Original Article

Frequency of Post Neonatal Tetanus Mortality in a Tertiary Care Center

Juverya Naqvi, Ali Akbar Siyal and Naseer Ahmed Memon

ABSTRACT

Objective: To determine the frequency of post neonatal tetanus mortality in a tertiary care hospital.
Study Design: Case series study
Place and Duration of Study: This study was conducted at the Pediatric ward of Peoples medical college and hospital Nawabshah from January 2017 to December 2017.
Materials and Methods: A total 98 children having clinical diagnosis of tetanus, who had lock jaw, stimulatory fits/spasm that has developed beyond 1 month of age were included in this study. The demographic and clinical data collected on a proforma was statistically analyzed and results were tabulated.
Results: Frequency of post neonatal tetanus death was observed in 19.4% children. Rate of mortality was 21.7% in unvaccinated children as compare to 6.7% in vaccinated children (p=0.29).
Conclusion: We conclude that tetanus remains a public health problem in our environment and that all stakeholders must work to achieve complete eradication of this disease by immunization. We recommend that vaccination during pregnancy and in infancy, as recommended in the National Program on Immunization (NPI). These recommendations could reduce the post-neonatal tetanus burden to its barest minimum and ultimately, the elimination of tetanus.

Key Words: tetanus, post neonatal, vaccinated, mortality

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INTRODUCTION

Tetanus is a preventable disease which occurs worldwide. Tetanus is an acute, spastic paralytic illness caused by Clostridium tetani, a motile gram +ve spore forming obligate anaerobe. The disease is endemic in approximately 90 developing countries[1] including Pakistan. While in developed part of the world it is almost eliminated[2,] the global incidence of tetanus is about 18 per 100000 population per year with case fatality ranging from 20- 50 %[3]. Tetanus caused 61000 estimated deaths in <5 years in 2008 [4].

Tetanus, is an acute, spastic paralytic illness caused by clostridium tetani, a motile gram +ve spore forming obligate anaerobe [1]. The spores of clostridium tetani are present in soil contaminated with animal excreta as this organism is found in its vegetative form in alimentary tract of various animals. After getting entry in human body through contaminated wounds, the spore changes in to vegetative forms and produces its exotoxin, tetano-spasmin, which is the 2nd most poisonous substance known[1]. most post neonatal tetanus cases occurs due to traumatic injuries, including penetrating wound by some dirty object such as nail, splinter, fragment of glass, or unsterile injection, sometimes even with animal bites, ear and other body piercing, burns, RTA and compound fractures. In some rare cases there is no history of trauma. Tetanus is not transmitted from one person to other[1].

Four clinical forms of tetanus are recognized. They are generalized, localized, cephalic and neonatal tetanus.

Diagnosis is established clinically. As tetanus is a preventable disease, vaccination is highly safe and efficacious. Active immunization should be instituted in all partially immunized, unimmunized children and those recovering from tetanus as disease itself does not confer immunity. Passive immunization is given as treatment of a case as well as prevention following high risk injury. The efficacy of tetanus vaccine is around 98.3% but the protective antibodies wane with age[5], and global coverage of DTP3 is 85% in 2017, and here in Pakistan the reported coverage is around 75%[6].and it is proved that vaccination is the most cost effective intervention in developing countries as WHO estimated that 2 million deaths were prevented in children in year 2003 by vaccination[7]. Despite all these preventive measures, tetanus remains a major threat in developing countries like Pakistan. In European countries, due to higher vaccination coverage rates and proper surveillance and reporting every single Case of tetanus in children is reported[8], but here in our country there is a major lapse between attending physician and

