

# A Fatal Case of Adult Generalized Tetanus in the Al-Buraimi Governorate Sultanate of Oman: A First Clinically Diagnosed Case Report

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## Abstract

Tetanus is a notifiable disease in Oman under event based surveillance system. It is an uncommon but very fatal disease caused by spores of bacteria found in the environment. The disease remains an important public health problem in many parts of the world, especially in low-income countries or districts, where immunization coverage is low. Tetanus requires a history of injury or wound. This is a clear typical clinical picture in our fatal case of a 43 years old Bangladeshi expatriate who was diagnosed for the first time in the governorate at Accident & Emergency Department of Al-Buraimi Hospital, Sultanate of Oman. Regular health education awareness of the public for immunization and timely seeking medical care can play an important role in lowering the morbidity and mortality of tetanus. This case report should definitely contribute to raise the awareness of tetanus, both at local and national level among all health workers and public.

**Keywords:** Tetanus, fatal, morbidity, mortality

## 1. Introduction

Globally, there were 56,743 (95% uncertainty interval (UI): 48,199 to 80,042) deaths due to tetanus in 2015 which includes 19,937 neonatal and 36,806 non-Neonatal tetanus deaths in older children and adults as compared to the neonatal deaths 199,118 and non-neonatal deaths 137,904 in 1990 (Kyu, Mumford, & Stanaway et al, 2017). During recent years, World Health Organization (WHO) reports improvement in mortality rates from tetanus, associated with aggressive vaccination campaigns. The prevalence of tetanus in low-resource settings is disproportionately higher (some studies showing 135 times higher) than in developed countries, with mortality rates of 20% to 45%. While adopting an interprofessional approach and with regular education of the public morbidity and mortality of tetanus be lowered (Bae & Bourget, 2021; Rushdy, White, Ramsay, & Crowcroft, 2003). Anyone can get tetanus, but the disease is particularly common and serious in newborn babies and pregnant women who have not been sufficiently immunized with tetanus-toxoid-containing vaccines. However, there is an increased risk of tetanus in adolescent and adult males due to exposure to contaminated objects and also limited opportunity for receiving booster doses in many countries (WHO, Tetanus. Fact sheet, 2018). Tetanus is different from other vaccine-preventable diseases because it does not spread from person to person. It is caused by a bacterium called *Clostridium tetani* found in soil, dust, and manure and enters the body through breaks in the skin (usually cuts or puncture wounds). It is usually caused by contaminated objects (CDC, Tetanus).

Signs and symptoms of tetanus appear anytime from 3 to 21 days after tetanus bacteria enter the body through a wound. Most cases will be symptomatic occur within 14 days (WHO, Tetanus). Generalized tetanus is occurring in approximately 80% of cases. Trismus appears as the first most common symptom, with the progression of spasms throughout the rest of the body (Bae & Bourget, 2021). Nearly all cases of tetanus occur in people who have never been vaccinated or adults who have not received their booster dose kept up to date on their booster shots. However, people who recover from tetanus do not have natural immunity and can be infected again (CDC, Tetanus).

The Disease surveillance system of Oman shows a remarkable decline in the incidence of EPI target diseases, between 1981- 2019. Only one case of neonatal tetanus (NNT) was in 1995. The effective communicable disease control relies largely on the sensitive and efficient surveillance system. In 2018 Ministry of Health emphasized on the event-based surveillance and the newly introduced e-notification system (Annual Health Report, Ministry of health, Sultanate of Oman, 2019).

Our fatal case 43 years old had 10 days history of nail injury on the right foot while working in farmhouse before having typical clinical picture of generalized tetanus with localized wound infection with *Klasiella* at site of injury. The case was notified through e-notification system to the regional surveillance team at directorate disease surveillance and control.

## 2. Case Presentation

A 43-year old male expatriate, Bangladeshi national was working as a farmer for the last 4 years in Mahadah Wilayat of Al Buraimi Governorate Oman. He was presented at Accident & Emergency Department of Al Buraimi Hospital on 1<sup>st</sup> December, 2018 morning with typical sign and symptoms of generalized Tetanus after exposure to nail injury on his right foot within last 10 days. According to Ablett Classification with mild to moderate severity, he was admitted for acute management in ICU for 14 days with all required management of tetanus including mechanical ventilation but he died on 14<sup>th</sup> December 2018.

### 2.1 Onset of Symptoms

He complained of neck stiffness with pain, difficulty in opening mouth (lockjaw or Trismus), generalized stiffness and dysphagia for 2 days.

### 2.2 General Examination on Admission

Revealed afebrile (37 °C), SPO<sub>2</sub>: 98%, blood pressure (150/75 mmHg), pulse 55/min, respiratory rate 20 breaths/min, conscious and oriented. The patient was not able to fully open his mouth, neck was extended, abdomen was tense and rigid but he was moving all his limbs equally. Due to a nail injury on right foot sole, he had pus discharge with necrotic edges.

