Smoking among tuberculosis patients in Kerala, India: proactive cessation efforts are urgently needed

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OBJECTIVES: To document smoking patterns among tuberculosis (TB) patients at eight different points of time before, during and after treatment, and to investigate the frequency and content of the quit smoking messages they received.

DESIGN: A stratified random sample of 215 male TB patients from Kerala, India, who had completed treatment in the previous 9 months was surveyed using a pre-tested semi-structured interview schedule.

RESULTS: Six months prior to diagnosis, 94.4% of male TB patients were ever smokers and 71.2% were current smokers. Although 87% of patients had quit smoking soon after diagnosis, 36% had relapsed by 6 months post treatment. One third relapsed during the first 3 months of treatment and another third during the next 3 months of treatment. Two thirds of all smokers received cessation advice from primary care physicians, but less than half received advice from others. Less than half of all messages were TB-specific; the rest were very general short instructions. Smoking more than 15 cigarettes/bidis at the time of diagnosis was significantly associated with a lower quit rate during treatment (OR 8.0, 95%CI 2.1–30.9).

CONCLUSION: Messages to not smoke often go unheeded among TB patients. Proactive efforts are needed to encourage health staff and DOTS providers to give strong cessation messages.

KEY WORDS: cessation; Kerala; tuberculosis; patients

India has the highest tuberculosis (TB) burden in the world, with an annual case load of 1.8 million; this represents one fifth of total global cases and two thirds of cases in South Asia.1,2 The DOTS strategy,3 which is based on directly observed short-course treatment, uninterrupted drug supplies, an adequate recording and reporting system, a national network of laboratories, and governmental commitment to tuberculosis control, is the internationally recommended approach to TB control, and is at the heart of the World Health Organization (WHO) Stop TB strategy.4 India has implemented this strategy in a phased manner, under the Revised National TB Control Programme (RNTCP). In March 2006, the coverage of the DOTS strategy reached the entire country.5 To its credit, India achieved a DOTS treatment success rate of 87% in 2004 against a target of 85%.6 One area where additional TB control efforts are needed is tobacco cessation. Smoking is associated with default, failure and death among TB patients.7 Several studies have shown an association between smoking and TB-related infection, disease and mortality.8-14 A recent meta-analysis reported that those who had close or very close contact with smoking household members were nine times more likely to have TB compared to those who had distant contact.15

Tobacco smoking is very common in India: prevalence varies between 25% and 50% among men aged >15 years, although it is only 0.2-4.2% among women of the same age.16 The corresponding figures for Kerala State, the site of the present study, are respectively 28.2% and 0.4% for men and women. There are few data on the prevalence of smoking among TB patients, and published studies to date have not examined when relapse occurs during and after 6 months of DOTS-based treatment. Recent studies have highlighted the importance of physician advice in promoting smoking cessation in the general population17-20 and among TB patients.21-23 In India, very few data exist on whether tobacco cessation advice is extended to TB patients and how messages are understood.

The four objectives of the present study were: 1) to document tobacco use patterns among TB patients at different time points before diagnosis, during treatment and following treatment; 2) to examine how often cessation messages are given to TB patients by health staff and DOTS providers; 3) to investigate how messages received are understood; and 4) to
identify critical points of time when cessation messages need to be given based on when relapse is most likely to occur.

STUDY POPULATION AND METHODS

Study design, setting and participants
This study is an activity undertaken by Quit Tobacco International (QTI), a tobacco cessation research project initiated in India and Indonesia as a means of building tobacco cessation research capacity. A cross-sectional survey was conducted between November 2006 and February 2007 in Thiruvananthapuram and Kollam districts in the Indian state of Kerala. There are 14 districts in Kerala: Thiruvananthapuram district is ranked ninth on the basis of a human development index (HDI) score, while Kollam ranks sixth. Thus, one study district was slightly below the state average and the other district slightly above. The study sample was selected by stratified random sampling from all male TB patients (≥18 years) diagnosed with TB in 11 treatment units (TUs) located within the two districts between 1 October 2005 and 31 December 2005. Patients were eligible for study participation if they had completed TB treatment 6–9 months before the study.

