

Neonatal Tetanus: A Continuing Menace

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ABSTRACT

Background: Tetanus especially that affecting the newborn has continued to contribute to morbidity and mortality in developing countries such as Nigeria despite the availability, for over 30 years of an effective vaccine. Its contributing factors include low immunization coverage, poor obstetric services and illiteracy. This study aims at reviewing the status of neonatal tetanus in UPTH with its characteristics and outcome while highlighting the need for instituting sustainable control measures.

Methods: This is a retrospective analysis, involving the review of hospital records on neonatal tetanus cases treated at the University of Port Harcourt Teaching Hospital from 1995 to 2009. The case notes of all neonatal tetanus patients in the department of paediatrics from 1995-2009 were retrieved and reviewed for age, sex, presenting complaint, immunization status, examination finding, duration of hospitalization and outcome of illness.

Results: Two hundred and ninety six neonates, comprising 174 (58.8%) males and 121(40.9%) females were treated 1(0.3%) of them did not have any record of his or her sex. Most of the mothers did not receive any doses of Tetanus Toxoid [TT] vaccine and delivered outside health facilities. Fifty percent of the cases died. The number and characteristics of the cases and deaths did not change significantly over the period.

Conclusion: Essential obstetric care, strengthening of routine immunization, compulsory immunization of all women of childbearing age and school-age children should be adopted to reduce the incidence of neonatal tetanus in the country, while improved health care will reduce the associated high case fatality rate.

Key Words: Neonatal tetanus, Outcome and trends; Port Harcourt; Nigeria.

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decade and in fact, Nigeria recorded the highest absolute increase in neonatal tetanus deaths worldwide with an increase from the 23,400 deaths recorded in 1990 to 37,900 recorded in 1997, a 62% increase in incidence^{1,12-20}. Worldwide, the disease has come under control in several countries and concerted efforts have led to a reduction in its incidence in many others with China having a reduction in its number of cases from 75000 deaths in 1990 to 14000 deaths in 1997, a reduction of 82%¹. In the 1996 World Health Report, tetanus was one of the ten biggest killers accounting for the deaths of 500 000 neonates²¹. The unnecessary deaths caused by this highly preventable disease was highlighted in the speech by Dr. Ralph Henderson, the Director of WHO's EPI, when he commented as follows in 1990: *The continuance of neonatal tetanus represents a major failure of public health practice. It is one of the most dramatic and angering indications of our major failure to provide basic maternal health services. Not one case of Neonatal tetanus should be allowed to occur. Before 1995, the disease should be eliminated in every country. We have a good, stable vaccine and it could and should have been done yesterday*²². Unfortunately, these "needless deaths" have continued as was noted in the 1994 *Progress of Nations*²³. The worse aspect of this problem is that in some countries like Nigeria, the disease is so underreported that its exact contribution to overall neonatal deaths remains highly speculative^{2,18,19}. In view of the continued contribution of neonatal tetanus to neonatal deaths, accounting for about fifty percent neonatal deaths in some countries, in May 1989 the World Health Assembly Resolution (WHO 42.32) established the goal to eliminate neonatal tetanus from the world by 1995 using a twofold strategy consisting of (1) the achieving of high levels of immunization coverage in women of childbearing age with Tetanus Toxoid and (2) Strengthening efforts to raise the proportion of clean deliveries (clean hands, clean delivery surface and clean cutting and care of the umbilical cord²⁴. This goal was reiterated at the 1990 World Summit for Children²⁵. Several articles have not only documented the usefulness of these two strategies in controlling the disease, but have also recommended their use to others.^{1,5,6,14,15,26-35} Despite the acceptance of the goals set at the 1990 World Summit for Children, the Nigerian government seems to have done little to control the scourge of this disease. This paper therefore seeks to review the status, characteristics and outcome of neonatal tetanus from 1995 - the year targeted for the elimination of neonatal tetanus - to year 2009 with a view to providing an update on the status of tetanus at this center, identifying contributing factors to its continued existence and highlighting ways of achieving sustainable control.

