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Socio-Demographic Factors that Associated with Childhood Tetanus and its Outcome in a Tertiary Level Hospital

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Abstract: Tetanus has remained a public health problem in developing countries with high case fatality rates. Efforts of neonatal, childhood and maternal tetanus elimination through vaccination have faced challenges in these parts of the world due to low health awareness, shortage of human and material resources and poor health seeking behavior for trauma. To determine the Socio-Demographic factors associated with childhood tetanus and its outcome in a tertiary level hospital. A cross-sectional descriptive type of study was conducted among all diagnosed admitted 104 childhood tetanus cases between o1 month and 12 years of children who had been referred from rural areas and different hospital services centers to Infectious Disease Hospital (IDH), Dhaka during January 2004 to October 2005. Data were collected from parents of children by a semi-structured open-end questionnaire consecutively. With the mean age of 5.94 years, children of 4-8 years got infected highest in number (46%) where male and female ratio found to be 1:1.2.Tetanus occurred in children with mostly the illiterate group of parents. Completion of EPI vaccination found in only 9.61% male and 6.73% female children with the most attributable reason of not being immunized was unawareness about EPI vaccination (35.79%). Mother's education found to have significant impact ($p<0.05$) on the immunization history of the children and initial treatment seeking personnel after the onset of symptoms. With the mean hospital stay duration of 16 days, the maximum children stayed in the hospital were 3 weeks or less (37.1%). Patients with tetanus got cured were 91% and 9% cases were fatal. There is the need to improve immunization campaign against pediatric tetanus among parents and adolescents in high schools premises. Children who are born without antenatal care of their mothers and in the lowest wealth quintile and who have mothers without autonomy in their healthcare decision-making might more likely to be unaware about fully vaccinated.

Keywords: Childhood tetanus, Routine Immunization of EPI, Socio-demographic factors.

INTRODUCTION

Vaccination is an important public health intervention and constitutes a cost effective strategy to reduce both the morbidity and mortality associated with infectious diseases. This immunization can prevent nearly twenty percent of childhood death[1, 2]. Maternal and neonatal tetanus is still a substantial but preventable in many developing countries.

Globally, a total of 56,743 deaths were reported due to tetanus in 2015. 19,937 deaths occurred in neonates and 36,806 deaths occurred after the neonatal period. From all neonatal tetanus deaths, 45% and 44% occurred in South Asia and sub-Saharan Africa respectively[3]. Neonatal tetanus was estimated to be responsible for over half a million neonatal deaths globally in early 1980s[3].

It is estimated that deaths of newborn and deaths of under 5years children have been reduced, but that still 130 000 babies died around the year 2004 from this very preventable disease [1,2]. It is estimated that input data for deaths by 43% among neonates and 23% among 1–59-month-olds, respectively because of different infectious diseases[6].

Despite this impressive progress, two global elimination target dates have been missed, most recently in 2005, to a rate of 'less than 1 case per 1000 live births in every district of every country'. Most of the remaining deaths from neonatal tetanus occur in a limited number of large countries with low coverage of facility births and tetanus toxoid immunization, such as India and Nigeria[5].

In Bangladesh, there are 83% of children were fully vaccinated. BCG had the highest completion (97%), followed by OPV (92%), pentavalent vaccine (91%), and MCV (85%). Full vaccination coverage ranged from 64.4% in Sylhet to 90.0% in Rangpur and was lowest among non-locals of all regions (78.4%)[8].

Bangladesh has expended considerable public health effort targeting reductions in childhood vaccine-preventable diseases. Assessment of childhood vaccination through the Bangladesh Demographic and Health Survey (DHS) program is key to providing the essential information needed to inform and guide future program development through the identification of gaps in coverage, including differences based on residence or socio-demographic group[8].

