Original Research Article

Awareness and Status of Tetanus Toxoid Immunization among Female Undergraduate Students in a Nigerian University.

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ABSTRACT

Aims: The study aimed to determine the level of awareness and status of tetanus toxoid (TT) immunization among female undergraduates in Port Harcourt.

Study design: This was a cross sectional school based study carried out among female undergraduate students.

Place and Duration of Study: The study was carried out in University of Port Harcourt in May 2014.

Methodology: A pre-tested questionnaire was administered to 512 female students selected through a Multi-Staged sampling technique. Information sought included socio-demographics, awareness of TT vaccine, knowledge of the immunization campaign for women of childbearing age and TT immunization status. Data was analyzed using epi info version 7.1.3.3.

Results: A total of 512 students participated in the study; mean age was 22± 2.79 years. Four hundred and eighty five (94.7%) and 409 (79.9%) students had heard of tetanus and TT vaccine respectively. Commonest sources of information were health workers. 33.8% knew the target population for the TT immunization campaign and 18.2% knew that the correct number of doses of TT is 5 doses. Two hundred and ninety eight (58.2%) and 10 (2%) students had received at least 1 dose and 5 doses of TT respectively. Students who had knowledge of the target population for TT immunization campaign (OR=2.1362, p=0.003) and those who were confident in the effectiveness of TT (OR=2.4074,p=0.000) were twice more likely to receive at least a dose of TT vaccine.

Conclusion: There was poor knowledge of TT immunization campaign for women of childbearing age and very poor coverage of TT5 among the female undergraduate students in Port Harcourt. Female undergraduate students should be reached during TT immunization campaigns.

Keywords: [Tetanus toxoid, Female undergraduates, Students, Port Harcourt }

1. INTRODUCTION

Maternal and neonatal tetanus (MNT) is a public health problem which has continued to plague most countries in the developing world, despite the availability of an effective preventive vaccine [1]. Tetanus is an acute, infectious, non-communicable disease caused by Clostridium tetani [1]. Every year 59,000 newborns die of this disease: this translates into 164 deaths daily or one death every 9 minutes of children under 1 month of age [1,2]. It accounts for 7% of neonatal deaths globally [3]. Thirty thousand mothers also die from tetanus after child birth annually, translating to 5% of maternal deaths [4]. Most of these deaths occur in Africa and in East and Southern Asia among populations with limited or no access to health care services and information related to safe birthing practices, with poor socio-economic status and low literacy rate.

Many countries have been certified as maternal and neonatal tetanus free, due to global efforts which have been directed at eliminating the disease [5]. Nigeria is one of the remaining 16 countries in Africa that are yet to eliminate maternal and neonatal tetanus [5]. In 2000, Nigeria was among the 27 countries said to be responsible for 90% of the global neonatal tetanus cases [4]. In the same year, the World Health Organization (WHO) classified Nigeria among the 17 countries with more than 50% of their districts at risk for maternal and neonatal tetanus because of their limited infrastructure (indicated by DPT3 immunization rate of 50% or less), serious manpower and logistic constraints [4]. In Nigeria, Neonatal tetanus accounts for 20% of the neonatal deaths, with the burden of the disease worst in the North East and North West parts of the country, where it accounts for up to 68.1% and 74.2% of the neonatal deaths in these regions respectively [1]. The major predisposition to this disease is lack of maternal immunization with Tetanus Toxoid vaccine, coupled with deliveries conducted by untrained caregivers in an unhygienic environment and with unhygienic birth practices [1,4]. These conditions allow the tetanus spores to contaminate maternal wounds during child birth and the umbilical cord at the time it is cut or dressed after delivery [1,4].

The major means of preventing maternal and neonatal tetanus recommended by WHO is the immunization of women of childbearing age (15 to 49 years) with 5 doses of tetanus toxoid vaccine as early as possible [1,4]. The vaccine schedule is as follows: First dose (TT1) is to be administered at first contact, 2nd dose (TT2) at 4 weeks after the first dose, TT3 6 months after TT2, TT4 1 year after TT3 and TT5 is given 1 year after TT4 [6]. The complete 5 doses is expected to provide lifelong protection for the would be mother and also provide adequate partial immunity for her unborn baby against neonatal tetanus [6]. Data on the up take of the vaccine by women of childbearing age in Nigeria showed poor up take of the vaccine [7-10]. In Ibadan, Bamidele and Umoh [11] reported that 36.3% of female undergraduates were aware of the tetanus toxoid immunization schedule, though 35.8% had commenced the schedule, only 10.4% of their respondents had received TT2. Lack of information on the need for the vaccination schedule was the commonest reason for non-vaccination. The authors concluded that there was a wide gap between policy formation and practice [10]. For maternal and neonatal tetanus to be eliminated in Nigeria, this gap has to be bridged. Data on tetanus toxoid immunization status of female undergraduates in Port Harcourt are scarce, this present study therefore aimed to determine the level of awareness and status of tetanus toxoid immunization among female undergraduates in Port Harcourt.

