Association between smoking cessation advice and smoking behaviour among tuberculosis patients at hospitals in North Sumatra, Indonesia

Nanda Safira* Virasakdi Chongsuvivatwong* Wit Wichaidit**

Abstract

Background: Healthcare workers are recommended to provide tuberculosis (TB) patients with tobacco control intervention according to the ABC (ask, brief advice, cessation support) approach in helping TB patients who smoked to quit smoking. In addition, directly observed therapy (DOTS) providers can also play a key role in encouraging smoking cessation. However, there is scarce data on the association between these measures and smoking cessation among TB patients.

Objective: To assess the association between smoking cessation advice and changes in self-reported smoking behaviours among TB patients who were smokers at diagnosis in Indonesia.

Methods: We conducted a hospital-based cross-sectional study of 38 pulmonary TB patients who were current smokers at the time of TB diagnosis. We excluded 4 patients who provided erroneous answers (n=34 patients). We considered patients who had become former smokers after diagnosis to be “quitters”, otherwise we considered them as those who “remained current smokers”. We analyzed data using descriptive statistics and multivariate logistic regression analyses with adjustment for potential confounders.

Results: There were 11 of 34 patients (32.4%) who received complete ABC. The probability of becoming quitters among those who received complete ABC vs. those who received incomplete, or no ABC was 13.3% and 47.4%, respectively (Adjusted OR = 0.12; 95%CI = 0.01 – 1.24). However, receiving smoking cessation advice from DOTS providers was positively associated with becoming quitters (Adjusted OR = 4.77; 95%CI = 0.65 – 34.81).

Conclusions: Receiving complete ABC was negatively associated with smoking cessation, whereas advice from DOTS providers may influence cessation. Our statistical power was low and social desirability of smoking cessation could have influenced the study findings. Relevant programs should also consider these caveats in the interpretation of study findings.

Keywords: ABC, cessation, Indonesia, smoking, tuberculosis

*Department of Epidemiology, Faculty of Medicine, Prince of Songkla University

**Department of Epidemiology, Faculty of Medicine, Prince of Songkla University, E-mail: wit.w@psu.ac.th

Received: *December 23, 2020* ***Revised:*** *June 10, 2021* ***Accepted:*** *August 2, 2021*

ความสัมพันธ์ระหว่างการให้คำแนะนำด้านการเลิกบุหรี่และพฤติกรรมการสูบบุหรี่ ในกลุ่มผู้ป่วยวัณโรคที่โรงพยาบาลในจังหวัดสุมาตราเหนือ ประเทศอินโดนีเซีย

นันดา ซาฟีรา* วีระศักดิ์ จงสู่วิวัฒน์วงศ์* วิทย์ วิชัยดิษฐ**

บทคัดย่อ

บทนำ : ปัจจุบันมีคำแนะนำให้บุคลากรสาธารณสุขแนะนำให้ผู้ป่วยวัณโรคเลิกบุหรี่ตามแนวทาง ABC (ask, brief advice, cessation support) ซึ่งผู้สังเกตการรักษาวัณโรค (ผู้ทำ DOTS) อาจมีบทบาทสำคัญในการส่งเสริมการเลิกบุหรี่ แต่ยังมีข้อมูลค่อนข้างน้อยในเรื่องความสัมพันธ์ระหว่างมาตรการดังกล่าวกับการเลิกบุหรี่

วัตถุประสงค์การวิจัย : เพื่อประเมินความสัมพันธ์ระหว่างการให้คำแนะนำการเลิกบุหรี่กับความเปลี่ยนแปลงของพฤติกรรมการสูบบุหรี่ในกลุ่มผู้ป่วยวัณโรคในประเทศอินโดนีเซียที่มีพฤติกรรมสูบบุหรี่เมื่อได้รับการวินิจฉัยวัณโรค

