

The effect of an educational intervention on awareness of various aspects of pulmonary tuberculosis in patients with the disease

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Abstract

Background: Tuberculosis (TB) is a major health problem worldwide. Raising awareness of various aspects of the disease among patients who have TB is important to help in control and prevention.

Aims: This was a quasi-experimental study, pre- and post-test, designed to evaluate the effect of an educational intervention on awareness among patients with pulmonary TB.

Methods: A structured questionnaire covering various facts about pulmonary TB was used in the pre-intervention phase for 150 TB patients who were being followed-up in a major hospital in Sudan ($r = 0.80$). The same questionnaire was reused after the patients underwent an educational awareness programme.

Results: There were more males (74%) than females. Mean age was 36.5 years. Most patients (86.6%) had some education, however, their knowledge about aspects of TB was generally poor prior to the intervention. This included the nature of the causative organism, modes of transmission and measures needed for the control and prevention. Post-intervention, there was significant improvement in all aspects of knowledge tested ($P < 0.007$).

Conclusion: Although the diagnosis of TB in the participants was confirmed and they were on regular clinical follow-up, their knowledge about various aspects of TB was poor prior to the educational intervention. There is a need for more effort towards raising awareness among patients with TB about their disease while on treatment. This is important to help control and prevent the disease.

Key words: pulmonary tuberculosis, awareness, patient education

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Introduction

Tuberculosis (TB) is a chronic infectious disease caused by *Mycobacterium tuberculosis* (1). It is the world's leading cause of death due to infectious disease (2) and was declared a global public health emergency in 1993 by the World Health Organization (WHO) (3). It has been reported that 64% of an estimated 10 million TB cases are detected and treated each year (2). Identification of risk factors is crucial for policy-makers to put in place appropriate strategies to prevent the disease and reduce the global burden of TB (3). The disease can be avoided and cured completely, depending on the level of health awareness and knowledge of the community through prevention and control (4). All WHO Member States have adopted the "End TB Strategy", which covers the period 2016–2035 (5).

The social stigma of TB is high in all categories of the community, irrespective of education level (6). Control is a high priority and has become an international objective with the increasing number of cases throughout the world, including the developed countries (6). Sudan has high prevalence of TB: incidence was 114 cases per 100 000 population in 2012 (2), reported to have increased

to 117 per 100 000 population in 2016, probably due to poverty and low health expenditure (6.2% of GDP) (7). The country accounts for 15% of the TB burden in the WHO Region for the Eastern Mediterranean (8). It was recently observed that 26.6% of patients with TB in the Region had extra-pulmonary TB (9,10).

Sudan is an extremely turbulent country that has seen years of civil conflict, including the North–South and Darfur crises (11). Conflicts impact health infrastructure and human resources, which can hinder disease prevention and control measures. This escalates the burden of communicable diseases such as tuberculosis (11). In addition, conflicts lead to the displacement of populations and impair access to health care. This can increase TB transmission, worsen patient outcomes and lead to increasing rates of drug resistance (12). Notified TB cases have remained relatively constant in Sudan over the past decade, within the range 19 817 to 22 097 (7). However, the prevalence of multi-drug resistant TB, as reported by Sudan's national TB programme in 2012, was 19.0% in re-treatment cases and 1.8% in new cases (7).

A national TB programme has been developed and implemented since 1992 in accordance with the

recommendations of the International Union against TB and Lung Disease (13).

This study was designed to evaluate the awareness of patients who have pulmonary TB before and after an educational intervention. The emphases were on the importance of ways to prevent the spread of the disease and compliance to treatment schedules.

Methods

Study design

The study was a quasi-experimental pre- and post-test educational intervention carried out on patients with proven pulmonary TB who were attending the chest clinic in Omdurman Military Medical Corps Hospital for follow-up during the period April–July 2018. The chest clinic is held twice a week: one morning and one afternoon session.