2. MATERIAL AND METHODS

This was a school based cross-sectional descriptive study carried out among female undergraduate students of the University of Port Harcourt in May 2014. The University of Port Harcourt is the largest Federal tertiary institution in Rivers State, Southern Nigeria. Records show that as at the 2013 / 2014 session, there were 11,526 male and 9,674 female regular undergraduate students.

The minimum sample size for this study was calculated using the formula [12]

$$n = \frac{Z^2(pq)}{}$$

E^2

Where n = minimum sample size

p= Prevalence of 35.8% reported by Bamidele and Umoh [10]

q= 100-p

E= Margin of error tolerated at 5%

Z= 1.96 at 95% confidence level

$$n = \frac{1.96^2 \times 35.8 \times (100-35.8)}{5^2} = 353$$

Thus minimum sample size of 353 was calculated.

Allowance for Design Effect (DE) = Sample size x1½ = 529.5

Allowance for attrition (5%) =26.5

Minimum sample size =529.5 + 26.5 = 556

However 560 students were recruited for the study. A multi – staged sampling technique was used to recruit the students. The students were first stratified into the eight major Faculties and Colleges of the University. One department was randomly chosen from each of the eight faculties / colleges. From the chosen departments, two academic grade levels were chosen by simple random sampling technique. The first 35 females in the register in the chosen levels were recruited for the study, making a total of 70 females per department. However 12 (2.1%) students did not give consent, another 36 (6.4%) did not return their questionnaires and were excluded from the study. Eventually only 512 students participated in the study.

The questionnaire used for the study was structured; self-administered and pretested by administering it to 40 students in a department not included in the study and the pretest results were also not included in the study. Information sought included socio-demographics, awareness of tetanus and tetanus toxoid (TT) and immunization status. Data was analyzed using the Epi Info version 7.1.3.3 statistical software. Proportions were compared using the chi square test and a p value of less than 0.05 was regarded as significant.

3. RESULTS

A total of 512 female students participated in the study. The age of the respondents ranged from 15 to 31 years with a mean age of 22 ± 2.79 years. A total of 405 (79.1%) of the respondents were less than 25 years of age, while 107 (20.9%) were 25 years and above.

Of the 512 respondents, 485 (94.7%) had heard about tetanus while 27 (5.3%) had not. Up to 172 (33.6%) respondents heard about tetanus from a health worker, 150 (30.9%) from school lessons, 67 (13.8%) heard about tetanus from the media, 40 (8.2%) from the media and family members and 30 (6.2%) heard about tetanus from family members alone. A total of 409 (79.9%) of the respondents had heard about tetanus toxoid while 103 (20.1%) had not. Concerning the correct response as to the target population for tetanus toxoid immunization campaigns, 173 (33.8%) of the respondents correctly answered “women of childbearing age”. Sixty four (12.5%) answered “pregnant women only”, 15 answered “married women only” and 260 (50.8%) had no idea.

Table 1 shows the relationship between the knowledge of the target population for TT and some variables. Correct knowledge of the target population for TT was significantly higher among the older age group (*P* = 0.013) and those in Medical faculties (*P*= 0.001). A significantly increasing trend in the proportion of respondents with correct knowledge of the TT target population was also noticed with advancing year of study (*P*= 0.001).

