	11	30.1 ± 9.7	7.1± 8.2
Totals	121	37	158	32.7±15.0	11.9±13.5

*Mean ± S. D.

case notes of patients admitted with the diagnosis of tetanus over the period were also retrieved and examined. The patient characteristics and clinical features were obtained and analysed.

Results

Patient characteristic and admission pattern

Over the period (January 1994 – December 2001) studied, 158 patients with tetanus were admitted and treated at the Fever's Unit; giving an average of approximately 20 cases per year. The

Table 2 The characteristics of injuries associated with adult tetanus in Accra.

Site on body (n=74)		Type of injury (n = 74)	
Face/Head	9 12.2%	Laceration	8 10.8%
Chest/Abdomen	4 5.4%	Abrasion	5 6.8%
Upper Limb	16 21.6%	Deep prick	18 24.3%
Lower Limb	33 44.6%	Open wound	8 10.8%
Scrotum	1 1.4%	Surgical wound	0 0
Uterus	1 1.4%	Cut	12 16.2%
Vagina	1 1.4%	Abortion	2 2.7%
Unknown	14 18.9%	Unknown	13 17.6%
		Others	
		Tumour	2 2.7%
		Abscess/cellulitis	3 4.2%
Place of injury (n = 72)		Pin prick	1 1.4%
Outdoors	41 56.9%	RTA	4 5.5%
Indoors	5 6.9%	Leg ulcer	1 1.4%
Unknown	26 36.1%	Acid burn	1 1.4%

RTA is Road Traffic Accident

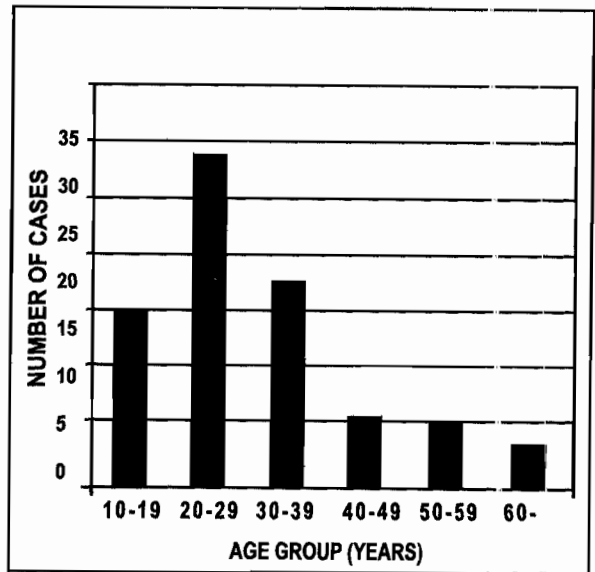


Fig. 1 Age distribution of adult tetanus in Accra

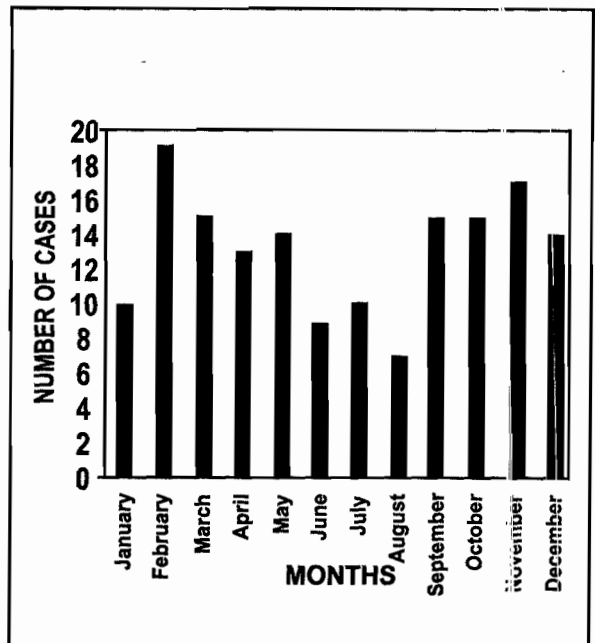


Fig. 2 The seasonal variation in the number of tetanus cases admitted in Accra

characteristics of patients are shown in Table 1. Males constituted 76.6% of cases, giving a male to female ratio of 3.3:1. The mean age for all patients was 32.7± 15.0 (range 12 – 78) years. The mean ages of males and females of 33.0 ± 18.1 and 32.6±13.9 years, respectively, were not significantly different. The age distribution is shown in Figure 1. The peak age was in the 20 – 29 age group, 75% of all cases were aged less than 40 years and 85% were less than 50 years old. The yearly distribution of tetanus cases is also shown in Table 1. The highest number of cases seen in a year was 35 in 1996; there was no clear pattern in the number of admissions per year. Figure 2 shows the seasonal pattern of tetanus admissions. The number of admissions was lowest during the months of June – August, the raining season in Ghana.

Table 3 The presenting clinical features of patients with adult tetanus (n = 74).

Features	Frequency	%
Locked jaw	61	82.4
Neck stiffness	37	50
Local spasm:		
Lower limb	5	6.8
Upper limb	2	2.7
Trunk	13	17.6
General spasm	46	62.2
Opisthotonus	11	15.1
Fever	21	28.4
Respiratory distress	7	9.5
Complications		
Aspiration	10	13.5
Infection	12	16.2
Wound present:	36	53.7
Dirty wound	22	64.7

Clinical features

The case notes of 74 out of the 158 (46.8%) patients could be retrieved and analysed. These case notes were for patients who were admitted evenly throughout the period. The characteristics of these 74 patients were not significantly different from those of the whole group.