วิธีการวิจัย : เป็นการวิจัยเชิงพรรณนาแบบภาคตัดขวาง ตัวอย่างคือ ผู้ป่วยวัณโรคปอดที่มีประวัติสูบบุหรี่ ณ วันที่วินิจฉัยวัณโรค จำนวน 38 คน คัดออก 4 คน (ตัวอย่าง = 34 คน) จัดตัวอย่างเป็น 2 กลุ่ม ได้แก่ กลุ่มผู้เลิกบุหรี่ และกลุ่มผู้ยังคงสูบบุหรี่ วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา และวิเคราะห์การถดถอยแบบหลายตัวแปร

ผลการวิจัย : ผู้ป่วย 11 คน จาก 34 คน (ร้อยละ 32.40) ที่ได้รับคำแนะนำตามแนวทาง ABC โดยครบถ้วน มีโอกาสเลิกบุหรี่น้อยกว่าผู้ป่วยที่ได้รับแนวทาง ABC ไม่ครบถ้วน (13.3% vs. 47.4%, ตามลำดับ; Adjusted OR = 0.12; 95%CI = 0.01 - 1.24) ส่วนการได้รับคำแนะนำการเลิกบุหรี่จากผู้ทำ DOTS มีความสัมพันธ์เชิงบวกกับการเลิกบุหรี่ (Adjusted OR = 4.77; 95%CI = 0.65 - 34.81)

สรุปผล : การได้รับแนวทาง ABC มีความสัมพันธ์เชิงลบกับการเลิกบุหรี่ ส่วนการได้รับคำแนะนำจากผู้ทำ DOTS อาจมีอิทธิพลต่อการเลิกบุหรี่ อย่างไรก็ดี การวิจัยนี้มีอำนาจทางสถิติต่ำและอาจมีการให้คำตอบที่พึงปรารถนาทางสังคม การนำไปใช้ควรใช้วิจารณญาณในการตีความผลการวิจัย

คำสำคัญ : ABC การเลิกบุหรี่ อินโดนีเซีย การสูบบุหรี่ วัณโรค

*สาขาวิชาระบาดวิทยา คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์

**สาขาวิชาระบาดวิทยา คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์, E-mail: wit.w@psu.ac.th

Background

Smoking is an important risk factor for *Mycobacterium tuberculosis* (MTB) infection and development of tuberculous (TB). Among TB patients, smoking is also associated with numerous adverse outcomes.[1-2] The World Health Organization and the International Union Against Tuberculosis and Lung Disease have recommended that healthcare workers follow the Ask, Brief advice, and Cessation support (ABC) guidelines to promote smoking cessation at TB diagnosis.[3] In addition, directly observed treatments (DOTS) providers also have the potential to encourage smoking cessation.

Indonesia is a middle-income country with the third-highest number of TB cases in the world. The incidence of tuberculosis in Indonesia in 2018 was 845,000 cases.[4] Approximately 31% of Indonesia's population smoke.[5] Smoking prevalence is slightly more common in the western provinces included North Sumatra.[6] However, there is scarce data on the association between ABC intervention delivered by healthcare workers or smoking cessation advice delivered by DOTS providers on changes in smoking behavior among TB patients. Such information is potentially useful in the planning and decision-making processes of health programs and policy makers.

Objective

The objective of this study was to assess the associations between history of receiving ABC from healthcare providers or smoking cessation advice from DOTS providers and changes in self-reported smoking behaviours among TB patients in North Sumatra, Indonesia, who were smokers on the day of TB diagnosis.

Methodology

Study design and study setting

This was a hospital-based cross-sectional study conducted in North Sumatera Province. Our study was conducted in the city of Medan, with a population of 1,750,971 persons. We collected data from TB-DOTS clinics at four general hospitals in Medan.

Study population

Study population included adult pulmonary TB patients aged 18 years or older who had received tuberculosis treatment at the study hospitals for at least one month. In other words, we collected data form our study participants during the continuation phase of TB treatment. We excluded patients with extra-pulmonary TB and patients who were not adequately healthy to be interviewed from participating in the study.

