

## Neonatal Tetanus: Risk Factors and Prognosis

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**ABSTRACT** Neonatal tetanus (NT) remains a common cause of morbidity among neonates in Indonesia. A retrospective study was made on 83 cases on NT seen in Cipto Mangunkusumo Hospital, Jakarta over the period of 1991-1993. The purpose of this study was to know the factors which might contributed to NT. The number of cases on NT admitted per year was almost the same; 91.6% of cases were residents inside Jakarta and came from low socioeconomic level with low educational level. Almost 3/4 of cases were delivered by traditional birth attendants who cut the umbilical cord with uncleaned instruments or dressed it with herbal mixtures, ashes, etc. None of the mothers had had tetanus immunization when they were pregnant. The ratio of male to female was 1.24 : 1. All cases presented the symptoms within the first 14 days of life, mostly at 5-8 days of life. The overall mortality was 63.8%. The most frequently found complications were omphalitis (36%) and sepsis (24%). It is concluded that low socioeconomic level, low educational level, absence of tetanus immunization during pregnancy and poor umbilical cord dressing may contribute to the development of NT. [Paediatr Indones 1995; 35:1-7]

### Introduction

In certain parts of the world, especially in hot and humid climates and where hygiene is deficient<sup>1</sup> tetanus is a common neonatal problem and the major cause of perinatal mortality. Tetanus is a disease presented with uncontrolled muscle spasms resulting from the action of the

potent neurotoxin-tetanospasmin, which is elaborated by *Clostridium tetani*.<sup>2</sup> This is usually due to contamination of the umbilical stump with *C. tetani*: (a) when the cord is cut with an unclean instrument such as an old razor blade, a piece of broken glass, dirty scissors or knife, a sharp leaf, or bamboo stick; (b) when the umbilical cord is dressed with herbal mixtures, ashes, coffee, powders, charcoal, etc.; (c) when the baby is born in an unclean surrounding, usually by traditional birth attendants (TBA);<sup>3</sup> (d) if the mother is unimmunized or inadequately immun-

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ized during her pregnancy.

The mortality rate of neonatal tetanus in this hospital is still high (57.1%).<sup>4</sup> The high mortality is due to several factors, i.e., short incubation period, severe and complicated cases, or delay in diagnosis and treatment. The aim of this study was to detect factors which might contribute to neonatal tetanus and to determine the onset of neonatal tetanus as well as to document complications developed and mortality during hospitalization.

## Methods

The study group comprised 83 neonatal tetanus patients who were admitted to level two neonatal care of Cipto Mangunkusumo Hospital, Jakarta between April 1991 to 31 December 1993. Information for the study was obtained from history given by parents or relatives. The medical records provided data on the infants' condition on admission and their clinical course in the nursery.

Treatment of all patients was kept identical, i.e.:

1. Immediately on admission the infant was sedated with 2.5 mg diazepam which was slowly injected intravenously, followed by the dose of 8-10 mg/kg/day given in intravenous fluid drip 5% glucose : physiological saline solution = 4 : 1. The solution of intravenous fluid drip was renewed every 6 hours and went on for 48-72 hours. Thereafter a nasogastric tube was fit up for feeding the baby. Diazepam was given intravenously when prolonged spasm reappeared. The intravenous fluid drip was maintained for

giving intravenous diazepam. As soon as the muscle stiffness had relaxed suffice to allow any sucking movement, the infant was put on the breast frequently. Though very little milk was obtained at first, lactation was stimulated. Tube feeding might have to be continued for 2-3 weeks.

2. On admission intravenous ampicillin with the dose of 100 mg/kg/day plus gentamicin 5 mg/kg/day were started to all patients for 10 days.
3. Antitetanus serum (ATS) 10 000 U/day IM was given for 2 days.
4. Supportive treatment, included airway cleaning, put the baby on oxygen, and dressing the dirty or infected umbilical cord with 70% alcohol or povidone iodine solution was given.

