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Factors Contributing to Low Coverage of Tetanus Toxoid among pregnant Women in Ad-Damazin Locality (Blue Nile State)

[1] Ahmed Ismail Hassan Ali; [2]Abdalmagid, M.A.

[1] Public Health Specialist, Blue Nile Region, Ministry of Health
[2] Senior Public Health Specialists, Khartoum State, Ministry of Health.
Contact Person: **mabdemajed@gmail.com**

Abstract:

Background: Neonatal tetanus remains a significant avertable cause of morbidity and mortality in neonates. Adequate vaccination strategies, including at least two doses of tetanus toxoid for reproductive age women, can decrease neonatal mortality.
Objectives: This study aimed to determine the factors contribute to low coverage of Tetanus Toxoid immunization.
Materials and Methods: Descriptive cross sectional study health facility based conducted in Aldamazin locality. Data was collected via questionnaire and interview of healthcare providers.
Results: The coverage of TT was found to be 68.2%. Only 27.8% were taking five doses, 19.3% taking three doses and 15.8% taking two doses. Knowledge by symptoms of TT was poor while knowledge by methods of prevention was good. The study revealed that age of pregnant women (p=.000), mother level of education (p=.009), ANC visits (p=.006), number of ANC visits (P=.003), distance of health center from house (p=.007), time to health center (p=.0018), number of pregnancy (p=.000) and gestational age of pregnancy (.000) were significantly influence the vaccination status and contribute to low coverage of TT. Women who having ANC visits were significantly more vaccinated against TT (70%). The odds of vaccination against TT were increased 2.4 folds among women having ANC visits (OR=2.4, 95% CI (1.3-4.5).

Conclusion: The rate of vaccination against TT is relatively high, but with complete of five doses is considered low. Age of pregnant women, mother level of education, ANC visits, number of ANC visits, distance of health center from house, time to health center, and number of pregnancy and gestational age of pregnancy were significantly influence the vaccination status and contribute to low coverage of TT. In order t increase the proportion of mothers protected at birth, awareness creation and immunization campaigns should be directed to school-aged groups, during preconception care, and antenatal care should also be strengthened. Furthermore, more studies are needed to determine the absolute proportion of mothers protected from tetanus at birth by antibody testing.

Introduction:

Tetanus also known as a “Lockjaw” is a serious disease but it is preventable through the vaccination and safe delivery practices (1). It affects the body’s muscles as well as nervous system. Mortality from Tetanus is very high even under hospitalized care and it can range from 10% to 60% (2). There is limited access to health care facilities in remote areas and communities residing in these areas are prone to increased risk for Maternal and Neonatal Tetanus (MNT). Pakistan is among those eight countries of Asia and Africa where about 73% of neonatal Tetanus deaths occurs in comparison to other regions (3).

About 54 % women of reproductive age group receive at least two doses of Tetanus Toxoid (TT) vaccine during their last pregnancy in Pakistan (4). Worldwide, all countries are committed to "elimination" of maternal and neonatal tetanus (MNT), i.e. a reduction of neonatal tetanus incidence to below one case per 1000 live births per year in every district. As of March 2019, 13countries remain that have not eliminated MNT, (1) It is estimated that tetanus causes 213 000 – 293 000 deaths worldwide each year and that it is responsible for 5–7% of all neonatal deaths (5) and 5% of maternal deaths globally. Of particular concern is maternal and neonatal tetanus (MNT) as it is estimated that every year worldwide 5% of maternal deaths occur due to tetanus and 14% of all neonates die due to MNT. Tetanus can occur during pregnancy or within 6 weeks after termination of pregnancy By 2016 there were only five countries where tetanus still occurred at a rate of more than 10 per 100,000 people: Somalia, South Sudan, Kenya, Chad, and Central African Republic (6). The cases of neonatal tetanus have been reported from different sites (12 cases). The coverage of tetanus is low in some localities in the Blue Nile state according to the report in last year of 2018 is only 35% which is far away from WHO recommended coverage well functioned and providing a real vaccination services, Blue Nile State (AD-dmazein Locality) coverage TT vaccination remain very low. This study tries to find out the factors contributing to the problem and determined the factors that contribute to low coverage of tetanus in pregnant women in Aldamazin locality in terms of anti-tetanus protection for maternal and neonatal tetanus and its association with protection at birth.

Materials and methods:

Study design:

This study was descriptive cross sectional study health facility based.

Study area:

The study was conducted in AL-Damazin Locality, Blue Nile State.

