Original Research Article

LIFELONG TETANUS TOXOID VACCINATION AS PART OF THE NATIONAL IMMUNIZATION SCHEME; A STUDY OF PREGNANT WOMEN ATTENDING INSTITUTE OF MATERNAL AND CHILD HEALTH IN LAGOS, NIGERIA

ABSTRACT

Objective: This study determined pregnant women's awareness and determinants of uptake of National immunization recommendations for a maternal tetanus vaccine.

Study design: A cross-sectional study of 347 eligible pregnant women who attended the booking antenatal clinic of ICMH. Structured interviewer-administered questionnaires, captured socio-demographic, obstetrics and vaccine-related data. Data were analyzed using the IBM SPSS version 20 statistical computer software package. Descriptive and inferential statistics were applied.

Results: The majority ([66%, 229)/347 of the respondents were not aware of the national immunization schedule for tetanus toxoid. Only 28.8% (100) women could correctly state the dosing interval for the vaccination. Of the 184 women due to having completed the vaccination, 36 (19.6%) reported completion. Age, parity, marital status, women's occupation were significantly associated with ~~Tetanus~~ tetanus vaccine uptake in pregnant women.

Conclusion: Awareness of maternal tetanus vaccination is low, thus increase may be achieved through antenatal health talk and policies.

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Keywords: Tetanus toxoid immunization, pregnant women, vaccination

INTRODUCTION

Tetanus infection is still an unresolved universal burden, especially in developing countries. [1] It causes worldwide morbidity and mortality in both mother and neonate.[1] Interestingly, it is responsible for up to 5% of neonatal death per annum and about 180 000 neonatal death occur yearly.[2]

Tetanus infection has leads to maternal mortality of about 30,000 per year, it is, therefore, imperative to eliminate this preventable disease from being a cause of maternal and neonatal death. [1] World Health Organization (WHO) established strategies for achieving this, which are adequate protection with tetanus toxoid vaccination, clean safe delivery, and good surveillance to eliminate this menace.[2] In Nigeria, the incidence rate is about 14.6-20% per thousand live birth, with only 5% of the cases reported to the health services.[3]

WHO aimed to achieve the elimination of maternal neonatal tetanus worldwide by 2015.[2] Nigeria like many other African countries and Asian counterparts failed to achieve this even in 2020.[4,5]

Tetanus toxoid-containing vaccine should be given in three doses at infancy and two booster doses during 4-7 years and later during adolescence. [2,5] This should provide protection throughout life.[5] The challenges are that many women especially in developing countries like Nigeria are neither immunized at birth nor are partially immunizedthereafter. [6,7,8]

National Immunization scheme by WHO recommends that women should be vaccinated with a series of five doses of tetanus toxoid vaccine with a specific minimum interval between each dose. [6] This has been incorporated into the national immunization scheme.[9] The level and protection against tetanus increase with each dose. [7] The level of protection, the duration of protection depends on the number of doses and intervals they are admi;nistered. [6,7] A woman who receives five doses of tetanus toxoid at

specific intervals is fully immunized and is protected against tetanus throughout her childbearing years.[5,7]

According to WHO, tetanus vaccination of pregnant women or women of childbearing age is mandatory if she is naïve to tetanus vaccination or she is unaware of her immunization status.[1] WHO recommends that a pregnant woman should be given 2 doses of tetanus toxoid 4 weeks apart and the last dose must be given 2 weeks before delivery to confer a protection of 1-3 years and an 80% protection, which means the doses have to be repeated during the subsequent pregnancy.[2,5,6] A five-year protection would be achieved if she is given a third dose six months from the last dose. Furthermore if she takes two more doses, given a year apart, she would have 10-year protection after the fourth dose. While the fifth dose gives 99% protection throughout childbearing age.[2,6,9]

The aim of the study is to determine the awareness, knowledge and factors affecting the completion of the lifelong tetanus toxoid immunization.

Methodology

The study was conducted in department of obstetrics and gynecology of the Lagos State University Teaching Hospital (LASUTH), Ikeja, one of the tertiary hospitals in the Lagos metropolis.

