

Outcome of Tetanus Patients Admitted in Rangpur Medical College Hospital

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Abstract:

Background: Tetanus remains one of the major public health hazards of the developing world. Mortality is much lower in the developed world because of the availability of facilities, unlike in most developing countries. **Objectives:** This study was aimed to determine the outcome of tetanus patients admitted in infectious disease unit of Rangpur Medical College Hospital. **Methods:** A total of 91 cases of tetanus patients were seen in the 18 month period with a mean of 5 cases per month; they are diagnosed and managed for tetanus in the medical wards from January 2011 to June 2012. The data were retrieved from their case records and analyzed. **Result:** There were thirty one deaths, accounting for an overall mortality of 34.1%. Total fifty six patients were cured among which sixteen (17.6%) were cured with complication and four (4.4%) patient were absconded. Mortality was high 45.84% (11 patient out of 24) in ≥ 40 years age, whereas low 29.85% (20 patient out of 87) in < 40 years age (45.84% vs 29.85%). Mortality rate was also higher among female than male patients (34.66% vs 33.85 %). Farmers experienced more death than non-farmer (41.18% vs 29.82%, $P < 0.05$). Mortality was higher in patients who had not received any medical treatment for their wound than in patients who had received it for their wound (52.78% vs 21.81%, $P < 0.05$). Patients with short incubation period of less than one week had higher mortality in comparison with those who had incubation period more than one week (53.33% vs 23.25%, $P < 0.05$). Of the 91 patients, fifty six (64.34%) were alive, though four remained in a persistent vegetative state due to tetanus toxin-induced brain damage and another two required a below knee amputation of the left leg. Hence, 40 were discharged well and 16 were discharged with permanent disabilities. **Conclusion:** The case fatality rate of tetanus has remained consistently high in the medical college. Factors that were significantly associated with high mortality included older age, and incubation period of less than 7 days. It is recommended that preventive immunization against tetanus be given to all Bangladeshis with secondary vaccination at adulthood.

Key words: Infectious disease, Occupation, Clostridium Tetani, Muscle Spasm.

[BSMMU J 2014 ; 7 (2) : 77-83]

Introduction:

Tetanus is a nervous system disorder characterized by muscle spasms that is caused by the toxin-producing anaerobe, *Clostridium tetani*, which is found in the soil. The clinical features of tetanus and its relationship to traumatic injuries were well known among the ancient Greeks and Egyptians and too many clinicians before the introduction of vaccination with tetanus toxoid in the 1940s. The term "lockjaw" (now called trismus) lives in

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modern parlance as a reminder of one of the cardinal features of tetanus: intense painful spasms of the masseter muscles.

Although tetanus is now rare in the developed world, the disease remains a threat to all unvaccinated people, particularly in developing countries. In contrast to developed nations where tetanus is rare, tetanus remains endemic in the developing world, and the incidence often increases following natural disasters such as earthquakes and tsunamis. Approximately one million cases of tetanus are estimated to occur worldwide each year, with 300,000

to 500,000 deaths¹. Neonatal tetanus, which the WHO targeted for elimination by 1995, accounted for approximately 59,000 deaths in 2008². While this represents a decrease in mortality of 92 percent compared with 1988, as of 2010, 39 countries had still not eliminated maternal and neonatal tetanus. Most cases of tetanus follow an acute penetrating skin injury. The injury may be major but often is trivial, so that medical attention is often not sought. Tetanus is also associated with chronic skin ulcers^{3,4}, abscesses, gangrene, burns, surgery, abortion, child-birth, and intravenous drug abuse⁴. In some patients no portal of entry for the organism can be identified³.