Inclusion criteria in the study were: adult patients (age above 18 years); diagnosis of pulmonary TB documented in the medical records; patients on follow-up for at least 2 months; patients attended the follow-up regularly; and patients noted to be compliant to treatment by their treating team.

Exclusion criteria were: incomplete medical records; and not willing to participate in the study.

The research fellow (MEM) attended both clinics every week with prior permission of the consultant physicians in charge. On average there were about 6 patients with proven pulmonary TB per clinic. Over the study period, our researcher (MEM) approached 190 patients who fulfilled the inclusion criteria while waiting to be seen or soon after being seen by the treating team (convenience sampling method). She explained the research objectives to each patient and recorded the required information from 150 patients who accepted to participate in the study. Participants in the study were requested to attend educational sessions of at least 2 hours each, in groups according to their convenience. The educational sessions were arranged with the collaboration of the treating team, and each group answered the same questionnaire after completion of the session.

A structured questionnaire was designed by the authors, revised, amended and finally approved by an expert committee consisting of 2 consultants from the Department of Communicable Diseases, Federal Ministry of Health, and 2 consultants from the Department of Community Medicine, Faculty of Medicine, the National Ribat University. The questionnaire was used in face-to-face-interviews with the participants in the study. It included 6 variables for sociodemographic data and 34 items covering basic knowledge about TB: causes, mode of transmission, symptoms, treatment, control and prevention. The score for the knowledge variables was recorded by interval scale with “Yes” or “No” answers for each variable question. A score of “1” was awarded for each correct answer. The total score was adjusted to be out of 100.

The content validity of the questionnaire was evaluated and approved by the panel of experts detailed above. Instrument validity and reliability were tested in a pilot study on 15 patients who answered the questionnaire before and after the educational intervention. The pilot study patients were excluded from the study sample. The Pearson correlation coefficient (r) was 0.80. A teaching programme comprising lectures, handouts, leaflets and handbooks containing the instructions for the control and prevention of the spread of the disease were distributed to the participants. The data collection time between the pre- and post-test was 4 months.

The paired samples t -test was used to measure the statistical difference between the 2 means; 95% confidence interval (CI) was used where appropriate. Statistical significance was taken at level $P \leq 0.05$.

Ethical considerations

Permission was obtained from the Research Committee on Human Subjects in the National Ribat University and from the manager and director of the TB Management Unit in the Military Hospital. All participants in the study were informed about the aim of the study and they signed a written informed consent form. It was explained that the data would be kept confidential. Participants had the right to withdraw from the study any time they wished.

Results

One hundred and fifty out of 190 patients approached agreed to take part in the study (response rate 79%). Mean age was 36.5 (range 16–63) years. There were 111 males (74%) and 39 females (26%).

The majority of the participants (86.6%) had basic education or higher: 49.3% having secondary school education and only 1.3% having higher education. Just over 13% were illiterate.

The participants were tested on their knowledge of various aspects of TB. The 4 fields covered in the questionnaire were: causative agent, mode of transmission, symptoms, and control and prevention. There was an improvement in the scores for all the variables after the educational intervention and the differences were all statistically significant. Although more than 86% of the patients were educated (about 50% secondary school or higher) yet their knowledge about the nature of tuberculosis as an infectious disease was very low and improved significantly after the educational intervention (Table 1).

Correct information about mode of transmission of TB was very deficient prior to the educational intervention (Table 2). The knowledge that TB is transmitted by contaminated air droplets showed a high statistically significant improvement ($P < 0.001$) after the educational intervention.