Measurement of Study Variables

Exposures: We measured our first exposure (ABC: Ask, Brief Advice, Cessation Support Intervention delivered by healthcare providers), by designing the 14-item ABC intervention assessment questions based on the Smoking Cessation and Smoke-Free Environments for Tuberculosis Guideline

(Second Edition).[3] We considered patients who reported that their healthcare providers: 1) *asked* about (i) their smoking status, (ii) anyone smoke inside the house; 2) *briefly advised* them about smoking cessation and the benefits of smoking cessation with their TB condition, and; 3) provided them with minimal *cessation support* by providing (i) develop the quit plan, (ii) discuss how to deal with the challenges to quit, (iii) give advice to make a home smoke-free to have received complete ABC. With regard to our second exposure (receiving advice on smoking cessation from DOTS provider), we included the following question in our study questionnaire: "Does your DOTS provider suggest quitting or cut down your cigarette smoking?". Possible responses included: 1) Yes; 2) No; 3) I am no longer smoking; 4) Refused to answer. We included answers from participants who answered "Yes" and "No" in our analyses, and considered participants who answered “Yes” to have received smoking cessation advice from their DOTS provider.

Outcome: Changes in self-reported smoking behaviours among TB patients who smoked included: 1) Quitting; 2) Remaining current smokers. We measured the outcome by adapting the Global Adult Tobacco Survey Questionnaire (GATS)[7] to use as a self-reported smoking behaviour measurement tool. Covariables/ Patient Characteristics: We designed the participant characteristics section of our interview questionnaire to obtain information on the patients’ socio-economic and demographic characteristics. We also assessed the patients’ level of nicotine dependence using questions adapted from the Fagerstrom Test for Nicotine Dependence (FTND).[8-9]

Study Tools Development and Finalization

Our study tool was a face-to-face structured interview questionnaire with sections to measure the exposure, outcome, and other participant characteristics as described above. The study questionnaire was drafted in English, then translated to Bahasa Indonesia, then back translated to English to assess the accuracy of the translation. Locations where discrepancies were found between the original and back-translation were identified, and the Indonesian translation was then assessed to resolve translation inaccuracies. Two experts in the fields of public health and epidemiology reviewed the questionnaire into the local context. We then pilot-tested the study instrument in Bahasa Indonesia in 10 patients who met the same eligible criteria at the hospitals’ TB-DOTS clinic. The feedback from the pilot-test participants were used to further modify the study instrument. The patients included in the pilot test were not included as participants in the survey.

Sample size calculation

We performed sample size calculation as a part of a study whose objective was to

assess the smoking status of tuberculosis patients during their course of treatment.[10] In that calculation, we assumed the prevalence of current smokers among TB patients of our study to be 77.6% (p=.776). With the precision level of 5% (d=.05), 95% level of confidence, and 10% non-response rate, we calculated the minimum sample size of 294 patients using the sample size calculation formula for estimation of proportion in a single population. This sample size of 294 TB patients also included never smokers and former smokers, who were not presented in this study. The analysis performed in this study included all patients among the original study's samples who were current smokers on the day of diagnosis.

Data collection

We recruited seven recent graduates from the Faculty of Public Health, University of Sumatera Utara, Medan, as our enumerators. We trained all enumerators for three days on quantitative interview methods, data quality control, and survey research ethics. The enumerators then conducted data collection according to established protocols. We asked healthcare providers at the TB DOTS clinics to invite the patients to participate and introduced the patients to our trained enumerators. Enumerators explained to the patients about our study and assessed the patients' eligibility. Patients who met the study criteria and agreed to participate in this study obtained both oral and written information from Enumerators and gave written informed consent. Enumerators then collected data by face-to-face interviews in a private area using the paper-based version of the study instrument. The mean length of the interviews was 45 minutes.

