Vol. 12(2), pp. 51-63, April-June 2020
DOI: 10.5897/IJNM2020.0415
Article Number: D97B84963483
ISSN: 2141-2456

http://www.academicjournals.org/IJNM

ACADEMIC JOURNALS
expand your knowledge

International Journal of Nursing and Midwifery

Full Length Research Paper

Effect of tetanus toxoid immunization training program on knowledge and attitude on female nursing students in Government Universities in Khartoum State

Amani Abdelgader Mohamed[1]* and Faiza Ali Nasor[2]

1Department of Nursing, Sabia University College, Jazan University, Saudi Arabia.
2Faculty of Nursing Sciences. Khartoum University, Sudan

Received 9 January, 2020; Accepted 17 April, 2020

Tetanus is an acute infectious disease, most cases occur due to lack of vaccination or incomplete immunization on exposure leading to increase morbidity and mortality. Studies reveal that adequate knowledge regarding tetanus is more important for the prevention of maternal and neonatal tetanus in the future. The study aims to study effect of tetanus toxoid immunization training program on knowledge and attitude of female nursing students in government universities in Khartoum state. The Experimental design was used. The study was done in Government Universities in Khartoum state which has faculty of nursing, randomly; Tow University selected study group and the rest control group. A total of 181 students were recruited study group and 246 control group. Data were collected from both groups using structure close end questionnaire and attitude scale; pre intervention and training program offered to the study group and after six months data recollected from both groups. Mean knowledge changed from 1.5709 pre to 1.8154 post interventions for the study group and showed statistically significant with p-value = 0.000, while control group showed statistical significant knowledge. Total mean percent for positive attitude 65 (48%) pre were changed to 72.8 post intervention; while negative attitude were changed from 34.55% pre to 27.28% post in the study group. In the control group, Wilcoxon ranged test showed a statistical significant in the control group from pre to post intervention. From the study group, health education is effective and is the best strategy to improve knowledge, attitudes and increased vaccination status of participants.

Key words: Effect, tetanus, training, program, students.

INTRODUCTION

Tetanus is a vaccine-preventable disease that causes an annual deaths of 309,000 and in the year2000, it killed about 200,000 new born (Ogbeyi et al., 2017). Tetanus spores are widespread in the environment and transmission occurs when spores are introduced into the body, usually through a puncture-type wound (Ogbeyi et

*Corresponding author. E-mail: a33m33ani@yahoo.com. Tel: 00966550968580.

al., 2017; Abir et al., 2017; Sirri, 2007). When it enters the body, it produces a toxin that causes muscular rigidness, spasms, and makes breathing difficult resulting in death among all age groups. Tetanus is an acute infectious disease, most cases occur due to lack of vaccination or incomplete immunization on exposure leading to increase morbidity and mortality (Ogbeyi et al., 2017; Abir et al., 2017). Deaths due to tetanus in developing countries are 135 times higher than those in developed countries (Sirri, 2007). Tetanus that strikes women during pregnancy or within 6 weeks of the termination of pregnancy is called maternal tetanus. Maternal tetanus (MT) is responsible for at least 5% of maternal deaths (Nora, 2012; Naeem et al., 2010).

It is a deadly infectious disease for which immunization is available in expanded program of immunization (EPI) at both Infant level and for females of reproductive age. More than 95% of patients who develop tetanus have not been previously immunized (Naeem et al., 2010; Njidda et al., 2017; Qadir et al., 2007; Ahmed et al., 2001).

Worldwide, more than 50,000 maternal deaths occur per year, but still, more than 270,000 newborns and 30,000 women die of tetanus yearly (Qadir et al., 2007). As a result of improved maternal immunization with tetanus toxoid (TT), approximately 725,000 cases of neonatal tetanus are prevented worldwide (Njidda et al., 2017). Maternal and Neonatal tetanus (MNNT) can be prevented by immunizing women of childbearing age during pregnancy or outside of pregnancy' through hygienic birth practices and immunization of women of childbearing age with the (TT) vaccine (WHO, 2006; Obaid, 2007; Millennium Development Goals, 2005-2015).Despite the effort done to eliminate MNT, most of the countries had achieved elimination leaving 40 countries that still have not eliminated the disease (Federal Ministry of Health, 2005),Sudan is one of them. The EPI policy in Sudan is to give tetanus vaccination to all pregnant women. In addition to routine provision of vaccination conducted in the health facilities, MNT campaigns are conducted in high risk districts targeting all women of childbearing age (15-45 years) (Federal Ministry of Health, 2005; El-Sayed, 2006). The main aim of the EPI program is to eliminate MNT or lower the incidence to less than 1 per 1000 live births (WHO, 2006; Obaid, 2007; Shultz, 2015; Shafiq, 2017).