Knowledge about common symptoms in pulmonary TB was alarmingly low among patients prior to the educational programme. Coughing blood was not recognized as an important symptom by the majority

Table 1 Knowledge in regard to agents causing tuberculosis (TB) (correct answer scores) prior to and after the intervention (n = 150, degrees of freedom = 148)

Knowledge variable	Score				95% CI		t	P
	Pre-test		Post-test		Lower	Upper		
	Mean	SD	Mean	SD				
TB is an infectious disease	0.59	0.49	0.95	0.23	-0.44	-0.27	-8.0	< 0.003
TB is a bacterial infection	0.55	0.50	0.96	0.20	-0.50		-9.4	< 0.001
TB is a viral infection	0.53	0.50	0.93	0.25	-0.50	-0.32	-8.9	< 0.006
TB is a parasitic infection	0.53	0.50	0.93	0.25	-0.50	-0.32	-8.9	< 0.006

CI = confidence interval; SD = standard deviation.

of patients until they were educated about this (Table 3). Although our participants were coming regularly for medical follow-up, more than a third of them were not aware of the importance of strict compliance to the treatment regimen (Table 4).

Prior to our educational intervention, only 55% of the respondents knew that TB was a bacterial infection. This rose to 96% post-intervention. Similarly, knowledge that the major source of infection was via contaminated droplets in the air increased from 60% of participants to 93% after the intervention.

Discussion

In this study, the majority of patients (74%) were males. This is consistent with a WHO study from Eastern Sudan which reported that pulmonary TB was commoner among males in the general population (14). The mean age of our patients was 36.5 years, i.e. the young productive age, a finding that supports the view that this disease has a high impact on productivity and the economy (3,5).

Although about 50% of our sample had reasonably good education, their knowledge of various aspects of TB prior to the educational intervention was generally poor. Awareness is a very important parameter to be assessed in order to provide baseline data to assist decision-makers in the planning and delivery of an effective control programme (14).

It is rewarding that after our educational intervention the participants attained a high (statistically significant) knowledge score (around 90%) in all variables. A study done in Egypt in 2012 showed similar findings, i.e.

significant improvement following an educational intervention programme (15).

Prior to our educational intervention, only 55% of the respondents knew that TB was a bacterial infection; this almost doubled after the intervention. A 2006 WHO report stated that there was lack of awareness of even the occurrence of TB in Khartoum State in (16). Similarly, only 60% of our respondents knew that the major source of infection was contaminated droplets, improving to 93% after the intervention, over 50% improvement. It is now known that the major source of TB is droplet infection, and the droplet nuclei generated by sputum-positive patients with pulmonary TB particles must be fresh enough to carry a viable organism. Other research has established that various social determinants compound the issue: these include gender issues, unemployment, illiteracy, poor nutrition, indoor air pollution, political instability and lack of access to proper sanitation and health education (17,18).

Knowledge of symptoms related to pulmonary TB was disturbingly poor in our study sample. Only about one third of the respondents gave the correct answers prior to the intervention. This improved significantly post-intervention. Similar findings were reported by Lewis et al. in 2004 (19).

Again knowledge about measures needed for control and prevention improved significantly post intervention. Gaps in the knowledge, such as mode of transmission, treatment measures and prevention, can lead to diagnostic and treatment delays among many of those living with TB. Delays in treatment occur for several reasons, e.g. lack of knowledge, lack of awareness

Table 2 Knowledge in regard to mode of transmission of tuberculosis (TB) (correct answer scores) prior to and after the intervention (n = 150, degrees of freedom = 148)

Knowledge variable	Score				95% CI		t	P
	Pre-test		Post-test		Lower	Upper		
	Mean	SD	Mean	SD				
TB is transmitted through contaminated air droplet	0.60	0.49	0.93	0.25	-0.42	-0.24	-7.4	< 0.001
TB is transmitted through shaking hands	0.57	0.50	0.93	0.25	-0.45	-0.27	-7.9	< 0.007
TB is transmitted through sharing dishes	0.55	0.50	0.91	0.28	-0.45	-0.27	-7.7	< 0.004

CI = confidence interval; SD = standard deviation.