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Table 1: Relationship between knowledge of tetanus toxoid target population and some variables

	Knowledge of Tetanus Toxoid target population			
Variable	**Correct N (%)**	**Wrong N (%)**	**Total N**	**P value**

Age group	**<25 years**	126 (31.1)	279 (68.9)	405	0.013*
	≥25 years	47 (43.9)	60 (56.1)	107	
Year of study	**One**	39 (26.5)	108 (73.5)	147	
	Two	45 (25.3)	133 (74.7)	178	<0.001*
	Three	14 (29.8)	33 (70.2)	47	
	Four	31 (33.3)	62 (66.7)	93	
	Five	3 (100.0)	0 (0.0)	3	
	Six	41 (93.2)	3 (6.8)	44	
College / Faculty	**Medical**	46 (71.9)	18 (28.1)	64	<0.001*
	Non - medical	127 (28.4)	321 (71.6)	448	

* = significant

Only 93 (18.2%) of the respondents knew that the complete number of shots for TT was 5 shots. Other respondents gave various answers from 1 – 4 and 319 (62.3%) had no idea Table 2 shows the relationship between the knowledge of the complete dose of TT and some variables. Correct knowledge of the complete dose of TT was significantly higher among the older age group *(P* = 0.001) and those in Medical faculties (*P*=0.001).

132 **Table 2: Relationship between knowledge of tetanus toxoid complete dose and some**
133 **variables**

Variable		Knowledge of Tetanus Toxoid complete dose			
		Correct N (%)	Wrong N (%)	Total N	P value
Age group	**<25 years**	53 (13.1)	352 (86.9)	405	<0.001*
	≥25 years	40 (37.4)	67 (62.6)	107	
Year of study	**One**	14 (9.5)	133 (90.5)	147	
	Two	24 (13.5)	154 (86.5)	178	<0.001*
	Three	5 (10.6)	42 (89.4)	47	
	Four	9 (9.7)	84 (90.3)	93	
	Five	1 (33.3)	2 (66.7)	3	
	Six	40 (90.0)	4 (9.1)	44	
College / Faculty	**Medical**	39 (60.9)	25 (39.1)	64	<0.001*
	Non - medical	54 (12.0)	394 (88.0)	448	

* = significant

Concerning the effectiveness of TT, 309 (60.4%) thought it was effective, 32 (6.2%) thought it was not and 171 (33.4%) had no idea.

A total of 298 (58.2%) of the respondents had received at least one dose of TT and 214 (41.8%) had not received any at all. The most common occasion on which TT was received was after an injury (57.7%), routine immunization (32.6%) and during antenatal care (10.1%).

Figure 1 shows the reasons for not receiving any dose of TT. Most of the respondents who did not receive any dose of TT had no reason for not doing so. The next popular reason seen among 59 of the respondents was not being aware.