## Results

All 83 patients with neonatal tetanus were born to mothers who had had never received tetanus toxoid. Most patients (91.6%) came from inside Jakarta (Table 1). There were 46 male and 37 female patients; the male to female ratio was 1,24:1. See Table 2. Table 2 also shows that the number of neonatal tetanus cases admitted per year did not vary significantly. Table 3 depicts that most mothers and fathers has low educational level, i.e., elementary school.

There was no relationship between the income and the number of children in a family. The lower the income the more prominent the role of TBA. Each year the number of neonatal tetanus cases attended by TBA was almost the same. Table 6 shows that the role of TBA in neonatal tetanus was very high (73.6%).

Table 1. The area of Jakarta which neonatal tetanus patients referred to the nursery

Area	No	%
East Jakarta	23	27.7
North Jakarta	16	19.3
Central Jakarta	14	16.8
West Jakarta	12	14.5
South Jakarta	11	13.3
Outside Jakarta	7	8.4
Total	83	100.0

Table 2. Distribution of neonatal tetanus cases by sex per year

Year	Sex		Total
	Male	Female	
1991	11	14	25
1992	17	12	29
1993	18	11	29
Total	46	37	83

Table 3. Parental educational level

Education	Mother		Father	
	No.	%	No.	%
Illiterate	5	6.2	9	10.8
Elementary School	50	60.2	51	61.5
Junior High School	10	12.0	15	18.0
Senior High School	14	16.8	5	6.0
College	4	4.8	3	3.7
Total	83	100.0	83	100.0

Table 4. Family income and the average number of children in a family

Monthly family income (Rp)	Average no of children in family
< 50 000	3
50 000 -	4
100 000 -	5
150 001 -	4

Table 5. Distribution of birth attendants by family income

Family income (Rp)	Birth attendant		
	TBA	Midwives	Doctors
< 50 000	27	4	0
50 000-	24	5	1
100 000-	6	8	1
150 000 -	4	3	1

Table 6. Birth attendants in relation to neonatal tetanus

Attendants	No NT cases			Total	
	1991	1992	1993	No	%
TBA	22	19	20	61	73.6
Midwife	3	9	8	20	24.0
Doctor	-	1	1	2	2.4
Total	25	29	29	83	100.0

The TBA used a variety of instruments to cut the umbilical cord and to dress it (Tables 7 and 8). All of the cases occurred within the first 14 days of life with the highest number recorded at 5-8 days of life (Table 9). It was noted that the earlier the onset of the disease, the higher

Table 7. Instrument used for cutting the umbilical cord

Instrument	TBA		Midwives		Doctor		Total	
	No	%	No	%	No	%	No	%
Scissor	10	12	20	24.1	2	2.4	32	38.5
Bamboo stick	23	27.7	-	-	-	-	-	27.7
Razor blade	16	19.3	-	-	-	-	-	19.3
Knife	5	6.1	-	-	-	-	-	6.1
Unknown	7	8.4	-	-	-	-	-	8.4
<b>Total</b>	<b>61</b>	<b>73.5</b>	<b>20</b>	<b>24.1</b>	<b>2</b>	<b>2.4</b>	<b>32</b>	<b>100</b>

Table 8. Material used for dressing the umbilical stump

Material	TBA		Midwife		Doctor		Total	
	No.	%	No.	%	No.	%	No.	%
Alcohol	-	-	20	24.0	2	2.4	22	26.4
Herbal mixture	32	38.7	-	-	-	-	32	38.7
Ashes	8	9.6	-	-	-	-	8	9.6
Coffee	11	13.2	-	-	-	-	11	13.2
Frying oil	4	4.8	-	-	-	-	4	4.8
Unknown	6	7.2	-	-	-	-	6	7.2

the mortality. Table 10 depicts the complication of patients with neonatal tetanus. A patient might be suffered from one or more complications.

