ORIGINAL ARTICLE

Assessment of Changes in Knowledge and Stigmatization Following Tuberculosis Training Workshops in Taiwan

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Background/Purpose: There is little understanding of the depth of knowledge of health workers involved in tuberculosis (TB) control programs, and even less is known about health workers attaching stigma to TB patients. This study surveyed health workers enrolled in TB training workshops prior to the execution of the directly observed treatment, short course (DOTS) program.

Methods: All participants attended the training course and completed structured questionnaires before (pre-test) and after training (post-test). The questionnaires were collected immediately following completion and the scores were analyzed.

Results: Pair comparison of knowledge scores revealed that all participants made statistically significant improvements in level of TB knowledge, except those who had a history of TB ($p = 0.331$). Pair comparison of stigmatization scores revealed a reduction in stigmatization, with the DOTS workers attaching less stigma to TB patients. After training, caregivers, including women ($p = 0.012$), public health workers ($p = 0.028$), 40–49-year-old subjects ($p = 0.035$), those with an education of < 12 years ($p = 0.024$), those who had been a volunteer ($p = 0.018$), and those who had a history of TB and those who did not ($p = 0.034$, $p = 0.036$), were significantly less likely to stigmatize patients. TB knowledge was not found to be significantly correlated with stigmatization (pre-test, $p = 0.298$; post-test, $p = 0.821$).

Conclusion: Training workshops in TB control were effective for promotion of knowledge and elimination of stigmatization in first-line caregivers. DOTS workers attached less stigma to TB patients than public health workers, and older workers who had been volunteers attached the least stigma. [*J Formos Med Assoc* 2009;108(5):377–385]

Key Words: knowledge, stereotyping, tuberculosis

Various issues of different magnitude and complexity are faced by the governmental tuberculosis (TB) control program; some of the most concerning of which are the quality and quantity of manpower. First-line caregivers have the most influence on the success of the TB control program; however, relatively little is known about their depth of knowledge with regards to TB control and the extent to which health workers stigmatize TB patients. Insufficient knowledge and the high individual cost of treatment have been identified as the main obstacles to compliance among men (poor patient compliance), while sensitivity to interaction with health staff and stigmatization in society (poor health staff and system compliance) have been reported as the main obstacles among

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women.[1] Directly observed treatment (DOT), facilitated by education, holistic care, enablers and incentives, is still the best strategy to ensure patient adherence to treatment.[2] Health education must be stepped up within the TB control program, and the psychosocial implications of TB should be given due consideration.[3]

TB is often not treated completely; the reasons for this being related to poor adherence, delayed diagnosis, patients not completing treatment, and even hidden social prejudice. The most common reasons given for stopping treatment are adverse effects, health-care-worker mistakes or behavior, and health service failure. The desire to be cured and the knowledge that TB is curable are the most common reasons cited for completing treatment.[4]

Many consider TB patients to be unclean and link TB with AIDS, which leads to social stigmatization and discrimination,[5] and these factors may cause people with TB to hide their illness from families and the community. There is clear evidence of the effects of culturally influenced beliefs about and attitudes to TB and the treatment of TB on adherence to treatment. Among the reasons for not completing the process of diagnosis of TB, health-provider-related barriers were cited most frequently (45.9%) in the Revised National Tuberculosis Control Program facility.[4] Cultural factors are associated with misinformation about the medical aspects of TB and the stigmatization of persons with the disease,[6] and social stigmatization leads to delays in medical care being sought.[7] These social conditions necessitate culturally sensitive health education that takes into account local perceptions of TB.[8]

TB has profound stigma, and this results in delays in accessing care and barriers to treatment success.[9] Social support as a facilitator and stigma as a barrier are diametrically opposed concepts that show the need for information on TB care and treatment.[10] Better communication between health professionals, particularly dispensers, and patients is essential for improving treatment adherence, even with directly observed treatment, short course (DOTS).[11] Non-adherence seems to be related to treatment delivery failures, and the health system needs strengthening, with intensified health-care-worker training and supervision.[12] Training workshops are essential to the TB control program; nevertheless, the social stigma related to TB has been much less studied than that related to other diseases such as AIDS and mental illnesses. However, social stigma has important implications for the affected person's wellbeing and epidemic control.[13] This study therefore surveyed health workers enrolled in TB training workshops prior to the execution of the DOTS program.

