RESEARCH ARTICLE

Frequency of risk factors, vaccination status and outcome of tetanus in children at the Children's Hospital Lahore

Mubeen Nazar Duggal, Attia Bari, Fatima Zeeshan, Uzma Jabeen

Abstract

Objective: To determine the frequency of risk factors, vaccination status and outcome of tetanus in children beyond neonatal age at a tertiary care centre.

Methods: The prospective observational study was conducted at The Children's Hospital, Lahore, Pakistan, from January 2012 to December 2014, and comprised children aged between 1 month and 15 years of either gender admitted with diagnosis of tetanus. Variables recorded included age, gender, vaccination status in terms of number of diphtheria, tetanus and pertussis vaccine doses received per routine infant immunisation and booster doses of tetanus toxoid, risk factors as trauma, ear discharge, ear prick and duration of hospitalisation and outcome. Data was analysed using SPSS 16.

Results: Of the 74 patients, there were 47(63.5%) males and 27(36.5%) females. Overall, the mean age was 6.56+3.15 years 50(67%) were unvaccinated, none (0%) had received booster dose and post-trauma immune prophylaxis. Besides, trauma was the most common risk factor in 33(44.6%) cases followed by ear discharge 15 (20.3%) and ear/nose prick 2(2.7%), while the risk factor was unknown in 24(32.4%) cases. Mean duration of hospitalisation was 14.35±11.65. Mortality rate 16(21.6%) was significantly associated with shorter duration of stay ($p<0.001$). Mortality was high among unvaccinated children compared to vaccinated children ($p=0.01$).

Conclusion: Vaccination coverage was found to be inadequate and post-trauma immune prophylaxis had been ignored.

Key Words: Tetanus, Vaccination, Risk factors, Outcome. (JPMA 69: 174; 2019)

Introduction

Tetanus is a neuromuscular disorder characterised by increased muscle tone and spasms. It is caused by tetanospasmin, a toxin released by clostridium tetani.[1] Clostridium tetani, is a mobile gram-positive spore-forming obligate anaerobe with soil or dust as its natural habitat. It occurs worldwide but is endemic in developing countries and has continued to be a significant public health problem in resource-poor nations.[2] Tetanus is a vaccine preventable disease and a significant cause of morbidity and mortality in developing countries. The disease is usually classified into neonatal and post-neonatal tetanus in the paediatric age group.[3,4] The global incidence of tetanus is estimated at one million cases annually with case fatality ranging 20-50%. Worldwide estimated deaths from tetanus were 61000 in children under 5 years of age and neonates. A total of 984 cases of tetanus were reported from Pakistan in 2010.[1] The World Health Organisation (WHO) estimated that tetanus accounts for about 7% of neonatal deaths globally. While majority of tetanus cases are seen in neonatal age group, post-neonatal tetanus is also common.[2,5]

The disease is common in areas where soil is cultivated in rural areas, in warm climates, and in areas without comprehensive immunisation programme. In countries with successful immunisation programmes, neonatal tetanus is rare and affects older age groups inadequately covered by immunisation.[1] Most cases of tetanus follow an acute penetrating injury. The injury may be major but often minor, so that medical attention is often not sought.[1,6] Tetanus is also associated with chronic skin ulcers, abscesses, gangrene, burns, surgery, ear discharge and intravenous (IV) drug abuse. In some patients, portal

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of entry cannot be identified.[1,7] Suppurative otitis media (SOM) and circumcision by the traditional 'surgeon' are important portals of entry of the infection. It is therefore recommended that patronage of traditional surgeons should be discouraged and parents should be encouraged to seek medical care from healthcare facilities. Prompt wound-care with post-exposure prophylaxis must be promoted.[8]

Furthermore, there is need to improve routine immunisation activities.[9] Children with ear discharge should be taken as a high-risk group for tetanus and be evaluated for immunisation at first visit.[7]

In Pakistan, like most developing countries, tetanus is endemic and remains an important health problem, especially in rural areas.[1] WHO instituted the Expanded Programme on Immunisation (EPI) in 1974 to provide vaccination to most children before their first birthday. EPI schedule of three doses of DPT during infancy with no provision for booster doses is inadequate for tetanus prevention in childhood. A clause should be added to EPI schedule specifying at least two additional doses of tetanus toxoid (TT) at age 4-6 years and 11-12 years.[5]

A review of the literature shows that there are only a few studies on post-neonatal tetanus in Pakistan and that post-neonatal tetanus is a growing problem. Recently, our observations in clinical practice suggest an increase in post-neonatal tetanus cases. The current study was, therefore, planned to evaluate the risk factors with the aim of discovering the knowledge gap responsible for the persistence of tetanus in the paediatric age group.