There are six TUs in Thiruvananthapuram and five in Kollam. In the 11 TUs, 748 male TB patients were eligible for the study. A sample size of 208 TB patients was chosen based on an expected smoking prevalence rate of 75%. Anticipating difficulties in tracing patients due to incorrect addresses and death, we decided to contact 250 patients to obtain at least 208 for the study. From each of the 11 TUs, a sample of patients proportionate to the total number of TB patients detected in that TU was selected randomly. The size of sample selected from each TU ranged from 15 in the smallest TU to 36 in the largest. We were able to contact 215 of these 250 patients.

All patients agreed to participate in the study and gave informed consent. Female patients were excluded from the study, as smoking among females is very low in Kerala. Two trained interviewers visited the patients at their home or workplace and collected information on demographics, disease history, tobacco use history, quit smoking advice from health providers and patient perceptions about links between TB and tobacco. A pre-tested semi-structured interview schedule was developed and used for the study. Tobacco use histories were collected at eight time points. We recognised that recall could prove problematic, but we found that most patients were able to report smoking behaviour during the times queried because TB diagnosis and treatment were salient life markers for them. Reports of how much they smoked at these times were treated as very general indicators. In addition to responses to structured questions, informants were encouraged to share their experiences of quit attempts and reasons for relapse.

Definitions of terms used

Ever smokers were categorised into three types at each reference time point: 1) persistent smoker if the person had never quit smoking from the time of diagnosis to the reference point in question; 2) quitter if the person had quit smoking from the previous reference point to the focal reference point; and 3) relapsed smoker if the person had resumed smoking after having quit for a period of time captured by any of the previous reference points.

Statistical analysis
Survey data were analysed using the SPSS statistical programme (SPSS Inc, Chicago, IL, USA). The numbers of cigarettes and bidis smoked were numerically added together to obtain an aggregate score of the quantity smoked daily. Descriptive statistical analyses were performed and a P value <0.05 was considered statistically significant. A binary logistic regression analysis was performed to identify predictors of 1) initial quitting and 2) smoking relapse.

Ethical considerations
Institutional Review Board (IRB) approval was obtained from the Government of India and the Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. Before administering the survey, investigators explained the purpose of the study to all patients. The voluntary nature of participation and the anonymous and confidential nature of the interview schedules were strongly emphasised. Verbal informed consent was obtained from all patients.

RESULTS

Background characteristics of former TB patients
The mean age and mean years of education of the study patients were respectively 49.0 years (standard deviation [SD] 12.1) and 6.9 years (SD 2.1). About 90% of the subjects were currently married, all were of low socio-economic status (71% were daily wage earners) and 14% had some form of chronic disease (e.g., diabetes, asthma, heart disease). Of the 215 study patients, 203 (94.4%) were ever tobacco users, and only 41 (20.2%) had quit tobacco use 6 months before the diagnosis of TB. The prevalence of various types of tobacco consumed by the remaining 162 tobacco users at different time points covered by the study is provided in Table 1.

Smoking status at eight different time points
Of the 215 study patients, 199 (93%) were ever smokers and 153 (71.2%) current smokers 6 months before
Table 1  Forms of tobacco use among male tuberculosis patients at eight time points
\((n = 215)\)

<table>
<thead>
<tr>
<th>Time points</th>
<th>Any tobacco use</th>
<th>Smoking</th>
<th>Chewing</th>
<th>Snuff use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n)</td>
<td>%</td>
<td>(n)</td>
<td>%</td>
</tr>
<tr>
<td>6 months before diagnosis</td>
<td>162</td>
<td>75.3</td>
<td>153</td>
<td>71.2</td>
</tr>
<tr>
<td>1 week before diagnosis</td>
<td>151</td>
<td>70.2</td>
<td>141</td>
<td>65.6</td>
</tr>
<tr>
<td>1 week after diagnosis</td>
<td>37</td>
<td>17.2</td>
<td>20</td>
<td>9.3</td>
</tr>
<tr>
<td>During the intensive phase of treatment</td>
<td>52</td>
<td>24.2</td>
<td>36</td>
<td>16.7</td>
</tr>
<tr>
<td>During the continuation phase of treatment</td>
<td>58</td>
<td>27.0</td>
<td>41</td>
<td>19.1</td>
</tr>
<tr>
<td>On completion of treatment</td>
<td>75</td>
<td>34.9</td>
<td>56</td>
<td>26.0</td>
</tr>
<tr>
<td>3 months after completion of treatment</td>
<td>82</td>
<td>38.1</td>
<td>66</td>
<td>30.7</td>
</tr>
<tr>
<td>6 months after completion of treatment</td>
<td>83</td>
<td>38.6</td>
<td>67</td>
<td>31.2</td>
</tr>
</tbody>
</table>