METHODOLOGY:

A cross-sectional descriptive type of study carried out at Infectious Disease Hospital (IDH) during January 2004 to October 2005. A total number of 104 randomly selected tetanus affected children aged between o1 month and 12 years were assessed who had been referred from rural area to Infectious Disease Hospital (IDH). Data was collected by interviewing parents of the children and children themselves by a semi-structured open-end questionnaire. Analyses were performed using SPSS version 16.0. Results were expressed as rates, proportions and diagrams.

RESULTS

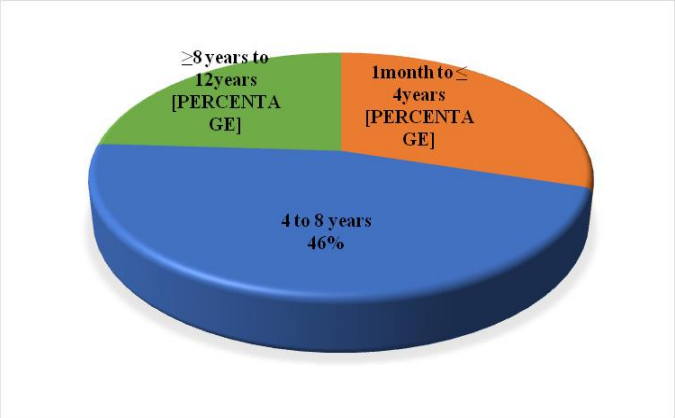

Fig-1: Distribution of respondents by Age, n=104

Figure1 shows with the mean age of 5.94 years the children reported with tetanus 1 month to under 4 years were 30%, 4 to 8 years children were 46% and aged above 8 years to 12 years were 24%.

Figure 2 shows female and male children ratio was 1:1.2 (male was 55% and female was 45%).

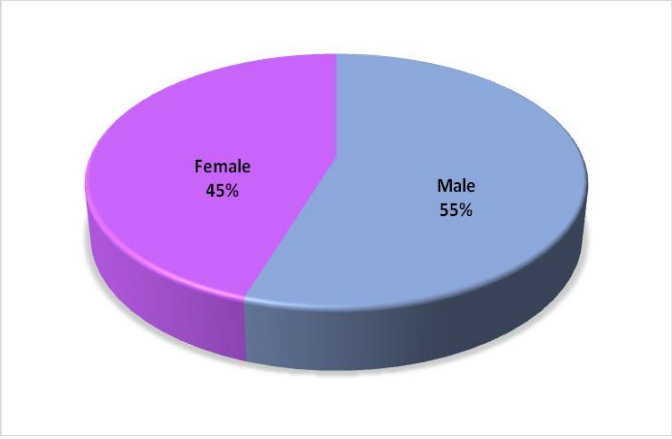

Fig-2: Distribution of respondents by Sex, n=104

Table-1: Distribution of children by Parents Education

	Frequency	Percentage
Father's education		
up to class five	25	24
SSC	3	4
Graduate	1	2
Illiterate	73	70
Mother's education		
Up to class five	16	16
Illiterate	88	84

It has been observed that the tetanus among children mostly occurred among the illiterate group of parents. Illiterate fathers were 70% and mothers were 84% whereas only 16% mothers were class five passed and 24% fathers were the same.4% and 2% of fathers were SSC and Graduate respectively.

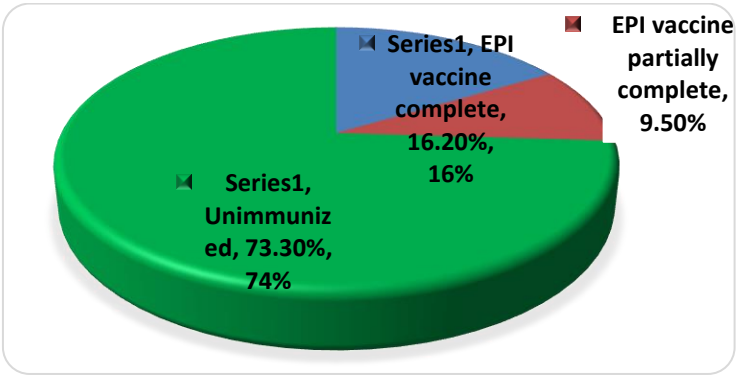

Fig-3: Distribution of the children by Immunization history

Figure 3 describes the immunization status of the children. We found children have no history of being immunized at all was 73.3%. Only 16.2% children have completed EPI vaccination. And 9.5% children have history of partial completion of EPI vaccination.