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surveillance authorities. The objection to vaccination is also reported in western countries, *13* cases of non-neonatal tetanus were reported in U.S.A from year 1992-2000, that study concluded that the majority of cases of tetanus among children in the United States were in unvaccinated children whose parents objected to vaccination[9]. A retrospective study done in India also showed that unvaccinated children (54.8% of all cases were in 0-10 year age group) are the major victims of post neonatal tetanus[10]. Certain risk factors other than trauma, like otorrhea/ear discharge also predispose children to tetanus, if concomitant by unimmunized or partially immunized status the risk of tetanus increases[11,]. In which the study done at Nigeria showed 100% presence of otitis media in children presented with post neonatal tetanus[11]. In Dhule Maharashtra 54.8% cases of tetanus were aged 0-10 years admitted in Government medical hospital during 10 years[12].There is this hospital based study done in Nepal 19 cases of post neonatal tetanus were admitted from July 2004-May 2006, which also shows that the ear discharge was present in 16.0% of the pediatric tetanus patients, suggesting that it is a very significant factor that leads to post neonatal tetanus[12]. In another study done at Larkana showed that 24 children admitted with post-natal tetanus during a period of one year, among these cases source of infection was trauma in 17(22%) and discharging ear in 7(9.1%) patients and all these children were not immunized[17]. Another factor that can lead to post neonatal tetanus is circumcision which accounted for 50% of the cases in a study from Nigeria[18]. A ten year review in Calabar Nigeria showed that frequency of post neonatal tetanus was 1.1% with a mortality rate of 3.7%[19].

MATERIALS AND METHODS

This case series study was conducted in the department of Pediatric, peoples medical college hospital Nawabshah, from January 2017 to December 2017. The sampling technique was non-probability consecutive sampling. All the children either sex clinically diagnosed having tetanus, aged more than 1 month, who have lock jaw, stimulatory fits/spasm that has developed beyond 1 month of age was included and all patients of tetanus aged below one month and children having other causes of spasms or fits were excluded from the study. An informed consent was obtained from parents. The demographic and clinical data was collected on a proforma designed for the study. The data was analyzed statistically and results were tabulated.

RESULTS

A total of 98 children clinically diagnosed as having tetanus who had lock jaw, stimulatory fits/spasm that has developed beyond 1 month of age were included in this study. Most of the patients were 7 to 12 Years of age (figure 1). The average age and weight of the cases were 9.5±2.83 years and 36.10±10.99 kg respectively as shown in table 1. Out of 98 children 73(74.49%) were male and 25(25.51%) female. Male to female ratio of this study was 3:1. Fifteen children (15.31%) were vaccinated in which 14 were fully vaccinated and 1 partially, while 83 (84.49%) were unvaccinated children. Frequency of post neonatal tetanus death was observed in 19.4% (19/98) children as shown in figure 2. Rate of mortality was 21.7% (18/83) in unvaccinated children as compare to 6.7% (1/15) in vaccinated children (p=0.29) as shown in figure 3.

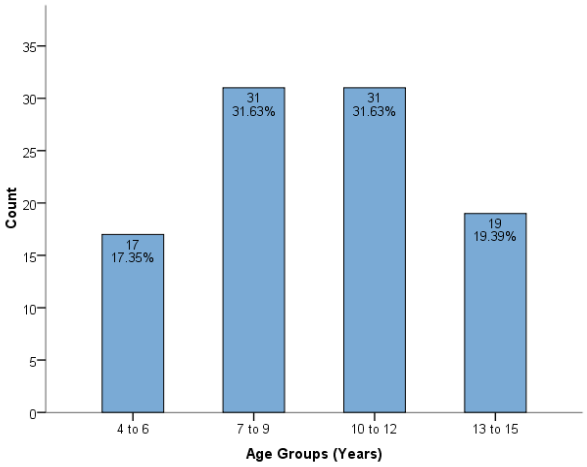

Figure No.1 Age Distribution of the Study Patients (n=98)

Table No.1: Descriptive Statistics of Age and Weight of the Patients

Statistics	Age (Years)	Weight (Years)
Mean	9.50	36.10
95% Lower Bound	8.93	33.89
95% Upper Bound	10.07	38.3
Median	9.5	36
Std. Deviation	2.83	10.99
Minimum	4	20
Maximum	15	56
Inter quartile Range	5	17