Table 2  Smoking status among male tuberculosis patients who had smoked at eight time points \((n = 153)\)

<table>
<thead>
<tr>
<th>Time points</th>
<th>Persistent smoker</th>
<th>Relapsed smoker</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daily</td>
<td>Non-daily</td>
</tr>
<tr>
<td></td>
<td>(n) (%)</td>
<td>(n) (%)</td>
</tr>
<tr>
<td>6 months before diagnosis</td>
<td>151 (98.7)</td>
<td>2 (1.3)</td>
</tr>
<tr>
<td>1 week before diagnosis</td>
<td>139 (90.8)</td>
<td>2 (1.3)</td>
</tr>
<tr>
<td>1 week after diagnosis</td>
<td>19 (12.4)</td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>During the intensive phase of treatment</td>
<td>19 (12.4)</td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>During the continuation phase of treatment</td>
<td>19 (12.4)</td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>On completion of treatment</td>
<td>18 (11.8)</td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>3 months after completion of treatment</td>
<td>18 (11.8)</td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>6 months after completion of treatment</td>
<td>18 (11.8)</td>
<td>1 (0.7)</td>
</tr>
</tbody>
</table>

Table 3  Quantity of smoking among male tuberculosis patients at eight time points by smoking status

<table>
<thead>
<tr>
<th>Time points</th>
<th>Persistent smoker ((n = 18))</th>
<th>Relapsed smoker ((n = 46))</th>
<th>Permanent quitter ((n = 46))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean sticks*</td>
<td>Median sticks</td>
<td>Mean sticks</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>6 months before diagnosis</td>
<td>23.3</td>
<td>25.0</td>
<td>17.6</td>
</tr>
<tr>
<td>1 week before diagnosis</td>
<td>22.7</td>
<td>25.0</td>
<td>16.2</td>
</tr>
<tr>
<td>1 week after diagnosis</td>
<td>10.1</td>
<td>10.0</td>
<td>—</td>
</tr>
<tr>
<td>During the intensive phase of treatment</td>
<td>12.8</td>
<td>14.0</td>
<td>5.4</td>
</tr>
<tr>
<td>During the continuation phase of treatment</td>
<td>13.8</td>
<td>15.0</td>
<td>6.2</td>
</tr>
<tr>
<td>On completion of treatment</td>
<td>18.1</td>
<td>20.0</td>
<td>6.9</td>
</tr>
<tr>
<td>3 months after completion of treatment</td>
<td>17.8</td>
<td>19.0</td>
<td>7.7</td>
</tr>
<tr>
<td>6 months after completion of treatment</td>
<td>17.9</td>
<td>19.0</td>
<td>7.7</td>
</tr>
</tbody>
</table>

* Cigarettes or bidis.
### When does relapse occur?

Table 4 presents data on when former quitters relapsed to start smoking again. Of the 48 TB patients who relapsed, one third relapsed during the first 2–3 months of treatment, another third during the next 3 months of treatment and 21% during the 3 months after treatment. Of these 48 relapsed smokers, 12 had health staff DOTS providers and the remaining 36 had non-health staff DOTS providers. Notably, more than half of all relapses occurred during the early months of treatment among patients whose DOTS providers were non-health staff. Among patients who had DOTS providers who were health staff, most relapses occurred after completion of treatment.

### Characteristics of smokers with different smoking status

The personal characteristics of persistent smokers, relapsed smokers and permanent quitters are provided in Table 5.

### Quit smoking advice and cessation messages from health professionals and DOTS providers

All patients were asked if any health professional had inquired about their smoking habits at any of their TB-related clinic visits since diagnosis. All of those who smoked in the months before diagnosis were then asked whether they had received any cessation advice from any health professional. Those who reported receiving smoking cessation advice were asked what messages they had received. All 153 study patients except one reported that they had been asked about tobacco use by health staff. The proportion of patients who received smoking cessation advice from different health professionals is shown in Table 6.