Patients and Methods

The prospective observational study was conducted at the Department of Paediatric Medicine, The Children's Hospital, Lahore, Pakistan, from January 2012 to December 2014. After getting approval from the institutional review board, patients aged between 1 month and 15 years of either gender admitted with clinical diagnosis of tetanus in the emergency unit, medical ward and intensive care unit (ICU) were enrolled for the study using non-probability convenience sampling. Informed written consent was obtained from parents or guardians. Sample size was calculated using OpenEpi software[10] with 80% power of test and 5% level of significance considering 20% case fatality rate of tetanus.[1] Patients with acute hypertonia of other causes (e.g. meningitis, encephalitis) and those whose parents refused to give consent were excluded.

Data was collected regarding age, gender, vaccination status in terms of number of diphtheria, tetanus and pertussis vaccine (DPT) doses received as part of routine infant immunisation and booster doses of TT, risk factors such as trauma, ear discharge and nose / ear prick, or unknown aetiology, post-trauma tetanus immune prophylaxis, duration of hospitalisation and outcome.

Data was analysed using SPSS 16. Age and duration of hospitalisation were presented as mean and standard deviation (SD). Gender, vaccination status, risk factors, post-trauma tetanus immune prophylaxis and outcome were presented as frequency and percentage. Chi square test was employed and $p<0.05$ was considered significant.

Results

Of the 74 patients, there were 47(63.5%) males and 27(36.5%) females. Overall, the mean age was 6.56+3.15 years, and the commonest age group at presentation was 6-10 years with 38(51.4%) cases. 50(67%) were unvaccinated, none (0%) had received booster dose and post-trauma immune prophylaxis (Figure 1). Trauma was the most common risk factor in 33(44.6%) cases followed by ear discharge 15 (20.3%) and ear/nose prick 2(2.7%), while the risk factor was unknown in 24(32.4%) cases (Figure 2).

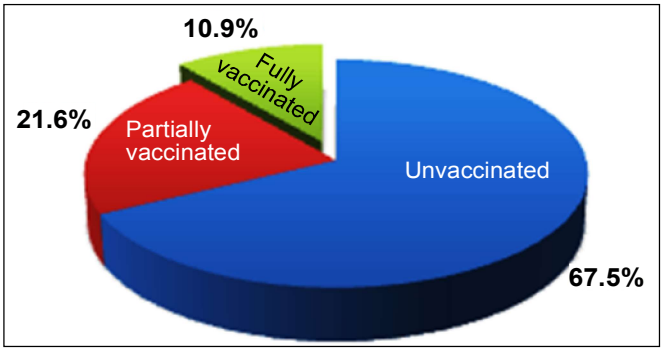

Figure-1: Vaccination Status.

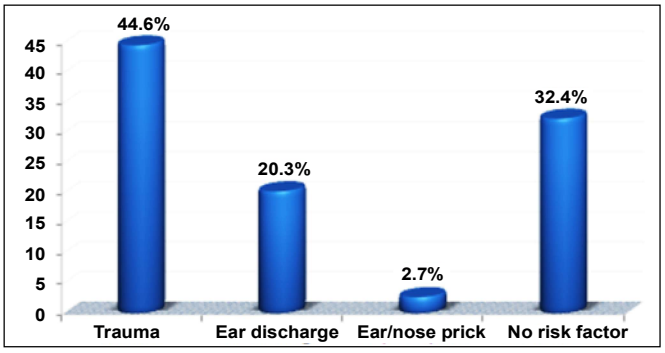

Figure-2: Risk factors of Tetanus.

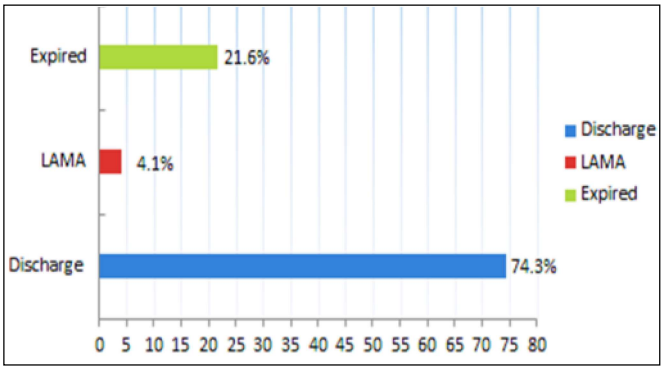

Figure-3: LAMAs left against medical advice.