A study on the knowledge of tetanus immunization among internees in a government medical college of Kolkata found that 57.4% internees were not aware of the number of doses of tetanus vaccine recommended for children under the age of 16 years and 76.8% internees were not aware of the number of doses of tetanus vaccine recommended for women of child bearing age (Chowdhury et al., 2011).Another study done on knowledge regarding tetanus and status of (TT) vaccination among nurses in a tertiary hospital, Dhaka India, presented that knowledge was found to be unsatisfactory and significantly higher among married andmultipara women ($p<0.005$, $p<0.05$) respectively. Moreover, those who were vaccinated also had significantly higher knowledge on vaccination schedule ($p<0.001$)(Sobhan et al., 2007). A study from Turkey reported that because tetanus immunity of women in child bearing age was not sufficient, the government introduced supplemental immunization activities for all women in child bearing age and for all children (Essen, 2006).

The (TT) vaccination of pregnant women was included in the WHO's (EPI) as early as the mid-1970s and is now a standard practice (Shultz, 2015; Shafiq, 2017; Chowdhury et al., 2011).Increasing knowledge about tetanus is an important precondition to improve the increase of TT coverage. Other factors influencing TT immunization coverage showed that the awareness of mothers, place of residence and maternal education are predictors for TT immunization status (Qadir et al., 2007; Sobhan et al., 2007; Essen, 2006; Blencowe et al., 2010; Singh et al., 2012; Tanjida et al., 2009).

Importance of TT given to women who are or who becomes pregnantis that antibodies forms in her body and readily crosses to the placenta, thereby protecting the newborn against tetanus during birth. A few months after wards a three dose of tetanus toxoid vaccine provides protection against maternal and neonatal tetanus for at least five years. A maximum of five doses will protect women through their childbearing years.MNT is both forms of generalized tetanus and has similar clinical courses (Blencowe et al., 2010; Singh et al., 2012; = 2016; Mijal, 2009; Verma and Khann, 2012; Hadeel and Iqbal, 2014).

In Sudan, there is no available information on the TT vaccination coverage of women in childbearing age. But in the pilot study, the researcher opines that the young girls had lack of knowledge attitude and practice of Vaccination.Thus, it is important to assess knowledge attitude and practice of TT immunization for women in child bearing age.However, the study aims to increase level of knowledge and attitude of the university students from structural training program of TT vaccine for women in child bearing age.

Justification

The Expanded Program on Immunization (EPI) rescheduled five doses of TT for all women of childbearing age, but the strategy could not attain the coverage as expected, because large number women of child bearing age were not aware of the benefit of immunization and complete protection against tetanus (Chowdhury et al., 2011). Even the educated females of child-bearing age do not seem to have the knowledge of complete immunization against tetanus. It has also been reported that even where knowledge was adequate, the practice did not corresponds with knowledge, which

suggested additional factors might have been preventing translation of knowledge into ones practice.[17] In the view of the fact that in developing countries, majority of deliveries are assisted by non-health workers, increasing coverage of tetanus toxoid is desirable.

Hypotheses

H1: Undergraduate students who receive TT vaccination training program will have highest percentage of level of knowledge and attitude than group not received TT program.
H0: There is no change on the level of knowledge and attitude among the students who took the TT vaccination training program to the control group

Aims of the study

To study the effect of tetanus toxoid immunization training program on knowledge and attitude of female nursing students in Government Universities in Khartoum state

MATERIALS AND METHODS

Study design

A quasi experimental research design was used.

Study setting

The study targeted all Government Universitiesthat have faculty of nursing sciences in Khartoum State and these universities are International University of Africa, AlzaiemAlazhari University, Khartoum North University, Al-Neelain University, Khartoum University, and Omdurman Islamic university. However the study was conducted in five universities, Al-Neelain University was not accepted to participate in the study.

Population

Female students in first year were included in the study. Only females were included because the TT is only given to females in the reproductive age, since they will be married soon and may face a lot of problems during deliveries or miscarriages due to unsafe environments. First year students were chosen because they have not been exposed to any vaccination topics as not to have any confounding factor that can contaminate the data and to facilitate the follow up during the four years of being in the universities.

Inclusion criteria

The study included female students in first year.

Exclusion criteria

The study excluded male students.

Sampling procedure

Simple random sample was used, two universities were study group and the rest were control group.

Sample size

For total coverage, study group was 181students and control group was 246 students.

Variables under study

Dependent variable

Knowledge and attitude of tetanus toxoid vaccine in child bearing age.

Independent variable

Training program on tetanus toxoid immunization for women in child bearing age.

Methods of data collection

Data were collected using structured closed ended questionnaire to assess the students' knowledge on tetanus toxoid immunization in childbearing age, as well as attitude scale pre and post intervention.

Development of data collection tools

Structured knowledge questionnaire

(i) The researcher developed the questionnaire in reference to related original research articles, and literature (Appendix I).
(ii)The questionnaire consists of three parts:

Section I: Consist of demographic variables such as age, marital status, residence and university name.

Section II: consist of questions for knowledge information on tetanus and tetanus toxoid immunization in childbearing age**.**
(iii) The questionnaire was pretested in the study population before usage for knowledge questions; a correct answer will give 1 point while a wrong answer will give 0. Wilcoxon study rank test was used to determine and compare the changes or improvement on the level of the knowledge for the study population.

