

Case-fatality of adult Tetanus at Jimma University Teaching Hospital, Southwest Ethiopia

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Abstract

Background: Tetanus remains a major health problem in Ethiopia like in most other developing countries.

Objectives: To assess the clinical presentation, complications and outcome of tetanus patients.

Methods: In this retrospective study, patients (age ≥ 13 years) who were admitted to Jimma University Teaching Hospital from 1996 to 2009 were included.

Results: Data from 171 patients were analyzed (129 males, 42 females, mean age 33 years). The mean hospital stay for patients discharged cured and deceased was 21.5 ± 12 and 6.5 ± 6.7 days, respectively. None of our patients was immunized for tetanus. Tracheostomy and mechanical ventilation (MV) was done in 10.5% and 11 %, respectively. The case-fatality was 38%. The mean annual admission and case-fatality increased over the study period from 9 to 20.5 and from 21 % to 51%, respectively. Establishment of intensive care unit (ICU) did not improve mortality due to infrequent tracheostomy and MV.

Conclusions: The case-fatality was high like in most other studies and the majority of patients died in the first few days indicating that adequate respiratory support was not given. Establishment of ICU did not improve mortality. Tetanus can be prevented by vaccination and if it occurs it needs well equipped ICU.

Key words: Tetanus, case-fatality, complication, vaccination, Africa

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Introduction

Even though the incidence and case-fatality of tetanus decreased markedly in developed countries¹⁻⁶, it remains a major health problem in developing countries especially in sub-Saharan Africa⁷. Tetanus became a rare disease in the developed countries as a result of immunization and it occurs mainly in elderly due to decline in protective antibodies^{2, 8}. In developing countries tetanus is common in the young due to lack of effective immunization program and appropriate treatment of injuries⁷.

Tetanus is associated with high case-fatality rate which ranges from 6% to 72% depending on the availability of well equipped intensive care unit (ICU)^{3, 4, 6, 9-26}. The availability of ICU was found to improve mortality from tetanus⁹. Hadgu et al in 1975 in Addis Ababa studied tetanus patients from three different hospitals and found case-fatality of 36%²⁶. Habte-

Gabr et al in 1978 in Gondar ,Northwest Ethiopia found case-fatality of 55% in patients ≥ 10 years old²³. Hodes et al in 1990 analysed tetanus patients from Addis Ababa and reported case-fatality of 27 %²⁵. Ramos et al in 2008 evaluated tetanus patients from rural area in Ethiopia and found a case-fatality of 20%²⁴.

In Jimma (located in southwest Ethiopia), like in most developing countries in the world, tetanus is endemic and remains an important health problem especially among the rural farming folks. In this study our objectives were to assess the clinical presentation, complications and treatment outcome of adult tetanus patients who presented to Jimma University Teaching Hospital (JUTH) which is 400-bedded referral hospital.

Methods

In this retrospective study of clinical records of tetanus patients (age ≥ 13 years) who were admitted to JUTH from July 1996 to August 2009 were included. The study was started after getting ethical approval from Jimma University. Clinical records were searched manually .The individual case notes were then retrieved and studied. Confidentiality was

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assured by assigning each patient record a code number. Pretested datasheet was used to collect demographic and clinical data by the investigators. Tetanus was classified into generalized, cephalic and localized types. The severity of tetanus was classified into mild, moderate and severe²⁷.

The diagnosis of dysautonomia was made when two or more of the following were fulfilled²⁸:

1. Labile blood pressure
2. High fever in the absence of infection
3. Tachycardia/dysrhythmia in the absence of fever
4. Sudden diaphoresis in the absence of fever.

Hypoxemia was defined as arterial oxygen saturation of < 90% using pulse oximetry.

The data were analyzed using SPSS 13.0 for Windows (SPSS, Chicago IL, U.S.A). Odds ratios and significance levels were calculated along with 95% confidence intervals. The independent sample t-test was used to compare means.

Results

Data from 171 patients with tetanus were analyzed (129 males, 42 females, mean age 33 years). The mean age of males and females was 34 and 31 years, respectively (P -value>0.05) (Table 1 and 2).

