

TETANUS: PRESENTATION AND OUTCOME IN ADULTS

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ABSTRACT

Objectives: Tetanus is still a common clinical entity, especially in developing countries. The purpose of this study was to evaluate the presenting features as well as the outcome of tetanus in adult patients admitted to the hospital.

Methodology: This was a hospital based descriptive study conducted at the Infectious Diseases Unit, Rashid Hospital Dubai, United Arab Emirates from Jan. 2003 to Dec. 2008. The study was designed to include demographics, clinical information and outcome observed in the patients admitted with clinical diagnosis of tetanus. Patients with malignancy, immunosuppression (AIDS/ Drugs), significant cardiac dysfunction and renal impairment were excluded. The patients were treated as per the standard protocol for the management of tetanus.

Results: A total of 44 patients were enrolled into the study. The mean age+SD of the patients were 26.3+5.8 years and all of the study patients were males. Thirty six (81.81%) patients gave the history of injury prior to onset of the symptoms, whereas eight (18.18%) patients were unable to recall any history of injury. All the study patients were laborers working in construction companies except for four who were gardeners. Body stiffness/spasm, difficulty in opening the mouth, difficulty in swallowing, body pain, neck pain and backache were the main presenting complaints. The patients with upper limb injuries had shorter incubation period and more severe disease with high frequency of autonomous nervous system insufficiency. Overall, hospital stay was 46.6+11.4 days. Forty (90.9%) patients required mechanical ventilation. The mean+SD ICU stay was 26.4+5.8 days and on weaning all the ventilated patients required tracheostomy. Eight (18.18%) patients died as a result of ventilator associated complications (Pneumonia) and autonomic nervous system dysfunction.

Conclusion: Tetanus still carries high morbidity and mortality rate despite the available advanced management facilities including ICU care. The incidence of tetanus can be reduced significantly by an effective immunization program and proper wound management of the patients.

KEY WORDS: Tetanus, adults, features, outcome.

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INTRODUCTION

Tetanus is a clinical condition caused by toxin produced by *Clostridium Tetani* which is an obligate anaerobic gram positive bacillus. Tetanus occurs sporadically and almost always affects non-immunized, partially immunized or fully immunized persons who fail to maintain

adequate immunity with booster doses of vaccine. The global incidence of tetanus is still estimated at one million cases annually, with case fatality ratio ranging from 20-50%.¹ *Cl. Tetani* produces spores which are resistance to heat, desiccation and disinfectants. The spores are also not completely destroyed by boiling but can be eliminated by autoclaving at atmospheric pressure of 120°C for 15 minutes. Spores of *Cl. Tetani* live in soil, faeces, dust and on instruments. A tiny breach in skin or mucosa, eg. Cuts, penetrating injury, burns, ulcers, ear piercing, banding of piles, may admit the spores. Spores germinate in the wound in anaerobic condition and the vegetative bacteria produce tetanospasmin (also called tetanus toxin), a zinc metalloprotease that cleaves synaptobrevin, a protein essential for neurotransmission release. Tetanospasmin is a neurotoxin that reaches the neuromuscular junction, enters the motor neuron and diffuses via retrograde axonal transport to the central nervous system, where it exerts its major function. Inhibitory neurons are blocked resulting in muscular rigidity and spasm. Instability of the autonomic nervous system is also provoked by the effect of tetanus toxin on inhibitory neurons.^{2,3}

The time period for the appearance of symptoms varies from two days to several weeks after injury—the shorter the duration, the more severe the attack and worse the prognosis. The common symptoms are lock jaw, rigidity of muscles of the body, board like abdominal wall, arching of back and spontaneous spasm of the muscles of the body which is triggered by the movements of the patient or by noise. Autonomic involvement may cause cardiovascular complications such as fluctuations in blood pressure and arrhythmias. Most studies conclude that these cardiovascular abnormalities are due to hyperactivity of the sympathetic nervous system as result of lack of neural control of the adrenal glands resulting in excessive release of catecholamines.⁴ The diagnosis of tetanus is made on clinical ground as the organism is not cultured routinely and also detection of toxin is not carried out commonly. The patient may die of exhaustion, asphyxia, aspiration

pneumonia or autonomic nervous system instability and tetanus still carries high mortality in adults, children and neonates, especially in developing countries.^{2,5} This study was conducted to evaluate the clinical manifestations and outcome of tetanus in adult patients admitted to the Rashid hospital.