Section III: Immunization status of the participant

Attitudes scale

There were 10 questions for the attitude which were answerable by "Strongly Agree", "Agree", "Disagree", and "Strongly Disagree". Pre-intervention and post intervention mean percentage were analyzed using descriptive and inferential statistics (Appendix II)

Work plan

Phase I: Assessment phase

Data were collected from the intervention and control group using structured questionnaire and attitude scale which was considered

Table 1. General information about tetanus for study and control group pre and post.

Variable	Study group pre		Study group post			Control group pre		Control group post		
What do you know about tetanus?	Frequency	%	Frequency	%	P value	Frequency	%	Frequency	%	P value
Highly infectious	56	30.9	165	91.2	0.000	78	31.7	137	55.7	0.074
Vaccine preventable	125	69.1	151	83.4	0.000	164	66.7	191	77.6	0.000
Enter the body through the wound	132	72.9	168	92.8	0.000	187	76.0	186	75.6	0.000
Enter the body through umbilical stump and UN clean delivery.	123	68.0	169	93.4	0.000	143	58.1	175	71.1	0.000
It cause by anaerobic bacteria	35	19.3	159	87.8	0.000	59	24.0	74	30.1	0.000
It affect pregnant mother	95	52.5	172	95.0	0.000	163	66.3	152	61.8	0.000
It affect women in childbearing age	106	58.6	167	92.3	0.000	167	67.9	135	54.9	0.126
Total mean percent		**53.1**		**90.8**			**55.8**		**60.9**	

as baseline data before the program about tetanus toxoid immunization in child bearing age.

Phase II: Implement TT training program

In which tetanus toxoid immunization in childbearing age program material was developed by the researcher based on available resources and review of relevant literature including WHO and booklets regarding tetanus toxoid immunization in childbearing age to help the participant in receiving the message. The program activities were implemented through two sessions; the time period for each session was two hours for study group, one week for each university. The program were presented in a clear, concise manner and focused on the point to be learned, using different methods such as lectures, pictures, broacher discussion, and videotapes.

Phase III: Evaluation phase

Evaluation of the program for TT immunization of women in childbearing age were done six months after implementation of the program, data were collected using the same method of data collection used in phase one.

Data analysis method

(i) The collected data were interred in to SPSS variation 20.

(ii) The data were organized, tabulated and analyzed using descriptive statistics.

(iii) The inferential statistics (nonparametric test Wilcoxon sign rank test) were used to find out the differences in knowledge and attitude between pre and post-test for study and control group. The results were presented in Tables 1 to 7 and Figures 1 to 4.

Ethical consideration

Official consent was obtained from the Graduate College Medical and Health Studies Board -University of Khartoum. An official consent was obtained from the dean of faculties of nursing students.

The researcher made it clear to the participants in the study that they could withdrawal at any time and their rights will be protected.

High confidentiality were observed during filling questionnaire.

RESULTS

Interventional study was conducted in all Government Universities in Khartoum state that has faculty of nursing sciences, to study the effect of tetanus toxoid immunization training Program on knowledge and attitude of female nursing students. All the data was obtained from a sample of 181 of students in the study group, and 246 of the students for control group, both groups were enrolled in the study. The data collected were analyzed statistically and the result were categorized in parts which are demographic variable, previous immunization, sources of information, numbers of doses and reasons for not being immunized for the study and control groups. These also include knowledge of study and control group and the statistical test for it, practicing immunization and finally mean percentage of the attitude. The study has shown the fallowing findings as explained in the Figures 1 to 4 and Tables 1 to 7.

DISCUSSION

An interventional study was conducted to study the effect of tetanus toxoid immunization training program on knowledge and attitude of female nursing students. In this study, mean knowledge was changed obviously from 1.5709 pre to 1.8154 post interventions. The result supported by MIJAL study, showed changed in mean score from 4.77

Table 2. Complication, venerable age group and target group for immunization of study and control pre and post intervention .

Variable	Study group pre		Study group post			Control group pre		Control group post		
	Frequency	%	Frequency	%	P value	Frequency	%	Frequency	%	P value
Complication										
Disability	77	42.5	160	88.4	0.000	144	58.5	132	53.7	0.251
Death	89	49.2	154	85.1	0.000	164	66.7	179	72.8	0.000
Total mean percent		**45.9**		**86.8**			**62.6**		**63.3**	
Venerable age group prone to tetanus										
Neonate	100	55.2	172	95.0	0.000	104	42.3	101	41.1	0.005
1month – 1 year	46	25.4	164	90.6	0.000	78	31.7	55	22.4	0.000
1-5 years	45	24.9	158	87.3	0.000	97	39.4	88	35.8	0.000
6-12 years	63	34.8	158	87.3	0.000	94	38.2	80	32.5	0.000
Women of 15-49years	123	68.0	177	97.8	0.000	169	68.7	155	63.0	0.000
Others	34	18.8	158	87.3	0.000	50	20.3	32	13.0	0.000
Total mean percent		**37.9**		**90.9**			**45.1**		**34.6**	
Target group for immunization										
Newborn	117	64.6	165	91.2	0.000	141	57.3	112	45.5	0.161
Mother of newborn	128	70.7	163	90.1	0.000	134	54.5	123	50.0	10.000
Bothe mother and newborn	126	69.6	175	96.7	0.000	154	62.6	175	71.1	0.000
Women of 15-49 years	116	64.1	158	87.3	0.000	154	62.6	144	58.5	0.007
Pregnant women	113	62.4	168	92.8	0.000	132	53.7	157	63.8	0.000
Children <5 years	47	26.0	122	67.4	0.000	65	26.4	82	33.3	0.000
Total mean percent		**59.6**		**87.6**			**52.9**		**53.7**	

Table 3. Knowledge about immunization schedule, importance, purpose of vaccine receiving and side effects of vaccine for study and control group pre and post intervention.

