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Effects of directly observed treatment short-course education program on the knowledge, attitude and practice of community health extension workers in the management of tuberculosis in Sagamu local government, Ogun state, southwest Nigeria

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ABSTRACT

Background: Tuberculosis (TB) is one of the leading infectious diseases globally. Effective follow-up of TB patients is imperative for disease control. The present study assessed the effects of a directly observed treatment short course (DOTS) education program on the knowledge, attitude and practice (KAP) of community health extension workers (CHEWs) in the management of TB in Sagamu, Ogun State, Southwest Nigeria.

Methods: A controlled experimental study was carried out in three phases (pre-training, immediate post-training and three months post-training) between two groups (control and intervention groups). Data were analyzed using paired and Student's t-tests as appropriate.

Results: Pre-training assessment KAP scores were poor for CHEWs in both the control and intervention groups. There was a statistically significant increase (p<0.05) in KAP of DOTS in TB management at both the immediate and three months post-training stages when compared with the pre-training stage. Comparison between the immediate and three months post-training scores showed no significant difference.

Conclusions: The education program was an effective intervention to improve the CHEW's knowledge, attitude and practice of DOTS in the management of tuberculosis. Thus, there should be frequent education of health care providers on DOTS to increase their capacities for meeting the challenges of providing care for tuberculosis patients.

Keywords: Tuberculosis, CHEW, DOTS, Sagamu

INTRODUCTION

Tuberculosis (TB) is a chronic infectious disease caused by Mycobacterium tuberculosis. Global statistics show that over 10 million people are infected with TB, and in 2013 alone, 9 million new cases were recorded. The TB scourge is further worsened by the HIV/AIDS epidemic, as a third of HIV/AIDS patients is co-infected with TB. With an annual mortality of 1.45 million deaths despite intense prevention and control campaigns, more stringent attention should be focused on monitoring and

evaluation.³ According to national tuberculosis and leprosy control program in Nigeria (NTBLCP), Nigeria is ranked among the 22 high burden countries in the world with predisposing factors including: overcrowding, poor nutrition, poverty, improper diagnosis and treatment and poor compliance.^{4,5} In an attempt to stem TB epidemic, the World Health Organization (WHO) introduced the Directly Observed Treatment Short course (DOTS) strategy.⁶ The DOTS strategy lays emphasis on close treatment monitoring of TB. Consequently, to achieve wide coverage of National health policies, new cadres of

health workers whose orientation tended towards the provision of health care in rural communities were developed. Among these cadres of workers are the Community Health Extension Workers (CHEWs). The CHEWs receive formal training which enables them serve as first line primary health care workers at the grass roots. To ensure early diagnosis and effective management of TB, it is therefore pertinent to ascertain the level of knowledge, attitude and practice of DOTS by CHEWs.

METHODS

Study location: This study was carried out in Sagamu, Ogun state in the southwestern part of Nigeria. Sagamu is a semi-urban area with an estimated population of about 200,000 people, ¹⁰ four health clinics and two Tuberculosis and Leprosy (TBL) control centers. The control subjects were obtained from Ikenne local government area also in Ogun state. Ikenne is also a semi-urban area with an estimated population of about 140,000 people, which is serviced by five health clinics. All health facilities in both local government areas provide DOTS services to TB patients.

Study population: This study was a controlled experimental study. All 112 CHEWs in the health facilities within Sagamu and Ikenne local government areas were included in the study. The 58 CHEWs in Sagamu served as the intervention group, while 54 CHEWs in Ikenne served as the control group.

Sample size: The minimum expected sample size for an observable mean difference between control and study group of 10% (0.01) or more at 0.05 level of significance was calculated using following the method.¹¹

$$n = \frac{(Z\alpha + Z\beta)2 \ 2(\delta)2}{(M1-M0)2}$$

Where n= Minimum sample size for each group.

- Zα= standard normal deviate corresponding to 5% level = 1.96
- $Z\beta$ = standard normal deviate corresponding to 20% level = 0.84
- δ = standard deviation from previous study.