### 2.3 Laboratory Findings

Full blood count on admission revealed hemoglobin of 14.15 g/dl, WBC count of 917 k/ul, red blood cell count of 5.02 million per ul and platelets 163.10 k/ul. Differential count: Neutrophil---65.18%, lymphocyte---27.93%, Monocyte---4.99%. Follow up full blood count on 5<sup>th</sup> day of admission revealed increased WBC count 17 k/ul and Neutrophil count of 77.80% followed by 10<sup>th</sup> day WBC count 24.80 k/ul and neutrophil count of 88.13%. Liver function test revealed Total Bilirubin 3.80 umol/L, ALT 16.50 IU/l, ALP 77 U/L. Renal function test showed Urea 10.20 mmol/L, Creatinine 97 umol/L within normal limits. High CK of 1354 U/L was noted. Lactate level of 2.62 mmol/L. Bone profile picture within normal range. Serum Electrolyte revealed Sodium 146 mmol/L, Potassium 3.29 mmol/L, Chloride 105 mmol/L. Blood Culture revealed no growth. Pus swab culture from infected wound site revealed growth *Klasiella* species (localized) sensitive to Amoxicillin& Clavulanic Acid, Cefotaxime, Ceftriaxone, Cefuroxime, Ciprofloxacin and Imipenem.

### 2.4 Management

Acute management was started in intensive care unit (ICU) isolation room after initial assessment at Emergency department including local wound debridement to clean the wound, and administration of IV antibiotics (Ceftriaxone, Meropenem and Metronidazole) in halting the toxin's production, 1500 IU Tetanus Immunoglobulin (TIG) was given to neutralize toxins by passive immunization, and mechanical ventilation had been done with sedation to support respiratory failure.

### 2.5 Other Supportive Medicine

Benzodiazepine (Midazolam) was given for controlling muscle spasm as well as magnesium sulphate to reduce autonomic dysfunction. As tetanus spasm result in high metabolic demand and a catabolic state, adequate IV fluids and nutritional support was given.

### 3. Discussion

Tetanus is rare in developed countries, but more prevalent in developing ones. It is found mainly in areas where the soil is cultivated, in warm climates, and among males (Bae & Bourget, 2021; Fetuga, Ogunlesi, & Adekanmbi, 2010). Tetanus spores are durable and can survive for prolonged periods in certain environments. In most of the cases, the source of infection is a wound usually from a minor injury. In developed countries, such as the United States, cases of tetanus occur in the unimmunized or in the elderly with decreased immunity. Intravenous drug users are also at risk owing to contaminated needles or drugs (Bae & Bourget, 2021). Tetanus is diagnosed on the basis of clinical features and does not require laboratory confirmation. The WHO definition of non-neonatal tetanus requires at least one of the following signs: a sustained spasm of the facial muscles in which the person appears to be grinning, or painful muscular contractions (WHO, Tetanus. Fact sheet, 2018). According to this definition, there must be a history of injury or wound, which was evident in our case, following nail injuries on his right foot within the last 10 days of presentation.

Tetanus is a notifiable disease in Oman under event-based surveillance system case. Our fatal case of generalized tetanus was notified through e-notification to the regional surveillance department at the Directorate of Disease Surveillance and Control. There was no history of animal bite or record of previous vaccination. The case was admitted in ICU for 14 days for acute management of tetanus and was mechanically ventilated on second day of admission following deterioration in his condition.

The Expanded Programme on Immunization (EPI) of Oman continues to strive to achieve and maintain high immunization coverage and communicable disease reduction especially among children. The immunization coverage for children was more than 99% for all types of vaccine at national level during 2019. The major thrust of prevention is through the immunization program that continues to maintain high coverage and thus reduce the burden of vaccine preventable diseases (VPD) in the target population. Several vaccine preventable diseases have either been eliminated or their numbers have reduced substantially. Some examples are polio-free status maintained since 1994. The last case of neonatal tetanus (NNT) was reported in 1995 (Annual Health Report, Ministry of health, Sultanate of Oman, 2019).

WHO recommends that an individual who receives 6 doses (3 primary plus 3 booster doses) of TTCV would be protected throughout life. The 3-dose primary series should begin as early as 6 weeks of age, with subsequent doses given with a minimum interval of 4 weeks between doses. The 3 booster doses should preferably be given during the second year of life (12–23 months), at 4–7 years of age, and at 9–15 years of age. Ideally, there should be at least 4 years between booster doses (WHO, Tetanus). Based on WHO recommendation, Oman vaccination coverage for TTCV among children is more than 99% in 2019 (Annual Health Report, Ministry of health, Sultanate of Oman, 2019).