Variable	Study group pre		Study group post			Control group pre		Control group post		
	Frequency	%	Frequency	%	P value	Frequency	%	Frequency	%	P value
Knowledge about immunization										
Did you know about tetanus toxoid immunization schedule in child bearing age	71	39.2	167	92.3	0.000	181	73.6	145	58.9	0.004
Did you have knowledge about the importance of TT vaccination	92	50.8	174	96.1	0.000	142	57.7	200	81.3	0.000
Five doses of vaccine should receive during reproductive age	26	14.4	157	86.7	0.000	129	52.4	168	68.3	0.000
Total mean percent		34.8		91.7			61.2		69.5	

Table 3. Cont'd.

The purpose of vaccine receiving										
To protect mother and child	168	92.8	181	100.0		215	87.4	229	93.1	0.000
Total mean percent		92.8		100.0			87.4		93.1	
Side effects of vaccine										
Pain in the site of injection	107	59.1	158	87.3	0.000	181	73.6	160	65.0	0.000
Swollen at site of injection	64	35.4	137	75.7	0.000	138	56.1	108	43.9	0.064
Slight fever	76	42.0	138	76.2	0.000	151	61.4	143	58.1	0.009
Headache	44	24.3	119	65.7	0.000	106	43.1	53	21.5	0.000
Allergy	59	32.6	129	71.3	0.000	52	21.1	47	19.1	0.000
Total mean percent		38.7		75.2			51.1		41.5	

Table 4. Mean percent of knowledge for study and control group.

Variable	Mean percent of study group		Mean percent of control group	
	Pre	Post	Pre	Post
General information about tetanus	53.1	90.8	50.8	60.9
Spread of tetanus	40.03	85.06	52.7	55.2
Signs and symptoms	31.9	92.8	41.6	49.8
Complication	45.9	86.8	62.6	63.3
Venerable age group prone to tetanus	37.9	90.9	45.1	43.6
Target group for immunization	59.6	87.6	52.9	53.7
Dealing of wound, emergency care for break skin	64.2	86.6	69.6	62
Period of communicability for study group	18.2	56.2	42.2	36.6
Knowledge about immunization	43.8	91.7	61.2	69.5
The purpose of vaccine receiving	92.8	100	87.4	93.1
Side effects of vaccine	38.7	75.2	51.1	41.5
Total	47.83	85.78	56.11	57.2

Table 5. Knowledge mean and standard deviation of study group pre and post.

Variable	Knowledge		
	N	Mean	Std. Deviation
Study group pre	181	1.5709	0.14531
Study group post	181	1.8154	0.12049

Table 6. Test statistics for study and control group pre and post.

	Knowledge of study group (post – pre)	Attitude of study (group post _ pre)	Knowledge of control (post- pre)	Attitude of control group (post _ pre)
Z	-10.525-[c]	-11.980-[b]	-1.059-[b]	-.239-[b]
Sig. (2-tailed)	0.000	0.000	0.290	0.811

Wilcoxon Signed Ranks Test.

Table 7. Attitude of study group pre and post**.**

Variable	Pre				Post			
	Positive attitude		Negative attitude		Positive attitude		Negative attitude	
	F	%	F	%	F	%	F	%
Tetanus immunization can be given to students in the university	163	90	19	10.0	166	91.7	14	7.8
Do you need to be routinely immunized against tetanus in child bearing age	113	62.4	88	37.6	153	84.5	48	26.3
My family will not agree that I should be given injection in the university even if they know the benefits	3	1.7	178	98.3	10	5.5	170	93.9
It is not possible to give immunization in the form of injections to the students in the university	5	2.8	176	97.3	2	1.2	178	98.3
Routine tetanus immunization in adults is neglected in our country.	87	48.1	94	52.0	122	67.4	58	32.0
Updating knowledge on adult immunization can be achieved through participation in a training program	171	94.5	10	5.5	171	94.4	9	4.0
Regular seminar/refresher courses regarding immunization are needed.	168	92.8	13	7.2	176	97.2	4	2.3
I think majority of students will receive tetanus immunization in university if government made it compulsory	168	92.9	13	7.2	173	95.5	7	3.9
Immunization against tetanus is the responsibility of all health care providers.	167	92.2	14	7.8	173	95.6	7	3.9
Awareness and knowledge among students and teachers concerning the importance of tetanus toxoid injection is low	140	77.4	41	22.6	159	87.8	21	11.6
Total		65,48		34.55		72.08		27.28

pre to 13.52 post intervention, Mijal (2009) compared study done in china which showed inadequate knowledge and misunderstanding regarding TT immunization in study participants pre intervention program (Hadeel and Iqbal, 2014). In this study Wilcoxon signed rank test showed statistical insignificant for knowledge between study and control group, and this support educational program can help in changing knowledge. In this study knowledge was adequate in some items, such as purpose of vaccine was 98% pre changed to 100 post; however, in adequate in other items. This is similar to the study done in Iraqi which showed their knowledge of study participants were adequate in some items and inadequate in other items (Essen, 2006).