Table 3 Knowledge in regard to symptoms of tuberculosis (correct answer scores) prior to and after intervention (n = 150, degrees of freedom 148)

Knowledge variable	Score				95% CI		t	P
	Pre		Post		Lower	Upper		
	Mean	SD	Mean	SD				
Coughing for 3 weeks or more	0.65	0.48	0.99	0.12	-0.42	-0.26	-8.4	< 0.001
Coughing up blood	0.33	0.47	0.93	0.25	-0.69	-0.51	-13.7	< 0.001
Chest pain worse with breathing	0.35	0.48	0.84	0.37	-0.59	-0.40	-10.0	< 0.001
Weight loss	0.32	0.47	0.85	0.35	-0.63	-0.44	-11.1	< 0.003
Fatigue	0.33	0.47	0.82	0.39	-0.58	-0.39	-9.8	< 0.009
Night fever	0.37	0.49	0.89	0.32	-0.61	-0.42	-10.8	< 0.003
Night sweats	0.39	0.49	0.83	0.38	-0.53	-0.33	-8.6	< 0.006
Chills	0.43	0.50	0.85	0.35	-0.52	-0.33	-8.6	< 0.005

CI = confidence interval; SD = standard deviation.

of the significance of symptoms, negative social attitudes and combinations of these 3 factors (20–23). This can be explained by the fact that pulmonary tuberculosis is a disease associated with poverty and low socioeconomic level (23). Research has shown that a poor standard of living and overcrowding are related, and both contribute to the prevalence of the disease (1). Other factors that have resulted in increasing the trend of TB in Africa are HIV infection, malnutrition, crowded living conditions, lack of access to free or affordable health care services and dependence on traditional healers (24). The WHO is working to reduce the burden of TB and halve the number and prevalence of TB deaths by 2015 through its Stop TB strategy and supporting the Global Plan to Stop TB (25).

Tuberculosis is preventable using effective vaccination. However, the Bacillus Calmette–Guérin (BCG) vaccine has been the only successful TB vaccine so far (26). The BCG vaccine is usually given by intramuscular injection to babies and children from birth up to 16 years; it is also sometimes given to adults up to 35 years (27). The

adults are often given a tuberculin skin test (TST) before vaccination, but the vaccine does not work well in adults due to a number of factors, including the method used, route of administration, environment and characteristics of the population (27).

Conclusion

Although the diagnosis of TB in the participants in this study was proven and they were on regular clinical follow-up, their knowledge about various aspects of their disease was poor prior to the educational intervention. This reflects the need for more efforts towards raising awareness among patients with TB while on treatment. This is important to help in the control and prevention of the disease. Our educational intervention resulted in significant improvement in all the aspects of knowledge tested in our participants. This emphasizes the educational role of the health care providers in the management, control and prevention of TB.

Table 4 Knowledge in regard to control, prevention and compliance with treatment of tuberculosis (correct answer scores) prior to and after intervention (n = 150, degrees of freedom 148)

Knowledge variable	Score				95% CI		t	P
	Pre		Post		Lower	Upper		
	Mean	SD	Mean	SD				
Take varied and adequate food	0.47	0.50	0.87	0.33	-0.50	-0.31	-8.3	< 0.004
Avoid crowding	0.45	0.50	0.87	0.33	-0.52	-0.32	-8.6	< 0.006
Cover mouth and nose on coughing	0.52	0.50	0.91	0.29	-0.48	-0.29	-8.2	< 0.009
Avoid sharing dishes	0.51	0.50	0.87	0.33	-0.46	-0.26	-7.3	< 0.002
Open windows for fresh air	0.50	0.50	0.87	0.34	-0.46	-0.27	-7.4	< 0.001
Complete your treatment (compliance)	0.39	0.49	0.91	0.29	-0.60	-0.42	-11.0	< 0.006

CI = confidence interval; SD = standard deviation.

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Competing interests: None declared.

Effet d'une intervention éducative sur la sensibilisation aux divers aspects de la tuberculose pulmonaire chez les patients atteints par cette maladie

Résumé

Contexte : La tuberculose constitue un problème de santé majeur dans le monde entier. Il est important de sensibiliser les patients tuberculeux à divers aspects de la maladie afin de contribuer à la lutte et à la prévention.