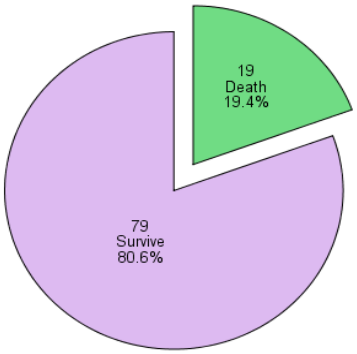

Figure No.2. Frequency of Post Neonatal Tetanus Death in Pediatrics Ward (n=98)

Table No.2: Comparison of Post Neonatal Tetanus Death Between Vaccinated and Unvaccinated Children with Respect to Gender

Gender	Death n= 19	Alive n=79	Total	p-value	Vaccination Status and Outcomes				
					Vaccination	Death n (%)	Alive n (%)	Total	p-value
Male	12(16.4)	61(83.6)	73	0.45	Yes	1(7.1)	13(92.9)	14	0.44
					No	11(18.6)	48(81.4)	59	
					Total	12	61	73	
Female	7(28)	18(72)	25		Yes	0(0)	1(100)	1	0.99
					No	7(29.2)	17(70.8)	24	
					Total	7	18	25	

Table No. 3: Comparison of Post Neonatal Tetanus Death between Vaccinated and Unvaccinated Children with Respect to Age Groups

Age Groups (years)	Death n= 19	Alive n=79	Total	p-value	Vaccination Status and Outcomes				
					Vaccination	Death n (%)	Alive n (%)	Total	p-value
4-9	11(22.9)	37(77.1)	48	0.38	Yes	1(7.1)	13(92.9)	14	0.139
					No	10(29.4)	24(70.6)	34	
					Total	11	37	48	
10-15	8(16)	42(84)	50		Yes	0(0)	1(100)	1	0.99
					No	8(16.3)	41(83.7)	49	
					Total	8	42	50	

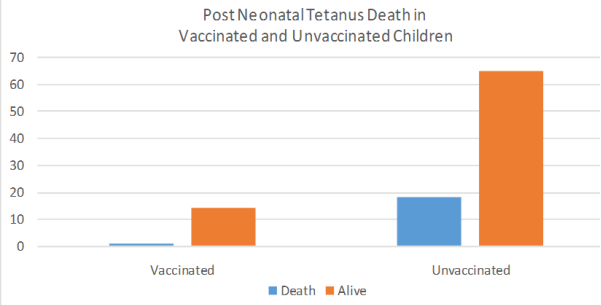

Figure No.3: Post Neonatal Tetanus Death in Vaccinated and Unvaccinated Children (n=98)

Rate of post neonatal tetanus death was also not significant between male and female (16.4% vs. 28%; p=0.245) as shown in table 2. Similarly rate of post neonatal tetanus death of children was also not significant between 4 to 9 years of age and 10 to 15 years of age groups (22.9% vs. 16%; p=0.38) as presented in table 3.

Rate of post neonatal tetanus death of children was high in unvaccinated children as compare to vaccinated children but it was observed statistically insignificant in male cases (18.6% vs. 7.1%; p=0.44) and also in female cases (29.2% vs. 0%; p=0.99) as presented in table-2. Rate of post neonatal tetanus death of children was also high in unvaccinated children as compare to vaccinated children but it was statistically insignificant in 4 to 9 years of age children (29.4% vs. 7.1%; p=0.139) and also in 10 to 15 years of age cases (16.3% vs. 0%; p=0.99) as presented in table 3.

Frequency of complication leading to post neonatal death is shown in table 8. Rate of neonatal death was significantly high in children with aspiration pneumonia as compare to without aspiration pneumonia (26.3% vs. 9.8%; p=0.041) while neonatal death was not significantly difference in children with and without G.I bleeding complication (28.6% vs. 15.7%; p=0.146)

Rate of post neonatal death was not significant in children with and without aspiration pneumonia in vaccinated children while in unvaccinated children post neonatal death was high in children with aspiration pneumonia as shown in table 9. Rate of post neonatal death was not significant in children with and without G.I Hemorrhage in vaccinated children (p=0.20) and in unvaccinated children (p=0.36) as presented in table 10.