Knowledge regarding signs and symptoms of study group was inadequate pre intervention, which

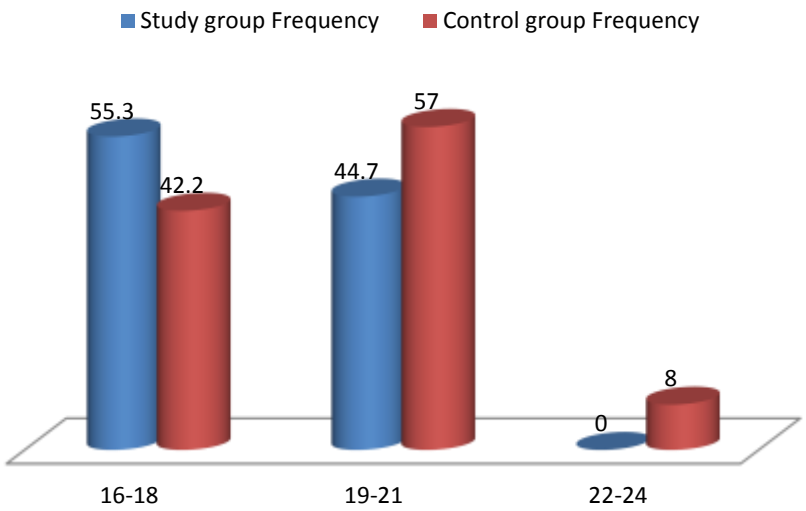

Figure 1. Age of study and control group.

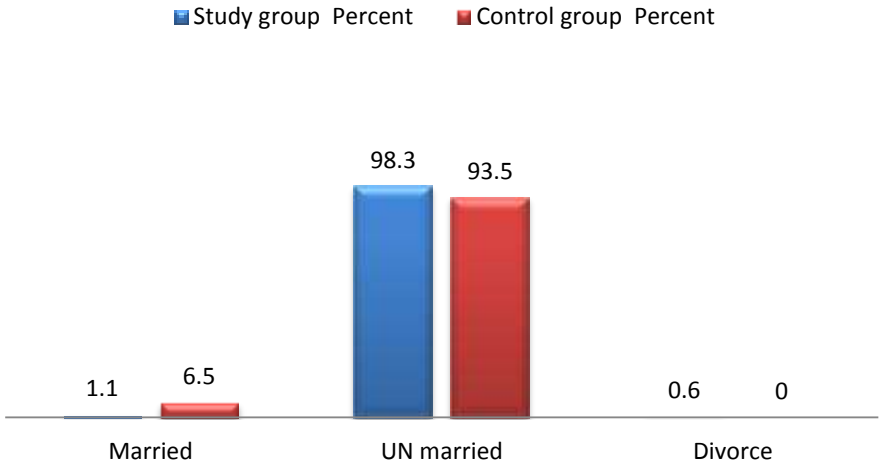

Figure 2. Marital status for study and control group.

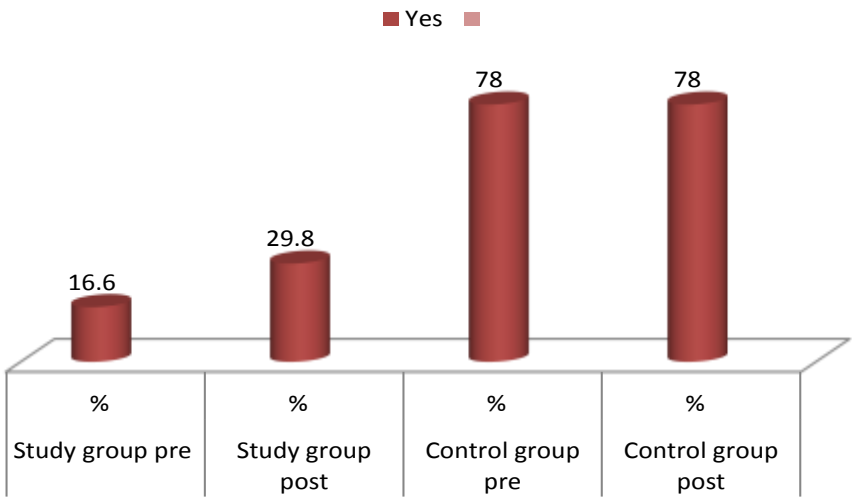

Figure 3. Percentage of Immunization against tetanus for study and control group.

