ORIGINAL ARTICLE

NEONATAL TETANUS: RISK FACTORS AND OUTCOME

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ABSTRACT

Background: Neonatal tetanus (NNT) is one of the childhood's preventable diseases and a leading cause of neonatal death especially in developing countries. This study was done to determine the outcome and factors contributing to the neonatal tetanus.

Materials & Methods: This cross sectional study was conducted at the Sifwat Ghayoor Memorial Government Children Hospital, Peshawar, Pakistan over a period of one year from 1st August 2015 to 31st July 2016. Hundred confirmed cases of neonatal tetanus admitted to the hospital were enrolled in the study using consecutive non probability sampling technique. Study variables were Age in days, weight, area of residence, birth order of child, gender, monthly income, mother's education, family type, H/O antenatal visits, mode of delivery, delivery performed by trained birth attendant, health facility near home, and outcome of the disease.

Results: Seventy four (74%) were male while 26(26%) cases were female. The mean age at admission was 8.34±3.54 days. Mean weight of the neonates admitted with NNT was 3.28±0.61 Kg. A great number of deliveries were taken place at home 78(78%), 70(70%) deliveries were conducted without a trained birth attendant, in a great number of cases 75(75%) materials other than antiseptic were applied to the umbilical cord, the umbilical cord was cut with non sterile instrument in 78% cases and 36(36%) patients died out of 100 (95% Confidence Interval 26.43-45.57).

Conclusion: Factors leading to neonatal tetanus are; non immunization of mothers during pregnancy, home delivery, delivery by non skilled birth attendants, application of ghee/surma on umbilical cord and cutting of umbilical cord by unsterilized tools. With proper immunization, antenatal care and hygienic delivery practices, disease can be controlled and mortality can be reduced.

KEY WORDS: Neonatal tetanus; cord care; risk factors; Neonate; Tetanus toxoid.

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INTRODUCTION

Neonatal tetanus is a highly fatal, vaccine preventable disease resulting in a significant morbidity and mortality among new born in the developing world.[1]NNT is a bacterial infection that results when the umbilical cord is contaminated with the spores of clostridium tetani due to unhygienic measures taken during the delivery or poor cord care practices soon after the baby is born.[2] Globally, NNT accounts for almost 7% of the deaths among children during the first four weeks of their lives.[3]NNT is a highly under-reported disease and a large portion of the cases remain hidden from the recognition as it is estimated that only 5% of cases with NNT are actually reported to the health facilities.[4]

According WHO estimate about 49000 newborn children died due to NNT during the year 2013, most of them in rural areas of developing countries where majority of the deliveries are conducted at home in the absence of trained birth attendants using unhygienic practices and without aseptic cord care. As of August 2015, there still remain 21 countries around the World that have not yet eliminated the maternal and neonatal tetanus.[5,6]Pakistan is one of those developing countries that is still struggling to eliminate the neonatal tetanus. Almost all the deaths due to neonatal tetanus occur in low income countries of the world, mostly in Asia and Africa.[7]

The risk factors for neonatal tetanus are related to prenatal, natal and postnatal factors and include lack of proper antenatal care, lack of maternal im-

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munization with TT, unhygienic delivery and cord care practices.[8] Application of certain substances like ghee, surma or mustard oil on the umbilical cord, home delivery conducted by unskilled birth attendants and lack of maternal education are identified as important risk factors predisposing the neonate to tetanus infection in the first 28 days of life.[9] This study was done to determine the outcome and factors contributing to the neonatal tetanus.

MATERIALS AND METHODS

This cross sectional study was conducted at the Sifwat Ghayoor Memorial Government Children Hospital, Peshawar, Pakistan over a period of one year from 1st August, 2015 to 31st July, 2016. 100 confirmed cases of neonatal tetanus admitted to the hospital were enrolled in the study using consecutive non probability sampling technique.

The diagnosis of neonatal tetanus (NNT) was established on clinical signs and symptoms as per WHO criteria. Any patient presenting with normal ability to suck and cry during first 2 days of life but between 3-28 days of life could not suck normally, became stiff, had trismus (locked jaw/inability to open mouth), provoked/unprovoked seizures and fever was defined as NNT case.