METHODOLOGY

This was a hospital based descriptive study conducted from January 2003 to December 2008 at the Infectious Diseases Unit, Rashid Hospital Dubai, UAE. Rashid Hospital is one of the biggest tertiary care hospitals in Dubai, accredited by the Joint Commission International (JCI). A separate proforma was filled for each case entered into the study. The study was designed to include demographics (age, sex, nationality); clinical information and outcome of the patients admitted with clinical diagnosis of tetanus. The patient was diagnosed to have tetanus on the basis of clinical history and findings on physical examination.

The patients with malignancy, immunosuppression (AIDS/Drugs), significant cardiac dysfunction and renal impairment were excluded from the study. The patients were treated as per standard protocol for the management of tetanus and which included antibiotics (C. Penicillin 4 million units 4h x 7 days and/or Metronidazole 500mg x TID 7 days), wound care, passive immunization with human tetanus immune globulins (500 Units I/M stat) and active immunization with injection Tetanus Toxide at the time of admission which was repeated when patient were discharged from the ward. The majority of patients (especially those with evidence of secondary wound infections) received Penicillin, whereas other patients (including those who gave history of allergy to Penicillin) were given Metronidazole. A few patients received combination of Penicillin and Metronidazole (these patients initially were started on Metronidazole but later Penicillin was added because of secondary infection). The patients also received Diazepam for the control of spasm and mechanical ventilation when and where it was required. The patients were dis-

charged from the hospital after the complete recovery/ with minimal disability. Data was analysis by SAS Enterprise Guide 4.1.

RESULTS

A total of 44 patients fulfilled the criteria to be included into the study. The mean age+SD of the patients were 26.3+5.8 years (20-40 years), Fig-1. All the patients under study were male, laborers and expatriates who visited or lived in Dubai. Among the study patients, majority of them were Indian followed by Pakistani and other nationalities, Fig-2. Forty (90.9%) patients were working in construction companies, whereas four (9.09%) patients were gardeners. All the patients presented within 2-5 days of the development of symptoms.

The incubation period was varied from 4 days to 32 days. The body stiffness/spasm, difficulty in opening the mouth, difficulty in swallowing, body pain, neck pain and backache were the main presenting complaints. The most (86.3%) of the patients were afebrile at the time of presentation (Table-I). Twenty eight (63.63%) patients gave history of trauma of the lower

Table-I: Summary of presenting symptoms of the study patients.

<i>Symptoms</i>	<i>No. of patients</i>	<i>% of patients</i>
Body stiffness/spasm	41	93.1%
Trismus	39	88.6%
Dysphagia	28	63.6%
Rhisus sardonicus	24	54.5%
Dysarthria	19	43.1%
Body aches	18	40.9%
Backache	10	22.7%
Abdomen pain	8	18.1%
Irritability	8	18.1%
Headache	6	13.6%
Fever	6	13.6%
Neck pain	5	11.3%
Jaw pain	4	9.0%
Dyspnea	3	6.8%

limbs, whereas eight (18.18%) patients had trauma of the upper limbs and majority of these patients had penetrating injury followed by lacerated wound, eight (18.18%) patients were unable to recall any history of trauma. In comparison to the patients with history of trauma to lower limbs/no history of trauma, the patients with trauma to upper limb had shorter incubation period and severe disease. The patients with severe disease had high frequency of autonomic nervous system insufficiency than those with mild disease. However, there was no significant age difference (25.9+5.2 vs 26.7+4.9 years) between the patients who had severe disease/died than those who suffered from mild disease. This could be explained by the fact that all the study patients were young (20-40 years).

