

A Prospective Single Center Study Assessing Clinical Profile of Tetanus in Children: An Observational Study**Sunil Kumar Singh¹, Anil Kumar²**¹Senior Resident, Department of Pediatrics, GMCH, Bettiah, Bihar, India²Professor and HOD, Department of Pediatrics, GMCH, Bettiah, Bihar, India

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Conflict of interest: Nil

Abstract**Aim:** The aim of the present study was to assess the clinical profile of tetanus in children admitted in tertiary care hospital.**Methods:** A prospective single centre observational study carried out over a period of 24 months by Pediatrics Department, All eligible patients as per inclusion and exclusion criteria were selected for the study. 50 patients were included in the study.**Results:** Gender wise distribution shows that 62% were male. Epidemiological distribution showed that 34 (68%) of patients were from rural area. Socioeconomic distribution shows that 33 (66%) patients were from lower socioeconomic status. Among non-neonatal tetanus, 20 (40%) were traumatic and 8 (16%) were otogenic while others were idiopathic. Among non-neonatal cases mortality was 17 cases with commonest mortality in the age group. Among non-neonatal cases the mortality was commonly seen in traumatic cases. 78% were not immunized and 20% were partially immunized. The most common complication seen was Hyperpyrexia in 13 (26%), followed by Pneumonia in 11 (22%) cases, Thrombophlebitis and Bedsore in 7 each (14%) cases septicaemia was seen in 4 (8%) cases.**Conclusion:** Tetanus is more common in rural population. This may be due to illiteracy, poor socio economic status, poor awareness of immunization programme, fear of complication due to vaccination, superstition. Mortality is decreased as the incubation period and period of onset increased. Mortality is increased with temperature and grade of tetanus increased.**Keywords:** autonomic disturbances, period of onset, trismus, tetanus

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Introduction

Tetanus, an acute infection caused by *Clostridium tetani*, can be classified as neonatal and nonneonatal tetanus (including maternal tetanus). [1] Non-neonatal tetanus is most often caused by trauma following penetrating wounds, whereby the ubiquitous tetanus spores get inoculated, germinate, and release tetanospasmin, leading to the signs and symptoms of tetanus. [1] Tetanus may also complicate abscesses, otitis media, unsterile surgical procedures, burns, and animal bites. [1] Rarely, there may be absence of any history suggestive of an underlying etiology/cause. [1] Though the incidence of non-neonatal tetanus in India has decreased from 23,356 cases in 1990 to 4,946 cases in 2017, tetanus still continues to be an illness associated with significant morbidity and mortality, even in a metropolitan city like Mumbai. [2]

Following the entry of the organism, the incubation period (i.e., the duration from infection to the first symptom) is usually 2 to 14 days, but may

sometimes be longer (for few months). The period of onset (i.e., the duration from the trismus to the first spasm) is variable, and a shorter period of onset is often predictive of severe tetanus and death. [3-5] Diagnosis of tetanus is essentially clinical. Generalized tetanus is characterized by trismus (lockjaw) due to masseter muscle spasm, risus sardonicus, followed by stiffness, difficulty in chewing, dysphagia, neck muscle spasms, opisthotonus, and autonomic disturbances. As per the World Health Organization (WHO), the case definition of nonneonatal tetanus is any person older than 28 days with acute onset of at least one of the following: trismus, risus sardonicus, or generalized muscle spasms. [6] Less severe forms include localized tetanus and cephalic tetanus.

Tetanus is a significant public health problem throughout the world. It is associated with a high morbidity and mortality particularly in the developing countries. [7] Tetanus cause

approximately 213,000—293,000 deaths worldwide each year, out of which 180,000 have been reported in neonates. [8] Tetanus is endemic in India. The annual incidence of neonatal tetanus in India is 1.74/1000 live births. [9] The case fatality rate of tetanus ranges from 6% to 72% depending on the availability of well equipped intensive care unit. 7 Tetanus occurs sporadically. It affects unimmunized and partially immunized subjects. Completely immunized subjects who did not receive booster doses of vaccine may also be affected. It is therefore very important that all age groups have the universal primary immunization with subsequent maintenance of adequate antitoxin levels by means of appropriately timed boosters. [10]

The aim of the present study was to assess the clinical profile of tetanus in children admitted in tertiary care hospital.

Materials and Methods

A prospective single centre observational study carried out over a period of 24 months by Pediatrics Department, GMCH, Bettiah, Bihar, India. All eligible patients as per inclusion and exclusion criteria were selected for the study. 50 patients were included in the study.

Inclusion criteria: All children less than 13 years old including neonates with diagnosis of tetanus admitted in pediatric department who presented with spasm suggestive of tetanus and diagnosis confirmed with independent evaluation by at least two pediatricians were included.

Exclusion criteria: other causes of spasms like meningoenephalitis, hypocalcaemia and others were ruled out with appropriate investigations.

Informed written consent was taken from legal guardian of the patients before inclusion in the

study. After admission detailed history regarding presenting complain, duration of symptoms on admission and on discharge asked. History was taken to search for the sources of infection viz: Trauma (type of injury, duration , site, vaccination status, treatment), Ear discharge (duration

,type of discharge, treatment taken and symptoms of tetanus),and In neonatal tetanus: history of antenatal care, no. of tetanus toxoid doses, delivery by trained/untrained Dai, environment of delivery. Instrument used to cut cord and history of any local application was asked.

Detailed general and systemic examination was carried out Grading of tetanus was done on admission and severity reassessed if severity increased after admission. Patients were observed for disappearance of symptoms and the time of disappearance. Patients were observed for development of complications. Grading of tetanus was done according to Patel and Joag classification.