Rate of post of neonatal death with and without aspiration pneumonia according to age group for vaccinated and unvaccinated children separately are given in table 11 and 12 respectively. Similarly rate of post of neonatal death with and without G.I Hemorrhage according to age group for vaccinated and unvaccinated children separately are given in table 13 and 14 respectively.

DISCUSSION

Tetanus is a vaccine preventable disease and a significant cause of morbidity and mortality in developing countries[21-24]. The disease is usually classified into neonatal and post-neonatal tetanus in the paediatric age group.

Post-neonatal tetanus is also a growing problem. It is yet to receive the attention it deserves in most developing countries in comparison with neonatal tetanus in terms of institution of preventive and control interventions. The reason may be due to the fact that most countries in the developing world set the machinery in their health systems to control neonatal tetanus to improve their health indices, thereby relatively neglecting the disease in the older age group. A review of the literature shows that there are few studies on post-neonatal tetanus in Nigeria and that post-neonatal tetanus is a growing problem[15, 21].

In this study the average age and weight of the cases were 9.5±2.83 years and 36.10±10.99 kg respectively. In Zafar et al study[17] the ages of babies were from 3-28 days mean age was 7.89 + 1.23 days.

In Junejo et al[13] study majority of patients 71(49.9%) were between 6-10 years. This is almost similar to other studies. In Nepal[19], majority of patients presented between 6-14 years. In Uganda[20], 54%of patients were between 5-13 years. In a study from Nigeria [20], 77% of patients were between 5-10 years.

In present study out of 98 children 73(74.49%) were male and 25(25.51%) female. Male to female ratio of this study was 3:1. Fifteen children (15.31%) were vaccinated in which 14 were fully vaccinated and 1 partially while 83(84.49%) were unvaccinated.

In Zafar et al study[17] study, 55% cases were males and 45% cases were females. This slight increase might be due to relatively better hospital care providing to male child as compared to females who are mostly neglected in our social set up. Reports gathered from both hospital and community based surveys showed that the ratio of male to female neonatal tetanus cases worldwide is 1:1[21].

The male preponderance in our study might reflect gender bias in care seeking and to cultural practices giving preference to the survival of male children in this area.

The Frequency of post neonatal tetanus death was observed in 19.4% (19/98) children in this study. Rate of mortality was 21.7% (18/83) in unvaccinated children as compare to 6.7% (1/15) in vaccinated children (p=0.29). Rate of post neonatal tetanus death of children was also not significant between male and female (16.4% vs. 28%; p=0.245). Similarly rate of post neonatal tetanus death of children was also not significant between 4 to 9 years of age and 10 to 15 years of age groups (22.9% vs. 16%; p=0.38).

In Junejo et al[13] study mortality was quite high 27 (18.24%). In a previous study from this hospital[17], mortality was also very high 50% in older children. In developed countries mortality in tetanus is not so high because of intensive care facilities. In a study from Malaysia[22], mortality was 18.2% In USA (10), no death was reported and in a study from Saudi Arabia[23], mortality in tetanus patients was 9.09%.

In our study we have seen quite a high prevalence of this vaccine preventable disease, and this is of concern because vaccines are free but the overall cost of treating such diseases is very high, even in western world one study is solely focused on the burden of cost of treating vaccine preventable disease like tetanus[24].

CONCLUSION

We conclude that tetanus remains a public health problem in our environment and that all stakeholders must work to achieve complete eradication of this disease by immunization. We recommend that vaccination during pregnancy and in infancy, as recommended in the Extended Program on Immunization (EPI). These recommendations could reduce the post-neonatal tetanus burden to its barest minimum and ultimately, the elimination of tetanus.

Author's Contribution:

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Revisiting Critically:	Juverya Naqvi, Ali Akbar Siyal
Final Approval of version:	Juverya Naqvi

Conflict of Interest: The study has no conflict of interest to declare by any author.

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