Brief Smoking Cessation Interventions on Tuberculosis Contacts Receiving Preventive Therapy

Dear Editor,

Tobacco is one of the greatest public health threats, accounting for more than 7 million deaths each year.[1] In Singapore, the prevalence of smoking was estimated as 13.3% of the population aged 18 to 69 years in 2013.[2] The positive association between tuberculosis (TB) and smoking is well established in regard to the increased risk of latent TB infection (LTBI), active TB, TB recurrence and mortality due to suppression of the immune system.[3-5] Brief smoking cessation advice by healthcare professionals is demonstrated to be effective[6-9] and recommended by the United States Preventive Services Task Force.[10]

Although previous studies have determined smoking cessation effectiveness on active TB patients, few studies have examined the impact on contacts with LTBI.[11-14] Hence, this trial was established to determine the effectiveness of brief, opportunistic regular smoking cessation advice, which can be easily incorporated into routine clinical outpatient settings in contacts with LTBI undergoing 6 months of preventive therapy (PT) at the Singapore TB Control Unit Contact Clinic.

Materials and Methods

A prospective cohort (intervention) group was compared to a historical control group. The period of the intervention group recruitment was from 28 March to 30 September 2016 and comprised current smokers with LTBI who had self-reported their status on commencement of their PT. The control group was recruited 6 months earlier (30 September 2015 to 27 March 2016) using similar criteria. For the control group, brief, uniformed smoking cessation advice was given by the clinic nurses only at the start of PT, and their smoking status was confirmed again upon completion of their 6 months of treatment.

Interventions in the cohort group consisted of a smoking cessation booklet published by the Singapore Health Promotion Board (HPB) and brief, uniformed smoking cessation advice by the same group of nurses as those advising the control group at the initial visit; similar smoking cessation advice would be repeated at 4 to 5 weekly intervals until their treatment completion. Patients were instructed to peruse the booklet, with no assistance offered. Nurses were instructed to tell patients that smoking increases their chances of developing active TB and can cause other serious illnesses such as cancer and heart disease. Smoking status was checked and recorded by the same group of nurses at each visit, with the approximate date of smoking cessation, if applicable, and number of sticks smoked, if reported by the patient.

Information pertaining to patient demographics and presence of comorbidities such as diabetes mellitus, human immunodeficiency virus (HIV) infection and end stage renal failure were captured as per routine contact clinic patient's initial interview data. Patients who ceased PT prematurely were excluded from the analysis.

Ethics approval was not sought as this intervention was a programmatic initiative implemented for detection of benefits on contacts undergoing PT at our centre.

Data were analysed using SPSS (version 13; SPSS, Inc., Chicago IL), where Pearson's χ^2 was used to compare the results for the 2 groups. The level of significance was $P < 0.05$. Variables which were compared included the age, country of birth, gender, ethnicity and comorbidities such as diabetes mellitus and end stage renal failure.

Results

There were 41 individuals in the control group and 56 cases in the cohort group for analysis. Comparison of the baseline characteristics as described in Table 1 showed no significant differences in most variables, except for a significantly higher number of smokers who were of ethnicities other than Chinese, Malay and Indians in the cohort group ($P = 0.03$).

A significantly higher proportion of individuals in the intervention group achieved successful smoking cessation at the completion of their PT compared to the control group (35.7% vs 9.8%, $P = 0.003$), or decreased their cigarette consumption (32.3% vs 19%, $P = 0.024$). Table 2 shows the analysis of baseline characteristics between those who achieved smoking cessation against those who did not in the intervention group, with no significant differences demonstrated.

Discussion

A significantly higher proportion of smokers in the intervention group quit smoking at the time of PT completion compared to a historical control group, demonstrating effectiveness of brief regular, uniform smoking cessation

Table 1. Baseline Characteristics of the Control and Cohort Groups

Characteristics		Controls (n = 41)	Cohort Group (n = 56)	Univariate Analysis		Multivariate Analysis	
				Odds Ratio	*P* Value (CI 95%)	Odds Ratio	*P* Value (CI 95%)
Age							
≥40 years		20 (48.8%)	28 (50.0%)	1		1	
<40 years		21 (51.2%)	28 (50.0%)	0.95	0.91 (0.43 – 2.13)	1.72	0.27 (0.65 – 4.54)
Ethnicity							
Chinese		23 (56.1%)	19 (33.9%)	1		1	
Malay		5 (12.2%)	11 (19.6%)	2.66	0.12 (0.79 – 9.01)	2.73	0.12 (0.77 – 9.68)
Indian		6 (14.6%)	6 (10.7%)	1.21	0.77 (0.34 – 4.37)	1.64	0.55 (0.33 – 8.20)
Others		7 (17.1%)	15 (26.8%)	3.46	0.02 (2.21 – 9.92)	5.50	0.03 (1.22 – 24.70)
Country of birth							
Singapore		24 (58.5%)	30 (53.6%)	1		1	
Others		17 (41.5%)	26 (46.4%)	1.22	0.63 (0.54 – 2.76)	1.59	0.48 (0.45 – 5.66)
Gender							
Male		34 (82.9%)	49 (87.5%)	1.44	0.54 (0.46 – 4.49)	1.80	0.36 (0.52 – 6.24)
Female		7(17.1%)	7 (12.5%)	1		1	
Comorbidities							
Diabetes mellitus	No	37 (90.2%)	55 (98.2%)	1		1	
	Yes	4 (9.8 %)	1 (1.8 %)	0.12	0.17 (0.018 – 1.57)	0.14	0.10 (0.01 – 1.49)
End stage renal failure	No	40 (97.6%)	55 (98.2%)	1		1	
	Yes	1 (2.4%)	1 (1.8%)	0.82	0.73 (0.04 – 11.98)	0.74	0.84 (0.04 – 13.28)