In Bangladesh, like most developing countries in the world, tetanus is endemic and remains an important health problem especially among the rural farming folks. Although an estimated 41,000 cases of neonatal tetanus occur annually⁵, the exact incidence of other types of tetanus in Bangladesh, a country with 140 million inhabitants, is not known, partly because of lack of compliance in reporting new cases to the authorities. The Government of Bangladesh, Bureau of Statistics has reported 7.5% of maternal deaths or an estimated 1080 women died in 1996 from pregnancy related tetanus⁶. Case-fatality rates for non-neonatal tetanus in developing countries range from 8 to 50 percent⁷. However, the mortality in other types of non-neonatal tetanus in Bangladesh is not known. We undertook an eighteen month retrospective study of all the tetanus cases in adults managed in infectious disease unit of our hospital, looking into its demographic and clinical profiles, risk factors for tetanus, treatment received and the outcomes.

Methods:

All cases of tetanus in patients from January 2011 to July 2012, who were admitted at the infectious disease unit of Rangpur Medical College Hospital, were included in this 18-month retrospective descriptive study. The tetanus cases were searched for and identified from the case record files in the Record Office of the hospital.

Selection criteria for the patients consists of: (1) Physicians made clinical diagnosis of tetanus. Patients with doubtful clinical diagnosis of tetanus where there were other differential diagnosis like conversion disorder, drug

induced rigidity were not included in this study. The individual case notes were then retrieved and studied. Age, sex, occupation, clinical features of the individual cases of tetanus, incubation time, identifiable injury, history of previous vaccination against tetanus, wound prophylaxis, treatment received, complication if any were noted on a standard case record form. Tables and charts were then made to summarize the various data of interest. Data were analyzed using SPSS. A descriptive analysis was done on all variables to obtain a frequency distribution. The mean \pm SD and ranges were calculated for quantitative variables. Continuous variables were compared by the Student t test. Proportions were analyzed with the chi-square test or 2-tailed Fisher's exact test as appropriate. A P value of 0.05 or less was considered statistically significant.

Results:

There were 91 cases of tetanus in the study period with a range of 3 to 10 cases per month and a mean of about 5 cases per month. There were 65 male (71.4%) and 26 female (28.6%) patients. The age and sex distribution of these 91 tetanus patients is shown in figure 1. Most cases occurred in the age groups 30-39 years and 20-29 years, with 32 and 22 cases respectively. Sixty four (70.3%) cases occurred in people less than 40 years of age. Only four patients were more than 60 years of age.

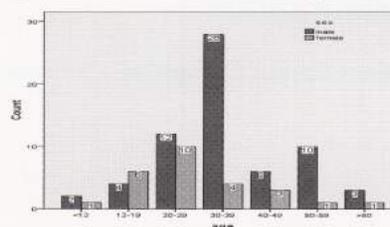


Fig 1 : Age & Sex Distribution

The occupational groups of the patients are shown in Table 1. Thirty four (37.4%) patients were farmer, twelve (13.2%) were laborer and industry worker, fifteen (16.5%) were housewives, eight (8.8%) were businessman, twelve (13.2%) were student and in ten (11.0%) patients the exact occupations of the patients were not known as the occupational history were not recorded in medical record files.

Table-I
Occupational group

Occupation	Frequency	Percent (%)
Farmer	34	37.4
Labourer/industrial worker	12	13.2
House Wives	15	16.5
Businessmen	8	8.8
Student	12	13.2
Others	10	11.0
Total	91	100.0

Risk factors for tetanus:

Fifty two of the 91 (57.1%) patients had a reasonably identifiable acute injury (prick, puncture wound or laceration) prior to the onset of tetanus, as shown in Table II. Twenty one (23.1%) were the history of minor surgery (Boil, stitch in cut injury) for about a week before the first symptoms of tetanus. Other risk factors identified were abortion (6.6 %), child birth (4.4%). In three (3.3%) patients, there was no clinically identifiable portal of entry. Thirty six (39.6%) patients did not consider the injury severe enough to be treated either by themselves or by doctors. Of the other patients with a wound who did seek medical help, twenty (22.0%) received an immunization with tetanus toxoid, and nineteen (20.9%) got prophylactic penicillin antibiotic in combination with an immunization (Table-III). None of the patients received tetanus immunoglobulin in prophylaxis treatment of the wound.

