



# Is Adult Tetanus an Endemic in India?

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## ABSTRACT

**Background:** Tetanus is a life-threatening disease in developing country like India, with high morbidity and mortality rate. Though maternal and neonatal tetanus is eliminated, adult tetanus still remains in boom and is overlooked.

**Methods:** An observational descriptive study using retrospective secondary data was undertaken among the patients admitted to a regional referral hospital to study the epidemiological factors influencing tetanus, clinical features and the outcome of tetanus.

**Results:** Analysis of 41 clinically diagnosed cases of tetanus showed that, majority were in 50-69 years of age group who resided in rural area and agriculture was their main occupation. Case fatality rate was 53.6% which revealed that mortality was the major outcome. And 95% of those infected were not aware of their immunization status.

**Conclusion:** An early diagnosis, a proper wound management immediately after the injury, health education programs to create awareness among the public not to neglect even trivial injuries would definitely lead India to the path of elimination of adult tetanus. Strong emphasis is to be laid on adult immunization beyond the age of 10 years.

**Key Words:** Tetanus, Adult immunization, epidemiological factor, trismus

## INTRODUCTION

TETANUS, also called lockjaw is a vaccine preventable disease. Unlike other vaccine preventable diseases, tetanus is a dead-end infection. It is characterized by fever, trismus, neck rigidity, opisthotonos, and risus sardonicus.

In India, tetanus remains a public health problem even today. There were 56,743 deaths due to tetanus in 2015. Amongst them, 19,937 deaths occurred in neonates and remaining occurred in older children and adults.<sup>1</sup> A milestone reached was in May 2015, when India was officially certified as achieved elimination of maternal and neonatal tetanus.<sup>2</sup>

India is a country where agriculture is the bread and butter to 58% of population.<sup>3</sup> Hence, working in fields is inevitable. Minor injuries suffered by farm-

ers while harvesting or working in the fields are entry point for tetanus bacteria to get into the body. Added to this, is the general attitude among people to avoid micro injuries or apply cow dung, turmeric or mud to injury. Even minor wounds can cause a fatal disease.

Literature discloses that antibody levels higher than 0.01 IU/ml are sufficient enough to protect against tetanus and this can be achieved with primary immunization. However, antibodies decrease over time. Therefore CDC, WHO and Advisory committee on immunization practices in India recommend a booster every 10 years.<sup>4,5,6</sup>

In India, the universal immunization programme was launched in 1985. It is understood that people born before this programme was implemented, are still

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vulnerable. A series of expert committee meetings are being conducted to make adult immunization an ongoing programme in our country.<sup>7,8</sup>

Considering this, a study was undertaken to gain insight into the current status of tetanus and its epidemiology with the objectives to identify the demographic factors associated with tetanus cases admitted to regional referral hospital and to report the common clinical presentation and treatment outcome.

## METHODS

An observational descriptive study was planned using retrospective secondary data from the patients admitted to the regional referral hospital with history of tetanus during January-December 2017. The regional referral hospital of Bengaluru, which caters to entire state of Karnataka besides Tamilnadu is the centre where all probable and diagnosed cases of tetanus among adults are referred to. The case definitions given by CDC was used to identify the study population.<sup>9</sup>

A **probable case** of tetanus is, in the absence of a more likely diagnosis, is an acute illness with a) muscle spasms or hypertonia, and b) diagnosis of tetanus by a health care provider OR Death, with tetanus listed on the death certificate as the cause of death or a significant condition contributing to death.

There was no available definition for a confirmed case and laboratory confirmed case of tetanus.

A questionnaire was designed using the information recorded in the case sheets which included demographic details like age, sex, religion, occupation, information of clinical presentation, history of injury, immunization status and treatment outcome. Only the case sheets with complete basic information were included.

A written permission was taken from the head of the regional referral hospital and a statement regarding usage of data for academic purposes only was also given in writing before the start of the study.

**Statistical Tools:** Data was entered in MS excel and analyzed using descriptive statistics like frequency tables and graphs. Also, Morbidity (Hospital admission rate) and mortality (case fatality rate) indicators were calculated.

**Ethical consideration:** The study was presented before the Institutional Ethical Committee and was approved.

## RESULTS

A descriptive study was carried out in a regional referral hospital in 2017 to determine the epidemiological features of tetanus and its outcome. A total of 41 clinically diagnosed cases were identified in that

year. Amongst them, 22 were males and 19 females. Majority of them belonged to age group between 50-69 years (Fig 1). About 68% were of rural origin. And 88% of the patients belonged to Hindu religion, the remaining 12% were Muslims. Majority (51%) of the patients were from agricultural background (Fig 2) and 19.5% of them were home makers. (Others include driver, vegetable vendor, student). Hospital admission rate and case fatality rate was 5.6% and 53.6% respectively.

The most common clinical presentation (Table 1) was skeletal muscle involvement which included trismus, neck stiffness and stiffness of limbs, back and body. When asked about their immunization status, in 95% of patients it was not known and only one patient had history of taking tetanus toxoid.

On studying the outcome of disease, the case fatality was 53.6% (n=22). The most common predisposing risk factor for the disease was acute injury in twenty patients, history of fall in four patients, one after RTA, one following surgical procedure (Table 2). Unfortunately, two patients developed tetanus secondary to ear prick. Sadly, in thirteen patients there was no identifiable portal of entry, thus reflecting that the injuries were very trivial for the patient to recall.