All the neonates between 3-28 days of age and of both gender with confirmed diagnosis of NNT were included in the study. Neonates with sepsis, meningitis and metabolic fits were excluded from the study. Data collection was done using a preformed standard proforma having closed ended questions after taking an informed consent from the parents. History from mother was taken regarding immunization (2 doses of tetanus toxoid during pregnancy), their vaccination cards were checked. H/O delivery, at home or hospital, H/O type of tool which was used for cutting cord whether it was knife, scissor, or blade, H/O application on cord after cutting, and if delivery conducted by non skilled birth attendant or by professional trained birth attendant. Age in days, weight in Kg, area of residence, birth order of child, gender, monthly family income, mother's educational status, family type, H/O antenatal visits, mode of delivery, health facility near home, and outcome of the disease were noted as variables of interest.

Data was entered and analyzed using the statistical software SPSS 16.0. The frequency and percentages were calculated for the categorical variables like gender, area of residence, mother's level of education, mother's immunization status, type of family, disease outcome etc while mean and standard deviation were calculated for the quantitative variables like age, weight, monthly family income.

RESULTS

Among neonates included in the study, majority were male 74(74%) with a lesser number of female cases 26(26%)with a male to female ratio of 2.84:1. The mean age at admission was 8.34±3.54 days with the range from 2-22 days. Mean weights of the neonates admitted with NNT was 3.28±0.61 Kg with variation from 2-5 Kg. The monthly family income varied from 3000-60000 PKR with the mean income of 11700±8501 PKR.

Majority of the cases were the resident of rural area 86(86%) as compared to urban area 14(14%). An overwhelming majority of mothers were illiterate 92(92%) while only 8(8%) had completed their primary (7 out of 8)or higher level of education(1 out of 8). 78(78%) children came from the joint family background while 22(22%) belonged to the nuclear family setup.

Regarding vaccination status of the mothers with TT, 82(82%) did not have the vaccination to prevent the neonatal tetanus while 18(18%) had either partial vaccination with one dose of TT during pregnancy or complete vaccination with the status of vaccination failure.

Fifty five (55%) mothers had at least one antenatal visit to health facility while 45(45%) mother did not have even a single visit to health facility for antenatal checkup.

A great number of deliveries were taken place at home 78(78%) while just 22(22%) ladies delivered at health facility with majority of deliveries 95(95%) being NVD and just 5(5%) C/Section**(Table 1)**.

Table 1: Multi variate descriptive analysis of risk factors of neonatal tetanus (n=100)

S.No.	Variable	Attributes	Frequency	%age
1	Mode of delivery	NVD	95	95
		C/Section	5	5
2	Delivery conducted by TBA	Yes	30	30
		No	70	70
3	Application of antiseptic to the umbilical cord	Yes	28	28
		No	72	72

70(70%) deliveries were conducted without a trained birth attendant while 30(30%) deliveries were conducted by trained health personnel.

In a great number of cases 75(75%) materials other than antiseptic were applied to the umbilical cord while in just 25(25%) cases only antiseptic material was applied to the umbilical cord.

Sterilized instrument for cutting the umbilical cord was used in just 22(22%) cases while among the majority of the cases 78(78%) the umbilical cord was cut with non sterile instrument like knife, scissor or razor blade commonly used at home.

Tetanus immunoglobulin was given to all the cases admitted with neonatal tetanus (100%). Among 100 cases admitted with NNT, 36(36%) expired (95% Confidence Interval 26.43-45.57) while 64(64%) were recovered and subsequently discharged to home(Table 2).