MATERIALS AND METHODS

This is a retrospective analysis of data kept on neonatal

INTRODUCTION

In 1990 about 360 000 neonates died from neonatal tetanus in 20 countries, one of which was Nigeria with 23,400 deaths¹. Before tetanus became a notifiable disease in Nigeria, it has been shown to contribute significantly to morbidity and mortality, especially among neonates²⁻¹². Despite its being notifiable, much was not done to control its scourge in the country hence it remained prevalent throughout the last

tetanus cases managed at the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria from January 1995 to July 2009. All cases were diagnosed by paediatricians using the clinical features of the disease. The severity of the disease process was graded using a scoring format modified from that of Hendrickse^{38,39}. Information obtained from the records included: socio-demographic data of the patients, relevant immunization histories, the history of the illness, its clinical features, management and outcome. Data entry into a microcomputer used the WHO Statistical package, EPI Info version 6.04b. Chi Square and Fishers' Exact Test statistics were used to test the significance of associations and a p value of 0.05 or less was considered statistically significant. Tables and graphs are used to present the data.

RESULTS

Two hundred and ninety six cases comprising 174(58.8%) male and 121(40.9%) female, 1(0.3%) whose sex was not indicated were studied. The detailed description of the cases and the factors affecting their outcome are shown in Tables I and II. There was no significant sex difference in the age distribution of the cases ($p=0.118619$). The yearly distribution of all cases ranged from 2 cases in 2008 to 50 in 1998 with a mean of 19.7 cases per year (Table I, Fig. 1). The age range was 2-28 days with a mean age of 7.84 days (Standard Deviation (SD) 3.26) and a modal age of 7 days. 153(66.2%) were aged 2-7 days while only one was aged 22-28 days. Eighty-nine (30.1%) children survived, 38 (12.8%) were either discharged against medical advice or absconded from the hospital while 151(51.0%) died. Amongst the survivals were 53(30.5%) males and 35(28.9%) females while there were 88(50.6%) males and 63(52.1%) females. Thus, the sexes of the children did not significantly affect the outcome of the disease ($\chi^2=1.3$; 2df, $p=0.52312413$). The percentage annual deaths ranged from 20.0% in 2003 to 60.0% in 1996 and 2007. Although it showed no consistent pattern, the annual proportional mortality over the period of study differed significantly, with the highest proportional deaths occurring in 1998 ($\chi^2=25.54$, 12df, $p=0.01244448$). 60.1% of those aged less than 7 days died compared to 25.0% of those aged 15-21 days. Thus the ages of the children at presentation significantly affected the outcome of the disease ($\chi^2=15.5809$, 8df, $p=0.00414$). The duration of hospitalization ranged from a few hours to 29 or more days. The earliest recovery time was 7 days during which period five children recovered. Most deaths occurred in the first week of admission with 48(80.0%) patients, among whom were 34(82.9%) neonates, dying within this period. Among those that stayed for 14-20 days, 72.2% survived while all those who spent 21 days or more on admission survived. Specifically, among those who spent 0-7 days on admission 5 survived, 7 were discharged against medical advice while 48(80%) died. Thus, the duration of stay in the hospital was significantly associated with the outcome with increased chance of survival for those who stayed in hospital for at least 14 days, irrespective of the age ($\chi^2=21.03755$; 1df with Yates' correction, $p=0.000004$). The immunization status of the mothers was largely unknown with 17 (8.7%) claiming to have received TT1 and 24(58.3%), TT2. Among these patients, 41.2% and 58.3% respectively died. Thus the receipt of at least a dose of tetanus toxoid immunization significantly enhanced the survival of the child ($p=0.001010$, Fisher's Exact Test).

57 (19.3%) completed at least secondary education. The educational status of the mothers did not significantly influence the outcome of the cases: ($\chi^2=6.7905$, 2df, $p=$

Table I: The Characteristics and Outcome of the Neonatal tetanus cases

Characteristics	Cases studied		Out comes					
			Survival		Parental discharge		Death	
1	Total	Percent	Total	Percent	Total	Percent	Total	Percent
SEXES:								
Males	174	58.8	53	30.5	22	12.6	88	50.6
Females	121	40.9	35	28.9	16	13.2	63	52.1
Sex not indicated	1	0.34	1					
2 Years of admission								
: 1995	29	9.8	5	17.2	7	24.1	17	58.6
1996	15	5.1	6	40.0			9	60.0
1997	42	14.2	12	28.6	8	19.0	22	52.4
1998	50	16.9	12	24.0	10	20.0	28	56.0
1999	21	7.1	4	19.0	7	33.3	10	47.6
2000	43	14.5	18	41.9	1	2.3	24	55.8
2001	31	13.4	14	45.2	2	6.5	15	48.4
2002	NI							
2003	15	5.1	2	13.3			3	20
2004	NI							
2005	26	8.8	11	42.3	3	11.5	9	34.6
2006	9	3.0					4	44.4
2007	5	1.7	2	40			3	60
2008	2	0.7	1	50			1	50
2009	4	4.6	2	50			2	50
YR NI	4						4	100
3 AGE AT PRESENT								
2-7days	153	66.2	34	22.2	27	17.6	92	60.1
8-14days	73	31.6	34	46.6	8	11.0	31	42.5
15-21 days	4	1.7	3	75.0			1	25.0