Table 1: The Clinical profiles of tetanus patients by outcome status at Jimma University Teaching Hospital from July 1996 to August 2009

	Total(n=171)	Dead(n=65)	OR(95%CI)
Sex			
Male	129	49	1.0
Female	42	16	1.0(0.5-2.0)
Age in years			
< 40	109	42	1.0
≥40	34	11	0.8(0.3-1.7)
Admitted to(after establishment of ICU)			
ICU	36	15	1.0
Wards	7	2	0.6(0.1-3)
Tracheostomy			
No	153	62	1.0
Yes	18	3	0.3(0.08-1.05)
Mechanical ventilation			
No	152	58	1.0
Yes	19	7	0.9(0.36-2.5)
Dysautonomia			
No	155	57	1.0
Yes	16	8	1.7(0.6-4.8)
Aspiration pneumonia			
No	152	59	1.0
Yes	19	6	0.7(0.3-2)

ICU= Intensive Care unit

Table 2: The age and sex distribution of adult tetanus patients who were admitted to Jimma University Teaching Hospital from July 1996 to August 2009

Age in years	Male	Female
<20	8	3
20-29	35	16
30-39	32	15
40-49	18	3
50-59	8	2
60+	3	0
Total	104	39

Note: The age of 28 patients was not known

Before the establishment of the ICU, 90 patients were admitted to the hospital and after the establishment of ICU in May 2005, 81 were admitted. Of the 81 patients who were admitted after ICU establishment, 37 were managed in the ICU and 7 in the wards. We could not find out site of admission of 37 patients. The seasonal admissions were: June to August (n=45), September to November (n=41), December to February (n=36) and March to May (n=46). The mean hospital stay for patients discharged cured was 21.5 ± 12 days and for deceased 6.5 ± 6.7 days. Twenty – two patients (13%) had history of trauma [Information about history of recent trauma was not available in majority of our patients.] None of our patients had history of immunization for tetanus. The data about clinical type of tetanus was available in 48(28 %) cases only and 47 had generalized and one patient cephalic tetanus. Severity of tetanus was documented in 46(27%) patients and 43 had severe tetanus while 3 had moderate tetanus. No one had mild tetanus. The incubation period and period of onset was known in 24(14%) and 34(20%) patients, respectively. The mean incubation period and period of onset was 8 ± 3.8 days and 2.3 ± 1.3 days, respectively. Assessment of arterial oxygen saturation using pulse oximetry was done in 28 patients and it was < 90 % in 7 cases. Complications were documented in some patients: aspiration pneumonia (n=19), dysautonomia (n=16), respiratory failure (n=7), thrombophlebitis(n=7), bed sore(n=5), deep vein thrombosis(n=4), acute renal failure(n=1). Tracheostomy was done in 18(10.5%) patients and mechanical ventilation was used in 19(11 %) cases. Almost all patients were treated with tetanus antitoxine (human tetanus immune globulin was not available), diazepam, chlorpromazine and antibiotics. The case-fatality of tetanus was 38 %, with no difference between sexes. There was no significant difference between the mortality rates of patients

aged < 40 years and \geq 40 years. The case-fatality of patients with incubation period of more than 10 days and below 7 days was similar (33% versus 30%). The case-fatality of patients with period of onset of \geq 3 days and < 3 days was 27% and 39%, respectively (OR=1.7, 95%CI=0.4-8). The pattern of tetanus admission over the years and case-fatality is shown in Table 3. The annual tetanus admission increased from 9 to 20.5 over the study period. The case-fatality of tetanus showed increment progressively from 21% to 51 % over the years. After the establishment of ICU in 2005, there was no drop in case-fatality compared to the previous years (47% versus 44 %). The case-fatality of tetanus patients admitted to the ICU and wards after the establishment of ICU was similar. The mortality rate of patients with tracheostomy and mechanical ventilation was 16.7% (3/18) and 36.8 % (7/19), respectively. Majority of the deaths occurred in the first few days: 38 % died in the first 3days while 84 % died in the first 10 days. Of the 106 patients discharged cured, 25(24 %) received tetanus toxoid at discharge.