Investigations like hemoglobin, total count, differential count, Erythrocyte Sedimentation Rate (ESR), renal function test and chest X-ray were done in all patients. In patients with chronic ear discharge, X-ray mastoid was done and ear swab were sent for culture. In neonatal tetanus patients, umbilical cord swab was sent when umbilical discharge was present.

Data Analysis:

Computerized analysis of data was done with the help of Graph pad version 5 demo. The study variables were analyzed for their association with immediate outcome by applying Fisher’s exact test as and when applicable. All p values were two tailed and p<0.05 was considered statistically significant.

Results

Table 1: Socio-demographic data of tetanus cases

Parameters	Numbers	%
Age		
<1 month	6	12
1 month – 3 years	11	22
4 – 6 years	12	24
7 – 9 years	9	18
10 – 12 years	12	24
Total	50	100
Gender		
Male	31	62
Female	19	38
Total	50	100
Geographic distribution		
Rural	34	68
Urban	16	32
Total	50	100
Socioeconomic class		
Upper	3	6
		4.44

Middle		14	28	26.67
Lower		33	66	
Total		50	100	
Causes of Tetanus				
Neonatal		6	12	
Non-neonatal	Traumatic	20	40	
	Otogenic	8	16	
	Idiopathic	16	32	
	Total	50	100	

Gender wise distribution shows that 62% were male. Epidemiological distribution showed that 34 (68%) of patients were from rural area. Socioeconomic distribution shows that 33 (66%) patients were from lower socioeconomic status. Among non-neonatal tetanus, 20 (40%) were traumatic and 8 (16%) were

otogenic while others were idiopathic. Among non-neonatal cases mortality was 17 cases with commonest mortality in the age group. Among non-neonatal cases the mortality was commonly seen in traumatic cases.

Table 2: Immunization status

Immunization status	N	%
Immunized	1	2
Partially immunized	10	20
Not immunized	39	78

78% were not immunized and 20% were partially immunized.

Table 3: Complications associated with tetanus

Complications	N	%
Hyperpyrexia	13	26
Pneumonia	11	22
Thrombophlebitis	7	14
Bedsore	7	14
Septicemia	4	8
DIC	3	6
Autonomic instability	2	4
Complication due to over sedation	2	4

The most common complication seen was Hyperpyrexia in 13 (26%), followed by Pneumonia in 11 (22%) cases, Thrombophlebitis and Bedsore in 7 each (14%) cases septicemia was seen in 4 (8%) cases.

Discussion

Tetanus, an infective intoxication of the nervous system by *Clostridium tetani*, is an ancient disease which is associated with a high mortality rate. Despite the widespread availability of a safe and effective vaccine against this disease, it remains a major health problem in developing countries. [11] Tetanus is more common in developing countries, where the climate is warm, and in rural areas where the soil is fertile and high cultivated, where human and animal population are substantial and live in close association and where unhygienic practices are more common and medical facilities poor. In rural India, tetanus was a common cause of death, particularly in the new born. But immunization of infants and expectant mothers has reduced the incidence to large extent. [12]

Gender wise distribution shows that 62% were male. Male preponderance and higher incidence of tetanus in children < 10 years was observed in our study. Similar results have been documented in other studies. [13,14] The male preponderance could be explained by the fact that boys tend to spend more time outdoor hence they are more likely to be exposed to the causal organism. They are also more prone to penetrating injury thereby facilitating the organism to enter the body. Higher incidence of tetanus in younger children can be explained by the lack of effective immunization program and inappropriate treatment of injuries [15] whereas in developed countries tetanus occurs mainly in elderly due to decline in protective antibodies. [13]

Epidemiological distribution showed that 34 (68%) of patients were from rural area. Socioeconomic distribution shows that 33 (66%) patients were from lower socioeconomic status. Among non-neonatal tetanus, 20 (40%) were traumatic and 8 (16%) were otogenic while others were idiopathic. Among non-neonatal cases mortality was 17 cases with commonest mortality in the age group. Among non-neonatal cases the mortality was commonly seen in

traumatic cases. 78% were not immunized and 20% were partially immunized. The most common complication seen was Hyperpyrexia in 13 (26%), followed by Pneumonia in 11 (22%) cases, Thrombophlebitis and Bedsore in 7 each (14%) cases septicaemia was seen in 4 (8%) cases. Complications like pneumonia, autonomic instability, GI bleed, hypoxemia, sepsis, urinary tract infections, decubitus ulcer and vertebral fractures have been reported in several studies. [16-18] Complications are contributory factor for high tetanus mortality. [16,18] Autonomic instability in tetanus is due to the effect of tetanus toxin on the brainstem and autonomic interneurons thereby impairing baroreceptor reflexes causing refractory hypotension. Direct effect of toxin on myocardium and loss of adrenal inhibition is another postulated mechanism for autonomic instability. [19,20]

Conclusion

Tetanus is more common in rural population. This may be due to illiteracy, poor socio economic status, poor awareness of immunization programme, fear of complication due to vaccination, superstition. Mortality is decreased as the incubation period and period of onset increased. Mortality is increased with temperature and grade of tetanus increased. Complications may occur as a part of disease or due to therapeutic interventions. Thus Improvement in coverage of maternal TT and institutional deliveries as well routine immunization of children by awareness and health education programmes may help in reduction of incidence and mortality of neonatal tetanus as well as non-neonatal tetanus. Early recognition by surveillance, intense and prompt management improves morbidity and mortality in childhood Tetanus.

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