

Determinants of tobacco cessation among patients with chronic diseases (diabetes/hypertension) enrolled in Ministry of Health Tobacco Cessation Clinics, Kingdom of Saudi Arabia from 2012-2017

A case control study

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ABSTRACT

الأهداف: التحقق من العوامل المرتبطة بنجاح الإقلاع عن التبغ بين المرضى الذين يعانون من أمراض مزمنة (ارتفاع ضغط الدم أو مرض السكري) الذين التحقوا في عيادات الإقلاع عن التبغ التابعة لوزارة الصحة في المملكة العربية السعودية خلال الأعوام 2012-2017م.

المنهجية: أجريت دراسة حالة- ضابطه على 402 مشاركاً. تم تعريف الحالات كمجموعه المرضى الذين يعانون من (السكري/ ضغط الدم المرتفع) ممن امتنعوا عن استخدام التبغ لمدة 6 أشهر على الأقل بعد حضور عيادات الإقلاع عن التبغ. الشاهد هم مجموعه المرضى الذين يعانون من أمراض مزمنة ممن لم يمتنعوا عن استخدام التبغ لمدة 6 أشهر على الأقل بعد حضور عيادات الإقلاع عن التبغ. تم جمع البيانات في مدينة الرياض من الأول من يناير 2018 إلى 30 أبريل 2018 من خلال المقابلات الهاتفية. تضمن الاستبيان أسئلة حول الخصائص الاجتماعية الديموغرافية، تاريخ استهلاك التبغ، وحالة المرض المزمن والخدمات المتلقاة من عيادات الإقلاع عن التبغ. تم إجراء تحليل وصفي للبيانات، تحليل ثنائي المتغير وتحليل متعدد المتغيرات.

النتائج: نجح 85 مشاركاً (21.1%) في الإقلاع عن استخدام التبغ، في حين لم ينجح 317 (78.9%). من بين أولئك الذين لم يقلعوا عن السجائر، 97 (42.4%) قللوا من استهلاكها. متوسط الفرق في تدخين السجائر من قبل إلى بعد حضور عيادة الإقلاع عن التبغ 01.812 ± 5.928 (95% فاصل الثقة: 1.040-2.584). معظم الذين استخدموا أشكال أخرى من التبغ 16 (72.7%) لم يغيروا استهلاكهم. يزيد احتمال الإقلاع عن التبغ بانخفاض المستوى التعليمي، نسبة الأرجحية=17.01 (95% معامل الثقة: 1.00-289.2 القيمة الاحتمالية=0.050) وبين أولئك الذين كانوا يسيطرون على ارتفاع ضغط الدم، نسبة الأرجحية=17.824 (95% معامل الثقة: 1.5-209.6 القيمة الاحتمالية=0.022).

الخلاصة: لزيادة معدلات الامتناع عن التبغ، ينبغي النظر في أساليب جديدة مثل المشورة والمتابعة المنتظمة في عيادة الأمراض المزمنة، إبلاغ المرضى عن خدمات عيادة الإقلاع عن التبغ وتوفير خدمات الهاتف المجاني. هناك حاجة لمزيد من الجهد للحد من استهلاك أنواع أخرى من التبغ (غير السجائر).

Objectives: To investigate factors associated with tobacco cessation among patients with (diabetes or hypertension) who attended Ministry of Health (MOH) Tobacco Cessation Clinics (TCC), Saudi Arabia over the years 2012-2017.

Methods: A case control study was conducted with 402 respondents. Data collection took place in Riyadh, Saudi Arabia from January 2018 to April 2018. Cases were

patients with diabetes or hypertension who had been abstinent from tobacco for at least 6 months after attending MOH tobacco cessation clinics. Controls were patients with chronic diseases who had not quit tobacco after cessation clinics. Data were collected through a questionnaire by telephone interviews. Descriptive analysis, bivariate analysis, and multivariable regression were carried out.