Inclusion criteria:

Pregnant Women in Ad-Damazin locality

Sampling and sampling technique:

Sample was taken by the following formula;

$$n = \frac{Z^2 P (1 - P)}{e^2}$$

n = The desired sample size

Z = normal distribution =1.96

P = (unknown prevalence) = 50%

e = marginal error =.05

$$\text{Total sample size} = \frac{(1.96)^2 * (1-0.0.5) * (0.05)^2}{(0.05)^2}$$

n= (3.8416) x 0.25 / (0.0025) =384.16

n=384

The sampling technique used was simple random sampling.

Data collection tools

Questionnaire:

The questionnaire was used for data collection. It was divided into 5 sections to collect information on the following topics: social, demographic and economic characteristics of the woman, information about her last pregnancy, knowledge about TT vaccination and the reasons for non-vaccination.

The questions were closed-ended with possible options listed against each and coded. The interviewers chose answers from the given options but if not listed, the response are records as "other" with specific information then the women's responses were checked from their vaccination card which is a client-retained record. At the start of interview, the purpose of the survey was explained to the interviewees and informed verbal consent was taken. The interviewees could be assuring about the confidentiality of their identity.

Interview: Interview was conducted with healthcare providers in Al-damazin locality.

Data analysis:

Data analyzed using SPSS version (24.0). Descriptive analysis was used , frequency tables shows proportion and percentage of the variables , pie and bar graph was used for representation of the data , significance level was accepted is 0.05 , t- test , Chi square , ANOVA test were used to find out the relationship between pregnant women's vaccination status and the variables.

Ethical consideration

The study protocol was reviewed and approved by University relevant body. Permission to undertake the study was obtained from the relevant authority. And then verbal informed consent was obtained from the participants prior to participation in the study, and data collected was kept in proper way for high confidentiality.

Expected outcome:

Factors contributing to low TT coverage expected to be clear for an appropriate action.

Results:

Table 1: Soicodemographic characteristics

Sociodemographic	Response	No.	%
Age of pregnant women	15 – 23	115	30.7
	23 – 32	197	52.7
	32 -41	61	16.3
	41 -49	1	.3
	Total	374	100.0
Educational level	Illiterate	124	33.2
	Khalwa	36	9.6
	Basic	128	34.2
	Secondary	60	16.0
	University	24	6.4
	Post graduate	2	.5
	Total	374	100.0

TT2 vaccination	Yes	255	68.2
	No	119	31.8
	Total	374	100.0
ANC Visit	Yes	330	88.2
	No	44	11.8
	Total	374	100.0
No. of ANC visits	Zero	23	6.1
	Less than 3 visits	157	42.0
	More than 3 Visits	194	51.9
	Total	374	100.0

Sociodemographic	Response	No.	%
Occupation of pregnant	Student	7	1.9
	House wife	339	90.6
	Worker	12	3.2
	Employee	15	4.0
	Other	1	.3
	Total	374	100.0
Level of household income	Less than 100000 SDG	41	11.0
	100001-150000 SDG	144	38.5
	More than 150000 SDG	189	50.5
	Total	374	100.0
Distance HC from House	Less than 5 km	171	45.7
	5-9 km	115	30.7
	More than 10 km	88	23.5
	Total	374	100.0

Time to Health Care Centre	Less than one hrs	166	44.4
	One hrs	81	21.7
	More than 2 hrs	127	34.0
	Total	**374**	**100.0**
No. of Pregnancy	First	85	22.7
	Second	69	18.4
	Third	102	27.3
	More Than 3	118	31.6
	Total	374	100.0
Gestational age of pregnancy	Mean ±SD	26.3±8.9	

Table 2: Knowledge of mother about symptoms of TT:

Knowledge by symptoms	Response	No.	%
Spasm	Yes	42	11.2
	No	332	88.8
	Total	374	100.0
Crying	Yes	42	11.2
	No	332	88.8
	Total	374	100.0
Convulsion	Yes	56	15.0
	No	318	85.1
	Total	374	100.0
Hardening muscle	Yes	27	7.2
	No	347	92.8
	Total	374	100.0
Stiffness	Yes	29	7.8
	No	345	92.2

	Total	374	100.0
Fever & sweating	Yes	71	19.0
	No	303	81.0
	Total	374	100.0
All true	Yes	36	9.6
	No	338	90.4
	Total	374	100.0

Table 3: Answer of mothers whether there is a way to protect themselves and their children, from the incidence of tetanus:

Protection from TT	Response	No.	%
There is a way to protect themselves and their children, from the incidence of tetanus	Yes	315	84.2
	No	48	12.8
	I don't Know	11	2.9
	Total	374	100.0

Table 4 : Knowledge of methods of protection from TT

Knowledge of methods of protection from TT	Response	No.	%
Methods of protection from TT	Vaccination	287	76.7
	Treatment	25	6.7
	Other	2	.5
	I don't know	60	16.0
	Total	374	100.0