M1-M0= Minimum anticipated difference to be judged statistically significant.

$$n = \frac{(1.96 + 0.84)2_{\chi} 2(1.78)2}{(10)2}$$
$$n = 49.68 \approx 50$$

The study groups therefore had the required minimum sample size of 50 subjects each; 58 CHEWs in Sagamu formed the intervention group, while 54 CHEWs in Ikenne formed the control group.

The pre-intervention (pre-training) activities included (a) obtaining official permission to proceed with the study from the Local Government Area authorities, (b) consent of the CHEWs to fully participate at all stages of the study was obtained, (c) the study questionnaire was pretested among CHEWs in another local government area and necessary corrections were made, (d) a base-line survey to determine the CHEWs knowledge, attitude and practice (KAP) of DOTS was conducted using the corrected questionnaire. This represented the pre-training assessment for the intervention group and the initial assessment for the control group.

The training program used for the study consisted of a structured educational protocol based on the Federal Ministry of Health National Tuberculosis and Leprosy Control Program (NTBLCP) revised workers manual. ¹² These sessions covered all aspects of the management of tuberculosis (DOTS). Participating CHEWs (intervention group) were divided into four batches with an average of 14 CHEWs each, and the training lasted two weeks.

The first post intervention evaluation was done immediately after the training (immediate post-training assessment). The second evaluation was carried out three months after the training (three months post-training assessment). Evaluation of the effects of training was done using standardize scores for the various variables during analysis. For the control group, reassessments were conducted two weeks and three months after the initial assessment.

The assessments were done using self-administered structured questionnaires. The EPI-INFO 6 statistical computer software was used for the data entry, validation and analysis. Scores were assigned to the variables evaluated. The total scores were 40 for knowledge, 16 for attitude and 10 for practice (Total=66). Measures of central tendency and dispersion were computed for variables, and means compared. The pre-training assessments were compared with the post-training assessments, while the control group was compared with the intervention group using the paired t-test. Level of significance was put at p<0.05.

RESULTS

Mean age of the respondents was (37.1 ± 7.1) years. The male to female ratio was 1:1.6 for all respondents. Also, 74.1% of all the participants were married (Table 1). The mean years of experience were 9.2 ± 1.2 years (Table 1). 68.8% of the participants had cared for TB patients prior training (35 in the intervention group and 42 in the control group) and 40.2% of the respondents were caring for TB patients during the training (24 in the control group and 21 in the intervention group) (Table 1). Only 23.2% of the respondents (12 of the control group and 14 of the intervention group) had received any training in DOTS management of TB prior to the training, hence, majority 97.3% considered the training necessary.

Before the training, about 50% of participants in both groups had any knowledge of DOTS-related terms and acronyms (Tables 2 and 3). Immediately after training, knowledge increased to between 89% and 98% (p<0.05) in the intervention group, and remained high three

months after training (79.6% to 96.3%) (Table 2). The generally poor awareness pattern did not change significantly in the control group neither during second assessment nor third assessment (Table 3).

Table 1: Demographic distribution of respondents.

Characteristics	Contro (n=54)	ol group n %	Interve (n=58)	ntion group n %	Chi-square	p-value
Age (years)						
<31	10	18.5	6	10.3		
31-40	29	53.7	31	53.4	2.21	0.530
41-50	11	20.4	17	29.3	2.21	0.550
>50	4	7.4	4	6.9		
Sex						
Male	24	44.4	20	34.5	1.16	0.201
Female	30	55.6	38	65.5	1.10	0.281
Marital status						
Single	17	31.5	12	20.7	1.70	0.193
Married	37	68.5	46	79.3	1.70	0.193
Years of experience						
<1	5	9.3	0	0.0		
1-5	13	24.1	7	12.21		
6-10	18	33.3	24	41.4		
11-15	8	14.8	9	15.5	10.39	0.065
16-20	2	3.7	6	10.3		
>20	8	14.8	12	20.7		
Cared for TB patient(s)in the pa	ı					
Yes	42	77.8	35	63.6	2.627	0.105
No	12	22.2	20	36.4		
Caring for TB patient(s) now						
Yes	24	44.4	21	36.8	0.665	0.415
No	30	55.6	36	63.2		0.415

Table 2: Awareness of dots-related acronyms in intervention group.