A case report of generalized tetanus in a 45 years old Indonesian gentleman was published in Saudi Journal of Medicine and Medical Sciences in 2015. The patient was presented with dysphagia and back stiffness with no clear history of any trauma except subungual hematoma found on examination under ring finger nail. A minor trauma to his finger by a stone probably one week before while he was in Indonesia. He was admitted to an intensive care unit, received tetanus therapy and discharged home after 40 days of admission. The study concluded that without apparent injury or with minor injury the personation of the disease is always a challenge for physician to diagnose timely as early aggressive treatment might improve the outcome in such patients (Alfilfil, Alshahrani, Abdulbaser, & El Fakarany, 2015). Whereas in our case study, the patient had a penetrating injury due to nail and was presented late to emergency department to receive the required treatment and care, which highlighted the need of health education and awareness of the public regularly.

In 2019, a retrospective study was conducted in China published in Dove Press journal of Infection and Drug Resistance reported 17 tetanus cases who had worked as farming (47.0%), retired (23.5), homebound (23.5), and workers (6.0%). The causes of injuries were: metal injury (52.9%), deep injury (29.4%), electrical injury (5.9%), maxillofacial region and knee injury (5.9%), and skin ulceration (5.9%), and workers (6.0%) with mean age of the patients was 56.71±9.05 years. Only one patient died (Fan et al., 2019). Similarly, in 2017 a retrospective study was published in Annals of Intensive Care in France among 70 ICU patients from 2000 to 2014. The median age was 80 years and 86% of cases were females as compared to 70.6% males in the study which was conducted in China (Mahieu et al., 2017). In all these studies, it was found that cases were among adults over the age of 40 as well as mortalities were low due to aggressive management and support. Our current fatal case report is about a 43 years old male. He had an exposure to nail injury while working in a farmhouse as a farmer. He was aggressively treated with antibiotic and mechanically ventilated with sedation.

In 2015, a study on global burden of disease was conducted to assess mortality of tetanus from 1990–2015

including global, regional, and national levels and trends of mortality from neonatal and non-neonatal tetanus. Data from vital registration, verbal autopsy studies and mortality surveillance data covering 12,534 site-years from 1980 to 2014 were used. Between 1990 and 2015, the global mortality rate due to neonatal tetanus dropped by 90% and non-neonatal tetanus dropped by 81%. Age standardized mortality from tetanus was higher among males compared to females globally (Kyu et al., 2017).

Globally there were 36,806 non-neonatal tetanus deaths in older children and adults in 2015 as compared to the non-neonatal deaths 137,904 in the year 1990. Middle East North Africa region (MENA) reported 541 non neonatal death cases (0.10 mortality rate per 100,000) in 2015 as compared to 2379 death cases (0.71 mortality rate per 100,00) in 1990 among older children and adults. Oman reported 1 death case (0.02 mortality rate per 100,000) in 2015 similarly in 1990 as 1 death case (mortality rate of 0.04 per 100,000). Although globally both neonatal and non-neonatal tetanus deaths were concentrated in low and middle countries, a small number of deaths from non-neonatal tetanus continued to occur in high-income countries especially among gerontal patients. In developed countries, tetanus is rare but occasional cases and deaths continue to occur in unvaccinated individuals. The current patterns and distribution of tetanus mortality have not been well documented (Kyu et al., 2017).

In Oman, tetanus is uncommonly rare disease. The country have maintained high vaccination coverage of children and has reduced the burden of vaccine preventable diseases but still sporadic cases of this uncommon, as rare disease can be seen among people who did not get all the recommended tetanus vaccinations. In 2001, a study was conducted on tetanus patients admitted to the Sultan Qaboos University Hospital Oman from 1991 up to the end of 1999. It was retrospectively reviewed to evaluate results of 10 patients comprised of 9 adults and one infant aged 2 weeks. All patients presented with severe generalized tetanus. Average Intensive Care Unit stay of the 9 surviving patients was 5.5 weeks. One adult patient died on the 6th day of admission following myocardial infarction. This includes people who have never received a tetanus vaccine which probably seen in our case scenario where patient was admitted for 14 days in ICU for acute management of generalized tetanus. Finally, he died after receiving all aggressive treatment due to exposure to nail injury in farm house around 10 days before admission (Al-Kaabi, Scrimgeour, Louon, & Al-Riyami, 2001).

#### **4. Conclusion**

Due to lethal infection, tetanus patients require prolonged intensive care unit aggressive treatment and multi-disciplinary management. Non-neonatal tetanus is mainly common in adults above 40 years. This is possibly due to decrease immunity over time and failure to take recommended tetanus vaccinations. Timely seeking medical care is very essential after early recognition of signs and symptoms of tetanus. Our first fatal case in the governorate has highlighted the need of regular health education of the public. Awareness is also required among health staff so that morbidity and mortality of tetanus can be lowered down.

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#### **Ethical approval and Informed Consent**

Formal ethical approval from Al Buraimi hospital director was taken as requirement from Regional Research and Ethical Committee considering death of patient due to non-availability of any relative in Oman. Personal information including name and initials will not be published and efforts will be made to conceal identity as much as possible but only clinical details to be reported and published but anonymity could not be guaranteed.

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#### **Competing Interests Statement**

The authors declare that they have no significant competing financial, professional, or personal interests that might have influenced the performance or presentation relevant to this publication.

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