Materials and Methods

Nationwide TB training workshops were held in Taiwan from April to November 2006, during which, 1279 participants attended the same training course, the content of which included education about TB, information on the current situation of TB epidemiology, the skills required for DOTS execution, destigmatization and human rights. The aim of the study was to investigate the changes in the levels of TB knowledge and the degree of stigmatization in first-line caregivers following attendance at a training course. The study population consisted of public health workers ($n=444$) or DOTS workers ($n=815$); public health workers were on the staff of a health center, and DOTS workers were lay health workers that were recruited from each county to take part in the DOTS program. The first part of the structured questionnaire used in this study during the DOTS training courses contained nine items on TB knowledge, which were derived from a previous TB knowledge questionnaire of the Centers for Disease Control (CDC), Taiwan. The second part of the structured questionnaire contained eight items on stigmatization, and was derived from the Attribution Questionnaire - Short Form - 8 Items (AQ-S8) for Measures of Illness Stigma.[14] The questionnaire required participants to rate the importance of indicators of TB knowledge and stigmatization, using a Likert scale, which ranged from extremely unimportant to extremely important (1–5 points). The higher the score, the

greater the knowledge and the stigmatization. Cronbach's alpha values for TB knowledge and AQ-S8 were calculated from our data using reliability analysis. These values (Cronbach's alpha for TB knowledge, 0.72; AQ-S8, 0.68) indicated moderate to high internal consistency for the measurement instruments used in this study.

Participants were placed into groups according to the geographical distance from their homes. Standardized procedures were then implemented, e.g. the same instructors and teaching materials were used across the board. Participants were asked to complete the structured questionnaire before (pre-test) and after (post-test) training, and the questionnaires were collected immediately after completion. In order to assess the magnitude of the effects of training, we analyzed the scores of all participants. The differences in scores before and after training were compared by univariate and multiple regression analysis, and the pre-test and post-test scores were computed by the paired *t* test.

Results

Pair comparisons of participants who completed both the pre-test and post-test and related factors are shown in Table 1. All study participants made a statistically significant improvement in their level of TB knowledge, with the exception of those with a history of TB ($p = 0.331$). There was a reduction in stigmatization scores in general, which was statistically significant in women ($p = 0.012$), public health workers ($p = 0.028$), 40–49-year-olds ($p = 0.035$), those with an education level < 12 years ($p = 0.024$), those who had been a volunteer ($p = 0.018$), and in those who had a history of TB and those who did not ($p = 0.034$, $p = 0.036$).

Group comparison of related factors using univariate analysis is shown in Table 2, and reveals that the pre-test TB knowledge scores differed significantly between factors. Public health workers scored higher than DOTS workers ($p < 0.001$), the 40–49-year-old group scored higher than the other age groups ($p = 0.053$), those with a high education level scored higher than those with a low level ($p < 0.001$), and those who had known TB patients scored higher than those who had not ($p < 0.001$). The post-test TB knowledge scores were consistent in general and there were no significant differences in factors, except for those with a history of TB, who showed less improvement than those without ($p = 0.031$). There was a significant reduction in TB stigmatization scores in those who had been volunteers (pre-test $p = 0.024$; post-test $p = 0.003$). There were no differences for the other factors.

Multiple regression analysis, as shown in Table 3, revealed that those aged 40–49 years ($p = 0.003$), those with a high education level ($p < 0.001$), and those who had known TB patients ($p = 0.001$) had higher pre-test TB knowledge scores, while those with a history of TB had low TB knowledge scores and showed less improvement in TB knowledge score after the training course, as compared with those who did not have a history of TB ($p = 0.031$). There were no significant differences in the pre-test TB stigmatization scores, but there were statistically significant changes in the post-test scores, which demonstrated a significant decrease in stigmatization scores in DOTS workers as compared with public health workers ($p = 0.038$). In addition, participants who had a history of TB exhibited a significant reduction in stigmatization scores ($p = 0.031$). Besides these factors, TB knowledge was not found to be significantly correlated with stigmatization.