A content analysis of messages received by smokers at the time of diagnosis revealed that only about half contained TB-specific messages—messages that smoking aggravates TB, smoking reduces the effectiveness of TB treatment and smoking can cause relapse of TB. The five most common TB-specific messages reported were: 1) ‘Smoking is bad for this disease. Stop it’; 2) ‘Because you have TB, give up smoking’; 3) ‘Smoking will prevent cure, so stop it’; 4) ‘This disease is due to smoking, so stop it’; 5) ‘Smoking will reduce the effect of drugs, so give up smoking’.

Fifty per cent of study patients who received messages stated that they were only given general advice to quit smoking without any explanation. The four most common general messages were: 1) ‘You should quit smoking’; 2) ‘Don’t smoke again’; 3) ‘Give up smoking’; 4) ‘Stopping smoking is good for your health’. Most patients reported receiving only one brief message from a doctor at the time of diagnosis,
a time when they were quite ill, and being told many things about their medication. Two fifths of DOTS providers were health staff and three fifths were non-health staff (mostly *anganwadi* workers, grass root workers in the integrated child development services scheme). When the DOTS provider was a health staff member, only 30% of TB patients received a cessation message. When non-health staff were the DOTS providers, more than three quarters of TB patients reported being told to quit smoking while taking treatment.

**Predictors of initial quitting and smoking relapse**

Logistic regression was undertaken to measure the influence of factors such as presence of chronic disease, quantity of smoking, use of smokeless tobacco, type of DOTS provider and type of quit advice on initial quitting and smoking relapse. Daily smoking of more than 15 cigarettes/ *bidis* at the time of diagnosis was the only factor significantly associated with persistent smoking. Type of DOTS provider was the only variable found to be significantly associated with smoking relapse at any time.

**DISCUSSION**

Among 153 former TB patients surveyed, two thirds were current smokers at the time of TB diagnosis. This rate is two and a half times that in the general population in Kerala.16 Even though most quit smoking as soon as they were diagnosed with TB, due to a combination of discomfort and fear of death, smoking relapse started soon after serious symptoms abated 4–8 weeks after treatment. Those who quit and relapsed did so across all time periods surveyed. Nearly 36% of those who quit at some point during treatment relapsed by 3 months post treatment, with very few relapsing 3–6 months post treatment. This is worrying, given that smokers are three times more likely to experience TB relapse8 and five times more likely to die from TB compared to non-smokers.13

Brief tobacco cessation has recently been advocated in TB control programmes using the ‘5 As’ cessation approach (Ask, Assess, Advise, Assist, Arrange).21–23 In the present study, most TB patients received short cessation messages at the time of diagnosis, but such advice was not followed up during subsequent interactions with health staff. Messages were mainly received from doctors, not other health staff. All health professionals serving TB patients should be trained and encouraged to promote smoking cessation and to give messages that are TB-specific. We found that ‘quit for health’ messages are generally not taken seriously by many TB patients. We also found that because patients in the DOTS programme do not routinely visit health professionals, it is important for DOTS providers who routinely see patients to offer quit messages throughout the 6 months of treatment and in the 3–6 months following treatment. In Kerala, patients know most of the non-health staff DOTS providers offering cessation advice, and their intervention may be seen as showing concern for the patient rather than being intrusive. As they see TB patients three times a week during the intensive phase and once a week during the continuation phase of treatment, DOTS providers are good resources for smoking cessation activities.

**Strengths and limitations of the study**

The high response rate and carefully selected sample size are strengths of this study. The data are robust enough to support the conclusions about the need for 1) repeated exposure of TB patients to smoking...
cessation interventions and 2) interventions for former and quitting smokers to encourage sustained cessation. However, as this is a descriptive study we cannot know the direction of the association. For example, messages to stop smoking could be recalled differently, according to subsequent or previous behaviours. In other words, this study may simply have measured whether or not people thought they remembered being told to stop smoking, and not whether or not the message was actually given. A well-designed randomised controlled trial might be able to overcome some of the limitations of this study.