A descriptive cross-sectional study involving 350 participants who gave a written informed consent and had the right to withdraw from study were recruited consecutively until the desired sample size was achieved. The study was conducted over a 3-month period. The study was carried between January and April 2021

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Data were collected from eligible participants using structured questionnaires administered by the investigator to obtain participants' personal information and questions related to the study. Confidentiality

and privacy were guaranteed for all the participants Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 20.0 (SPSS Inc. Chicago, Illinois, U.S.A).

RESULTS

The mean (±SD) age of the women was 31.25 years ± 5.47; 196 (56.5%) had tertiary education and 231 (66.6%) were of Yoruba ethnicity and 11 (33.3%) were of the Edo ethnicity. Among the particpants 210 (60.5%) were skilled workers and 338 (97.4%) were married. The majority of the husband were in 30-39 age group (190, (57.2%). The mean (±SD) parity was 1.54 ± 0.87. The mean (±SD) husband's age was 38.17 ± 5.79 years and most (77.7%) were skilled workers. [Table 1]

The study showed that 66% were not aware of the national immunization schedule for tetanus toxoids. Only 28.8% (98) women could correctly state the dosing interval for the vaccination schedule. [Table 2] The study showed that 71% had two doses, of tetanus toxoid; TT21.4% had one dose, of tetanus toxoid; TT1,8.3% had three doses, of tetanus toxoid; TT3 and 8.3% had four doses, of tetanus toxoid; TT4 each, whileand 1.2% had five doses of tetanus toxoid. [(Table 3])

Among the 347 respondents, 202 (58.2%) had the desire to complete the vaccination; 133 (38.3%) were not sure of completing the vaccination while 12 (3.5%) indicated no desire to complete it. [Table 4]

The reasons for non-completion were forgetfulness, busy schedule, loss of interest and belief that vaccine was not needed or painful. Age,(P=0.0001), parity(P=0.0112), women's occupation (,P=(0.0229) were significantly associated with tTetanus vaccine uptake among pregnant women. [Table 5]

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Discussion

Despite the World Health Organization's (WHO) recommendation of life long tetanus toxoid vaccination in pregnant women as part of the national immunization, women's uptake is still in its ~~infantry~~ infancy in some parts of the world including Nigeria. The five doses of immunization schedule are obscured to many women and it is yet to be widely accepted and practised in several developing countries.

Of the 347 women enrolled in this study, only 34% were aware of the 5 doses of TT. In a study carried out in eastern part Nigeria awareness was 21.4% in Alakahia community in Rivers state which was also an urban centered study.[10] In contrast, Sule et al in a Local Government centre study found that 19.5% of women of childbearing knew about~~of~~ the lifelong immunization.[11] This disparity may arise from the variation in the study sites and target population. Our study was carried out among pregnant women in a tertiary institution attended by a large proportion of educated women with tertiary level education. The awareness of the five doses for the completion of tetanus toxoid immunization is rather low. This is the finding in most parts of the country as well as other developing countries.[8,12]

In this study, 28.2% could correctly state the dosing interval and number of vaccines to achieve adequate lifelong immunization. Similarly, 21.4% of women of childbearing age in the Niger Delta community of Nigeria had good knowledge of TT immunization.[13] In other parts of the country, the result was not different. Gabriel-Job in South East of Nigeria found that 58.6% of non-pregnant women responded that only two doses of TT are needed for lifelong protection while 2.2% responded that 5 doses were required.[10] In a study in the northwestern part of Nigeria, 68.8% felt that a single dose of tetanus immunization is sufficient in achieving lifelong immunity.[9] This gap in knowledge could arise from

inadequate publicity of the~~n~~ immunization schedule by the government or ignorance, acceptance and compliance with the vaccination~~.~~ schedule by the women.[9~~-~~]

The awareness and knowledge of the long-life immunity are low generally among both pregnant women and non~~-~~pregnant women. [8,9,10]~~–~~ 18.5% of female undergraduate students in a Nigerian university had knowledge of the five doses.[14] ~~-~~Most undergraduates may not have heard of life-long vaccination since many would not have had antenatal care exposure ~~as~~ so this may account for the low level of knowledge.