Mean duration of hospitalisation was 14.35±11.65. Mortality rate 16(21.6%) was significantly associated with shorter duration of stay (p<0.001) (Figure 3). Mortality was high among unvaccinated children compared to vaccinated children (p=0.01).

Discussion

Studies on tetanus in Pakistan have focussed mainly on neonatal and adult tetanus and data on post-neonatal tetanus is scarcely reported. Present study is an effort to highlight disease burden in post-neonatal age group. According to results, 6-10 years was the commonest age of presentation. This finding is consistent with other studies done in Pakistan and other developing countries.[1,3,5,11] This can be explained by the fact that EPI provides tetanus immunisation only in infancy without booster doses which provide protection till 3-4 years of life, protective level of antibodies then fall making individuals susceptible to tetanus. Our study showed male preponderance as shown by other studies, including neonatal, post-neonatal and adult tetanus.[12-15] This may be due to parental preference for males to bring for medical care or adventurous behaviour of males causing injuries and subsequent tetanus infection in unvaccinated children.

Tetanus is still a major public health issue in Pakistan despite the availability of an effective vaccine. In this study, unvaccinated children outnumbered partially vaccinated (1-2 doses) and completely vaccinated (3 doses) children. Predominance of unvaccinated children reflects poor immunization coverage. These results are comparable to other studies.[1,3-5] According to a cohort study done in Karachi, very low proportion of children (39%) completed DPT3, and low adherence to immunisation has been found associated with parental socio-demographic characteristics (large family size, low parental education) and provider based characteristics (longer distance of EPI centres from home)[16].

Getting tetanus despite complete vaccination is worth mentioning. In our study all completely vaccinated children were above 6 years of age and none of them had received booster which is expected at 15-18 months and 4-6 years age. It has been shown in literature that 3 doses of DPT administered in infancy give protection up to 3-4 years of age, antibodies level then wane with time.[5] So, it is suggested that booster doses must be included in EPI to prevent tetanus.

Our study showed trauma as the most common risk factor and none of these patients got post-trauma tetanus immune prophylaxis. This is in agreement with other studies.[17-19] Public must be made aware of good wound care and physicians must be made aware of identification of tetanus-prone wounds and their appropriate prophylaxis. According to a study done in Karachi, majority of general practitioners had poor knowledge, so interventions like seminars and display of immunisation protocols in clinics were recommended.[20]

Ear discharge was the second most common risk factor 15 (20.3%) in our study. Other studies also report it as an important portal of entry.[3,5,7,9] It is suggested that all children with ear discharge should be evaluated for tetanus immunisation. Ear/nose pricks accounted for 2(2.7%) tetanus cases. It is a significant risk factor as reported by a study done in Vietnam.[21] No risk factor was identified in 24(32.4%) cases. This can be explained by the fact that injuries were too trivial to be recalled. This result is comparable with other studies done in paediatric hospitals in Larkana and Nijeria.[1,5]

Overall mortality of 21.6% in our study is comparable to other studies done in Pakistan and the developing world. A study done on post-neonatal tetanus in Larkana reported a mortality rate of 22% which is similar to our study.[1] Another study conducted in Faisalabad, including children and adults of any age, reported a mortality rate of 40.4% which is quite high.[22] Varied mortality rate (4.5% to 43%) has been reported from studies in different parts of the developing world.[6,9,17,19] Inadequate intensive care facilities might be the cause of high mortality rate in our study as all tetanus cases could not be managed in ICU due to shortage of space and they had to be managed in the wards. Observed mortality rate can be reduced by improving current intensive care facilities. Mortality rate

was significantly associated with shorter duration of stay ($p<0.001$) (mostly within first 3 days of hospitalisation). These findings are comparable with other studies.[3-5] One of the possible reasons for shorter duration of stay in expired patients is that they may present with severe disease at admission, although we did not classify disease severity.

In terms of limitations, there was no follow-up of patients who left against medical advice. It was a single-centre study and convenient sampling was used which limits the statistical power of study and generalisation of its results.

We recommend primary immunisation with booster doses. Children with ear discharge should also be taken as high-risk group and must be evaluated for tetanus immunisation.

Conclusion

Post-neonatal tetanus has high mortality. Vaccination coverage was found to be inadequate and post-trauma tetanus immune prophylaxis had been ignored. Primary immunization with booster doses is stressed. Children with ear discharge should be taken as high-risk group and must be evaluated for tetanus immunisation.

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