CONCLUSIONS

While advocating for DOTS provider participation in smoking cessation, the authors wish to stress that all DOTS providers need to be trained in how to offer effective brief cessation interventions. We also wish to point out that, in this study, smoking relapse was significantly higher in the initial months of treatment when a DOTS provider was non-health staff as compared to health staff, suggesting that it is particularly important for health staff to be involved in giving cessation messages in the first 3 months of treatment. Given that relapse is high in the early months following the completion of DOTS-based treatment, we also recommend that all patients be given a strong ‘stay quit’ message by health care providers to remain non-smokers at the end of DOTS treatment—a message that is TB-specific and not just general.

Acknowledgements

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RÉSUMÉ

OBJECTIFS : Documenter les types de tabagisme chez les patients tuberculeux à huit moments différents pendant et après le traitement et investiguer la fréquence et le contenu des messages d’arrêt du tabagisme qu’ils ont reçus.

SCHÉMA : On a fait une enquête recourant à un schéma d’interview semi-structurée préalablement testée dans un échantillon aléatoire stratifié de 215 patients tuberculeux de sexe masculin provenant de Kerala, Inde, et qui avaient achevé leur traitement au cours des 9 derniers mois.

RÉSULTATS : Six mois avant le diagnostic, 94,4% des patients tuberculeux de sexe masculin étaient fumeurs ou anciens fumeurs et 71,2% des fumeurs actuels. Bien que 87% des patients aient cessé de fumer peu de temps après le diagnostic, 36% ont rechuté dans les 6 mois après traitement. Un tiers a rechuté au cours des 3 premiers mois du traitement et un autre tiers durant les 3 mois suivants. Deux tiers de l’ensemble des fumeurs ont bénéficié d’un conseil d’arrêt provenant de médecins de santé primaire, mais moins de la moitié ont reçu cet avis provenant d’autres. Moins de la moitié de tous les messages concernaient spécifiquement la tuberculose et le reste, les instructions étaient très généralement brèves. Il y a une association entre le fait de fumer plus de 15 cigarettes/bidis par jour au moment du diagnostic et un taux plus faible d’arrêt au cours du traitement (OR 8,0 ; IC95% 2,1–30,9).

CONCLUSION : On ne prête pas souvent attention aux messages d’arrêt de la fumée. Des efforts proactifs s’imposent pour encourager le personnel de santé et les pourvoyeurs de DOTS de donner des messages plus forts d’arrêt du tabagisme.

OBJETIVOS : Documentar los tipos de tabaquismo de los pacientes tuberculosos en ocho momentos diferentes antes, durante y después del tratamiento e investigar la frecuencia y el contenido de los mensajes que recibieron sobre el abandono del consumo.

MÉTODO : Se escogió para el estudio una muestra aleatoria estratificada de 250 pacientes tuberculosos masculinos en Kerala, India, los cuales habían completado el tratamiento en los últimos 9 meses; se realizó la encuesta mediante una entrevista estructurada previamente validada.

RESULTADOS : Seis meses antes del diagnóstico, 94,4% de los pacientes con tuberculosis (TB) presentaban un antecedente de tabaquismo y 71,2% eran fumadores. Si bien 87% de los pacientes abandonaron el hábito poco después del diagnóstico, 36% lo reanudaron 6 meses después del tratamiento. Un tercio reanudó el tabaquismo durante los 3 primeros meses y otro tercio durante los siguientes 3 meses de tratamiento. Dos tercios de todos los fumadores recibieron consejos sobre abandono del hábito por parte de los médicos de atención primaria, pero menos de la mitad recibió mensajes por parte de otras personas. Menos de la mitad de todos los mensajes fueron específicos de la TB y el resto comportaban instrucciones cortas muy generales. El consumo de más de 15 unidades (bidis y cigarrillos) en el momento del diagnóstico se asoció en forma significativa con una menor tasa de abandono durante el tratamiento (OR 8,0; IC95% 2,1–30,9).

CONCLUSIÓN : Los consejos sobre el abandono del tabaquismo no suelen generar la respuesta esperada. Se precisan esfuerzos activos que estimulen al personal sanitario y a los proveedores de atención de la estrategia DOTS a transmitir mensajes enérgicos sobre el abandono del consumo de tabaco.