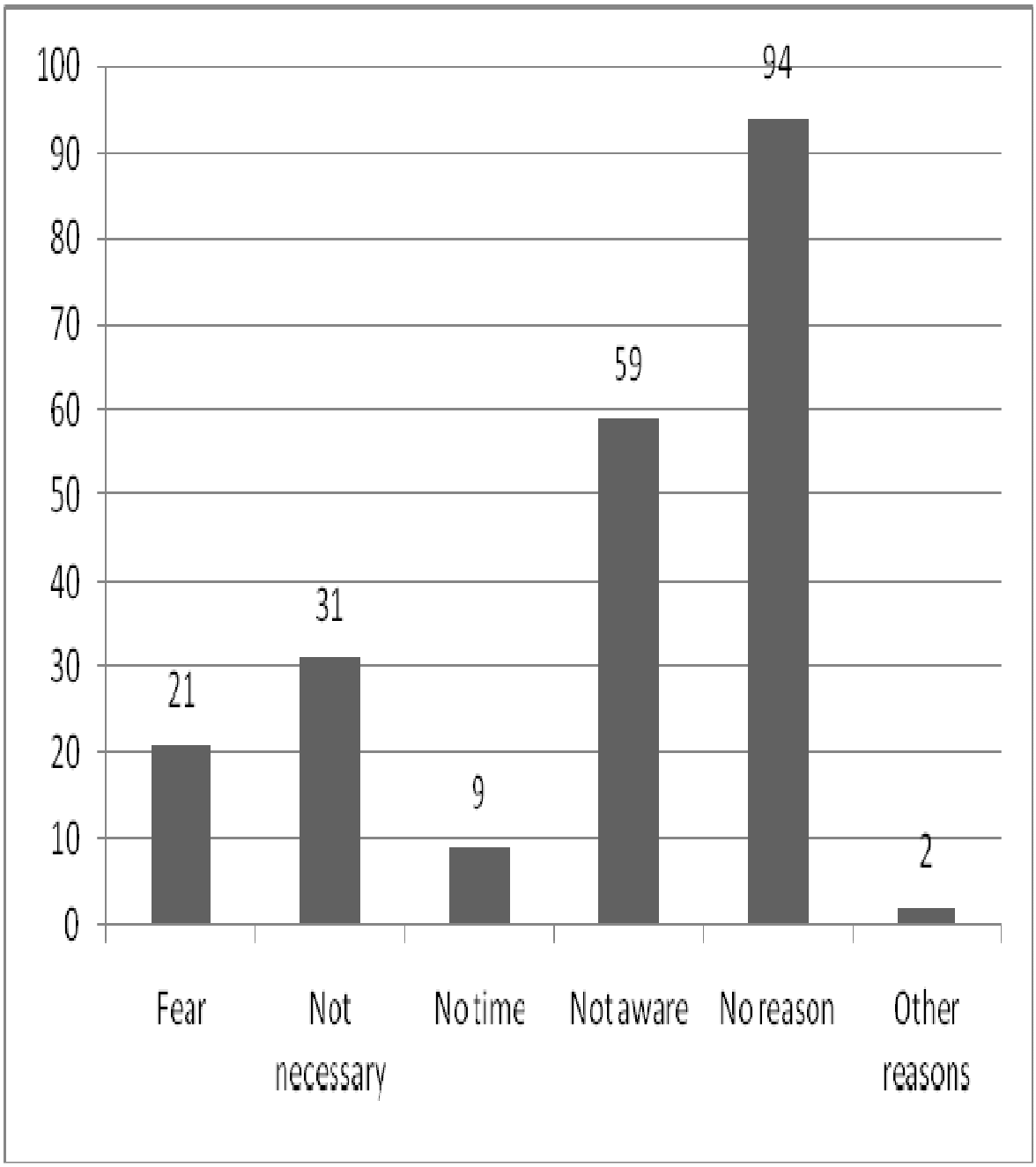

Figure 1: Reasons for not receiving tetanus toxoid immunization.

Table 3 shows the relationship between having received at least a dose of TT immunization and some variables. Being in a medical department ($p < 0.001$), being confident in the

150 effectiveness of TT (*P*= 0.001), a higher year of study (*P*= 0.001), correct knowledge of TT
151 target population (*P*=0.001) and correct knowledge of the complete dose of TT (*P*=0.001)
152 were significantly associated with receiving at least a dose of TT.

153 **Table 3: Relationship between receiving tetanus toxoid immunization and some**
154 **variables**

Variable		Received Tetanus Toxoid immunization			
		Yes N (%)	No N (%)	Total N	P value
Age group	**<25 years**	231 (57.0)	174 (43.0)	405	0.298
	≥25 years	67 (62.6)	40 (37.4)	107	
Year of study	**One**	72 (49.0)	75 (51.0)	147	
	Two	100 (56.2)	78 (43.8)	178	<0.001*
	Three	28 (59.6)	19 (40.4)	47	
	Four	55 (59.1)	38 (40.9)	93	
	Five	3 (100.0)	0 (0.0)	3	
	Six	40 (90.9)	4 (9.1)	44	
College / Faculty	**Medical**	52 (81.2)	12 (18.8)	64	<0.001*
	Non - medical	246 (54.9)	202 (45.1)	448	
Confidence in effectiveness of TT	**Yes**	215 (69.6)	94 (30.4)	309	< 0.001*
	No	83 (40.9)	120 (59.1)	203	
Knowledge of tetanus toxoid target population	**Correct**	133 (76.9)	40 (23.1)	173	<0.001*
	Wrong	165 (48.7)	174 (51.3)	339	

Knowledge of tetanus toxoid complete dose	**Correct**	72 (77.4)	21 (22.6)	93	<0.001*
	Wrong	226 (53.9)	193 (46.1)	419	

* = significant

Out of the 298 respondents that received at least a dose of TT, 10 (3.4%) had received 5 complete doses (2.0% of the total number of respondents), 15 (5%) had received 4 doses, 41 (13.8%) had received 3 doses, 85 (28.5%) had received 2 doses and 84 (28.2%) had received only TT1.

Table 4 shows the relationship between receiving the complete dose of TT and some variables. The older age group (p = 0.022), being confident in the effectiveness of TT (*P* = 0.047), correct knowledge of TT target population (*P*=0.001) and correct knowledge of the complete dose of TT (*P*=0.001) were significantly associated with receiving the complete dose of TT.