Table-II
Identified risk factors

Presence of injury	Frequency	Percent (%)
Acute Injury(puncture, prick)	52	57.1
Surgery	21	23.1
Childbirth	4	4.4
Abortion	6	6.6
Others	5	5.5
Not Identifiable	3	3.3
Total	91	100.0

Table-III

Patient received treatment before hospital admission

Prophylaxis	Frequency	Percent (%)
Wound Clean and debridement	16	17.6
Tetanus Toxoid	20	22.0
Prophylactic Antibiotic	19	20.9
No Medical Treatment	36	39.6
Total	91	100.0

Immunization history:

A history of previous tetanus immunization was obtained only from twelve (13.2%) patients (Table- IV). Four patients had received the immunization more than 10 years ago. There was no written proof of the immunization schedule in any cases. Fifty five (60.4%) patients said they never had been vaccinated. The remaining twenty-four (26.4%) patients could not provide any information at all regarding vaccination against tetanus. Serology to detect anti-tetanus antibodies was not performed.

Table-IV
History of immunization

Previous immunization	Frequency	Percent (%)
Received	12	13.2
Not Received	55	60.4
No information	24	26.4
Total	91	100.0

Incubation period:

The incubation period, defined as the time between the inoculation of the wound and the onset of the symptoms, could be evaluated in fifty eight (72.5%) patients. The mean incubation period was 10.8 ± 2.1 days (range 3-28 days). Twenty nine patients had an incubation period of less than one week, and twelve of them suffered from severe disease. The period of onset, defined as the interval between the first symptoms and the first spasm, could not be evaluated, as it was not recorded in case history of the patients.

Treatment:

All the patients were treated in two isolated rooms to guarantee a quite environment. There was no intensive care unit at Rangpur Medical College Hospital. Table V shows a summary of the treatments given to the 91 tetanus patients. Surgical toileting and debridement of the wounds were performed in all the eighty one (89.01%) patients. Eighty-two (90.10%) patients received intravenous crystalline penicillin as antibiotics, fifty one (56.04%) patients received it as the only antibiotics and forty-two (46.15%) patients received it in combination with metronidazole. Seventy six patients (83.51%) received intramuscular human antitetanus immunoglobulin. All the 91 (100%) patients received intravenous diazepam infusion as an integral part of their management. Supportive treatment such as balanced fluid and calorie intake, prevention of gastric stress ulcer, prevention of pressure sores were provided in all patients. Prophylactic heparin was used in fourteen patients.

Table-V*Treatments Afforded To the Patient in Hospital*

Treatments given	Frequency	Percent (%)
Wound toilet and debridement	81	89.01
Intravenous diazepam infusion	91	100.0
Intravenous crystalline penicillin	82	90.10
Intravenous metronidazole	51	56.04
IM human antitetanus Immunoglobulin	76	83.51
Outcome:		

Table-VI*Outcome of tetanus patient*

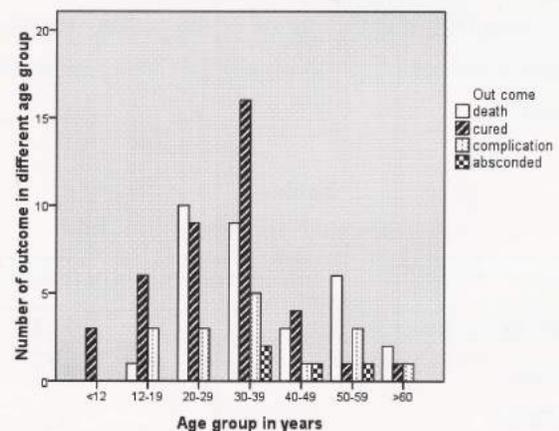
Outcome	Frequency	Percent(%)
Death	31	34.1
Cured	40	44.0
Cured With Complication	16	17.6
Absconded	4	4.4
Total	91	100.0

There were thirty one deaths, accounting for an overall mortality of 34.1%. Total fifty six patient were cured among which sixteen (17.6%) were cured with complication and four (4.4%) patient were absconded. Mortality was compared between subgroups of patients.