The type, site and place of the causative injury are shown in Table 2. The most common site of injury was on the lower limbs (44.6%); the type of injury was a deep prick (24.3%) or cut (16.2%), usually due to nail or other metal and most commonly occurred outdoors (56.9%). The mean time interval between injury and admission was 8.3 ± 22.4 weeks (range = 1–156 weeks). The mean duration of symptoms before admission was 2.9 ± 2.7 days (range = 1.0–21.0 days). The presenting features of patients are shown in Table 3. The most common presenting features were locked jaw (82.4%), general spasm (62.2%), presence of a wound (53.7%) and neck stiffness (50.0%).

Outcome

The average stay in hospital was 11.4 ± 11.6 days (range = 0–53 days). Those who died stayed 4.9 ± 7.4 days (range = 0–42 days) on the ward before death. This was significantly ($p < 0.0001$) shorter than the ward stay of 17.7 ± 11.6 days (range = 1–53 days) for those who survived. There were 79 out of 158 cases giving an overall case mortality rate (CMR) of 50.0%.

Discussion

The results of this study confirm that adult tetanus is still common in Ghana, as in other developing countries where immunisation programmes have only recently been started. The number of cases of adult tetanus of 20 per year found in this study in only one hospital in Ghana was relatively high and is taken to indicate a high prevalence of tetanus in Ghana (population of 18.8 million in 2000). If this annual incidence rate were taken for the whole of Ghana this would indicate an annual prevalence of 1.06 cases per 1,000,000 population. This is in sharp contrast to that of the United States in which, from 1995 to 1997, only 124 cases of tetanus were reported giving an annual prevalence of 0.15 cases per 1,000,000 population⁴. The annual rate of tetanus has been falling in the developed countries

from the 1940s when tetanus vaccination programmes were instituted and in 2000 this annual rate had fallen to 35 in the United States⁵ and 12–15 in Britain². Similarly, the number of reported cases fell in Ghana from 404 in 1994 to 219 in 2000³. The results of this study on the other hand did not show much change in the annual rate of admission. This is not unexpected as the study only looked at adult tetanus. The tetanus immunisation program in Ghana is only targeted at children and has been running for a relatively short time, effectively only since the 1990s and the uptake has been less than 80% only until recently. Secondary vaccination of adults is provided for a fee to those who have had wounds. We suspect that most patients are probably incorrectly treated as has been found in England where between 23 to 50% of patients were not treated correctly for tetanus^{6,7}. Thus, it is expected that the majority of Ghanaian adults are poorly or not immune to tetanus. In the United States and the United Kingdom, where good tetanus immunisation programs have been going on for a long time, sero-surveys have shown that about 10% of persons aged 20 to 39 years and 50–66% of those over the age 60 lacked protective levels of circulating antibodies to tetanus^{8,9}.

The seasonal variation in the admission rates in this series in which the admission was lowest during the raining season is in keeping with the literature. In most countries, tetanus is more common in the hot, dry, weather^{10,11} presumably because it would be in the spore form, which is able to infect wounds, rather than the vegetative form.

The mean age of 32.7 ± 15.0 years and the age distribution (the peak age was in the 20–29 age group and 85% were less than 50 years old) of patients in this study were much less than that of developed countries. For example, in Australia, approximately 80 percent of tetanus cases were in persons over the age of 50 years¹², while in the USA in 1991–1997, those aged >60 years had the highest incidence and were at greater risk^{4,6,13}. As tetanus mainly occurs in those who have not or have been poorly immunised, these disparities between our results and those from developed countries can therefore be taken to be due to the poorly developed immunisation program that had been carried out in Ghana. Developed countries have law requiring school children and those entering even day care to be immunised against tetanus⁴. Enactment of such a law and its enforcement would help ensure that all adults, including those who had been immunised during their childhood, were immune to tetanus. In addition, a policy of immunizing all adult patients who present to health facilities with tetanus toxoid unless there was proof of immunisation within the previous 10 years or there was a contraindication to immunisation could be effective in protecting adults as found in Dallas, USA¹⁴.

The male to female ratio in this series of 3.3:1 was similar to that found in the young age group (20–59 years) in the USA³ and in most reported series^{7,8,15}. The lower rate in females in this study may be partly explained by the tetanus immunisation of pregnant women in the mother and child health (MCH) program and a probable greater outdoor-at-risk activity in men compared to women.

In series reviewed by the CDC⁴, an antecedent acute injury was identified in 77% of cases. Injury to the extremities proved to be the source in over 80% of cases: 46% in the lower and 35% in the upper limbs. Puncture wounds were responsible for one-half of all acute injuries leading to tetanus. Our findings were similar (See table 2). Thus, the most common site was the lower limb (45%), the most common type of injury was a break in the skin with deep prick (24%) or an abrasion/laceration/cut (33.8%). Similar observations have been documented in

the literature^{15,16,17}. These results indicate that most injuries occur outdoors from deep penetrating injury from nail pricks and pricks by thorns etc. Unlike that in the USA where 10% of cases were intravenous drug users, none was found in this series. Similarly, no case was due to a surgical wound, however, two cases of abortion, presumably illegal, were found in this series. A limitation of this study, as in all retrospective ones, was that not all case notes were available and this may bias the above results.

The CMR of 50% observed in this series was very high. The underlying factors for this high CMR of adult tetanus in Accra is being investigated.

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