Table-2: Distribution of the immunization status of the children by their sex

		Sex of the Child	
		Male	Female
Immunization status	EPI vaccine complete	9.61%(10)	6.73%(7)
	EPI vaccine partially complete	3.84%(4)	5.76%(6)
	Unimmunized	42.3%(44)	31.73%(33)

According to the study, noticeable variation has been seen between male and female children in terms of immunization history though the relation was not found to be significant. But, male children found to unimmunized (42.3%) greater than female children (31.7%). Completion of vaccination schedule was in higher in number in male (9.61%) children than female (6.73%).

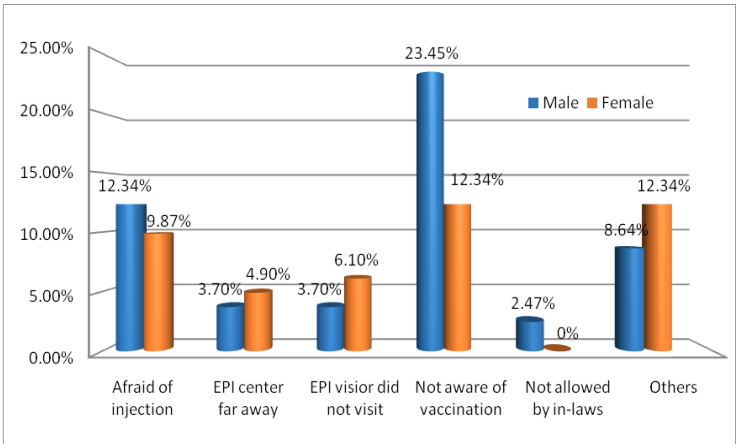

Fig-4: Distribution of the reasons of not being immunized by the sex of the children

As per the record, parents and caregivers were more precautious about the harmful effects of the vaccine and didn't allow vaccination- more in male (12.34%) than female (9.87%). Considerable fraction of people (incase of 23.45% male and 12.34% female) were not aware of EPI vaccination.

Table-3: Distribution of type of injury thought to be responsible for the onset of tetanus by the sex of the children

		Sex of the Child	
		Male	Female
Type of injury	Penetrating	32.75%(19)	20.69%(12)
	Sharp cut	1.7%(1)	0%(0)
	Lacerated	13.79%(8)	5.17%(3)
	Abrasion	0%(0)	1.7%(1)
	Others	13.79%(8)	8.62%(5)
	Penertating+Lacerated	1.7%(1)	0%(0)

Penetration injury found to be the most common reason thought to be responsible for the onset of tetanus of the injury which was reported, and found more in male children (32.75%) than female (20.69%).

Table-4: Distribution of the immunization history among the children by the educational status of the mothers

		Mother's Education		χ^2	P
		up to class five	Illiterate		
Immunization History	EPI vaccine complete	29.41%(5)	70.56%(12)	9.567	0.008
	EPI vaccine partially complete	40%(4)	60%(6)		
	Unimmunized	9.09%(7)	90.9%(70)		

(Numbers in parenthesis are frequency in support of each category)

The study represents that the immunization history of the children has a high propensity to get decrease in illiterate mothers. With P value less than 0.05, the association suggests a strong relation between mother's education and child's immunization status.