Data entry, data management and data analyses

Two members of the research team performed double data entry of the paper and pencil questionnaire independently using Epidata software. The principal investigator subsequently cleaned the entered data prior to analyses. We summarized the characteristics of the study participants and compared the characteristics of patients who were quitters and those who remained current smokers using descriptive and inferential statistics. We assessed the association between receiving ABC and quitter's status using cross-tabulation, univariate logistic regression, and multivariate logistic regression with adjustment for the stated potential confounders. We retained covariables that were significantly associated with the outcome ($p < .05$) as potential confounders in the multivariate regression models. We excluded covariables whose inclusion in the multivariate regression analyses did not allow us to calculate the adjusted OR between receiving ABC and quitter status.

Ethical Approval

This study received ethical approval from the Human Research Ethics Committee, Faculty of Medicine, Prince of Songkla University, Thailand (REC. 62-322-18-1), and Faculty of Medicine, University of Sumatera Utara, Medan, Indonesia.

Results

Enumerators identified 318 pulmonary TB patients who had received at least one month of TB treatment and 285 patients met the inclusion criteria, among whom 277 gave their informed consent and were interviewed (response rate = 277/285 = 97.2%). Out of 277 participants, 38 were current smokers at the time of diagnosis. We excluded 4 of these 38 patients who gave contradicting answers regarding smoking status, and included 34 patients for the analyses (n=34), including 15 recent quitters and 19 patients who remained current smokers (Figure 1).

Figure 1. Changes in smoking behaviours among study participants, including 34 study participants included in data analyses

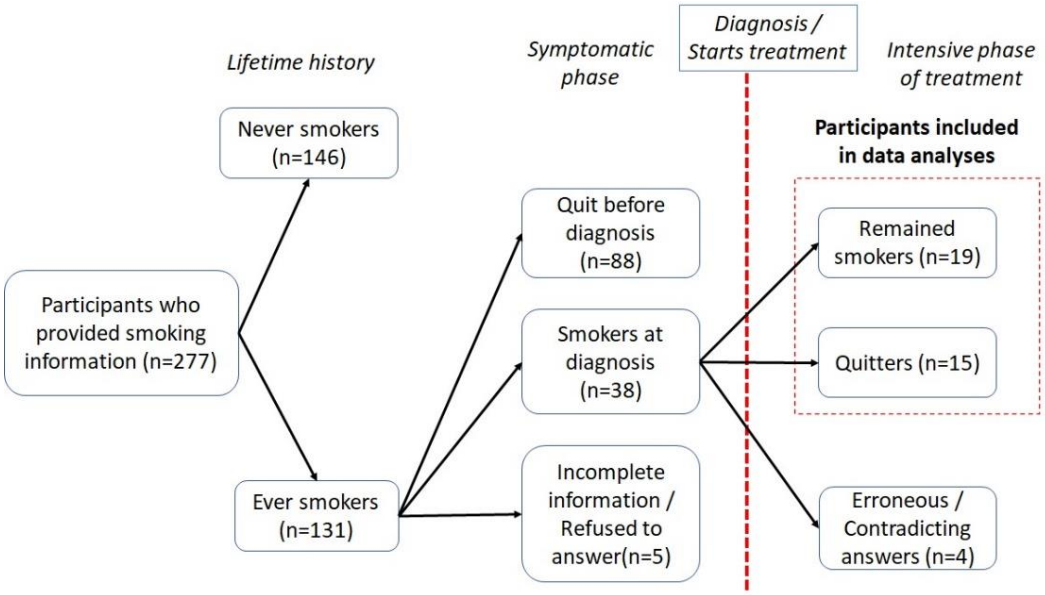

Table 1 presents the characteristics of the patients in the study who "remained smokers" and patients who were "quitters". Both groups had similar characteristics. The median nicotine withdrawal symptoms score was slightly higher among those who remained smokers compared to quitters but was not statistically significant.