Discussion

Encouraging people to seek and complete TB treatment is essential for the successful care and control of the disease, and an understanding of local beliefs, community education, and health-worker training play important roles.[5] Analyzing TB-related social stigma as a social process enables us to better understand some key social structural factors in the organization of the health care system, and to identify locally acceptable interventions to reduce stigma.[13] There is growing

Table 1. Pair comparison of related factors for TB knowledge and stigmatization scores

	TB knowledge					TB stigmatization				
	Pre-test		Post-test		*p* value for paired *t* test	Pre-test		Post-test		*p* value for paired *t* test
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Gender										
Female (418)	7.330	0.953	7.691	0.861	<0.001	36.969	9.028	35.959	8.952	0.012
Male (75)	7.307	1.102	7.760	0.803	<0.001	36.693	8.969	35.980	9.451	0.423
Identity										
Public health worker (202)	7.460	0.859	7.708	1.046	0.008	36.833	8.186	35.693	8.273	0.028
DOTS worker (287)	7.237	1.044	7.697	0.691	<0.001	36.909	9.411	36.153	9.510	0.130
Age group										
<40 yr (139)	7.137	1.150	7.770	0.486	<0.001	37.413	8.610	36.800	8.139	0.338
40–49 yr (196)	7.439	0.961	7.679	0.925	0.001	37.511	8.490	36.268	9.161	0.035
≥50 yr (156)	7.359	0.795	7.667	1.005	0.003	35.734	9.907	34.809	9.541	0.170
Length of education										
<12 yr (285)	7.182	1.124	7.695	0.688	<0.001	36.670	9.391	35.499	9.547	0.024
≥12 yr (207)	7.536	0.659	7.710	1.040	0.035	37.256	8.450	36.684	8.170	0.224
Had been a volunteer										
No (318)	7.308	1.029	7.704	0.940	<0.001	37.292	8.636	36.826	8.625	0.265
Yes (167)	7.359	0.880	7.701	0.672	<0.001	36.100	9.459	34.493	9.578	0.018
History of TB										
No (474)	7.340	0.929	7.719	0.820	<0.001	36.877	9.012	36.105	9.055	0.034
Yes (18)	7.000	1.847	7.278	1.447	0.331	37.857	9.297	32.429	7.903	0.036
Knew a TB patient										
No (202)	7.178	1.087	7.752	0.507	<0.001	37.266	8.721	36.274	9.071	0.074
Yes (279)	7.416	0.889	7.659	1.043	<0.001	36.481	9.227	35.672	9.051	0.107

Table 2. Univariate analysis of related factors for TB knowledge and stigmatization scores

	TB knowledge						TB stigmatization					
	Pre-test			Post-test			Pre-test			Post-test		
	Mean	SD	*p* value for *t* test or ANOVA	Mean	SD	*p* value for *t* test or ANOVA	Mean	SD	*p* value for *t* test or ANOVA	Mean	SD	*p* value for *t* test or ANOVA
Gender												
Female (593)	7.356	1.000	0.381	7.678	0.848	0.367	37.103	8.771	0.943	36.250	8.924	0.703
Male (114)	7.263	1.190		7.768	0.775		37.167	8.821		35.890	9.485	
Identity												
Public health worker (317)	7.521	0.786	<0.001	7.659	1.009	0.414	37.183	8.092	0.702	36.014	8.435	0.612
DOTS worker (383)	7.193	1.184		7.717	0.668		36.930	9.211		36.370	9.443	
Age group												
<40 yr (223)	7.269	1.119	0.053	7.738	0.520	0.663	37.713	8.265	0.140	36.811	8.109	0.090
40–49 yr (269)	7.461	0.895		7.678	0.902		37.353	8.315		36.661	9.138	
≥50 yr (212)	7.264	1.095		7.657	0.980		36.123	9.805		35.089	9.541	
Length of education												
<12 yr (378)	7.185	1.146	<0.001	7.695	0.688	0.843	36.653	9.273	0.128	35.499	9.547	0.120
≥12 yr (322)	7.522	0.847		7.710	1.040		37.671	8.210		36.684	8.170	
Had been a volunteer												
No (455)	7.360	1.012	0.446	7.704	0.940	0.963	37.593	8.371	0.024	36.826	8.625	0.003
Yes (242)	7.298	1.083		7.701	0.672		36.021	9.314		34.493	9.578	
History of TB												
No (683)	7.346	1.006	0.465	7.719	0.820	0.031	37.082	8.771	0.826	36.105	9.055	0.067
Yes (22)	7.182	1.708		7.278	1.447		37.500	9.226		32.429	7.903	
Knew a TB patient												
No (302)	7.166	1.203	<0.001	7.752	0.507	0.242	37.464	8.408	0.261	36.274	9.071	0.432
Yes (388)	7.469	0.845		7.659	1.043		36.706	9.035		35.672	9.051	