Table 5 : The way of given TT to women of childbearing

The way of given TT to women of childbearing	Response	No.	%
The way of given TT to	One Dose	38	10.2

women of childbearing	Tow Dose	59	15.8
	Three Dose	72	19.3
	Four Dose	27	7.2
	Five Dose	104	27.8
	Don't know	74	19.8
	Total	374	100.0

Table 6: Reasons of not vaccinated:

Reasons of not vaccinated	Response	No.	%
The lack of knowledge of the importance of vaccination	Yes	40	10.7
	No	334	89.3
	Total	374	100.0
Difficult accessing to the place of vaccination	Yes	7	1.9
	No	367	98.1
	Total	374	100
lack of interest in vaccination	Yes	22	5.9
	No	352	94.1
	Total	374	100.0
Religious beliefs	Yes	2	0.5
	No	372	99.5
	Total	374	100.0
Vaccinations cause infertility or miscarriage	Yes	9	2.4
	No	365	97.6
	Total	374	100.0
Bad technician immunization	Yes	9	2.4
	No	365	97.6

	Total	374	100.0
Other	Yes	7	1.9
	No	367	98.1
	Total	374	100

Table 7: Healthcare providers' opinions about the reasons of increase incidence of TT:

Knowledge of mothers about increase incidence of TT	Response	No.	%
Knowledge of Tetanus	Yes	162	43.3
	No	212	56.7
	Total	374	100.0
Contaminated sharps	Yes	110	29.4
	No	264	70.6
	Total	374	100.0
Wounds contaminated	Yes	119	31.8
	No	255	68.2
	Total	374	100.0
Poor sanitary conditions surrounding the operations of childbirth and abortion	Yes	32	8.6
	No	342	91.4
	Total	374	100.0
Not to vaccinate mothers against tetanus	Yes	54	14.4
	No	320	85.6
	Total	374	100.0

Table 8: Association between age of pregnant women and having TT2 vaccination or not

Age of pregnant women	TT2 vaccination		Total
	Yes	No	
15 – 23	56	59	115
23 – 32	149	48	197
32 – 41	50	11	61

41 – 49	0	1	1
Total	**255**	**119**	**374**

χ2=32.6, df=3, P-value=.000.

Table 9: Association between education level and having TT2 vaccination or not

Educational level	TT2 vaccination		Total
	Yes	No	
Illiterate	70	54	124
Khalwa	28	8	36
Basic	91	37	128
Secondary	43	17	60
University	21	3	24
Post graduate	2	0	2
Total	**255**	**119**	**374**

χ2=15.3, df=5, P-value=.009.

Table 10: Association between ANC visits and having TT2 vaccination or not

ANC Visits	TT2 vaccination		Total
	Yes	No	
Yes	70	54	124
No	28	8	36
Total	**98**	**62**	**374**

χ2=6.7, df=1, P-value=.006.

OR (Odds Ratio)= 95% CI (Lower-Upper)

2.4 (1.3-4.5)

Table 11: Association between number of ANC visits and having TT2 vaccination or not

No. of ANC visits	TT2 vaccination		Total
	Yes	No	
Zero	12	11	23
Less than 3 visits	96	61	157
More than 3 visits	147	47	194
Total	**255**	**119**	**374**

χ2=11.4, df=2, P-value=.003.

Table 12: Association between occupation of pregnant and having TT2 vaccination or not

Occupation of pregnant	TT2 vaccination		Total
	Yes	No	
Student	3	4	7
House wife	230	109	339
Worker	8	4	12
Employee	13	2	15
Other	1	0	1
Total	255	119	374

$\chi2$=4.9, df=4, P-value=.295

Table 13: Association between level of household income and having TT2 vaccination or not

level of household income	TT2 vaccination		Total
	Yes	No	
Less than 100000 SDG	29	12	41
100000 SDG	90	54	144
More Than 150000 SDG	136	53	189
	255	119	374

$\chi2$=3.5, df=2, P-value=.173

Table 14: Association between distance HC from house and having TT2 vaccination or not

Distance HC from House	TT2 vaccination		Total
	Yes	No	
Less than 5 km	130	41	171
5-9 km	74	41	115
More Than 10 km	51	37	88
Total	**255**	**119**	**374**

$\chi2$=9.9, df=2, P-value=.007

Table 15: Association between time to health center and having TT2 vaccination or not

Time to health center	TT2 vaccination		Total
	Yes	No	
Less than one hrs	125	41	166
One hrs	54	27	81
More than 2 hrs	76	51	127
Total	255	119	374

$\chi2$=8.0, df=2, P-value=.0018

Table 16: Association between number of pregnancy and having TT2 vaccination or not

No. of pregnancy	TT2 vaccination		Total
	Yes	No	
First	44	41	85
Second	43	26	69
Third	81	21	102
Total	255	119	374