DOTS-related terms and acronyms	Pre-train assessme (n=58)		Immedia training (n=58)	nte post- evaluation	Three more post-train evaluation	ing	p-value)
	f	%	f	%	f	%	
AAFB	15	25.9	54	93.1	47	87	P=0.000*,P=0.149
Short course chemotherapy	15	25.9	54	93.1	47	87	P=0.000*, P=0.149
BCG	38	65.5	56	96.6	52	96.3	P=0.000*, P=1.580
Contact tracing	17	29.3	55	94.8	51	94.4	P=0.000*, P=0.944
Treatment failure	17	29.3	55	94.8	51	94.4	P=0.000*, P=0.944
Defaulter	17	29.3	55	94.8	51	94.4	P=0.000*, P=0.944
Isoniazid	35	60.3	56	96.6	51	94.4	P=0.000*, P=0.818
Tubercle bacillus	30	51.7	57	98.3	51	94.4	P=0.000*, P=0.181
Rifampicin	32	55.2	57	98.3	52	96.3	P=0.000*, P=0.817
Intensive phase	15	25.9	56	96.6	51	96.3	P=0.000*,P=0.821
Continuation phase	15	25.9	56	96.6	51	96.3	P=0.000*,P=0.821
Mantoux	36	62.1	57	98.3	51	96.3	P=0.000*,P=0.817
DOTS	7	12.1	52	89.6	43	79.6	P=0.000*,P=0.667
Drug compliance	27	46.6	53	91.3	51	94.4	P=0.000*,P=0.590

f= frequency, upper p-value compares pre-training assessment with immediate post-training evaluation. Lower p-value compares immediate and three months post-training valuation. *= statistically significant.

Table 3: Awareness of DOTS-related acronyms in control group.

DOTS-related terms and acronyms	Assess	aining sment (n=54)	Immediat training e (n=54)		post-tr	months aining tion (n=52)	p-value
	f	%	f	%	f	%	
AAFB	12	22.2	14	25.9	12	23.1	P1=0.155 P2=0.134
Short course chemotherapy	12	22.2	14	25.9	12	23.1	P1=0.155 P2=0.134
BCG	39	72.2	38	70.4	36	69.2	P1=0.556 P2=0.580
Contact tracing	14	25.9	12	22.2	12	23.1	P1=0.667 P2=0.768
Treatment failure	14	25.9	12	22.2	12	23.1	P1=0.667 P2=0.768
defaulter	14	25.9	12	22.2	12	23.1	P1=0.667 P2=0.768
Isoniazid	32	59.3	30	55.6	28	53.8	P1=0.812 P2=0.818
Tubercle bacillus	30	55.6	30	55.6	30	57.7	P1=0.148 P2=0.181
Rifampicin	28	51.9	29	53.7	27	51.9	P1=0.822 P2=0.817
Intensive phase	16	29.6	16	29.6	13	25.0	P1=0.811 P2=0.821
Continuation phase	16	29.6	16	29.6	13	25.0	P1=0.811 P2=0.821
Mantoux	34	62.9	36	66.7	34	65.4	P1=0.834 P2=0.817
DOTS	4	7.4	5	9.3	4	7.7	P1=0.611 P2=0.667
Drug compliance	24	44.4	26	48.1	21	40.4	P1=0.582 P2=0.590

f= frequency, P1-value compares pre-training assessment with immediate post-training evaluation. P2-value compares immediate and three months post-training valuation. *= statistically significant.

The mean scores for knowledge of DOTS in the control and intervention groups were 16.00 ± 1.2 and 16.32 ± 1.4 with the mean difference of 0.32. This highlights the similar level of DOTS knowledge in both groups prior to the implementation of the program. Comparison of the two post-training evaluation stages (in the intervention group) did not show any significant difference. In the control group, there was no appreciable improvement in the knowledge of respondents during the three assessments (Tables 4 and 5).