Table 1 Characteristics of TB patients who were current smokers on day of diagnosis (n=34)

Variable	Remained smokers (n=19)	Quitters (n=15)	P
	n (%)	n (%)	
Sex of the Respondent			
Male	18 (94.70)	15 (100.00)	.999**
Female	1 (5.30)	0 (0.00)	
Age in years (mean ± SD)	43.7 ± 12.3	49.9 ± 15.4	.211
Education level: >9 years (vs. ≤9 years)	13 (68.40)	10 (66.70)	1.000
Occupation			.882
Not working*	6 (31.60)	6 (40.00)	
Working full-time or part-time	13 (68.40)	9 (60.00)	
Current income			.961
<1,500,000 IDR	8 (47.10)	6 (46.20)	
≥1,500,000 IDR	9 (52.90)	7 (53.80)	
Marital status			.426**
Single/ never married	5 (26.30)	2 (13.30)	
Married	14 (73.70)	13 (86.70)	
Living residence			.104**
Within Medan city	13 (68.40)	14 (93.30)	
Outside Medan city	6 (31.60)	1 (6.70)	
AUDIT-C score, [mean ± SD]	3.53 ± 4.02	2.60 ± 3.35	.469
Owns DOTS Provider (vs. No)	16 (84.20)	11 (73.30)	.672
TB-related symptoms presentation prior to seeking medical care and diagnosis			
Cough only	4 (21.10)	4 (26.70)	.815**
Cough with sputum	11 (57.90)	7 (46.70)	
Cough with bleeding	4 (21.10)	4 (26.70)	
TB-related treatment side effect			
Has no side effect	0 (0.00)	2 (13.30)	.187**
Has side effect	19 (100.00)	13 (86.70)	
Nicotine dependence level			
Low	5 (26.30)	2 (13.30)	.426**
Moderate to High dependence	14 (73.70)	13 (86.70)	
Nicotine withdrawal symptoms score (Median [IQR])	65 [57- 70]	60 [55- 60]	.105

**Retired/unable to work/housewife/student/others; **Based on Fisher's exact test*

The most common components of ABC among these 34 current smokers were A= ask and B= brief advice accounting for 29 patients (85.3%) and 28 patients (82.4%), respectively. Among those who were asked and advised, 14 patients (41.2%) reported receiving C=cessation support, and only 11 patients received all three components of ABC. Among TB patients who were current smokers on the day of diagnosis and received complete ABC, 19.2% became quitters on the day of the interview. Among patients who did not receive complete ABC, 56.5% became quitters. However, the negative association remained was not statistically significant (Adjusted OR = 0.12; 95%CI = 0.01 – 1.24). On the other hand, patients who received smoking cessation advice from their DOTS providers were more likely to quit smoking than patients who did not receive such advice from their DOTS providers (Adjusted OR = 4.77; 95%CI = 0.65 - 34.81). (Table 2).

Table 2 Association between receiving complete ABC from healthcare providers and receiving advice on smoking cessation from DOTS provider on smoking status among TB patients who were smokers at diagnosis (n=34 patients)

Variable	Remained smokers (n=19)	Quitters (n=15)	Crude OR (95% CI)	Adjusted OR (95% CI)*
Received complete ABC				
Not complete ABC (n= 23)	10 (43.50)	13 (56.50)	1.0 (Ref.)	1.0 (Ref.)
Complete ABC (n= 11)	9 (81.80)	2 (19.20)	0.08 (0.01 - 0.76)	0.12 (0.01 - 1.24)
Advice on smoking cessation from DOTS Providers				
No advice (n= 12)	10 (83.30)	2 (16.70)	1.0 (Ref.)	1.0 (Ref.)
Advised to stop smoking (n= 15)	6 (40.00)	9 (60.00)	7.5 (1.2 - 47.05)	4.77 (0.65 - 34.81)

Ref.: reference value; *Adjusted for the co-exposure variable only, as no participant characteristic was significantly associated with the outcome

Discussion

To the best of our knowledge, this is the first hospital-based cross-sectional study to assess the association between ABC intervention by healthcare providers and smoking cessation among tuberculosis patients in Indonesia. Receiving complete ABC was found to be negatively associated with smoking cessation, while receiving advice from DOTS providers was positively associated with smoking cessation.