Table-VII*Sex / Outcome Cross tabulation*

Sex	Out come				Total
	Death	Cured	Complication	Absconded	
Male	22	28	11	4	65
Female	9	12	5	0	26
Total	31	40	16	4	91

Factors associated with poor outcome were (1) age greater than 40 years (2) female sex (3) occupation as a farmer (4) lack of medical treatment for tetanus prone wound and (5) short incubation period. Eleven (45.84%) died among 24 patients who were above 40 years of age. twenty (29.85%) died among 67 patients who were below 40 years of old and higher rate of death was observed among that group patients (45.84% vs 29.85%, $P < 0.05$, Fig-2). Mortality rate was also higher among female than male patients (34.66% vs 33.85%, table: VII). Farmers experienced more death than others (41.18% vs 29.82%, $P < 0.05$).

**Fig 2:** Number of outcome in different age group

Mortality was higher in patients who had not received any medical treatment for their wound than in patients who had received it for their wound (52.78% vs 21.81%,

$P < 0.05$). Patients with short incubation period of less than one week had higher mortality in comparison with those who had incubation period more than one week (53.33% vs 23.25%, $P < 0.05$). Of the 91 patients, fifty six (64.34%) were alive, though four remained in a persistent vegetative state due to hypoxic brain damage and another two required a below knee amputation of the left leg. Hence, 40 were discharged well and 16 were discharged with permanent disabilities.

For those 56 patients that were discharged alive, average length of stay of 27 days. Two patients spent more than 100 days in the hospital; one spent 106 and the other, 109 days

Discussion:

In this retrospective descriptive study we identified a total of 91 cases of tetanus in the eighteen month period from January 2011 to June 2012, giving a mean of 5 cases per month. The case records of these 91 tetanus cases were thoroughly studied to gather various demographic and clinical data of interest. We found regrettably that in some cases the occupational data of the tetanus patients was incompletely entered and hence, we were not able to analyze these tetanus cases in relation to the occupations of the patients. We were also unable to collect sufficient information on immunization history. More detailed history taking and recording should therefore be mandatory in the future so that important and complete data would be available for analysis to provide invaluable information⁸. Most of the cases of tetanus occurred in middle aged with no prior immunization or with an unknown history of immunization. Waning immunity, caused by the disappearance of the protective antibody levels in subjects who did not receive a regular booster injection, may also account for some tetanus cases¹⁰. We observed a mean of 5 patients per month with generalized tetanus in our referral hospital. The sex distribution analysis revealed that almost two-thirds of the cases (71.4%) occurred in men while a third occurred (28.6%) in

women. This finding is consistent with that of other studies^{5,9,10}. This could be explained by the fact that men tend to spend more time outdoor, in farming activities and other types of fieldwork. Hence, they are more likely to be exposed to both the causal organism, *C. tetani*, which is ubiquitous in soil in a tropical country like Bangladesh and the penetrating injury necessary for the organism to enter the body.

The mean age of tetanus patients in our series was 31.7 ± 10.08 years. 75% of the tetanus cases occurred in individuals less than 40 years of age. The possible explanation for this observation is that tetanus immunization program was only commenced in this country in the mid-1960.