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	22-28days	1	0.4				1	100.0	
4	Duration of hospitalization NI	192	64.9	49	25.5	48	25	95	49.5
	0-24 hours	13	4.4					13	100.0
	25 hours to 7 days	47	15.9	5	10.6	7	14.9	35	74.5
	8-13 days	8	2.7	5	62.5			3	37.5
	14-20 days	18	6.1	13	72.2	1	5.6	4	22.2
	21-28 days	9	3.0	5	55.6			1	11.1
	29 days or more	9	3.0	3	33.3			4	44.4
5	Age at "discharge" NI	191	64.5	49	25.7	48	25.1	94	49.2
	2-7 days	8	2.7					8	100.0
	8-14 days	48	16.1	4	8.3	7	14.6	37	77.1
	15-21 days	11	3.7	3	27.3			8	72.7
	22- 29 days	16	5.4	13	81.3	1	1.7	2	12.5
	30-45 days	20	6.8	18	90			2	10
5	Marital status of parents Not indicated	184	62.2	50	27.2	50	27.2	84	45.7
	Married	70	23.6	17	24.3	2	2.9	27	38.6
	Single/divorced	42	14.2	7	16.7	2	4.8	23	54.8
6	Educational status of mothers: NI	201	67.9	55	27.4	51	25.4	86	42.8
	Prim. Education	37	12.5	10	27.0	2	5.4	8	21.6
	Sec. Educ	57	19.3	24	42.1	3	5.3	30	52.6
	Some Post Sec Edu	1	0.3					1	100.0
7	Mothers employment status NI	189	63.9	51	27	50	26.5	88	46.6
	Housewife/unemployed/student	68	23	22	32.4	3	4.4	43	63.2
	Employed	39	13.2	16	41.0	3	7.7	20	51.3
8	Mothers TT STATUS Nil	181	61.4	55	30.4	52	28.7	74	40.9
	TT1	17	8.7	10	58.6			7	41.2
	TT2 or more	24	8.1	8	33.3	2	8.3	14	58.3
	NO TT	74	25.0	16	21.6	2	2.7	56	75.7
9	Portal of entry Circumcision wound	3	1.0	1	33.3			2	66.7
	Umbilical stump	262	88.5	84	32.1	36	13.7	142	54.2
	NI	31	10.5	4	12.9	19	61.3	8	25.8
10	Symptoms present Fever	28	12.1	8	28.5	1	3.6	19	67.9
	Trismus	1	0.4			1	100.0		
	Stiffness of the body	7	3.0	2	28.6	2	28.6	3	42.8
	Spasms	56	24.2	15	26.8	2	3.6	39	69.6
	Excessive crying	28	12.1	5	17.8	1	3.6	22	78.6
	Refusal of feeds	65	28.1	16	24.6	3	4.6	46	70.8
11	Severity of disease: Not graded	152	65.8	49	32.2	32	21.1	71	46.7
	Mild	3	1.3	3	100.0				

	Moderate	13	5.6	7	53.8			6	46.2
	Severe	63	27.3	12	19.0	3	4.8	48	76.2
12	Incubation period NI	106	36.1	38	35.8	20	18.9	84	45.3
	2-6 days	68	23.1	11	16.2	13	19.1	44	64.7
	7 – 13 days	108	36.7	29	26.9	22	20.4	57	52.8
	14-20 days	12	4.08	9	75	1	8.3	2	16.7
13	ANC NI	236	79.7	59	25	33	14.0	109	46.2
	ANC	36	12.16	14	38.9	2	5.6	18	50
	No ANC	24	8.1	8	33.3			16	66.6
14	The place of birth of the baby: NI	166	6.25	95	32.2	49	16.7	67	22.7
	TBA's home /Other homes	60	20.3	16	26.7	4	6.7	40	66.7
	Maternity	12	4.	4	33.3			8	66.7
	Hospital/clinic	14	4.7	5	35.7	1	7.1	8	57.1
	Prayer house /others	43	416	14	32.6	2	4.7	28	65.1
15	Instrument used for cutting the cord NI	210	70.9	61	29.0	50	23.8	99	47.1
	Sterile scissors	2	0.7	2	100.0				
	Unsterilize razor blade/scissors	84	28.4	26	31.0	6	7.1	52	61.9
16	Materials used for cord care: NI	202	68.2	58	28.7	47	23.3	97	48.0
	Methylated spirit	43	14.5	12	27.9	3	7.0	28	65.1
	Robb/ powder/others	57	19.3	17	29.8	5	8.8	35	164
	Leaves/herbs	6	2.0	3	50.0			3	50.0
	Vaseline	12	4.1	6	50			6	50