## Discussion

Most neonatal tetanus cases in this series came from every part of Jakarta (see Table 1). Thus there must have been traditional practice on child bearing. The

majority were at best harmless but some were very harmful because they play the main role in the occurrence of neonatal tetanus. Certain pregnant women prefer to be attended by TBA. Several reasons are responsible for this situation which can be divided into two main groups.<sup>5</sup>

1. Community background such as low level of education. Most parents in this series had a low educational level, i.e., elementary school (Table 3). This finding was not much different with

Table 9. The number of neonatal tetanus cases related to the onset and mortality

Age of onset (days)	No of patients	No of death
1	-	-
2	1	1
3	3	3
4	7	7
5	15	14
6	16	12
7	15	9
8	14	6
9	4	1
10	3	-
11	1	-
12	2	-
13	1	-
14	1	-
<b>Total</b>	<b>83</b>	<b>53</b>

Table 10. Complications of neonatal tetanus

Complication	NT cases	
	No	%
Omphalitis	30	36.1
Sepsis	20	20.0
Uncontrolled spasms	9	10.8
Bronchopneumonia	8	9.6
Miscellaneous	6	7.2

2. Low socioeconomic condition (Table 4). The highest family income was Rp. 200.000,- monthly. This was lower

than the National GNP (US \$570 = Rp 1 245 450 monthly = Rp. 103 788,-) of Indonesia, because each on the average each family had 4 children.

3. Traditional attitude of the community members and medically indigent population of pregnant women.

4. The attitude of TBA. They are popular in their area, very easy to reach, their fee is cheap and one can pay by installment.

The number of neonatal tetanus cases admitted per year to this hospital was the same, except for the year 1991 because the study was started in April 1991. Sixty-one out of the 83 cases (73.5%) were delivered by TBA. The ratio of male to female was 1.24:1 (Table 2). This was rather higher than the finding of Marbun et al.<sup>7</sup>

In this study 100% of the cases presented within the first 14 days of life, with the highest number recorded in 6-8 days of life. The majority of cases were infants who became ill following delivery assisted by TBA. All of the cases were infants whose mother had no tetanus immunization. This shows beyond doubt that the coverage of antenatal tetanus immunization is not yet sufficient to control neonatal tetanus in the population of Jakarta. Supposing that the widespread immunization of pregnant women and adolescent girls of childbearing age had been done properly, the number of neonatal tetanus cases and its mortality would have much decreased.

It was also found that some babies with neonatal tetanus were delivered by midwives and doctors; this might be due to inappropriate dressing of the umbilical

cord, using many kinds of stuff at home. The mortality in this study was 63.9%. This was almost the same as the finding of Soetomenggolo 1992 (57.1%). The mortality in this study was due to: (a) The early onset of the disease (Table 9); the shorter the onset interval the more severe were the spasms the poorer is the prognosis. (b) There were severe complications such as septicemia, uncontrolled spasms and pneumonia. Uncontrolled spasms caused the spasm of diaphragm, intercostal and abdominal muscle interferes with respiration, causing severe anoxic episode with deep cyanosis and may end in unconsciousness and cardiac arrest; (c). patients with neonatal tetanus usually produce excessive salivation. This condition together with the pharyngeal spasms (due to convulsion) might cause airway obstruction. Aspiration of vomitus might occur following severe spasm after a feed. Hypostatic pneumonia could develop in babies who had been oversedated. (d). Immunization of pregnant women with tetanus toxoid, had greater impact on mortality from neonatal tetanus than delivery in hospital or birth at home attended by TBA.

In conclusion, low educational and socioeconomic levels of the parents, uncleaned cutting of the umbilical cord, non-sterile dressing of the cord, and absence of tetanus toxoid immunization are factors associated with the development of neonatal tetanus. The range of the onset of the illness was 2-14 days, most of the cases had onset of 6-8 days. Infections (omphalitis, sepsis) are the most frequent complications found. The mortality rate of patients with neonatal

tetanus is high. These findings suggest that in order to eliminate neonatal tetanus, educational programs and better perinatal care are needed in addition to vaccination. The target age of tetanus toxoid immunization should include all women of child bearing age.

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