Original Article

Clinical Outcome of Tetanus Based on Dakar Tetanus Severity Score in Paediatric Intensive Care Unit of a Tertiary Care Hospital

Anila Jamil[1], Muhammad Sarwar[2], Fareeha Kausar[3], Nighat Sultana[4], Ambreen Aslam[5], Umer Waqar Azeem[6]

[1,3,5,6] Senior Registrar of Paediatrics, Childrens' Hospital, Lahore.

[2,4] Associate Professor Paediatrics, Childrens' Hospital, Lahore.

Author's Contribution

[2] Conception of study
[5] Experimentation/Study conduction
[3] Analysis/Interpretation/Discussion
[1] Manuscript Writing
[4] Critical Review
[6] Facilitation and Material analysis

Corresponding Author

Dr.Anila Jamil,
Senior Registrar
Childrens Hospital,
Lahore
Email: d_earthcrust@yahoo.com

Abstract

Objective: To evaluate the validity of Dakar scoring system in predicting the outcome of tetanus in children of post neonatal age.

Materials and Methods: A prospective single center study conducted at ICU (Intensive Care Unit) of The Children's Hospital Lahore in 131 children with diagnosis of tetanus from January 2020 to June 2021 by analyzing demographic and clinical parameters.

Results: Mean age of children was 8.11 ± 3.45 years with male predominance 91(69.5%). Major proportion of children was in range of 5-10 years comprising 65(50%). Period of onset of spasm was < 2 days in 92(70%) that correlate well with shorter incubation period (p-value <0.001). Mean duration of ICU stay was (18.81 ± 11.73) days. Only 14(10.7%) received three doses of vaccination but no one received booster dose. In majority of patients trauma due to road traffic accident 86(65.6%) was the predisposing factor followed by ear discharge 31(23.7%) and other causes 14(10.7%). Out of 131 patients 104(79.3%) received mechanical ventilation because of disease severity. Regarding outcome mild cases 2(1.5%), moderate 61(46.6%) and severe were 68(51.9%) according to Dakar scoring system and out of these severe cases 18(13.7%) expired (p-value < 0.001). However, 53(40.4%) discharged, 50(38.1%) shifted out to other wards after stabilization and 10(7.6%) left against medical advice. (p-value 0.001)

Conclusion: Dakar scoring system correlates well with disease severity and should be adopted to aid clinical triage and management as with effective and appropriate treatment patients can have good prognosis. However, preventive aspects should be emphasized regarding booster dose of tetanus.

Keywords: Tetanus, Outcome, Dakar scoring system.

Introduction

Tetanus is a disease that can be prevented through vaccination. After the advent of national vaccination programmes, morbidity and mortality of communicable diseases have been reduced but this is not the scenario with tetanus as it is still causing a significant burden on hospital resources. However, in developed countries with effective vaccination programmes and better medical facilities the disease frequency as well as death rates are also declining.1

The spores of causative agent Clostridium Tetani can survive for years and once they enter the injury site they germinate and secrete toxins, tetanolysin and tetanospasmin. Tetanospasmin affects neuromuscular transmission while tetanolysin causes haemolysis in the intravascular compartment and causes tissue injury. Diagnosis of tetanus is mainly clinical and laboratory tests are only supportive.2

Tetanus is an infectious disease that is not contagious, spores of Clostridium tetani usually found in soil, dust and dung can enter the human body through breech in skin .3 Tetanus affects nerve and motor end plate interaction. It is diagnosed clinically because of rigidity and spasticity of muscles, laryngeal spasm, lock jaw and in some cases opisthotonus. In complicated cases tetanus may affect autonomic nervous system causing heart rate abnormalities and blood pressure variation, need of inotropes and ventilation may be required because of respiratory muscles involvement.4 Mortality from severe tetanus is markedly high and only dedicated pediatric intensive care facility in the form of monitoring along with ventilation and adequate sedation can save lives.5

Various scoring system has been designed like Ablett Classification, Philips's score, and Dakar scoring system for predicting the outcome of tetanus patients admitted in intensive care units, but these scoring systems have not been applied in developing countries in full context due to non-availability of national guidelines 6. To evaluate the validity of Dakar Scoring System, we will apply it on all the tetanus patients admitted in our Pediatric Intensive Care Unit to predict the disease severity and mortality among these patients.

Materials and Methods

It was a prospective observational study, conducted in Pediatric ICU of The Children's Hospital Lahore and University of Child Health Sciences after approval from Ethical review board. Performa for data collection was designed and nonprobability convenience sampling method was used.131 patients with clinical diagnosis of tetanus during one and half year duration were enrolled. We included both gender with age range of 1-15 years who were diagnosed as tetanus clinically based on rigidity of muscles and normal sensorium while those with anoxic brain insult or having systemic comorbid conditions were not included in our study. Among patients fulfilling inclusion criteria data collected about demographic profile, clinical presentation, site of wound/ entry site, incubation period, onset of spasm, tachycardia, and autonomic involvement. Each parameter scored as either 0 or 1 and cumulative score was used in predicting the outcome. Outcome was noted as being shifted out to other medical wards after initial management and stabilization, discharged, death, left again medical advice (LAMA). Severity was graded by Dakar scoring system and classified as mild, moderate, and severe.