Results: Overall, 85 (21.1%) respondents had successfully quit tobacco, while 317 (78.9%) had not. Among those who had not quit cigarettes, 97 (42.4%) had reduced cigarette consumption, the mean difference in cigarette smoking from before to after MOH TCC was 01.812 ± 5.928 (95% confidence interval [CI]: 2.584-1.040). Most of those who used other forms of tobacco 16 (72.7%) had not changed their consumption. The likelihood of successfully quitting tobacco increased with those lower educational level (adjusted odds ratio [AOR]=17.01, 95% CI: 1.00-289.2, $p=0.05$) and among those who reported controlled hypertension (AOR=17.8, 95% CI: 1.5-209.6, $p=0.02$).

Conclusion: To increase abstinence rates, chronic disease counseling with regular follow-ups, providing toll-free telephone services should be considered. More effort is needed to reduce non-cigarette tobacco consumption.

Keywords: tobacco, cessation, DM, hypertension, Saudi Arabia

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Every year worldwide, 6 million premature deaths are attributed to tobacco use.¹ Smoking has been identified as a modifiable risk factor for diabetes and hypertension.² To reduce premature death in patients with non-communicable diseases, the World Health Organization (WHO) targets reduction of smoking prevalence to 30% by 2030.¹

Saudi Arabia has one of the highest prevalence rates of diabetes, 18.5% in 2017.^{3,4} Diabetic patients' economic burden on national healthcare is 10 times higher than that of non-diabetic patients,⁵ as the burden of treatment and complications is high.⁵ Additionally, in the last Saudi national health survey, 15.2% and 40.6% of Saudis respectively presented with hypertension or borderline hypertension.⁶ Thus, it is important to focus on modifiable risk factors for both these conditions.

Tobacco use in Saudi Arabia has changed over the past years. In 2010, the WHO estimated around 16% of Saudi Arabia's population smoked (26% of men and 3% of women). The highest smoking rate corresponded to the 25-39 age group among men (27.4%) and the 70 and above age group among women (4.2%).¹ If we compare prevalence between the 2005 Stepwise Approach Survey and the 2013 national health survey, smoking decreased in the 15-24 age group, (men: 25.9% to 16.1%; women: 1.0% to 0.8%) and prevalence increased from 12.2% to 15.3% in the 25-64 age group.^{7,8} Approximately half of Saudi smokers who attempted quitting reported failing to abstain in the last 12 months, although no information is available on their enrollment into a tobacco cessation program.⁸ Few studies have reported on quitting rates among smokers in Saudi Arabia.⁸⁻¹⁰

In the literature, certain factors are associated with smoking cessation in the general population, such as late age initiation of smoking, low nicotine dependence, previous successful long-term quitting attempts.¹¹ Yet, few studies have reported on determinants of cessation among those diagnosed with diabetes or hypertension.^{12,13} A recent study on chronic illness and smoking cessation reported that diabetics were more likely to quit than individuals with hypertension.¹² Similarly, a diabetes-specific 30-minute counseling session was efficacious in India.¹³ Other studies have indicated that an inpatient cessation program was more effective than an outpatient program.¹⁴

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In 2008, the WHO introduced tobacco control measures.¹⁵ Saudi Arabia has long been involved in tobacco use prevention and cessation promotion. In 2002, a Tobacco Control Program affiliated with the Ministry of Health (MOH) was established.¹⁶ The program employs approximately 100 full-time staff and runs over 70 clinics offering free services. Physicians offer behavioral therapy and medication, including nicotine replacement therapy, varenicline, and bupropion. The government covers all medication. Medications are also sold in pharmacies without prescriptions, except for varenicline and bupropion. Yet no toll-free telephone quitting line is currently available.¹⁷

Practices to aid tobacco cessation are usually generalized to all users.¹⁸ Individuals with diabetes or hypertension are pressured to change their lifestyle to reduce the risk of associated complications, but facilitating tobacco cessation in this population may require a more tailored approach.¹⁹ The WHO projects the Kingdom will likely not achieve the smoking component of the global non-communicable disease targets (if adopted by the Saudi government) based on current smoking trends.¹ However, most studies carried out in Saudi Arabia investigating determinants of tobacco cessation targeted the general population as a sample instead of patients with chronic-disease attending MOH Tobacco Cessation Clinics (TCCs). Our objective was to investigate the nature of those factors and estimate tobacco cessation rates in MOH TCC users according to those factors to provide clinicians and public health workers more knowledge upon which to modify their clinical approaches and increase tobacco cessation rates among chronic-disease patients.