Table 2: age group and Outcome of neonatal tetanus Crosstabulation (n=100)

age group	Outcome of disease		Total
	Recovered and discharged	Expired	
1 week	22	23	45
	22.0%	23.0%	45.0%
2 weeks	36	11	47
	36.0%	11.0%	47.0%
3 weeks	6	2	8
	6.0%	2.0%	8.0%
Total	64	36	100
	64.0%	36.0%	100.0%
Chi-square			8.116
P-value			0.017

DISCUSSION

In our study, a total of 100 cases of neonatal tetanus were observed among whom 76% were male and 24% were female. Almost similar findings were observed by Fetuga et al with 62.3% boys and 37.8% girls.[10]In another study by Onalo et al, 70% cases of neonatal tetanus were male while 30% cases were female.[11]This difference might be due to relatively better hospital care providing to male child as compared to female child. Although it has been documented in the earlier reports gathered from hospital and community based surveys that the ratio of male to female cases of NNT is 1:1.[12]

The mean age of the neonates at the time of admission with NNT was 8.34±3.54 days in our study that is in accordance with the study done by Dikici et al that documented the mean age at admission as 8.9 ± 4.3 days.[13]

Our study revealed that majority of the cases came from the rural areas comprising 86% while only 14% belonged to the urban settings. Similar were the findings by Lambo et al in their research where 87% neonates having tetanus belonged to rural areas.[14]These findings highlight that NNT is the disease of rural areas where health facilities are unavailable to the majority of the mothers and neonates.

Only 8% mothers went to school and had their primary or secondary level of education in our study and an overwhelming majority of the mothers 92% were illiterate which is in accordance with the study done by Sohaila et al where the literacy rate among mothers of the patients with NNT was 7.7%.[15]This shows that maternal literacy has a role in preventing the occurrence of this disease among neonates.

Our Study revealed that 82% mothers were not vaccinated against tetanus leaving only 18% who were either partially immunized or had full vaccination coverage that resulted in the vaccination failure. In a research done by Fauzia Zafar et al, 95% of the mothers were not vaccinated while only 5% mothers were vaccinated against tetanus either fully or partially with one TT injection during their pregnancy.[8]It has been documented that lack of maternal immunization exposes the neonate to tetanus and subsequent morbidly and mortality.

In our study 78% deliveries took place at home with majority of them (72%) not supervised by the trained birth attendants. Similar were the findings by Ladan et al in their study where 75.7% deliveries took place at home under non aseptic conditions without the supervision of trained birth attendant.[4] This might be due to the fact that trained birth attendants are usually not available in the rural settings from where the majority of the cases come and hence the neonates are exposed to the factors that can result in the transmission of the tetanus spores and the subsequent development of NNT.

In our study, it was found out that among patients admitted with NNT, there was a positive history of application of other substances among 75% of the newborns which was either ghee, mustard oil or surma while in 25% patients they applied either antiseptic solution or nothing at all. Similar finding were noted in other studies where the cord application was 70% with materials other than antiseptics.[8]These substances play a major role in the transmission of clostridium tetani through the wound of umbilical cord and result in the clinical disease.

As per our study, among NNT cases 78% had the history of cord cutting by non sterile instrument commonly used at home like shaving blade, kitchen knife or scissor which is in accordance with the studies done by Raza et al.[16]Cutting the umbilical cord with non sterile instruments exposes the neonate to the tetanus infection and thus leads to the development of NNT.

Among 100 cases enrolled in our study, 36 died resulting in a case fatality rate of 36% which is in accordance with the previous study done in Pakistan.[8]The reported mortality in one study in Pakistan due to tetanus in 1977 was 50% while in 1989, it decreased to 24% .[17] In another study done at Peshawar, the death rate observed among patients with NNT was 22%.[18]A recent study from a tertiary care hospital in Lahore reported 100% mortality among premature and 44.4% among full term neonates with tetanus.[19]Early neonatal period i.e. first week is the most dangerous period and is significantly associat-

ed with higher mortality among neonates presenting with tetanus which is also documented by Imuwahen et al in their research as more than 50% neonates died within first seven days of life when they develop tetanus during first few days.[20]In our study, more than 60% neonatal deaths were observed in the similar group of age less than one week.

CONCLUSION

Poverty, illiteracy, and antenatal care were the risk factors of poor neonatal risk outcome. Public awareness and health education, maternal vaccinations, and promoting safe delivery practices by formal training of TBAs (dais) should be part of strategic planning to overcome the problem.