SPSS version 25 was used for analysis. Demographic data like age, gender, duration of ICU stay presented as mean and standard deviation while Quantitative data like site of wound/entry site, incubation period, onset of spasm and outcome presented by calculating frequency and percentages. Statistical analysis was performed using chi-square test to see association between outcome and severity as well as ventilation requirement. A p-value of less than 0.05 was considered significant.

Results

Out of 131 patients included in study mean age of 8.11±3.45 years was noted with male predominance 91(69.5%). Most of the patients were in range of 5-10 years comprising 65(50%) among all included patients (Table 1).

Incubation period was shorter < 7 days in 72(55%) children followed by 7-14 days in 46(35.1%) and >14 days in 13(9.9%). However, period of onset of spasm was < 2 days in 92(70%) that correlates well with shorter incubation period (p value <0.001). Majority of severe cases had a period of onset of spasm less than 48 hours. Mean duration of ICU stay was 18.81±11.73 days. Out of 131 patients 104(79.3%) received mechanical ventilation because of disease severity and major chunk 66(63.4%) belongs to severe category associated with significant p value of <0. 001. Tracheostomy was done in 29(22.1%) and out of these

29, 21(72.4%) belongs to severe grades and 8(27.5%) moderate grades of tetanus (p-value of 0.03). All patients had generalized tetanus. Mild, moderate, and severe grades of tetanus comprising 2(1.5%), 61(46.6%) and 68(51.9%) respectively according to Dakar scoring system (Table 2). All patients were given booster vaccination on discharge or while being shifted out.

In majority of cases trauma due to road traffic accident 86(65.6%) was the predisposing factor followed by ear discharge 31(23.7%) and others 14(10.7%). Furthermore, lower limb was the predominant entry site 65(49.6%) followed by head and neck 46(35.1%), upper limbs and trunk 13(9.9%) and other sites 7(5.3%). (Figure 1) Regarding outcome out of 131 patients 53(40.4%) were discharged, 50(38.1%) were shifted out to other wards after stabilization and weaning from ventilator however 10(7.6%) left again medical advice with p-value 0.001. Mortality rate was 13.7% and all those who expired were severe cases associated with p-value 0.001(Table 3).

Table 1: Demographics and Clinical Characteristics

Characteristics	Number (%)
Age	
1-5 years	32 (24%)
5-10 years	65 (50%)
10-15 years	34 (26%)
Gender	
Male	91 (70%)
Female	40 (30%)
Incubation Period	
<7 Days	72 (55%)
7-14 Days	46 (35%)
>14 Days or unknown	13 (10%)
Onset of spasm	
<2 Days	92 (70%)
>2 Days	39 (30%)
Vaccination Status	
Fully Vaccinated	14 (11%)
Partially Vaccinated	68 (52%)
Unvaccinated	49 (38%)

Table 2: Severity of Tetanus

Mild (0-1)	*2 (1.5%)*
Moderate (2-3)	61 (47%)
Severe (4 & above)	68 (51%)
Total	133 (100%)

Table 3: Tetanus Severity vs Outcome

	Mild	Moderate	Severe	Total	P-Value
Shifted	1 (2%)	32 (64%)	17 (34%)	50 (38.1%)	0.001
Discharge	1 (1.8%)	25 (47.1%)	27 (50.9%)	53 (40.4%)	0.001
LAMA	0 (0%)	4 (40%)	6 (60%)	10 (7.6%)	0.001
Death	0	0	18 (100%)	18 (13.7%)	0.001
Total	2 (1.5%)	61 (46.5%)	68 (51.9%)	133	

Other Sites7(5.3%) 8%
Upper Limb Trunk13(9.9%) 10%
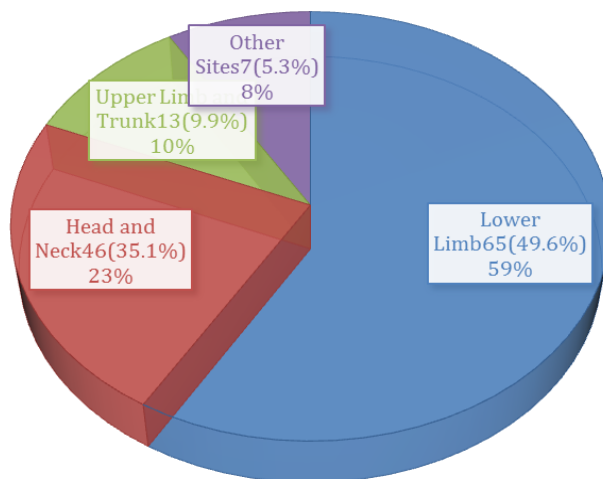Head and Neck46(35.1%) 23%
Lower Limb65(49.6%) 59%