More than half of the respondents 51.8% had a negative attitude to DOTS prior to training; 28 of these 58 were from the control while the remaining 30 were from the intervention group (Tables 4 and 5). Prior to the training program, all participants (100%) showed bad practice of DOTS (Tables 4 and 5). There was no statistically significant difference in the level of knowledge of participants, attitude to DOTS and practice of DOTS in the control group at subsequent evaluations, while there

were statistically significant improvements in the intervention group (Table 6).

Table 4: Baseline distribution of perception.

	Conti	rol	Interv	ention
Scores	f	%	f	%
knowledge				
0-9	2	3.7	2	3.5
10-19	32	59.3	35	61.4
20-29	15	27.8	14	24.6
30-39	5	9.2	6	10.5
Attitude				
0-7	28	51.9	30	51.7
8-16	26	48.1	27	48.3
Practice				
0-9	54	100	57	100
10-20	0	0	0	0

The mean perception scores at pre-, immediate post- and three months post-intervention for the control and intervention groups are shown in Table 7. The mean difference of changes in knowledge of DOTS was 15.22

(p=0.000), attitude to DOTS was 4.77 (p=0.000) and practice of DOTS was 4.42 (p=0.000) between the control and intervention groups (Table 8).

Table 5: Baseline scores.

	Group	Mean	% of total	Mean difference	t	p-value
		score	score			
Knowledge	Control	16.00	40.0	0.32	-1.668	0.120
(total=40)	Intervention	16.32	40.8			
Attitude	Control	7.46	46.6	0.08	-1.436	0.150
(total=16)	Intervention	7.54	47.2			
Practice	Control	3.96	39.6	0.40	1.208	0.230
(total=10)	Intervention	3.56	35.6			

Table 6: Pre and post-intervention scores.

	Mean difference	Standard deviation	Paired t	p-value	95% CI*
Control group					
Knowledge	-0.20	2.010	-0.70	0.485	-0.37-0.77
Attitude	0.04	0.989	0.29	0.776	-0.32-0.24
Practice	0.08	0.853	0.66	0.510	-0.32-0.16
Intervention group					
Knowledge	15.02	7.46	14.79	0.000	12.98-17.06
Attitude	4.82	3.25	10.88	0.000	3.93-5.70
Practice	4.50	2.16	15.30	0.000	3.91-5.09

Table 7: Comparison of changes in the groups.

	Mean difference	Standard deviation	Paired t	p-value	95% CI*
Control group					
Knowledge	-0.20	2.010	-0.70	0.485	-0.37-0.77
Attitude	0.04	0.989	0.29	0.776	-0.32-0.24
Practice	0.08	0.853	0.66	0.510	-0.32-0.16
Intervention group					
Knowledge	15.02	7.46	14.79	0.000	12.98-17.06
Attitude	4.82	3.25	10.88	0.000	3.93-5.70
Practice	4.50	2.16	15.30	0.000	3.91-5.09

Table 8: Comparison of means of the groups.

	Mean Difference	t	p-value	95% CI*
Knowledge	15.22	13.96	0.000	13.06-17.38
Attitude	4.77	9.96	0.000	3.82-5.72
Practice	4.42	13.52	0.000	3.77-5.07

^{*}CI= confidence interval

There were still significant differences in the knowledge, attitude and practice of DOTS between the control and intervention groups even after adjusting for sex, age, marital status, years of experience and previous experience in the management of TB patients (Table 9).

Table 9: Adjusted mean differences between the control and intervention groups.

	Mean difference	p- value	95% CI*
Knowledge	7.960	0.000	7.004-8.915
Attitude	2.546	0.000	2.159-2.933
Practice	2.298	0.000	1.998-2.598

^{*}CI= confidence interval

DISCUSSION

Community Health Extension Workers (CHEWs) were recruited soon after the introduction of DOTS into the Nigerian healthcare system.⁵ At this time, the country's

response to TB was still evolving and health training programs had not fully incorporated DOTS into their curricula. It is therefore unlikely that most of the participants received adequate formal instruction on DOTS in the management of TB. Majority (68.8%) of the CHEWs had cared for TB patients prior to the training and 45% of them were currently doing so at the time of this training. This suggests that majority of the CHEWs had cared for TB patients without adequate knowledge. This is possibly one major reason why TB control in the country has remained ineffective. He relative lack of professional preparation in DOTS management of TB was probably an important factor why virtually all the participants (97.3%) considered the proposed training necessary.