In Nigeria, the uptake of TT2 is 62%,[19] ~~most~~ Most women generally know of the two doses of tetanus toxoid immunization given to pregnant women during pregnancy.[~~-~~13,15] The two doses of tetanus toxoid reduces neonatal mortality by 94%.[11,15] Studies conducted in several cities in Nigeria have shown that the uptake of the protective two doses~~—~~ is high, Lagos (89.0%), Benin City (69%), Ibadan (~~(~~81.1%~~)~~).[16,17] Worldwide, TT2 vaccination uptake ranges from 50%-82%.~~–~~[17,18]~~,~~ This buttresses the fact that awareness of TT immunization ~~—~~has improved. Unfortunately, not the same with administration of the complete five doses of tetanus toxoid.

There is an obvious reduction in immunization uptake in TT5 when compared to TT2. In our study, about three-quarters have had TT2, a third had TT3 and TT4 each while only 1.2 % have been completely immunized with TT5. [Table 3]~~6.~~ In a study carried by Opara over 70% of the women were fully immunized for TT2 while less than 5% had TT5.[19] A register-based study by Nwokeukwu in the~~-~~ East showed that 10-16% completed the TT5 doses.[20] Other studies showed that ~~,~~most~~–~~ mothers had two doses of tetanus (51.8%) and a few (7%) had~~for~~ 5 doses.~~–~~[19] In Asia, a study in Bangladesh, 85% of women with children less than 1 year received two doses of TT only 11% of women of childbearing age received five doses of TT.[19] Knowledge of the five doses for life long immunization schedule is rather low.~~-~~[17,~~–~~18,19] In contrast, most developed countries have complete vaccination from childhood ~~in~~to adolescence.

Generally, there is a decline in immunization rates after the first two doses as seen in our study and this was similar to most studies carried in most developing countries.[19,20,21,22] The two doses do not give a long-life ~~immunization~~protection, and most women have to repeat this protective dose with subsequent pregnancies. The short interval of four weeks between the first and second dose during pregnancy allows most to just stop at TT2 and fail to complete the rest of the immunisation outside pregnancy.[5,11,12] A better approach would be the completion of the 5 doses in childbearing age or during and after pregnancies which gives maximum immunity.

Tetanus vaccination is burdened with compliance, despite the need for the completion the willingness and the means are sometimes lacking in women.[9] The study revealed that 58.2% desired to complete the vaccination during and after the index pregnancy while 38.3% are not sure they would ~~be~~ complete it and 3.5% of women would not. The reasons given for not completing are forgetfulness, busy schedule, other doses were not needed or too painful. ~~Table 4~~

Our study showed that parity, age, maternal occupation significantly influence the uptake of immunizations. T~~t~~his is similar to other studies which also identified the various factors which can affect the completion of the lifelong vaccination.[11,13,19,20,21,22] ~~Table 5~~

Women with advancing age were more likely to receive TT protective dose immunization than those of younger age group. The advanced age groups are more inclined to accept the vaccine and more aware of immunization probably due to hindsight from past knowledge. This is similar to the study carried out in Ethiopia, Zimbabwe, Kenya, Burundi, Zambia, Bangladesh and Ivory Coast.[12,21,22,23,24] In the same vein, advanced parity would positively influence the completion as women with previous antenatal care have previously been exposed to tetanus-related health talks during antenatal care.

The finding from studies revealed that though a high proportion of participants who were gainfully employed, increaseds the chances of completing the tetanus toxoid vaccination. A means of lively hood increases the decision making power of women.[20]

The study showed the deficit in the recognition of the role of five doses of tetanus toxoid vaccination. This is not only on the part of the women but also shows that the stakeholders are yet to achieve the targeted goal of the complete elimination of tetanus toxoid among reproductive-age women.