Table 2. Baseline Characteristics of Cohort Group Individuals Who Stopped or Continued Smoking

Characteristics		Stopped (n = 20)	Did Not Stop (n = 36)	Multivariate Analysis	
				Odds Ratio	*P* Value (CI 95%)
Age					
≥40 years		11 (55.0%)	17 (47.2%)	1	
<40 years		9 (45.0%)	19 (52.8%)	2.16	0.17 (0.72 – 6.45)
Ethnicity					
Chinese		5 (25.0%)	14 (38.9%)	1	
Malay		4 (20.0%)	7 (19.4%)	3.02	0.12 (0.74 – 12.28)
Indian		2 (10.0%)	4 (11.1%)	1.21	0.85 (0.19 – 7.78)
Others		9 (45.0%)	11 (30.6%)	2.99	0.17 (0.63 – 14.30)
Country of birth					
Singapore		8 (40.0%)	22 (61.1%)	1	
Others		12 (60.0%)	14 (38.9%)	2.06	0.31 (0.51 – 8.34)
Gender					
Male		18 (90.0%)	31 (86.1%)	2.65	0.24 (0.52 – 13.59)
Female		2 (10.0%)	5 (13.9%)	1	
Comorbidities*					
Diabetes mellitus	No	20 (100%)	35 (97.2%)		
	Yes	0 (0 %)	1 (2.8 %)		
End stage renal failure	No	20 (100%)	35 (97.2%)		
	Yes	0 (0%)	1 (2.8%)		

*Sample size was too small for any meaningful analysis to be made.

advice from healthcare providers. This outcome was achieved without specific training of our clinic nurses as to smoking cessation advice. As the cohort group was also given a HPB smoking cessation booklet at the beginning of their PT, it is not possible to tease out the effect/contribution of the smoking cessation booklet from that of repeated, brief smoking cessation advice; we therefore view and discuss these interventions as a package.

Brief smoking cessation advice to TB patients at each clinic visit has been shown to result in high quit rates in a Directly Observed Treatment Short (DOTS) course service in Indonesia,[15] and reinforced smoking cessation health messages have been found to be effective in routine TB services in rural China,[16] in addition to numerous other studies.[11-14]

Interestingly, another study by Lancaster and Stead, estimated the effect of physician's advice on patients' smoking cessation rate at 1% to 3% at 6 months.[7] The apparent increased intervention impact may be explained by the high frequency of interactions with our clinic staff as these individuals were seen every 4 weeks for 6 months, resulting in higher intervention exposure of subjects. The contacts might also relate more to the message of reduced active TB progression risk via smoking cessation.

Although a higher percentage of foreign-born individuals succeeded in smoking cessation compared to the control group, this could partly be due to the small sample size, further compounded by a significantly higher number of foreign-born subjects. Another possible explanation might be the desensitisation of Singapore-born persons to antismoking messages, having had repeated exposures from an early age.

Older individuals (≥40 years old) were also more likely to stop smoking. This could be due to perceived increased benefits of smoking cessation, with increased probability of concurrent pre-existing comorbidities. In contrast, those of younger ages (<40 years old) would likely be healthier, with less smoking cessation benefits perceived, especially where smoking might be conceived as fashionable within their social circle.

Our small sample size might have resulted in certain characteristics being both over- and under-represented. For example, the numbers of other ethnicities besides Chinese, Malay and Indian were significantly different in the cohort group, which might have accounted for the higher number who stopped smoking.

As in all studies which rely on patient self-reporting, our findings may have been influenced by biases of both social desirability and acquiescence, where participants might feel compelled to report what they think reflects better on them. However, trials such as Stange et al have shown high sensitivity (0.7) and specificity (0.96) based on patients' report in smoking cessation studies during exit surveys.[17] Still, perhaps more objective measures such as biological markers at certain time-points could be considered in future studies. We also measured outcomes only at the 6-month time-point, and the long-term impact of the interventions remains a question. Hence, further resources would be required before any definitive conclusions can be reached.

Although this intervention is suited to the chronic disease outpatient setting where regular follow-up is required, our results may not be replicable should the individuals be subjected to a once-off exposure. This, however, should not deter healthcare professionals from offering advice at every opportunity, as it is possible that repeated exposures in different consultations might still exhibit some effect. This would be similar to a real-world setting, where physicians and other healthcare professionals would be subjected to time constraints and thus would not be able to conduct a structured interview.

Conclusion

Repeated advice for smoking cessation is effective in patients undergoing TB treatment. Further studies should examine whether these benefits of smoking cessation are sustained over time.

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