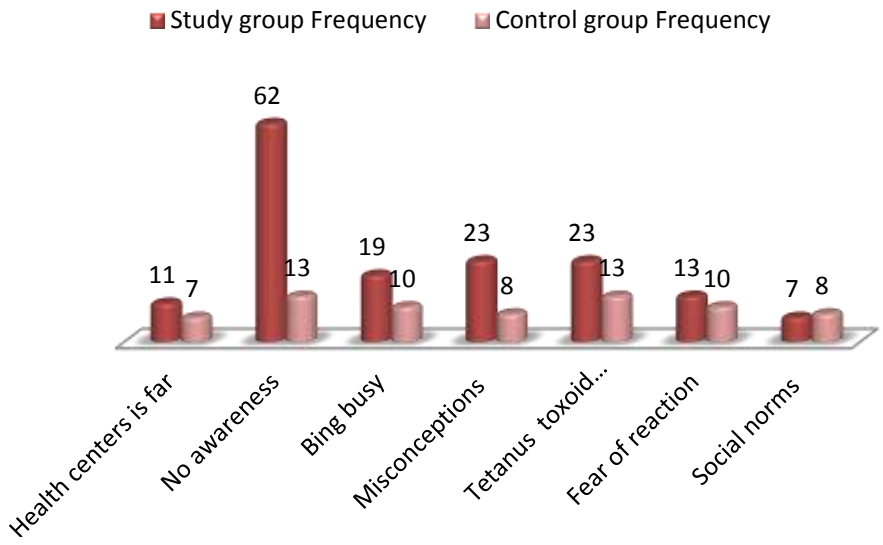

Figure 4. Reasons for not immunized against tetanus study and control group.

represent 31.9 changed to 92, 8 post, and knowledge regarding period of communicability were changed from 18.2 pre to 56.2 post, compared to control group which was changed negatively from 42.2 to 36.6, which meanseducational program has positive effect on changing knowledge in study participant . Total mean percent of knowledge items were changed in the study group (pre 47.8 to 85.8 post and for control group 56.1pre changed to 57.2 post).

In this study, attitude was changed for study group pre and post, total mean percent for positive attitude 65 (48%) pre were changed to 72.8 post intervention; while negative attitudes were changed from 34.55%pre to 27.28% post. Wilcoxon Signed Ranks test showed statistically significant in study group pre and post intervention with (p value = 0.000) this is similar to MIJAL study, attitude was statistically significant (Mijal, 2009).Concerning attitude of control group, it was insignificant among pre and post intervention.

This study showed that most participant source of information about tetanus toxoid immunization was family (41.4%), media 30.3%, and health center 18.8 for study group and family39%, media 26% and health center 17.5 for control group.This is compared to a study done in Dhaka, which showed respondent's source of knowledge about TT immunization was watching television 35%, health workers 24%, newspaper 16%, radio 13% and other sources 12% (Chowdhury et al., 2011).

In this study 16.6% of study group were immunized pre and 29.8% post. For participants who were not immunized, misconception had a higher percentage, 62%and tetanus toxoid not available at the near center, 23% for study group. Compared to study done by TanjidaShilpi, among the group not vaccinated, 50% respondents told their unawareness about need for vaccination against tetanus before the start of their reproductive life, 15.4% said they lack information regarding place and time of vaccination and 19.6% complained about inconvenience in schedule and place of vaccination (Tanjida et al., 2009).

In this study, participant who were immunized only one number of doses are 13.8 pre and 14.4 post, 0.06%pre to 8.3% post for two. This is similar to the study done by Mijalstating there was dramatic change in dose two from 0% pre to 100 post (Mijal, 2009).

Recommendation

1. Use a mass media campaign to create awareness among women, in childbearing age and families about the importance of TT vaccination & consequences of not being vaccinated.
2. Health promotion by making the TT vaccine available & accessible for all women at their reproductive age in the university.
3. Improve the monitoring and supervision of vaccination activities by ministry of health.
4. Regular training program about immunization for students in child bearing age
5. Regular refresh seminars are needed.

Conclusion

The educational program resulted in significant changed of knowledge from pre to post intervention for study group, also changed of attitude and increased vaccination status of the participant from pre intervention to post intervention .we need also further study and increasing sample size for generalizability of the study.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

REFERENCES

Abir T, Ogbo FA, Stevens GJ, Page AN, Milton AH, Agho KE (2017). The impact of antenatal care, iron–folic acid supplementation and tetanus toxoid vaccination during pregnancy on child mortality in Bangladesh. PLoS ONE 12(11):e0187090. https://doi.org/10.1371/journal. pone.0187090

Ahmed SI, Siddiqu MI, Jaffrey IA, BaigL, Thaver IH, Javed A (2001). Knowledge, Attitudes and Practices of General Practitioners in Karachi District Central about Tetanus Immunization in Adults.Www.Researchgate.Net/.../11588782

BlencoweH, Lawn J, Vandelaer J, Roper M, Cousens S (2010). Tetanus Toxoid Immunization to Reduce Mortality from Neonatal Tetanus. Www.Ncbi.Nlm.Nih.Gov/Pmc/Articles/Pmc284586

Chowdhury A, Mukherjee, A .Krlahiri S (2011).A Study on The Knowledge of Tetanus Immunization Among Internees In A Government Medical College of Kolkata. National Journal of Community Medicine 2(3).Http://Njcmindia.Org/Uploads/2-3_432-439.Pdf