Objectifs : Il s'agissait d'une étude quasi expérimentale, préalable et postérieure à l'intervention, conçue pour évaluer l'effet d'une intervention éducative sur la sensibilisation des patients atteints de tuberculose pulmonaire.

Méthodes : Un questionnaire structuré couvrant divers faits sur la tuberculose pulmonaire a été utilisé dans la phase pré-intervention auprès de 150 patients tuberculeux qui étaient suivis dans un grand hôpital au Soudan ($r = 0,80$). Le même questionnaire a été réutilisé après que les patients ont suivi un programme de sensibilisation.

Résultats : Il y avait plus d'hommes (74 %) que de femmes. L'âge moyen était de 36,5 ans. La plupart des patients (86,6 %) avaient un certain niveau d'éducation, mais leurs connaissances sur les aspects de la tuberculose étaient généralement insuffisantes avant l'intervention. Ceci concernait notamment la nature de l'agent causal, ses modes de transmission et les mesures nécessaires pour lutter contre la maladie et la prévenir. Suite à l'intervention, il y a eu une amélioration significative dans tous les aspects des connaissances testées ($p < 0,007$).

Conclusion : Bien que le diagnostic de tuberculose des participants ait été confirmé et que ces derniers fassent l'objet d'un suivi clinique régulier, leurs connaissances sur divers aspects de la tuberculose étaient insuffisantes avant l'intervention éducative. Il faut redoubler d'efforts pour sensibiliser les patients tuberculeux à leur maladie pendant le traitement. Cette sensibilisation est importante pour aider à prévenir la maladie et à lutter contre cette dernière.

تأثير التدخل التثقيفي على الوعي بمختلف جوانب مرض السل الرئوي في المرضى المصابين به

كلثوم يوسف، مبروكة المكي، روزا خليل بابكر، حسن أبو عائشة

الخلاصة:

الخلفية: يمثل السل مشكلة صحية كبيرة في جميع أنحاء العالم. ويُعتبر إذكاء الوعي بمختلف جوانب مرض السل بين المصابين به أمراً مهماً للمساعدة في مكافحته والوقاية منه.

الأهداف: هدفت هذه الدراسة شبه التجريبية، والاختبارين القبلي والبعدي إلى تقييم تأثير التدخل التثقيفي على درجة وعي المرضى المصابين بالسل الرئوي.

طرق البحث: استُخدم استبيان منظم يغطي حقائق مختلفة عن السل الرئوي في المرحلة السابقة للتدخل، وشمل 150 مريضاً بالسل من الذين كانت تخضع حالتهم للمتابعة في أحد أكبر المستشفيات في السودان (معامل الارتباط = 0.80). وقد استُخدم نفس الاستبيان بعد أن أنهى المرضى برنامجاً للتوعية الثقافية.

النتائج: كانت نسبة الذكور (74%) أعلى من نسبة الإناث. وبلغ متوسط العمر 36.5 عاماً. وكان أغلب المرضى (86.6%) حاصلين على قدر من التعليم، إلا أن معرفتهم بجوانب مرض السل كانت ضئيلة بشكل عام قبل هذا التدخل. وشمل ذلك طبيعة الكائن المسبب للمرض، وطرق انتقال العدوى به، والتدابير اللازمة لمكافحته والوقاية منه. وعقب التدخل، سُجل تحسن ملحوظ في جميع جوانب المعرفة التي تم اختبارها (القيمة الاحتمالية > 0.007).

الاستنتاجات: على الرغم من تأكيد تشخيص السل لدى المشاركين الذين كانوا يقومون بمتابعة سريرية منتظمة، إلا أن معرفتهم بمختلف جوانب السل كانت ضئيلة قبل التدخل التثقيفي. وهناك حاجة إلى بذل مزيدٍ من الجهود لإذكاء وعي مرضى السل حول مرضهم أثناء تلقيهم العلاج. ويُعتبر هذا أمرٌ مهمٌ للمساعدة في مكافحة المرض والوقاية منه.

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