Figure 1:

Discussion

Tetanus is a communicable disease that could be life threatening but it can be prevented by vaccine. However, with adequate management in intensive care unit life of these patients can be saved and outcome would be better. In this study 131 patients admitted to PICU (Pediatric Intensive Care Unit) of The Children's Hospital Lahore with tetanus were enrolled. The mean age was 8.11±3.45 years that is comparable with research done by Oyedeji et al 8.5±4.1 years7. The median age at diagnosis was 8 years in a study done in Hawassa – Ethiopia and a study by Nighat et al. from Pakistan showed mean age of 7.5±3.4 years.8,9 Major proportion of the children belongs to age range of 5-10 years comprising 65(50%) followed by 10-15years 34(26%).Similar results were seen in many other studies.1,10 A research done by Oyedeji et al. showed predominance of tetanus in older age group as 12(54.5%) in children 10-15 years, followed by 5(22.7%) each in age group 1-5 years and 5-10 years.7 The results of our study also revealed a male preponderance 91 (70 %) that was comparable with other studies too.7,9-12 The reason behind this could be the adventure seeking behavior of male children that ultimately predisposes them at risk of trauma leading to tetanus.

It was noted that in our study majority of children were either unvaccinated 49(38%) or partially vaccinated 68(32%), however only 14(10.7%) were fully vaccinated. We found quite astonishing results of a study conducted at PICU of Civil Hospital Karachi, Pakistan that none of their children were vaccinated against tetanus despite continuous efforts of government regarding vaccination programme13. However, in a study done at Ethiopia, only 8(38.1%) cases out of 24 were fully vaccinated as per national guidelines. Regarding the site of injury majority 65(49.6%) had trauma to lower limbs, similar results were supported by other studies. Similarly, a study done at Nigeria showed that lower limb injury was the most common site of entry in 21(53.9%) cases. However, ear discharge was reported in 13(33.3%) cases10,13,19.

Mean duration of ICU stay was 18.81±11.73 days that was comparable to a study done by Nighat et al. 20±13.3 and Animasahun of 20 days9,11. In our study 104(79.3%) received mechanical ventilation and tracheostomy was done in 29(22.1%). However, study published by Faizia Naseem et al. showed that 65% of their patients admitted to PICU received mechanical ventilation and 2% underwent tracheostomy13. In a study done by Nighat et al. 19% underwent tracheostomy and 33% received mechanical ventilation. Furthermore, Muazzam et al. showed 41% patients required tracheostomy, 39.9% patients remain without intubation9,14.

Various scoring systems have been designed for grading tetanus severity like Philips, Ablett classification and Dakar scoring system15. In our study we used Dakar scoring system for grading tetanus severity into mild, moderate, and severe. According to this, majority of the cases fall in the category of moderate and severe cases 61(47%), 68(51%) respectively. Furthermore, a study done at Hawassa-Ethiopia showed mild, moderate, and severe grades comprising 7(29.2%), 8(33.3%) and 2(8.3%) respectively8. In our study among all admitted patients, 50(38.1%) were shifted out to other wards after stabilization, 53(40.4%) discharge, and 10(7.6%) left against medical advice respectively. However, mortality rate was 18(13.7%) in contrast with mortality rate of 7(29.2%) in an Ethiopian study and 15(62.5%) survived, 2(8.3%) left again medical advice in similar study8. Case fatality ratio was much higher in a study at Nigeria 65.5% and in a study by Nighat et al. showed similar results as Oyedeji showing mortality rate of 18%7,9. Although lowest mortality rates have been observed in a study from Nigeria. Hence variable mortality rate has been observed in various studies.16-19

Strength and limitations

Strength of our study is that sample size was large enough as compared to other studies being conducted in other countries. Limitation of the study is that it was single centered study.

Conclusion

Tetanus is a serious disease that can lead to significant morbidity and mortality. Dakar scoring system can help to predict the outcome of tetanus severity and with effective management can save life. However, preventive aspects should be emphasized on national level and effective campaigns should be launched for public awareness regarding booster dose of tetanus.

References

1.   Nathan, B. R., & Bleck, T. P. (2011). CHAPTER 42 – Tetanus. Tropical Infectious Diseases: Principles, Pathogens and Practice, 284–288.