Table 3. Multiple regression analysis of related factors for TB knowledge and stigmatization scores

	TB knowledge				TB stigmatization			
	Pre-test scores		Post-test scores		Pre-test scores		Post-test scores	
	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
Constant	6.972	<0.001	7.846	<0.001	34.387	<0.001	36.638	<0.001
Gender (male *vs.* female)	−0.036	0.746	0.113	0.339	0.216	0.824	−0.376	0.751
Identity (DOTS worker *vs.* public health worker)	−0.184	0.060	−0.050	0.615	0.848	0.318	2.070	0.038
Age group								
(40–49 *vs.* <40 yr)	0.306	0.003	−0.101	0.338	0.646	0.469	1.227	0.250
(≥50 *vs.* <40 yr)	0.134	0.224	−0.134	0.239	−0.970	0.311	−0.513	0.655
Length of education								
(≥12 yr *vs.* <12 yr)	0.324	<0.001	−0.024	0.792	1.115	0.166	1.190	0.195
Had been a volunteer (yes *vs.* no)	0.041	0.667	0.060	0.535	−1.488	0.070	−1.705	0.080
History of TB (yes *vs.* no)	−0.123	0.593	−0.482	0.031	0.358	0.858	−5.000	0.031
Knew a TB patient (yes *vs.* no)	0.262	0.001	−0.079	0.348	−0.966	0.175	−0.340	0.687
TB knowledge scores								
Pre-test					0.352	0.298		
Post-test							−0.152	0.821

recognition that attention to knowledge and social behavioral factors regarding TB control is needed. The literature shows the effectiveness of witnessed dosing in DOTS programs, but failure to complete treatment is still an obstacle to the elimination of TB. A lack of knowledge of the benefits of completing the course is a major factor that leads to non-compliance in patients. Social stigmatization is a specific additional problem related to TB. Type of treatment (DOT or self-supervised), gender, employment, prior contact with a TB patient, perception of health status, attitude, knowledge and social support have all been found to be significantly associated with compliance.[15] Our study showed that the level of general knowledge about TB is sufficient for health workers to work on TB control. All participants showed considerable improvement, and the positive effects of the training workshops in terms of educating health workers were apparent. However, the number of participants with a history of TB was small ($n = 18$), which may have limited the statistical power of the study. Otherwise, the educational workshops were found to significantly increase TB knowledge.

Similar results were obtained after analyzing the TB stigmatization scores, and we were able to investigate whether training workshops were effective in working against stigmatization, and whether there were statistically significant differences between pre- and post-training scores. In general, we found that there was a reduction in stigmatization after the workshop.

Women are more likely than men to access health services, to be treated under the DOTS program, and to adhere to treatment, whereas men and elderly patients need additional support to access diagnostic and DOTS services.[16] Differences in gender and other factors were also identified in our study. There were unremarkable changes in stigmatization scores in men, DOTS workers, those aged < 40 years and > 50 years, those who had been a volunteer, and those who had known or not known TB patients. An almost significant difference was found in those who had not known a TB patient ($p = 0.074$), which implies that preconceived ideas about TB without prior contact with a TB patient are more difficult to address in terms of destigmatization. The experience of knowing a person with TB apparently mitigates stigmatization. Participants who had a history of TB had the lowest pre-test TB knowledge scores (mean = 7.000), which reflected the fact that TB patients had insufficient knowledge of the disease, and no significant improvement ($p = 0.331$) was found after the workshops. TB is still considered a shameful disease; an attitude that has a tendency to cause TB patients to hide their disease and avoid telling others about it, but to some degree, those who have completed treatment and are cured may not experience strong stigmatization. Participants who had a history of TB and who disclosed it in the structured questionnaire exhibited a significant reduction in stigmatization score ($p = 0.036$), as shown in Table 1, and self-stigmatization was eliminated effectively by the training workshop. Better understanding may lead to improved treatment regimens, adherence to treatment, and improved functioning and wellbeing of people with TB.[17] TB control programs should address issues such as continued respiratory symptoms, persistence of stigma, and poor emotional quality of life in patients with TB, even after they are cured.[18]