Table-5: Distribution of the initial treatment seeking personnel by the educational status of the mothers`

		Mother's Education		χ^2	P
		Up to class five	Illiterate		
Initial treatment got from	Qualified doctor	24.4%(10)	75.6%(31)	4.217	0.040
	Quack/Traditional Health Caregiver	9.5%(6)	90.5%(57)		

(Numbers in parenthesis are frequency in support of each category)

It has been observed that, the personnel to whom the primary approach was made after the onset of the symptoms was significantly associated (P= 0.040) with mothers education. Illiterate mothers tend to approach to non-qualified professionals (90.5%) more than the mothers who were educated upto class V (9.5%).

Table-6: Distribution of the immunization history among the children by the educational status of the fathers

		Father's Education			
		up to class five	SSC	Graduate	Illiterate
Immunization History	EPI vaccine complete	5.7%(6)	0.96%(1)	0.00%(0)	9.61%(10)
	EPI vaccine partially complete	2.8%(3)	0.00%(0)	0.00%(0)	6.73%(7)
	Unimmunized	15.38%(16)	1.9%(2)	0.96%(1)	63.46%(66)

Most of the unimmunized cases are found in children whose fathers are illiterate (63.46%). Among the children who have history of complete vaccination, in 5.7% cases their fathers were educated upto class V and in 9.61% cases they were illiterate.

Table-7: Distribution of the initial treatment seeking personnel by the educational status of the fathers

		Father's Education			
		up to class five	SSC	Graduate	Illiterate
Initial treatment got from	Qualified doctor	12.5%(13)	1.9%(2)	0.96%(1)	23.07%(24)
	Quack/Traditional Health Caregiver	0.96%(1)	11.53%(12)	0.00%(0)	47.11%(49)

Though not found significant association but, illiterate fathers (47.11%) showed higher inclination to approach for initial treatment to non-professional health caregivers. On the other hand 12.5% fathers who were educated up to class V and 23.07% illiterate fathers approached to qualified doctors for initial treatment.

Table-8: Distribution of the initial treatment seeking personnel by the working status of the mothers

		Working Status of the Mothers	
		Working mothers	Non-working mothers
Initial treatment got from	Qualified doctor	4.8%(5)	34.61%(36)
	Quack/Traditional Health Caregiver	4.8%(5)	55.76%(58)

It has been observed that non-working mothers are more attracted to non-professional health care practitioners (55.76%). But no disparity found in working mothers group to take their children either to professional or non-professional health care givers.

Table-9: Distribution of the respondents by the duration of hospital stay

	Frequency	Percentage
1 week or less	11	10.5
More than a week – 2 weeks	29	27.6
More than 2 week – 3 weeks	39	37.1
More than 3 weeks	21	20.0

With the mean hospital stay duration of 16 days, the maximum children stayed in the hospital were 3 weeks or less (37.1%). Less than a week and more than 3 weeks stay was 10.5% and 20% respectively.

Table-10: Distribution of the respondents by the outcome of the treatment, n=104

	Frequency	Percentage
Cured	94	91
Dead	10	9

The study has recorded that, 91% patients got cured where 9% cases were fatal.

DISCUSSION

Tetanus is entirely preventable with adequate doses of tetanus toxoid injection. The World Health Organization (WHO) recommends that six doses of tetanus toxoid vaccine might be administered before 16 years of age, including three doses in the first year and booster doses at early childhood, school age, and adolescence, respectively. These six doses of tetanus toxoid injections may confer life-long immunity against the disease [14,15].

In Bangladesh, Intra-muscular (IM) Pentavalent vaccine for Diphtheria, Pertussis, Tetanus, Hepatitis B, Haemophilus Influenza B is given at6 weeks, 10 weeks and 14 weeks by 3 doses[14]. And IM Tetanus toxoid 5 doses are given to women as follows-
TT-1: At 15 years IM

TT-2: 28 days after TT-1IM
TT-3: 6 months after TT-2 IM
TT-4: 1 year after TT-3 IM
TT-5: 1 year after TT-4 IM[4]

In this study, the mean age of the children with tetanus was reported 5.94 years; under 4 years were 29.5%, 4 to 8 years children were 45.7% and aged above 8 years were 23.8% and female and male children ratio was 1:1.2 (male was 55% and female was 45%).