All the patients were managed as per standard protocol for the management of tetanus which included surgical toilet and/or detriment of wound, infusion of Diazepam, intravenous

Table-II: Summary of treatment offered to the study patients

<i>Treatment</i>	<i>No. of patients</i>	<i>% of patients</i>
Intravenous Diazepam infusion	44	100%
Anti-tetanus Immunoglobulins	44	100%
Tetanus Toxoid	44	100%
Mechanical ventilation	40	90.0%
Tracheostomy	40	90.0%
ICU management	40	90.0%
Wound care	36	81.81%
Intravenous Crystalline Penicillin	30	77.2%
Intravenous Metronidazole	6	13.6%
IV C. Penicillin & Metronidazole	6	13.6%

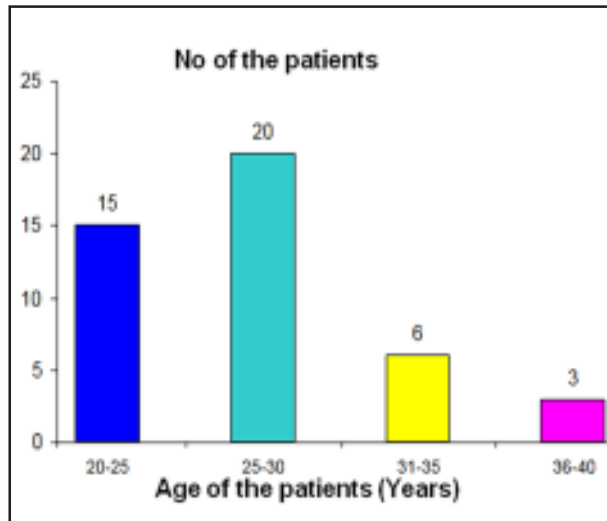


Fig-1: Age distribution of the patients.

Crystalline Penicillin and/or Metronidazole, ICU care and mechanical ventilation (Table-II). Forty (90.09%) patients were admitted in the ICU and required mechanical ventilation. The mean+ SD ICU stay was 26.4+5.8 days and on weaning all the ventilated patients required tracheostomy. Four (9.09%) were treated pharmacologically without mechanical ventilation as these patients had mild disease and their mean+SD hospital was 18.5+4.3 days. Thirty six (81.8%) patients were discharged healthy except two who developed brain hypoxia and these patients were discharged with minimal neurological deficit. Overall, the hospital stay was 46.6+11.4 days. Eight (18.18%) patients died and six deaths were related to ventilator associated pneumonia leading to septicemia and multi-organ failure. *Acinetobacter* (2), *Pseudomonas Aeurogenosa* (3) and *Klebsiella*¹ were isolated from blood or body fluid cultures of these patients. Two patients died as a result of cardiac arrest secondary to autonomic insufficiency (hypertension and tachycardia) due to tetanus.

DISCUSSION

Tetanus is still a major health problem in developing countries and it is associated with a high morbidity and mortality rate.⁶ In this study, we registered a total 44 of patients during the study period and all of our patients were labor-

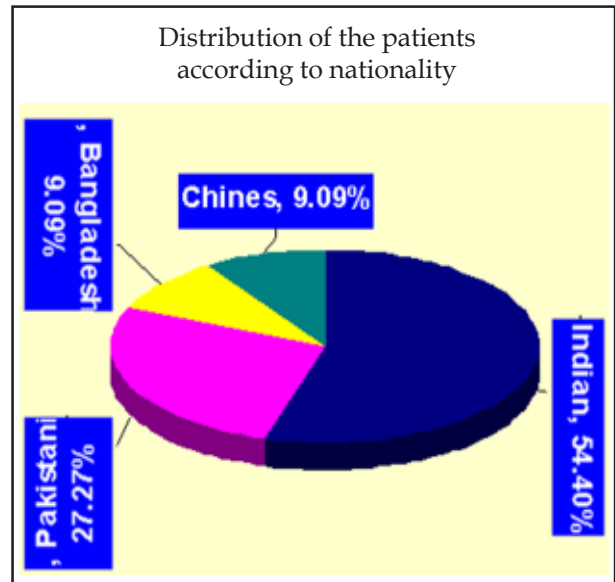


Fig-2: Distribution of the study patients according to the nationality.