Methods. A case control study with 402 respondents was carried out. Data collection took place in Riyadh, Saudi Arabia between January 2018 to April 2018. The Institutional Review Board was obtained from King Fahad Medical City, Riyadh, Saudi Arabia. We employed Saudi guidelines for tobacco cessation services to define cases and controls.²⁰

Tobacco cessation is defined as when a tobacco user quits all forms of tobacco use for at least 6 consecutive months. Based on that definition, cases were respondents with chronic disease (diabetes/hypertension) who had abstained all forms of tobacco use for at least 6 months after attending a MOH TCC. Abstinence was based on self-report and calculated based on the length of time between the last tobacco use date and the telephone call date. Controls were defined as respondents with chronic disease who did not quit all forms of tobacco

consumption for at least 6 months even after attending the TCC.

The inclusion criteria accommodated participants with diabetes, hypertension, or comorbid diabetes and hypertension; Saudi or non-Saudi; aged above 40 at the time of the study; adhering to clinic follow-up for 6 months or more (from the date of first visit to the date of the telephone call); and enrolled at TCC between January 2012 and May 2017. We excluded any participant in the TCC database without a contact telephone number or information on key variables. Our study was conducted in accordance with the principles of Helsinki Declaration.

Telephone numbers of patients who attended TCCs were obtained from the Tobacco Control Management System, a database containing program patient information. Ten interviewers telephoned these patients and explained the study aim and questionnaire content. Patients who answered the phone and were willing to participate were asked to answer the questionnaire; those who did not answer were called twice more and were excluded if there was no subsequent response. Interviewers were trained to fill out the questionnaire and administer phone interviews with a protocol providing a structured method for how to initiate the phone call, explain study aims, ask questions, and answer possible participant enquiries.

Assuming an odds ratio (OR) of 0.64, power of 80%, alpha of 5%, and precision of 5%, the required sample size was 362, and final sample size was 402 (adjusting for 10% non response rate). The OR was selected based on previous tobacco cessation studies. In one study, various factors were estimated, and employment was adopted, which was significantly associated with successful cessation (OR of 0.62 indicated employed smokers had higher cessation rates than unemployed).²¹ Odd ratio choice ensured the largest sample size among the factors considered.

The questionnaire comprised 7 sections. The first section recorded the participant's basic information: phone call date and participant contact number. They were assigned a code for the current study. The second section inquired on screening: current age, date of first and last TCC visit, and diagnosis of diabetes, hypertension, or both. For participants who could not recall the dates, we obtained them from the tobacco control management system to ensure at least 6 months of follow-up. The third section covered sociodemographic characteristics: participant's age, marital status, highest education level, current occupation, monthly income, and geographical region of MOH TCC follow-up. The fourth section covered the patient's chronic disease

history: total years diagnosed with the chronic disease, the usual clinic for disease follow-up and number of visits, level of control over the chronic disease, hospitalization history, hospital admission reasons, and if the treating physician had recommended tobacco cessation. Level of diabetes control was based on American Diabetes Association Guidelines:²² participants who reported having last hemoglobin A1c (HgA1c) level of over 7% were considered to have uncontrolled diabetes mellitus (DM), while participants who reported having last HgA1c level under 7% were considered to have controlled DM. Hemoglobin A1c level was measured based on participant self-reports. Level of hypertension control was based on Saudi guidelines:²³ participants who reported last blood pressure reading over 130/80 mm/Hg were considered to have uncontrolled hypertension, and those whose last blood pressure reading was under 130/80 mm/Hg were considered to have controlled hypertension. Nicotine dependence was assessed by asking participants to report their nicotine dependence level at their first visit to the clinic. The fifth section concerned current tobacco use; if not currently using tobacco, we inquired on the participants' last tobacco use date, and abstinence was calculated from the last tobacco use date to the telephone call date. Participants were asked their perceived reason for success. Current tobacco users were asked regarding the type of tobacco they consumed, frequency of use, number of packs consumed weekly (for cigarette smokers), and (for other users) the amount of tobacco they consumed (daily consumption or less than daily) and perceived reason for failure to quit. The sixth section concerned participants' history of tobacco use: age of first tobacco use, tobacco type and frequency of use before TCC, earlier attempts to quit, and quitting methods used before attending the MOH TCC. The last section covered the services participants had received from the MOH TCC: how they found the clinic, number of visits, treatment type received, medications prescribed, duration (days) of medication use, and overall satisfaction level with provided services.