$\chi 2$=19.2, df=3, P-value=.000

Table 17: Association between gestational age of pregnancy and having TT2 vaccination or not

TT2 vaccination	Mean	SD
Yes	27.5	8.8
No	23.8	8.8
Total	**26.3**	**8.9**
P-value	**.000**	

Discussion: The current study aimed to study factors contributing to low coverage of tetanus toxoid among pregnant women in Aldamazin locality in terms of anti-tetanus protection for maternal and neonatal tetanus and its association with protection at birth. The rate of vaccination of TT in this study was found to be 68.2% with most way of given five doses (27.8%) to women of childbearing. The finding of the study was not consistent with a report of studies conducted in Kenya (52.0%) and Pakistan (55.6%) (7, 8). The coverage of TT in this study was low compared to studies conducted in other developing countries such as Ghana 71% (9), and Sierra Leone 82.1% (10). The possible explanation for this difference could be due to geographical differences, sociocultural variation, and maternal health service utilization between the countries. In terms of women taken two doses in the study 15.8% the study finding was lower than study conducted in Nigeria 37.1% (11).

The study indicated that the knowledge of mothers by TT symptoms was very poor, only knowledge by spasm (11.2%), crying (11.2%), convulsion (15%), hardening muscles (7.2%), stiffness (7.8%), fever and sweating (19%) and all true was only (9.6%). The poor awareness of the tetanus toxoid vaccine is also not acceptable. This finding is accordance to that in a previous study by Ayub *et al*. who reported that 16.5% of young women in Karachi were aware of this immunization (12). However the study proved that knowledge about method of protection from TT was found high 76.7%. The most reasons of reasons of not vaccinated were the lack of knowledge of the importance of vaccination 10.7%. The finding in line with other study that showed the most common reason (32%) for inadequate TT vaccination reported by the women was that they were not aware of the importance of TT vaccination and did not know where and when to get the vaccination (18%) (13).

The most opinions of healthcare workers about the reasons of increased incidence of TT in this study were knowledge of tetanus 43.3%. Similar findings showed that inadequate awareness of vaccination among the public and HCPs is the most important factor for suboptimal coverage (14). Randi et al. reported that not knowing about the TT vaccine by HCPs was the main cause of low TT coverage (15).

The study revealed that age of pregnant women (p=.000), mother level of education (p=.009), ANC visits (p=.006), number of ANC visits (P=.003), distance of health center from house (p=.007), time to health center (p=.0018), number of pregnancy (p=.000) and gestational age of pregnancy (.000) were significantly influence the vaccination status and contribute to low coverage of TT. Women who having ANC visits were significantly more vaccinated against TT (70%). The odds of vaccination against TT were increased 2.4 folds among women having ANC visits (OR=2.4, 95% CI (1.3-4.5). This is consistent with previous findings in the southern region (SNNR) and in Sudan (16). The possible reasons for the increased likelihood of younger pregnant women, particularly those aged 15–25 years, to be more likely to receive the TT vaccine during ANC is due to their curiosity, attentiveness, and proactive approach toward their pregnancy and them actively seeking out the vaccine as they believe it offers crucial protection during pregnancy. Also the finding is consistent with previous findings in Ethiopia (17), Tigray, Ethiopia (18), Debre Tabor town (19), and a Somali region (20). When increased level of education the more likely hood of aware women about to importantly of TT vaccine protective doses for infant and increased the likelihood of intention to took it during pregnancy. This is also in line with the findings of previous studies in southern Ethiopia (21), Amhara region, and Tigray region (22, 23). This might be due to the pregnant mothers having regular ANC visits, the likelihood of receiving comprehensive healthcare services and completing the recommended TT vaccine doses, and increased contact time with healthcare professionals who provide mothers with valuable health information, which can positively influence their healthcare-seeking behavior.

Conclusion: The rate of vaccination against TT is relatively high, but with complete of five doses is considered low. The knowledge of mothers regarding symptoms of TT is low and good about there is ways for prevention from TT. Age of pregnant women , mother level of education , ANC visits , number of ANC visits, distance of health center from house , time to health center , number of pregnancy and gestational age of pregnancy were significantly influence the vaccination status and contribute to low coverage of TT. In order t increase the proportion of mothers protected at birth, awareness creation and immunization campaigns should be directed to school-aged groups, during preconception care, and antenatal care should also be strengthened. Furthermore, more studies are needed to determine the absolute proportion of mothers protected from tetanus at birth by antibody testing.

LIST OF ABBREVIATIONS

ANC= Antenatal care

TT= Tetanus Toxoid

SNNR= Southern Region

OR=Odds Ratio

HCPs=Health Care Providers

CI=Confidence Interval

MNT= Maternal and Neonatal Tetanus

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