Addressing the issues experienced by patients being treated for TB may improve adherence and treatment success.[19] The higher TB knowledge scores of public health workers as compared with DOTS workers ($p < 0.001$) showed that the former already had a high level of TB knowledge before attending a workshop. The fact that there were no significant differences after training reflects the efficacy of the teaching material used in the workshops. Knowledge level is correlated with level of education, i.e. the higher the education level, the higher the TB knowledge score; this was also true for those who had previously known TB patients. Interestingly, those who had been a volunteer had the lowest TB stigmatization scores, which differed significantly ($p = 0.024$) from the scores of those who had not been a volunteer. This variable still strongly affected TB stigmatization score after training, which suggests that

experience as a volunteer makes it easier to deal with stigmatization, and also that volunteers are more sympathetic.

After the workshop, reduction in stigmatization scores was expressed more strongly in DOTS workers than in public health workers ($p = 0.038$). It was easier to eliminate stigmatization in DOTS workers than public health workers, and those who had a history of TB showed a greater reduction in stigmatization score ($p = 0.031$). Social support as a facilitator and stigma as a barrier are diametrically opposed concepts, and demonstrate the need to inform patients about TB care and treatment. Interventions to reduce stigmatization and promote social support at the patient, household, community, and health-care-system levels should be part of future TB control plans.[20]

After controlling for the covariates, TB knowledge scores were not found to be significantly correlated with TB stigmatization scores. There is no doubt that training plays an important part in the TB control program, especially with regards to increasing knowledge of TB and reducing stigmatization.

Compliance is a potential factor that can increase the cure rate of TB patients, and the uncovering of other significant factors will pave the way to improving the effectiveness of TB treatment programs.[14] Daily health education and knowledge of TB and its treatment have been found to be independently associated with adherence.[21] As in many worldwide DOTS programs, the most basic task is to empower caregivers by training. Patient and provider costs are enormous, as is the impact of TB on patients and families. This information is vital for program planners, and indicates that existing control programs have been somewhat ineffective.[22] In our study, education workshops were found to foster positive attitudes towards TB control, as shown by the obvious improvement in TB knowledge and reduction in stigmatization after the training program in all participants. TB knowledge scores were inconsistent after the workshops. Significant increases in TB knowledge score were found in all participants, apart from those who had a history of TB, which indicates that TB knowledge is poor in participants with a history of the disease, even after the training workshop. However, although their knowledge scores were not significantly elevated, their stigmatization scores were found to have reduced significantly. There were inconsistencies with regards to destigmatization in women and in those who had been a volunteer, and DOTS workers showed the greatest reduction in stigmatization score. Those who had been volunteers showed a greater reduction in stigmatization scores. Although no definite correlation between knowledge and stigmatization was found, the TB control workshops were effective in the promotion of knowledge and elimination of stigmatization in first-line caregivers.

The implementation of DOTS in a large, diverse country, maintenance of the quality of services during the rapid expansion phase, decentralization of program management to the county level, and widening of the reach of the program to encompass all sectors of society, are some of the major challenges faced by TB control programs.[23] There is also a need to rethink the label of "defaulter" that is often given to TB patients.[24]

DOTS workers showed less tendency to stigmatize TB patients as compared with public health workers. Older people and those who had been a volunteer attached the least stigma to TB patients. These results imply that younger health workers need to pay more attention to destigmatization, and should be encouraged to become volunteers. It is very important for public health and DOTS workers who are involved in TB control programs to be trained to lead the way in combating TB.

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