REFERENCES

1. Oyedeji OA, Fadero F, Joel-Medewase V, Elemile P, Oyedeji GA. Trends in neonatal and post neonatal tetanus admissions at a Nigerian Teaching Hospital. J Infect Dev Ctries 2012;6:847-53.
2. Lambo JA, Nagulessapillai T. Neonatal tetanus elimination in Pakistan: Progress and challenges. Int J Infect Dis 2012;16:e833-42.
3. Ibrahim ML, Isa SE, Collins JC, Ugoya SO. Neonatal Tetanus: A large epidemiological review in Nigeria. Sahel Med J 2011;14:148-51.
4. Ladan ZF, Mohammed A, Ibrahim M, Obiagwu PN, Abba SU. Neonatal tetanus in Kano: A ten year review. Niger J Basic Clin Sci 2015;12:30-3
5. Lawn JE, Cousens S, Zupan J, Lancet Neonatal Survival Steering Team. 4 million neonatal deaths:when? Where? Why? Lancet 2005;365: 891-900
6. World Health Organisation. Immunization, Vaccines and Biologicals. [cited on line] [cited 6.1.2016]. Available from http://www.who.int/immunization/diseases/tetanus/en/
7. Khan EA, Khan R, Iqbal MT, Hasan Q, Farrukh S, Rana MS, et al. Risk characterization of maternal and neonatal tetanus in view of tetanus vaccination campaigns in Pakistan. J Ayub Med Coll 2015;27:220-2.
8. Zafar F, Rasheed J, Ghaffar HA. Neonatal tetanus. Professional Med J 2012;19:773-81.
9. Raza SA, Akhtar S, Avan B, Hamza H, Rahbar MH. A matched case-control study of risk factors for neonatal tetanus in Karachi, Pakistan. J Postgrad Med 2004;50:247-51.
10. Fetuga B, Ogunlesi T, Adekanmbi F. Risk factors for mortality in neonatal tetanus:A 15 year experience in Sagamu, Nigeria. World J Pediatr 2010;6:71-5.
11. Onalo R, Ishiaku HM, Ogala WN. Prevalence and outcome of neonatal tetanus in Zaria, Northwestren Nigeria. J Infect Dev Ctries 2011;5:255-9.
12. Silvers MJ, Haddy R. A method for adjusting genderbias in neonatal tetanus reports in Egypt 1991.Epidemiol Infect 2002;128:169-74.
13. Dikici B, Uzun H, Yilmaz-Keskin E, Tas T, GunesA,Kocamaz H, et al. Neonatal tetanus in Turkey; what has changed in the last decade? BMC Infect Dis 2008;8:112.
14. Lambo JA, Memon MI, Khahro ZH, Lashari MI. Epidemiology of neonatal tetanus in rural Pakistan. J Pak Med Assoc 2011;61:1099-1103.
15. Sohaila A, Shafiq Y, Azim S, Baloch B, Akhtar ASM, Tikmani SS, et al. Predictors and outcome of tetanus in newborns in slum areas of Karachi: a case control study. BMC research notes 2015;8:338.
16. Raza SA, Akhtar S, Avan BI, Hamza H, Rahbar MH. A matched case-control study of risk factors for neonatal tetanus in Karachi, Pakistan. J Posgrad Med 2004;50:247-51.
17. Billoo AG, Inkisar SM. Management of neonatal tetanus role of mothers in increasing survival rates. Specialist 1992;8:93-9.
18. Khattak MA, Aqeel M, Alam F. Neonatal tetanus: Disease pattern in Peshawar (NWFP).Pak Paed J 2005;29:193-6.
19. Shah AA, Ali AS, Hussain RR, Hussain A, Saeed A, Butt TK. Complications and outcome of neonatal tetanus. Pak Paed J 2007;31:126-31.
20. Mbarie IA, Abhulimhen-Iyoha BI. A 6 years review of neonatal tetanusat the Stella Obasanjo Hospital, Benin City, South-South Nigeria. Afr J Med Health Sci 2015;14:52-5.

CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.

AUTHORS' CONTRIBUTION

Conception and Design:	MAR, MIA, AH
Data collection, analysis & interpretation:	MAR, MIA, AH
Manuscript writing:	MAR, MIA, AH