Table 4: Relationship between receiving complete dose of tetanus toxoid immunization and some variables

		Received complete dose of Tetanus Toxoid immunization			
Variable		**Yes N (%)**	**No N (%)**	**Total N**	**P value**
Age group	**<25 years**	5 (1.2)	400 (98.8)	405	0.022*
	≥25 years	5 (4.7)	102 (95.3)	107	
Year of study	**One**	3 (2.0)	144 (98.0)	147	
	Two	3 (1.7)	175 (98.3)	178	0.371
	Three	1 (2.1)	46 (97.9)	47	
	Four	0 (0.0)	93 (100.0)	93	

	Five	0 (0.0)	3 (100.0)	3	
	Six	3 (6.8)	41 (93.2)	44	
College / Faculty	**Medical**	3 (4.7)	61 (95.3)	64	0.118
	Non - medical	7 (1.6)	441 (98.4)	448	
Confidence in effectiveness of TT	**Yes**	9 (2.9)	300 (97.1)	309	0.047*
	No	1 (0.5)	202 (99.5)	203	
Knowledge of tetanus toxoid target population	**Correct**	9 (5.2)	164 (94.8)	173	<0.001*
	Wrong	1 (0.3)	338 (99.7)	339	
Knowledge of tetanus toxoid complete dose	**Correct**	7 (7.5)	86 (92.5)	93	<0.001*
	Wrong	3 (0.7)	416 (99.3)	419	

* = significant

Table 5 shows the logistic regression analysis of some variables relating to receiving tetanus toxoid immunization by the respondents. After adjusting for various factors, only confidence in effectiveness of tetanus toxoid vaccine (OR=2.4074,P=0.000, Coefficient=0.8785) and the correct knowledge of the target population for tetanus toxoid (OR=2.1362,P = 0.003, Coefficient=0.759) significantly influenced receiving at least a dose of tetanus toxoid among the respondents. No factor was found to be significantly associated with the completion of the 5 doses of TT vaccine.

Table 5: Logistic regression analysis of factors relating to receiving Tetanus Toxoid immunization

	Received at least a dose of TT immunization			Received complete dose of TT immunization		
Variable	**Odds Ratio**	**Coefficient**	**P-Value**	**Odds Ratio**	**Coefficient**	**P-Value**
Age group (<25 / ≥25 years)	0.8543	-0.1575	0.549	2.4585	0.8996	0.2272
Faculty (Non medical / Medical)	0.9538	-0.0473	0.9348	1.7767	0.5748	0.4827
Confidence in effectiveness of tetanus toxoid (Yes / No)	2.4074	0.8785	0.000*	1.6147	0.4792	0.6757
Knowledge of tetanus toxoid target population (Correct / Wrong)	2.1362	0.759	0.0033*	8.4928	2.1392	0.0764
Knowledge of tetanus toxoid complete dose	1.2547	0.2269	0.5243	0.3082	-1.1771	0.1636

* = significant

4.DISCUSSION

Our data revealed that all the respondents in this study were within the childbearing age, the population of women recommended by WHO to receive 5 doses of tetanus toxoid immunization for the prevention of maternal and neonatal tetanus [4]. It also showed that

more than three quarter of them were aware of tetanus and tetanus toxoid vaccine. This high level of awareness is comparable to what was reported by Qadir et al among female college and University students in Karachi in Pakistan [13] and by Bamidele and Umoh among female workers and undergraduates in a university and teaching hospital in Nigeria [11]. The high educational qualification of the respondents in these studies may account for the high level of awareness reported in these studies. The fact that the Commonest source of information was health workers, followed by classroom lessons, demonstrates the important role health facilities and schools can play in dissemination of health information to the general public.

The results however indicate that this high level of awareness is not commensurate with the level of Knowledge exhibited by the respondents. Only one third of the respondents knew that the tetanus toxoid immunization campaign is targeted at women of childbearing age. More than half of the respondents did not know the target population, while 15.4% of the respondents were under the misconception that it is targeted at married women only or pregnant women only. Similarly, a very small proportion (18.2%) of the respondents knew that the complete dose for tetanus toxoid is 5 doses. This poor knowledge of the tetanus immunization programme and the high level of misconception about the target population may have contributed to the poor up-take of the vaccine by women of childbearing age in Nigeria, as has been previously reported [7-10].