Only one-third of all current smokers reported receiving all components of the intervention. These findings suggested that there might have been challenges in the implementation of integrating ABC as part of care for TB patients in Indonesia.[10] The majority of the patients reported being asked about smoking status by healthcare workers and being given brief advice for smoking cessation, but received no additional cessation support. Healthcare workers' perception that only those who were sufficiently trained in smoking cessation support should provide such service could have influenced this low prevalence.[12] A caveat regarding this finding is that we did not directly assess the minutia of compliance to the Indonesian ABC guidelines when conducting this study. We also did not have information on the TB treatment success rate at the study sites, which could have further contextualized each hospital's practice.

We found that smokers who received complete ABC were significantly less likely to quit smoking as compared to those who received incomplete or no ABC. Since the ABC approach only happened once in our study setting, smokers with intention to permanently quit smoking may need repeated ABC with concrete support to help maintain the person's quit status.[13] On the other hand, we found that those TB patients who were advised to stop smoking by their DOTS providers were 4.7 times more likely to quit smoking compared to those who had never been advised. A previous study showed that TB patients whose DOTS providers were trained to provide smoking cessation messages were less likely to resume their smoking after quitting compared to those patients who had received cessation message from doctor.[14] Thus family members may be in a good position to reinforce the healthcare worker's smoking cessation messages.[10]

Our study provides basic information on history of receiving smoking cessation intervention among TB patients and the association with the patients' smoking behaviours. However, the study has several limitations. Firstly, the statistical power is low, making it difficult to make a precise estimate in the observed association. Secondly, ABC was delivered at TB diagnosis and not when the TB patient first intended to quit (i.e., at the intention-to-quit stage of change, which could have been assessed by screening programs). Such timing reduced the implication for smoking cessation programs. Furthermore, ABC delivered to patients who were still at the precontemplation stage of smoking cessation may not have an adequately strong effect to induce cessation. Future studies should consider assessment of optimal timing for delivery of ABC intervention. Thirdly, history of receiving ABC and history of smoking at diagnosis and on

the day of interview were all self-reported. Social desirability could have influenced over-reporting of ABC or under-reporting of smoking behaviours. Future studies should consider more objective measurements such as the use of biomarkers for nicotine to assess smoking status. Fourthly, patients also may not fully understand the ABC intervention measurement questions, potentially leading to exposure misclassification. Finally, we conducted our study at hospitals in Medan, thus the findings cannot be generalized to other areas of Indonesia.

Conclusions and Recommendations

This study found negative association between ABC intervention and smoking cessation among TB patients who were current smokers at the time of diagnosis, which was contrary to our expectation. However, the extent that the patients received ABC also varied, particularly with regard to cessation support. Engaging family members who were DOTS providers to support patients to quit smoking might suggested in resulting the broader dissemination of smoking cessation. Caveats regarding low statistical power and the influence of social desirability should also be considered in the interpretation of the study findings. Future studies should also consider intention to quit screening as an opportunity to provide smoking cessation programs for TB patients.

Acknowledgement

The authors would like to thank the study participants for their time and the enumerators for their tireless effort in data collection. We also would like to thank the directors of the study hospitals for giving us the permission to conduct research. This study was a part of the PhD/Master thesis of the first author to fulfil the requirement for the TB/MDR-TB research training program at Epidemiology Unit, Prince of Songkla University under the support of Fogarty International Center, National Institutes of Health -- Grant number D43TW009522.