El-Sayed E (2006). Highlight on Expanded Program of Immunization in The Sudan. Sudanes Journal on Public Health: April.Www.Sjph.Net.Sd/Files/V1i2p152-158.Pdf

Essen B (2006).Tetanus Immunization Status of Women in Childbearing Age in Turkey. Japan Journal of Infectious Disease 60(92):6. Www.Ncbi.Nlm.Nih.Gov/Pubmed/17515639

Federal Ministry of Health, Republic of Sudan, Primary Health Care Directorate (2005).Expanded Programme on Immunization. Comprehensive Multi-Year National Immunization Plan 2006-2010. Www.Gavialliance.Org/Country/Sudan

Han WK (2016).Immunogenicity of MenACWY-CRM in Korean Military Recruits: Influence of Tetanus-Diphtheria Toxoid Vaccination on the Vaccine Response to MenACWY-CRM.Yonsei Medicine Journal 57(6):1511-1516 http://dx.doi.org/10.3349/ymj.2016.57.6.1511

Mijal AH (2009).The Effect of House To House Tetanus Toxoid Immunization And Individual Health Counseling Regarding The Importance Of Prenatal Care On The Knowledge, Attitude And Practices Among Pregnant Women Not Availing Prenatal Care In Three Selected Barangays of Ipil, ZamboangaSibugay. ADZU-SOM RESEARCHES/LEVEL42009/MIJAL, ANZAR H.

Millennium Development Goals (2005- 2015). Goal 5: Improve Maternal Health - Case study, West Africa. Available @http://www.bbc.co.Uk/worldservice/specials/l 112 mdg/page6.shtml accessed on 5/01/16 @ 20:00 hours

Naeem M, Zia-Ul-Islam Khan M, Abbas S, Adil M, Khan A, Maria Naz (2010). Coverage And Factors Associated with Tetanus Toxoid Vaccination among Married Women of Reproductive Age: A Cross Sectional Study In Peshawar.. Http://Www.Ayubmed.Edu.Pk/Jamc/Past/22 3/Naeem.Pdf

Njidda UM, Kever RT, Lola N (2017). Assessment of parents knowledge towards the benefts of child immunization in Maiduguri, Borno State, Nigeria. Nurse Care Open Access Journal 3(2):226-239. DOI: 10.15406/ncoaj.2017.03.00067

NoraR (2012). Knowledge and Attitudes on Tetanus Toxoid Immunization with the Completeness of Pregnant Women's Immunization in Indragiri Hulu District of Riau Province.Www.Ph-Gmu.Org/Test/Wisuda/Publikasi/Online/.../Ruspanora.Pdf

Obaid T (2007). Achieving The Millennium Development Goals Unfpa's Responses to the Needs of Safe Motherhood and Newborn Care in Viet Nam.Http://Vietnam.Unfpa.Org/Webdav/Site/Vietnam/Shared/2_Eng_All.Pdf

Ogbeyi OG, Gbahabo D, Afolarani D, Knowledge T (2017). Beliefs and Practices Regarding TetanusToxoid Immunization AmongNursing Mothers in Benue State, North Central, Nigeria. International Annals of Medicine 1(8).https://doi.org/10.24087/IAM.2017.1.9.275

Qadir.M, Murad.R, Mumtaz.S, Azmi.A, Rehman.R, Hani O (2007). Frequency of Tetanus Toxoid Immunization among College/University, Female Students of Karachi. Http://Www.Ayoubmed.Edu.Pk/Jamc/Past/22-1/Murad.Pdf

Shafiq E (2017). Knowledge, attitudes and practices related to tetanus toxoid vaccination in woman Journal of Infection Prevention. 18(5):232-241 .DOI: 10.1177/1757177416689722 jip.sagepub.com

Shultz T (2015). A Systems Approach to Improving Tdap Immunization Within 5 Community-Based Family Practice Settings: Working Differently (and Better) by Transforming the Structure and Process of Care. American Journal of Public Health | October 105:10

Singh A, Pallikadavath S, Ogollah R, Stones W. (2012). Maternal Tetanus Toxoid Vaccination and Neonatal Mortality in Rural North India. Www.Plosone.Org

Sirri M (2007). Effects of the Expanded Program of Immunization on Children between the Ages Of 0-11 Months within the Bafut Health District. Bamenda University of Science and Technology.Www.MinsanteCdnss.Cm/ Download/File/Fid

Sobhan F, Yasmeen N, SobhanF (2007). Knowledge Regarding Tetanus And Status Of Tetanus Toxoid Vaccination Among Nurses In A Tertiary Hospital, DhakaWww.Supportforlife.Org/.../5270

Tanjida S,,ArifulHuqSm, Sudhira B, Nahid S (2009). Status Of Knowledge And Practice About Complete Tetanus Toxoid Immunization Of Unmarried Female Students Of A Public University In Dhaka. Bangladesh Journal of Medical Science 8:4.