TABLE 11: THE IMPACT OF SELECTED FACTORS ON THE OUTCOME OF NEONATAL TETANUS CASES

Factors	Chi Square value	Degree of freedom	P value
Year of admission of the child	24.15	12	0.01939210
The age of the baby at presentation (>1 week associated with increased chance of survival)	15.5809	2	0.00414
The age of the child at departure from the hospital	49.40	10	0.000000
The sex of the child	0.09	2	0.767
Maternal employment status	1.11	2	292
Marital status of the mother	1.91	2	048558
Maternal educational level	8.7905	2	0.12339
Maternal tetanus Toxoid Immunisation status: receipt of at least TT1 compared to none	FET(Fisher's Exact Test)		0.001010
The duration of stay in the hospital (>7 days, increased chance of survival)	FET		0.000000
The presence of spasms at presentation	10.21	2	0.00605928
The presence of excessive crying at presentation	8.06	2	0.01775802
The presence of refusal of feeds at presentation	8.06	2	0.01775802
The severity of symptoms at presentation	29.25	6	0.00005458
The incubation period of the disease	15.7091	4	0.003434
The place of birth of the baby	26.86	12	0.00810279
Birth within or outside a health facility	20.67	4	0.00036798

0.12339).

DISCUSSION

The findings in this study have shown that tetanus, especially that affecting the newborn has remained a problem in our environment several years after it was supposed to have been eliminated^{24,25}. Indeed, the speculation, in 1994, that unless efforts at addressing the problem of tetanus were accelerated, the goal for its elimination would be missed has become a reality even in 2009, 14 years after the date set for the elimination^{1,24,33}. The risk factors documented in this study: poverty, low educational status, lack of immunization, delivery outside facilities with trained attendants, use of unsterile materials to cut and dress the cord have persisted into the new century. The continued existence of these health facility-related risk factors are strong pointers to the failure of the Primary Health Care System which was adopted, in 1978, as the means of ensuring Health for All by the Year 2000⁴². Its failure has been attributed to a number of factors but in the wake of the revision of the PHC systems in Nigeria and the introduction of the "Women and Child Friendly Health Services", there is a need to identify all obstacles to the utilization of health facilities for care by mothers so that the current low patronage will be improved upon. Indeed, the offer of free health care service for children under-five and pregnant mothers is an important step in improving the use rate since the introduction of user fees and poverty are some of the factors identified as hindering usage of these facilities for obstetric and other services. The provision of essential obstetric care to all pregnant women especially the poor and those in remote areas should be seen as urgent if the goals of reducing maternal and under-five mortality rates and the elimination of neonatal tetanus are to be attained in this country. Beside the attainment of these goals, some other reasons why efforts at the control of neonatal tetanus should be accelerated are the availability, for over 30 years, of an effective and stable vaccine for its control^{22,27} and the continued high maternal mortality rates^{20,25,37,41} which could be reduced by the same efforts aimed at improving the obstetric care for parturient women. Also the fact that the polio eradication campaign in Nigeria has brought us within reach of polio eradication implies that with good political will and global support, the goal of neonatal tetanus elimination is feasible in this country.^{1-6,15,16,22-24,29-36,40,41}

To address the perennial low immunization coverage for women and children, there is need to review the present vaccine delivery strategy. Waiting for mothers to come with their children at fixed facilities has been shown to lead to low coverage in a place where the educational level of the women is low. Immunization using the National Immunization Days and other outreach facilities have led us to the attainment of the Universal Child Immunization target of at least 80% coverage in 1990 and the present achievements with regards to polio eradication. It is therefore possible that the introduction of some outreach services such as mass immunization campaigns for women of child bearing age and compulsory immunization of school age children would be the means of attaining the goal elimination of neonatal tetanus. Similarly, reducing the drop out rate for immunization through birth registration and individual notification of parents of the dates for the immunization of their under-fives will help increase the coverage for the primary antigens as it did in China. We therefore suggest the adoption of multiple approaches to

control neonatal tetanus if we are to achieve Millennium Development Goal 4 of reduction of under-five mortality.

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