Before the educational intervention, the participants in both groups had low knowledge on all areas pertinent to the subject of DOTS in TB. Similar results have been reported among medical interns in other countries who showed poor knowledge of DOTS prior to appropriate training. ^{15,16} At the end of the training, there was significant increase in all aspects of DOTS-related knowledge in the intervention group much of which was still retained three months after the training. These findings suggest that once appropriately trained, health workers are likely to comply to the principles of DOTS in TB management, as has been suggested by others. ¹⁷⁻¹⁹

Prior to training, less than 50% of the control and intervention groups could accurately define a TB case, correctly identify new cases of TB or define the duration of phases of DOTS. Interestingly, by the end of the educational intervention, 92% to 96% of the intervention group could correctly outline the treatment phases of DOTS (p \leq 0.02). There was no appreciable improvement in the knowledge of the control group throughout the duration of the study.

More than half of the respondents (51.9% in control and 51.7% in the intervention group) had a negative attitude to DOTS at the start of the study. Such attitudes have been reported in previous studies. Before intervention, majority of the participants believed that TB was curable but were not sure whether DOTS was effective. Reasons given by CHEWs for their attitude on DOTS included: non-availability of drugs (55%), long duration of drug use (63%), delay in getting result from the laboratory (22%) and inadequate qualified workers to take care of patients (8%). Some participants felt that TB patients were not getting the best management from DOTS. The post intervention evaluation indicated positive changes in the attitude of the CHEWs to DOTS, while there was no significant change in attitude in the control group.

All (100%) of the participants showed very poor practice of DOTS in the management of TB patients in the pre-training phase. This generally poor performance rating in the overall DOTS-related practice on management of TB is probably an accurate reflection of actual workplace

practice of the participants. There was however a statistically significant improvement in the practice of DOTS in the intervention group during the intermediate and three months post-intervention evaluations (p = 0.000). No such improvement was observed in the control group as participants still showed poor practice of DOTS during and after the study.

Significant results were obtained for the changes in the intervention group but not in the control group. Even after adjusting for variables such as sex, age, marital status and years of experience, there was still a significant difference between the control and intervention groups concerning the management of TB using the DOTS method.

CONCLUSION

The education program was an effective intervention to improve the CHEW's knowledge, attitude and practice of DOTS in the management of tuberculosis. Thus, there should be frequent education of health care providers on DOTS to increase their capacities for meeting the challenges of providing care for tuberculosis patients. The difference observed between the two groups was due to the effect of an educational training on DOTS received by the intervention group. Thus, well-designed frequent education of CHEWs is essential to give them adequate knowledge of DOTS in the management of TB. This would inculcate appropriate attitudes and skills in the care of TB patients; ensure effective control of TB in the country and thus the achievement of one of the millennium development goals. Based on the findings of this study, recommendations would therefore be directed to the stakeholders at the three levels of health care delivery system in Nigeria; Local governments should conduct educational programs on the management of TB by DOTS, ensure effective supervision of workers and provide logistic support to ensure effective control. State governments should ensure that CHEWs are exposed to trainings by giving adequate support to TB and leprosy control programs. They should also put in place effective information systems to monitor TB-related cases in the state and provide adequate and competent human resources. Federal government should ensure adequate support to the state and local governments by providing free treatment for TB and making the study of DOTS a compulsory part of the curricula in all approved institutions for the training of CHEWs.

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Ethical approval: Ethical approval was obtained from the Health departments of Sagamu and Ikenne Local Governments. Informed consent was obtained from all respondents before administering the questionnaires and strict confidentiality of all information and results was maintained.

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