In this study, correct knowledge of the target population and the correct number of doses of tetanus toxoid to be administered are positively associated with being older in age, higher academic level and being in the Faculty of Medicine. This is not surprising because it shows the positive relationship between higher educational attainment and general knowledge about disease prevention. Students in Faculty of Medicine may have received detailed information about the tetanus toxoid immunization programme in course of their academic pursuits and were therefore operating at a higher knowledge level compared to the students from other faculties. Bamidele and Umoh [11] and Basher [14] also reported similar findings

among medical students in Nigeria and India respectively. The study further showed that majority (60.4%) of the students thought that TT is effective in preventing tetanus. This confirms the report of Naeem et al who made similar observations [15], though in the previous study, a higher proportion (89.5%) of respondents thought TT was effective.

The United Nations International Children's Fund (UNICEF), World Health Organization (WHO) and United Nations Population Fund (UNFPA) recommended that in high risk countries such as Nigeria, 90% of women of childbearing age should receive TT to achieve and maintain elimination of maternal and neonatal tetanus [4]. In this study, only 58.2% of the respondents had received at least one dose of TT, showing that Nigeria still has a long way to go in this fight to eliminate maternal and neonatal tetanus. This result however compares favourably with the 3.1% and 35.8%, 39.8% and 55.6% and 52% reported by Orimadegun [9], Bamidele and Umoh[10] in South Western Nigeria, Qadir et al [13] and Naeem et al[15] in Pakistan and Perry et al[16] in Bangladesh respectively. It is however lower than the 70.9% reported among medical students in Mymensingh, India by Basher [14]. These differences in observation maybe due to differences in level of awareness and knowledge of tetanus toxoid immunization programme for women of childbearing age.

The study further indicate that the most common occasion for receiving TT among the respondents was following an injury. Routine immunization was the second most common reason for receiving TT. Orimadegun et al [9] also had similar observation in Western Nigeria, but Bamidele and Umoh [11] reported routine TT immunization during pregnancy as the most common reason for receiving TT by majority of their respondents. This difference in observation maybe a reflection of differences in the age groups of respondents used in the three studies. The Bamidele and Umoh's study involved older women who may have been exposed to TT immunization during their several ante natal visits in health facilities.

The results in this study also showed that majority of the respondents who did not receive TT had no reason for not doing so; the next commonest reason was lack of awareness. This shows that with adequate community awareness campaign aimed at increasing the knowledge of women of childbearing age about the danger of maternal and neonatal tetanus and the need to prevent the disease by receiving 5 doses of TT immunization, the rate of vaccination may improve and Nigeria may meet the 90% target needed for the elimination of maternal and neonatal tetanus [4].

The study further revealed the very poor status of TT5 immunization coverage among the respondents. Only 3.4% of the respondents who received at least one dose of TT received the complete 5 doses, i.e.2% of all the respondents. This is not unexpected because the poor knowledge of the respondents on TT immunization programme for women of childbearing age, also affected their practice. Studies from other developing countries also reported a very poor TT5 immunization coverage among women of childbearing age [13,14,16].

Bivariate analysis showed that being in the medical faculty, being older in age, higher year of study, being confident in the effectiveness of TT, having correct knowledge of the target population and the complete dose of TT vaccine were positively associated with receiving TT immunization. However, after multivariate logistic regression analysis, only being confident in the effectiveness of TT vaccine in preventing tetanus and the knowledge of the target population of TT immunization campaign significantly influenced receiving at least one dose of the vaccine. This highlights the important role health education in schools, health facilities and the mass media can play in boosting TT immunization coverage by women of childbearing age.

The first limitation of the study is that the information sought is based on self-report and is subject to over or under reporting. Secondly immunization received during childhood and the adolescent period may not be easily remembered in adulthood.

5. Conclusion

There was a high level of awareness about tetanus and tetanus toxoid vaccine but poor knowledge of the tetanus toxoid immunization programme for women of child bearing age among female undergraduate students in Port Harcourt. There was also very poor coverage of TT5 among the students. Students who had knowledge of the target population of the TT immunization campaign and those who had confidence in the effectiveness of TT vaccine in preventing tetanus were twice more likely to receive at least one dose of TT vaccine compared to their counterparts who lacked such knowledge and also lacked confidence in the effectiveness of the vaccine. .

Extensive awareness campaign should be carried out in the university campuses on the danger of maternal and neonatal tetanus, the availability of a safe and effective preventive vaccine and the immunization schedule for women of childbearing age. Women of childbearing age in the University campuses should be reached during the sub immunization campaigns.

ETHICAL APPROVAL

Ethical approval was obtained from the Ethics Committee of the University of Port Harcourt Teaching Hospital.

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