References

1. Balian DR, Davtyan K, Balian A, Grigoryan A, Hayrapetyan A, Davtyan H. Tuberculosis treatment and Smoking, Armenia, 2014–2016. J Clin Tuberc Other Mycobact Dis. 2017;8:1–5. doi: 10.1016/ j.jctube.2017.04.001.
2. Wang M-G, Huang W-W, Wang Y, Zhang Y-X, Zhang M-M, Wu S-Q, et al. Association between tobacco smoking and drug-resistant tuberculosis. Infect Drug Resist. 2018;12(11):873–87. doi: 10.2147/IDR.S164596.
3. Bissell K, Fraser T, Chiang C-Y, Enarson DA. Smoking cessation and smokefree environments for tuberculosis patients. Paris, France: International Union Against Tuberculosis and Lung Disease; 2010. [Internet]. 2010 [cited 2021 May 7] Available

from: https://theunion.org/sites/default/file.

4. World Health Organization. Global Tuberculosis Report 2019. Geneva: World Health Organization; 2019. [Internet]. 2019 [cited 2020 Aug 10] Available from: https://apps.who.int/iris/bitstream/handle/.
5. World Health Organization. WHO Report on the Global Tobacco Epidemic, 2019: Country profile Indonesia [Internet]. 2019. [cited 2021 May 7] Available from: https://www.who.int/tobacco/surveillance/policy/country_profile/idn.pdf.
6. Kusumawardani N, Tarigan I, Suparmi, Schlotheuber A. Socio-economic, demographic and geographic correlates of cigarette smoking among Indonesian adolescents: results from the 2013 Indonesian Basic Health Research (RISKESDAS) survey. Glob Health Action. 2018;11(sup1):146760 5. doi: 10.1080/16549716.2018. 1467605.
7. Global Adult Tobacco Survey Collaborative Group. Global Adult Tobacco Survey (GATS): Core Questionnaire with Optional Questions, Version 2.0. Atlanta, GA: Centers for Disease Control and Prevention; 2010. [Internet]. 2010 [cited 2020 Mar 6] Available from: https://www.who.int/tobacco/surveillance.
8. Fagerström K, Furberg H. A comparison of the Fagerström Test for nicotine dependence and smoking prevalence across countries. Addiction. 2008;103(5): 841–5. doi: 10.1111/j.1360-0443.2008.02190.x.
9. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström test for nicotine dependence: a revision of the Fagerström tolerance questionnaire. Br J Addict. 1991;86(9):1119–27. doi: 10.1111/j.1360-0443.1991.tb01879.x.
10. Bam TS, Aditama TY, Chiang CY, Rubaeah R, Suhaemi A. Smoking cessation and smokefree environments for tuberculosis patients in Indonesia-a cohort study. BMC Public Health. 2015; 2;15(1):604. doi: 10.1186/s12889-015-1972-2.
11. Chongsuvivatwong V. Analysis of epidemiological data using R and Epicalc. Songkhla: Epidemiology Unit, Prince of Songkla University; 2015. (in Thai).
12. Dogar O, Elsey H, Khanal S, Siddiqi K. Challenges of integrating tobacco cessation interventions in TB Programmes: Case studies from Nepal and Pakistan. J Smok Cessat. 2016;11(2):108–15. doi: 10.1017/jsc.2015.20.
13. Campbell IA, Chaudhary RD, Holdsworth GM, Lyne OD. Brief advice to tuberculosis patients in Nepal to stop smoking: a pilot study by the Britain Nepal Medical Trust. Int J Tuberc Lung Dis. 2014;18(12):1438–42. doi: 10.5588/ijtld.14.0358.
14. Nichter M, Padmawati S, Ng N. Introducing smoking cessation to Indonesian males treated for tuberculosis: The challenges of low-moderate level smoking. Soc Sci Med. 2016;152:70–9. doi: 10.1016/j.socscimed.2016.01.028.