Majority (37.4%) of the tetanus patients were farmers. This pattern of occupational risk group is explained by the fact that farmers or the peoples who live in the rural areas and engage themselves in the agricultural sector are more likely to be exposed to the causal organism as well as the injury necessary for the organism to enter the body. Fifty two (57.1%) of the tetanus patients had an identifiable acute skin injury; a prick, a puncture wound or a laceration wound, a figure fairly consistent with that of other studies¹¹. Thirty-nine (48.75%) of these injuries occurred in the lower limb, while only twenty-nine (36.25%) were on the upper limbs. Other studies also reported that the majority of tetanus wounds were located on the lower limbs¹². In 3.3% of the patients, no probable portal of entry was identified; the injuries were likely to trivial to be recalled^{3,8,11}.

Body stiffness/spasm, trismus and dysphagia, in that order, were the commonest complaints of the tetanus patients in our series. Other investigators had also found trismus and rigidity to be the commonest presenting symptoms^{5,13}. Hence, a high index of suspicion for tetanus should be exercised whenever patients present with any of these symptoms as tetanus is essentially a clinical diagnosis and laboratory results as well as cultures are of little

diagnostic value^{3,5}. If a patient presents with all the three complaints, the probability of tetanus would be extremely high. Tetanus patients also complained of pains involving other parts of the body, either generalized or localized such as back, neck and jaw pain. If these were the only complaints, the correct diagnosis as well the appropriate management might be delayed¹⁴.

Nineteen patients had tracheostomy performed to circumvent the problem of laryngeal spasm (which could lead to asphyxiation and hypoxia) and to enable tracheal suction and toilet to be carried out efficiently (airway protection)^{9,15}.

The mortality rate of tetanus in our series was 34.1%. This finding is fairly consistent with that of other studies^{9,11,16,17}. 64.37% of patients of our series survived, though four remained in a persistent vegetative state due to hypoxic brain damage and another two required a below knee amputation of the left leg. Hence, 40 were discharged well and 16 were discharged with permanent disabilities. There was a delay in the diagnosis of tetanus and the institution of appropriate management¹³. One more patient presented late with history of generalized convulsion. Both developed hypoxic brain damage and remained in a persistent vegetative state upon discharge. The average length of hospital stay was 77 days. Two patients stayed for more than 100 days, one stayed 146 days and the other, 109 days.

In conclusion, tetanus remains in Bangladesh an important disease with substantial mortality and morbidity that primarily affects unvaccinated or inadequately vaccinated individuals^(5,9,11,15). As Bangladesh, like most third world countries, has very limited resources, the continued occurrence of this preventable disease represents a drain on existing health care funds. This must be brought to the attention of institutions responsible for planning health care programs. Tetanus is highly preventable through both routine vaccination and appropriate wound management⁸.

^{11,17,18}. The method of good management emphasizes: 1) wound care, 2) neutralization of the toxin, 3) antibiotic therapy, 4) supportive measures including good nursing care with control of convulsions, 5) completion of active immunization^{8,18}. Another important aspect that was revealed in our study was the inadequate management of those patients who did seek medical care for their wounds. Patients with tetanus prone wounds and an unknown immunity for tetanus only received a booster vaccine without tetanus immunoglobulin or any prophylaxis at all. The lack of appropriate prophylactic measure during wound management was found in other studies as well^{6,9}. Tetanus is a constant danger that we must not forget but must prevent it. A case of tetanus reflects the failure of our health care delivery system to provide adequate and appropriate immunization³. The solution to the problem of tetanus remains prophylaxis.

Conclusion:

In this era of modern management, it is very unfortunate on our part to lose a patient with tetanus. We should have a high index of suspicion when a patient present with features like body stiffness/spasm, trismus and dysphagia with a plausible background history so that none of the patient goes unnoticed. As well our preventive health-care services also have to be addressed side by side to prevent and or diminish the number of tetanus patients in our community.

Acknowledgement:

We are grateful to Dr. Md. Golam Mostofa, Director of Rangpur Medical College Hospital for allowing us to collect the data of tetanus patients while we were working in medicine department of this hospital. We also like to thank all the Nurses caring for the tetanus patients and to all the staffs working in Medical Record section of this hospital for their cordial held during this study.

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