2.   Bae C, Bourget D. Tetanus. [Updated 2021 May 12]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459217

3.   Narang M, Khurana A, Gomber S, Choudhary N. Epidemiological trends of tetanus from East Dehli, India: A hospital-based study. J Infect Public Health, 2014;7 (2); 121–124 https://doi.org/10.1016/j.jiph.2013.07.006

4.   Angurana, S. K., Jayashree, M., Bansal, A., Singhi, S., & Nallasamy, K. (2018). Post-neonatal tetanus in a PICU of a developing economy: Intensive care needs, outcome, and predictors of mortality. Journal of Tropical Pediatrics, 64(1), 15–23. https://doi.org/10.1093/tropej/fmx020

5.   Rodrigo, C., Fernando, D., & Rajapakse, S. (2014). Pharmacological management of tetanus: An evidence-based review. Critical Care, 18(2), 1–10. https://doi.org/10.1186/cc1379

6.   C L Thwaites et al predicting the clinical outcome of tetanus; the tetanus severity scores. volume 11 no 3 pp 279–287 March 2006 doi:10.1111/j.1365-3156.2006. 01562.x

7.   Oyedeji O, Fadero F, Joel-Medewase V, Elemile P, Oyedeji A. Trends in tetanus admissions in the paediatric age group at a Nigerian teaching hospital. Trop Med Int Heal. 2012;6(12):847-853. doi: 10.3855/jidc.2105.

8.   Tadele, H. (2017). Clinical Profile and Outcome of Pediatrics Tetanus… Clinical Profile and Outcome of Pediatrics Tetanus: The Experience of a Tertiary Hospital in Ethiopia. J Health Sci, 27(5), 559. https://doi.org/10.4314/ejhs.v27i5.14

9.   Sultana, N., Bari, A., Faizan, M., & Sarwar, M. (2019). Prognostic factors and outcome of post-neonatal tetanus in an intensive care unit of a tertiary care hospital. Pakistan Journal of Medical Sciences, 35(5), 1233–1237. https://doi.org/10.12669/pjms.35.5.656

10.   Alhaji, M., Akuhwa, R., Mustapha, M., Ashir, G., Mava, Y., Elechi, H., & Bukar, F. (2013). Post-neonatal tetanus in University of Maiduguri Teaching Hospital, North-eastern Nigeria. Nigerian Journal of Paediatrics, 40(2), 154–157. https://doi.org/10.4314/njp.v40i2.9

11.   Animasahun BA, Gbelee OH, Ogunlana AT, Njokanma OF, Odusanya O. Profile and outcome of patients with post- neonatal tetanus in a tertiary centre in southwest Nigeria: Any remarkable reduction in the scourge? Pan Afr Med J. 2015; 21:1-10. doi: 10.11604/pamj.2015.21.254.6488.

12.   Adegboye OA, Adeboye MAN, Anoba S. Childhood tetanus; still a public health concern: A review of 95 cases. Savannah Journal of Medical Research and Practice 2012; 1(1): 20-24. [doi: 10.11604/pamj.2015.21.254.6488]

13.   Naseem, F., Mahar, I. A., & Arif, F. (2016). Two years' study of tetanus cases in a paediatric intensive care unit. Pakistan Journal of Medical Sciences, 32(3), 641–645. https://doi.org/10.12669/pjms.323.9165

14.   Muazzam M, Mansoor SA, Badar S, Nadeem A, Anwar B, Waseer MH, et. al. TETANUS; Still cannot be prevented, a three-year retrospective study in DHQ hospital, Faisalabad. Prof Med J. 2013;20(6):1026-1034

15.   Ablett JJL. Analysis and main experinces in 82 patients treated in the leeds tetanus unit. In: Ellis M, editor. Symposium on tetanus in Great Britain. Boston Spa, UK: Leeds general infirmary, 1967.p.1-10. DOI: 10.1080/23120053.2015.1074436

16.   Ogunfowora, O. B., Ogunlesi, T. A., & Oba-Daini, O. O. (2019). Epidemiological trend of post-neonatal tetanus in a Nigerian teaching hospital. SAJCH South African Journal of Child Health, 13(4), 158–163. https://doi.org/10.7196/SAJCH.2019.v13i4.1605

17.   Imoudu, I. A., Ahmad, H., Yusuf, M. O., Makarfi, H. U., & Umara, T. (2018). A Primordial Killer Still on the Prowl: A Short Report on Paediatric Tetanus in North-Eastern Nigeria. 1(1), 1–5. https://doi.org/10.9734/AJMPCP/2018/39266

18.   Akuhwa RT, Alhaji MBM. Post-Neonatal Tetanus in Nguru, Yobe State, North-Eastern Nigeria. Niger Med Pract. 2010;57(3):1-6. doi: 10.4314/nmp. v57i3.5575

19.   Fawibe AE. The pattern and outcome of adult tetanus at a sub-urban tertiary hospital in Nigeria. J Coll Physicians Surg Pak. 2010;20(1):68-70