Verma R, Khann P (2012).Tetanus Toxoid Vaccine, Elimination Of Neonatal Tetanus In Selected States of India. Http://Dx.Doi.Org/10.4161/Hv.21145www.Landesbioscience.Com

WHO (2006).Department of Making Pregnancy Safer. Standard for Maternal and Child Health..Maternal Immunization against Tetanus .Integrated Management of Pregnancy and Childbirth.20 Avenue Appia 1211 Geneva 27 Switzerland.Www.Who.Int

APPENDIX

Questionnaire of research

This questionnaire is designed to assess The Effect of Tetanus Toxoid Immunization training Program on Knowledge and Attitude of female nursing students in governmental universities in Khartoum state .and the information is for research purpose only and will kept safe and not used for other purposes.

Appendix I.

A-	**Demographic variables**				
1-	**1-**	**Age in year**			
2-	**2-**	**University name**:			
	-	Khartoum			
1-	-	Omdurman Islamic university			
1-	-	Khartoum north university			
1-	**3-**	**Marital status**			
1-	-	Married			
1-	-	UN married			
1-	-	Divorce			
1-	**4-**	**Residence**			
	-	East of the Sudan			
1-	-	North of Sudan			
1-	-	West of Sudan			
1-	-	Middle of Sudan			
	-	South of the Sudan			
	-	Others			
			Scores		
B	**Knowledge information**		1 yes	0 No	0 I don't know
	5-	**Do you hear about tetanus toxoid vaccination in child bearing age**			
	6-	**If yes from where you know (source of knowledge about TT vaccination)**			
	-	family			
	-	college			
	-	media			
	-	health center			
	-	others			
	7-	**What do you know about tetanus**?	Yes	No	I don't know
	-	Highly infectious			
	-	Vaccine preventable			
	-	Enter the body through the wound			
	-	Enter the body through umbilical stump and UN clean delivery.			
	-	It cause by anaerobic bacteria			
	-	It affect pregnant mother			
	-	It affect women in childbearing age			
	8-	**How does the tetanus spread**	Yes	No	I don't know
	-	C. tetani spores can be found in the soil and in the intestines and feces			
	-	of many household and farm animals and humans It affect newborn			
	-	The bacteria usually enter the human body through a puncture conditions			
	-	Tetanus is not spread from person to person			
	9-	**Tetanus results in severe, uncontrollable muscle spasms. For example, the jaw is "locked" by muscle spasms, causing the disease**			
	10-	**Tetanus may develop in people who are not immunized against it or in people who have failed to maintain adequate immunity with active booster doses of vaccine**			
	11-	**What is venerable age group prone to tetanus**			
	-	Neonate			

Appendix I. Cont'd

- 1 month – 1 year
- 1-5 years
- 6-12 years
- Women of 15-49years
- Others

12- Target group for immunization

- Newborn
- Mother of newborn
- Bothe mother and newborn
- Women of 15-49 years
- Pregnant women
- Children <5 years
- No idea

13- If people have a wound, they should seek medical attention

14- If they are not immunized against tetanus or have not kept up tetanus booster shots every 10 years, any open wound is at risk of developing tetanus

15- If individuals have trouble swallowing or have muscle spasms in the facial muscles, go to the emergency department for treatment immediately

16- Any wound that results in a break in the skin should be cleaned with soap and running water in order to prevent tetanus

17- How long does it take to show signs of tetanus after being exposed?

- The incubation period varies from 3–21 days, with an average of eight days
- The further the injury site is from the central nervous system, the longer the incubation period.
- The shorter the incubation period, the higher the risk of death

18- Is TT vaccine is important for women in child bearing age

19- Do you know about tetanus toxoid immunization schedule in child bearing age

20- How many doses the women should take in child bearing age to prevent her and her newborn from maternal and neonatal tetanus

- One dose
- Two doses
- Three doses
- Four
- Five doses

21- Have you previously been immunized against tetanus?

22- If the answer in the question above no why not immunized before

- Health centers is far
- **No awareness**
- Bing busy
- Misconceptions
- Tetanus toxoid immunization not available in the center
- Fear of reaction
- Social norms
- Others

Appendix I. Cont'd.

23- If the question yes how many doses you take

- Only one
- Two
- Three
- Fourth
- Fifth

24- When you immunized before

- One month ago
- Three month
- Six month
- Over One year
- Cannot remember
- Not receive

25- If you are immunized before At which age you are immunized

- Infancy
- child hood
- adolescents
- adult hood

Appendix 2. Attitudes scale

	Strongly agree	Agree	Disagree	Strongly disagree
1- Tetanus immunization can be given to students in the university				
2- Do you need to be routinely immunized against tetanus in child bearing age				
3- My family will not agree that I should be given injection in the university even if they know the benefits				
4- It is not possible to give immunization in the form of injections to the student in the university				
5- Routine tetanus immunization in adults is neglected in our country.				
6- Updating knowledge on adult immunization can be achieved through participation in a training program.				
7- Regular seminar/refresher courses regarding immunization are needed.				
8- I think majority of students will receive tetanus immunization in university if government made it compulsory				
9- Immunization against tetanus is the responsibility of all health care providers.				
10- Awareness and knowledge among students and teachers concerning the importance of tetanus toxoid injection is low				