ers and male. The male predominance was also observed in other tetanus case studies.^{7,8} This could be explained by the fact that men tend to spend more time in outdoor activities and field jobs, they are more likely to be exposed to penetrating injuries and CI. Tetani is ubiquitous in soil in tropical and hot climate countries. In our study, only males were affected probably due to the fact that in Dubai, construction and agriculture farms are the main outdoor jobs where only males are working.

The mean+SD age of the patients under the was 26.3+5.8 years, which is quite younger than reported by Peetermans et⁹ al and Lau et al⁷. In contrast to this study the prevalence of Tetanus in older age was also observed in a population based survey of immunity to tetanus in the United States which showed that the prevalence of Americans with protective levels of Tetanus antibody declined rapidly starting at the age of 40 years and that most cases of tetanus occurred in persons of older age group.¹⁰ The younger age group in this study could be explained by the fact that this is the most productive age where people work in the field and outdoor jobs. All the study patients were expatriates and belonged to under developed counties and this racial background can be explained as the people from these nationalities are more

involved in field jobs in UAE which make them susceptible to the penetrating injury which allows the organism to enter into the body. The other possible reason for high prevalence of the disease in these nationals could be due to a less effective immunization program in their countries.

Most of the study patients had an identifiable acute injury at the time of presentation and majority of the injuries were inflicted on lower limbs, an observation also reported by Lau et al⁷ and Komolafe et al.¹¹ The clinical presentations of the study patients were similar to the experience as is observed by the other investigators and the most common presenting symptoms were body stiffness/spasm, trismus and dysphagia.^{7,9} However, the other investigators had found trismus and rigidity to be the most common presenting symptom.^{9,12} Therefore, high index of suspicion for tetanus should be exercised whenever patients present with any of these symptoms as tetanus is a essentially a clinical diagnosis and laboratory results as well as cultures are of little value.^{5,13} The treatment of tetanus patients requires a well established intensive care facility with a medical and nursing staff experienced in treating artificially ventilated and haemodynamically unstable patients. The majority (90%) of study patients required mechanical ventilation and ICU management for a variable period (Mean+SD= 26.4+5.8 days) an observation which is also reported in other studies.^{7,14}

The prognosis of patients with tetanus has been reported variably. Overall, mortality is approximately 10-50%, however in certain age groups e.g. neonates it is as high as 90-95%.^{15,16} In this study, mortality rate was 18.18% which is quite consistent with the observation reported by Lau et al⁷, whereas Mohammed, Anuradha and Komolafe et al have reported higher mortality rate, 45%, 37.78% and 25% respectively.^{6,8,11} The mortality rate was observed significantly lower (11%) by Peetermans et al in their study.⁹

The various factors have been known to affect the prognosis. The poor prognosis include shorter incubation periods, fever, tachycardia, fluctuating blood pressure, tetanus associated

with intramuscular injections specially quinine, extreme of ages, hypoxia and acidosis at the time of admission.¹⁵⁻²⁰ The major complication used to be respiratory arrest before advent of artificial ventilation; however, nosocomial infections and autonomic nervous system disturbances are major complications in post ventilator era.¹⁴ In this study, we also have the same observation as main complications in the study patients were nosocomial (mainly ventilator associated) infections and autonomic (hypertension and tachycardia leading to sudden cardiac arrest) dysfunction which lead to the death of eight patients.

CONCLUSION

Although tetanus is a preventable infectious disease, its prevalence is still high and it remains a difficult to treat disease with a substantial morbidity and mortality rate, even with available advanced facilities for its management. Furthermore, to reduce the incidence of tetanus more efforts are needed to provide appropriate wound management as well as vaccination to the patients.

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