Limitation

The limitation of the study is the recall bias that could arise from the women. The information on the dose received and the missed doses were based on reports given by the women which is highly subjective. A study that is register-based may be more representative of the actual uptake. It is therefore recommended that there is need for proper record keeping and also a reminder system to recall women on the expected days of immunization and thus enhance complete immunization of the women. There is still a need to establish policies that would favour completion of the expected five doses of TT immunization.

Conclusion

The adoption of lifelong tetanus immunization is important in maternal and neonatal elimination of tetanus infection. It is an attainable goal requiring all efforts from all stakeholders. A more effective follow-up system is required to ensure the completion of the immunization schedule. Other entry points where school-aged females could be educated and enrolled for tetanus immunization should be considered in Nigeria.

Ethical Approval and Consent

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Ethical approval was obtained from the Health Research Ethics and Committee of the Lagos State University Teaching Hospital. Ref Nobler/06/10/1583. The study was carried out according to the declaration of Helsinki.

The ~~participants consented~~participants consented to participating ~~in the~~in the study.

Data availability: The authors confirm that the data supporting the findings of this study are available within the article [and/or] its supplementary materials.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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TABLES

Age in years	**Frequency (N)**
20-29	—143
30-39	178
40 and Above	26
Total	347
Highest Education achievement	**Frequency (N)**
Primary	10
Secondary	138
Tertiary	196

None	3
Total	347
Occupational	**Frequency (N)**
None	50
Artisans	85
Skilled worker	212
Total	347
Marital Status	**Frequency (N)**
Single	8
Married	338
Widowed	1
Total	347

Table 1: Socio demographic table

Heard of National immunization scheme 5 doses for Tetanus toxoid	**Frequency (N)**	**Percentage (%)**
Yes	116	34.0%
No	231	66.0%
Total	347	100.0%
Knew the– Dose interval and number of the national immunization scheme correctly 04611	**Frequency (N)**	**Percentage (%)**
Could correctly state number of doses and interval of doses	98	28.0%
Don't Know- or incorrect knowledge	249	72.0%
Total	347	100.0%

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Table 2: Awareness and knowledge of pregnant women on immunization schedule for tetanus toxoid vaccination

How many tetanus toxoid vaccines have been taken since child bearing	**Frequency (N)**	**Percentage (%)**
1	37	11.3%%
2	232	70.9%
3	27	8.3%
4	27	11.3
5	4	1.2%
Total	327	100.0%

Table 3: Numbers of TT taken since child bearing

Reasons for not completing during and after delivery	Frequency (N)	Percentage (%)
Not needed	10	3.6%
Forgot	161	57.5%
Lost interest	12	4.7%
Busy	3	1.4%
Others	37	14.1%
I didn't register in the hospital; I delivered my babies through native hospital	1	0.38%
I took just one because I'm a new mum to be then	2	0.76%
Miscarriage	1	0.38%
Not aware	8	3.04%
Too painful	7	2.66%
Wasn't properly educated on it then	1	0.38%
Others	37	14.1%
Total	280	100.0%

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Table 4: Re~~se~~ason given for not completing the immunisation schedule

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Variables	Statistic	P-value	
Age in years	Total	$X^2 = 41.53$	<0.0001*
20-29	141(100.0)		
30-39	181(100.0)		
40 Above	25(100.0)		
Total	347(100.0)		
Highest Education achievement			
Primary	10(100.0)	$X^2 = 7.56$	0.1757
Secondary	138(100.0)		
Tertiary	196(100.0)		
None	3(100.0)		
Total	347(100.0)		
Occupation~~al~~			
None	52(100.0)	$X^2 = 4.95$	0.0229*

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Artisans	85(100.0)		
Skilled worker	210(100.0)		
Total	347(100.0)		
Number of pregnancies carried to 9 months			
0	5(100.0)	$X^2 = 8.98$	0.0112*
1	203(100.0)		
2	95(100.0)		
3	32(100.0)		
Total	335(100.0)		

Table 5: Association of the Factors limiting women from completing the national immunization status in IMCH