Table 3: The pattern of tetanus admissions and case-fatality in Jimma University Teaching Hospital from July 1996 to August 2009

Year of admission	Deaths/ Number admitted	Case- fatality rate (%)	Admission per year (mean)
1996-99	8/37	21	9.25
2000-02	9/29	31	9.66
2003-04	8/18	44	9.0
2005-06	15/32	47	16.0
2007-08	21/41	51	20.5

Discussion

The majority of our patients were males (75%) and 92% were \leq 50 years old which is similar to other studies done in developing countries¹⁴⁻²⁵. The male predominance could be explained by the fact that men tend to spend more time outdoor in farming activities and other types of field work. The fact that majority were young might reflect the Ethiopian demographics²⁹ that 94% of the population was \leq 59 year old in 2005. In contrast to our cases tetanus occurs mainly in older patients in developed countries³⁻⁶. There was no seasonal variation in the occurrence of tetanus in our study in contrary to other studies^{1, 6, 23, 25}. The mean annual tetanus admission increased from 9 to 20.5 over the study period. These might be due to the increased health posts, health centers, hospitals and health care workers in the area which

improved awareness about tetanus. There was also improvement in infrastructures which made transportation of patients easier. None of our patients had history of vaccination for tetanus.

Tracheostomy and mechanical ventilation was done in limited number of patients: 10.5% and 11 %, respectively. This is in contrast to other study done in Pakistan¹² where mechanical ventilation was used in 44% of cases. In a study done in India²⁸ tracheostomy and mechanical ventilation was done in 74% and 45%, respectively. In similar study from Malaysia¹³ tracheostomy and mechanical ventilation was utilized in 100% and 86%, respectively.

The case-fatality of tetanus was 38% in our cases which is similar to studies done in Italy, Brazil, Nigeria, India and Ethiopia which ranges from 33% to 39%^{4, 11, 16, 17, 26, 28}. In contrast to our study both lower and higher case-fatality rates were reported in other studies. Lower case-fatality rates were reported from Japan (6 %), United States(18%), Venezuela (15%), Pakistan(25%), Malaysia(18 %), Indonesia and Nigeria(26 %), and Ethiopia (20% and 27%)^{3,6,9,12-14,22,24,25}. Higher case-fatality rates were reported from Turkey (58%), Tanzania (73%) ,Nigeria(43% to 70%) and Ethiopia(55%)^{10,15,18-21,23}.

The case-fatality rate of tetanus was similar in male and female patients which is contrary to another study¹⁶ which showed higher case-fatality for female patients. A few studies found higher mortality in old people^{11, 16, 18-20,22} , but we did not find differences in case fatality over age. The mean hospital stay of deceased patients was 6.5 ± 6.7 days and majority of deaths occurred in the first few days: 38 % died in the first 3 days while 84 % died in the first 10 days. Tetanus patients who were treated conservatively(tracheostomy ,non-paralyzing muscle relaxants and sedation) died as a consequence of early acute respiratory failure while patients treated in ICU(maintenance of airway, ventilatory support, sedation,relaxant) the main cause of death was unexpected cardiac arrest probably related to overactivity of the autonomic system⁹. Even though the cause of death was not documented in majority of our patients, the fact that most deaths occurred in the first few days may indicate that the main probable cause of death was early acute respiratory failure due to inadequate respiratory support. The case-fatality of patients with and without tracheostomy was 17 % and 41 %, respectively, which is marginally significant (Table 1). This may indicate that infrequent tracheostomy might have caused more deaths. The case-fatality of tetanus increased from

21% to 51% progressively over the study period. This might be explained by the improved awareness, health care services and means of transportation which might have increased severely ill tetanus patients to attend the referral hospital. This progressive increment in case-fatality was not improved after the introduction of ICU in 2005. These might be explained by the infrequent tracheostomy and mechanical ventilation done in our patients (10.5% and 11%, respectively). In contrast to our study, establishment of ICU decreased case-fatality of tetanus from 44% to 15%.⁹ Of the 106 patients discharged cured only 24% received tetanus toxoid prior to discharge which is higher compared to a previous study from Ethiopia²⁵ which was only 8%.

The limitation of this study was detailed medical history, physical examination, investigations, and treatment was not documented properly that it was not possible to get adequate information to assess clinical type and severity of tetanus and complications in majority of patients. Further analysis to identify more predictors of mortality was not done. This indicates that improvement in documentation and keeping of medical records is needed.

Conclusion

Majority of our patients were young males and none of them had history of vaccination for tetanus. The case-fatality was high and tracheostomy and mechanical ventilation was used in few patients. The mean annual admission and case-fatality rate increased over the study period. Establishment of ICU did not improve mortality. Most deaths occurred in the first few days indicating that our patients did not get adequate respiratory support. Tetanus is associated with high mortality and morbidity that can be fully prevented by vaccination. If it occurs patient should be treated in well equipped ICU with respiratory support and treatment of complications.

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