In Ethiopia, many children fail to complete the full course of vaccination. A community-based unmatched case-control study was conducted in six kebeles of Amanuel district in east-central Ethiopia from March to April 2014. The study revealed that home delivery[AOR = 4.11, (95% CI: 2.26, 7.47), lake of antenatal visit [AOR = 2.54, (95% CI: 1.31, 4.95)], misperception about vaccines [AOR: 2.83, 95% CI: (1.56, 5.15)], and lack of postnatal care visits [AOR = 2.51, 95% CI: (1.18, 5.33)] [9]. (Adjusted Odds Ratio (AOR) with a 95% confidence interval (CI).)

According to this study, noticeable variation has been seen between male and female children and male children had been found to unimmunized (42.3%) greater than female children (31.7%). And rendering the findings, completion of vaccination schedule was in higher in number in male (9.61%) children than female (6.73%).

Due to the very nature of tetanus, hospital based studies are found to be an effective means for collecting information on the epidemiologic and clinical data on neonatal and childhood tetanus, and also for evaluating the impact of immunization programs[3].

In this study children reported with tetanus under 4 years were 30%, 4 to 8 years children were 46% and aged above 8 years to 12years were 24%.Illiterate mothers tend to approach to non-qualified professionals (90.5%) more than the mothers who were educated up to class five (9.5%).

In one study in peri-urban Karachi, Pakistan it was found that women aged <25 years had no formal education (adjusted odds ratio [OR], 2.1; 95% confidence interval [CI], 1.0–4.4), lack of knowledge about free vaccination (adjusted OR, 4.0; 95% CI, 1.64–10.20) and poor knowledge of tetanus disease/vaccination (adjusted OR, 4.6; 95%, 2.2–9.6) [11]. On the other hand, overall vaccination in Bangladesh has improved, but still there is room for improvement. There might have lack of knowledge about tetanus and lack of motivation and awareness about the importance of TT vaccination [10]. Here, the immunization history of the children had a higher propensity to get decrease in illiterate mothers. Another thing was that illiterate fathers (47.11%) showed higher inclination to approach for initial treatment to non-professional health caregivers. On the other hand 12.5% fathers who were educated up to class five and 23.07% illiterate fathers approached to qualified doctors for initial treatment.

The literature revealed updated country-level mortality estimates for all Member States for 17 specific causes: HIV/ AIDS, tuberculosis (TB), diphtheria, measles, pertussis, poliomyelitis, tetanus, dengue, malaria, schistosomiasis, trypanosomiasis, Japanese encephalitis, Chagas disease, maternal conditions, abortion, cancers, war and conflicts[13]. It has been found that there was a declining trend of neonatal mortality due to maternal and neonatal tetanus (MNT) from 0.5 million to 0.25 million during 1980–1997 [5, 1]. In Bangladesh scenario, the present estimates of vaccination coverage in 2014 based on the DHS data were slightly lower than composite estimates based on country-specific data reported to the WHO and UNICEF[7]. Recent estimates suggested an annual decline of 8.9% mortality in the last decade [13].

Family-level decision-making was an important factor against the uptake of TT vaccination in our study population. We believe that if a woman is empowered enough to make a decision about receiving vaccination and seeking healthcare, that would significantly improve the TT vaccine coverage.

CONCLUSION AND RECOMMENDATION

Tetanus is a vaccine preventable disease. Childhood immunization coverage in Bangladesh is the highest in the WHO South East Asia Region for several antigens. Geographical and demographic differences in vaccination may portend difficulties in eliminating preventable diseases within Bangladesh as it is one of the most densely populated countries in the world. Closer follow-up of patients to identify the progress of severity assists in identifying cases that require respiratory support and drug escalation. Hence, health promotion with scale up of EPI for infant tetanus immunization and large scale studies to provide support for booster vaccination schedules are recommended.

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