**Table 1: Age and Sex Distribution of Study Population**

Age group (yrs)	Male (%) (n=22)	Female (%) (n=19)
10-29	3 (14)	4 (21)
30-49	8 (36)	2 (10)
50-69	10 (45)	7 (37)
>70	1 (5)	6 (32)

**Table 2: Occupation of Study Population**

Occupation	Cases (n=41) (%)
Agriculture	21(51)
Home makers	8 (19)
Daily wage workers	6 (15)
Others	6 (15)

**Table 3: Clinical Features of Study Population (N=41)**

Clinical features	Cases (%)
<b>Skeletal muscle involvement</b>	
Trismus	35(85.4)
Neck stiffness	37(90.2)
Stiffness of limbs, back and body	37(90.2)
<b>Cranial nerve involvement</b>	
Slurring of speech	7 (17.1)
Ptosis	4 (9.8)
<b>Smooth muscle involvement</b>	
Dysphagia	9 (21.9)
Dyspnoea	1 (2.4)
<b>Others</b>	
Fever	6 (14.6)
Cervical spine tenderness	1 (2.4)
Paraspinal muscle spasm	1 (2.4)
Photo and phonophobia	1 (2.4)

**Table 4. Epidemiological Profile of Study Population (N=41)**

Characteristics	Cases (%)
<b>Tetanus vaccination status</b>	
Partially immunized	2 (4.9)
Immunization status unknown	39 (95.1)
<b>Risk factors</b>	
Acute injury	20 (48.8)
H/o of fall	4 (9.8)
Rta	1(2.4)
Surgical procedure	1 (2.4)
Ear prick	2 (4.9)
No identifiable portal of entry	13 (31.7)
<b>Material causing wound</b>	
Wooden stick	10 (24.4)
Nail	15(36.6)
Sharp weapons	6 (14.6)
Needles	5 (12.2)
Other materials	5 (12.2)
<b>Site of injury</b>	
Limbs	18 (43.9)
Face	5 (12.2)
Trunk	5 (12.2)
Unknown	13 (31.7)
<b>Treatment outcome</b>	
Expired	22 (53.7)
Recovered	9 (21.9)
Referred to higher center	3 (7.3)
Discharged against medical advice	2 (4.9)
Data missing	5 (12.2)

## DISCUSSION

The present study showed the occurrence and mortality was more in people who were above 40<sup>10</sup>. Tetanus is till prevalent in developing countries like India with significantly increasing morbidity and mortality, despite the availability of an effective vaccine since 1920.

The present study showed the occurrence and mortality was more in people who were above 40 years, which was in agreement with the findings by Chalya et al<sup>11</sup> and studies in Malaysia and Bangladesh.<sup>12,13</sup> This could be attributed to gradually declining immunity with age and their unvaccinated status. This observation was also consistent with a population based serologic survey which was done in the United States of America, which showed that the prevalence in Americans of the protective levels of the tetanus antibody declined rapidly, starting at the age of 40 years and that most cases of tetanus occurred in persons of the older age groups.<sup>14</sup>

Of the total 41 cases admitted in the year 2016, there was male pre-ponderance which was in accordance with the findings of other Indian studies.<sup>15-17</sup> This can be explained by the fact that men spend more time in outdoor activities like agriculture and other field work and hence were more likely to be exposed to the *Clostridium tetani* spores which are ubiquitous in the soil. The females might have been protected against tetanus by vaccination during the antenatal period.

With regard to religion, majority (80%) of the patients belonged to Hindu religion and Muslims accounted to only 12%. This could be that Hindus contribute to the highest share of workers involved in agriculture. Muslims are notably more involved in the household industry which is mainly artisanal work like carpentry, black smiting. This also explained the reason for 68% patients from rural areas.

As in other studies, majority of the patients were daily wage workers or farmers (51.2%).<sup>11, 15-17</sup> As most of them worked barefoot in the fields sustaining injuries in the field causing higher risk of exposure to tetanus spores. In spite of portal of entry not being identified, few patients developed the disease. Also, majority of injuries occurred on the lower limb, which was in accordance with the findings of other studies.<sup>14-17</sup> This may be due to the practice of working barefoot in the fields and also due to the lack of protective footwear.

Most of the patients presented with difficulty in opening mouth, neck stiffness and stiffness of back and limbs, which was in accordance with findings of other studies.<sup>18</sup> Thus, a high amount of clinical suspicion is necessary whenever the patients present with the above symptoms, as tetanus is mainly diagnosed clinically and as the laboratory tests and cultures are of little diagnostic value.<sup>15</sup> Diagnosis of tetanus mainly depends on clinical grounds alone. There are no laboratory tests that can diagnose /exclude tetanus.<sup>19,20</sup> Wound culture rarely yields *Clostridium tetani* and are not available quick enough to aid diagnosis. Hence, the presentation of tetanus is so characteristic that a presumptive diagnosis should be made if a person is presenting with above mentioned symptoms.

Immunization status was not known in majority (95%) of the patients. The reasons being limited public awareness about adult vaccines, lack of provider assessment and referral for routine vaccination for adults during health care visits.

## CONCLUSION

Although tetanus is a vaccine preventable illness and WHO has declared that India has reached an elimination stage, its prevalence is still a major concern. It still remains a difficult to treat disease, with high morbidity and mortality because most cases are either reported late or are not vaccinated.

Currently we have got immunization coverage evaluation report till 5 years of age, but coverage evaluation of 10 and 16 years with TT is not known. Hence, we need to immediately intensify efforts for the provision of vaccines in the national immunization schedule that could help mitigate adult suffering from infectious diseases, especially for people under high risk who are working outdoors like agriculture and daily wage workers.

An early diagnosis, a proper wound management immediately after the injury, health education programs to create awareness among the public not to neglect even trivial injuries would definitely lead India to the path of elimination of adult tetanus also.

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