Participant consent was taken by phone. Participants' anonymity was assured by assigning each participant a code number for analysis purpose only. Participants received no incentives or rewards.

Statistical analysis. The research team was responsible for recording and verifying participants' data entered by the phone interviewer. Data were tabulated and analyzed using Statistical Package for Social Sciences, version 21 (IBM Corp, Armonk, NY, USA). Both descriptive and analytic inferential statistics were conducted. Categorical variables were presented as

counts and proportions (%), and continuous variables were given as mean \pm standard deviation. Results were presented as percentages with a 95% CI for smoking cessation. Factors associated with successful smoking cessation were evaluated in a bivariate analysis, and results were presented as OR with 95% CI. Chi-square and univariate analysis were used for comparison and correlation between variables of interest versus other categorical variables. We used Chi-square test to evaluate the association between demographic variables against the group of respondents as case (those who quit all forms of tobacco at least for 6 months and more after attending MOH TCC) versus control (those who fail to quit all forms of tobacco at least for 6 months and more after attending MOH TCC) with *p*-values which indicates whether the association was statistically significant. *P*-value of ≤ 0.05 has been accepted as the level of significance. A multivariate analysis was conducted as well, again with OR and 95% CI. A *p*-value of ≤ 0.05 was used as the significance level for all the statistical tests.

Results. A total of 769 potential participants were contacted; 402 were included in the sample, 275 did not respond, and 92 were excluded. The response rate was 64.2%. The majority of respondents had not quit tobacco 317 (78.9%), while 85 (21.1%) had successfully quit all forms of tobacco for 6 months and more after attending MOH TCC. **Tables 1-3** presents descriptive analysis of respondents' sociodemographic, chronic disease characteristic, and received medical services.

Harm reduction. Among those who were currently using cigarettes, 97 (42.4%) were able to reduce cigarette consumption after attending MOH TCC, 91 (39.7%) were not able to quit, while 41 (17.9%) increased cigarette consumption. The mean difference in cigarette smoking from before to after MOH TCC was -01.812 ± 5.928 (95% CI: 2.584-1.040). Among those currently using alternative forms of tobacco, most could not alter tobacco consumption after the MOH TCC ($n=16$, 72.7%), while, 5 (22.7%) of these increased tobacco consumptions after the MOH TCC and only 1 (4.5%) could reduce tobacco consumption.

Table 4 presents Chi-square results of sociodemographic characteristics and respondents' quit status. The Chi-square tests showed that all sociodemographic characteristics included in the table had no significant relationship to respondent quit status. After controlling for sociodemographic factors, the likelihood of successfully quitting tobacco increased with lower educational level (adjusted OR [AOR]=17.01, 95% CI: 1.00-289.2, $p=0.050$) and among those who

Table 1- Socio-demographic characteristics of respondents with chronic diseases (diabetes/hypertension) attending Ministry of Health Tobacco Cessation Clinics, Riyadh, Saudi Arabia, 2012-2017.

Characteristics	Results
Age, years (n=402)	
40-50 years	140 (34.8)
51-60 years	170 (42.3)
61-70 years	75 (18.7)
71-80 years	17 (4.2)
Gender (n=402)	
Male	393 (97.8)
Female	09 (2.8)
Marital status (n=395)	
Single	1 (0.3)
Married	382 (96.7)
Divorced	6 (01.5)
Widowed	6 (01.5)
Missing=7	
Educational level (n=390)	
Intermediate or less	167 (42.8)
Diploma or high school	140 (35.9)
Bachelor or higher	83 (21.3)
Missing values	12 (3.0)
Missing=12	
Occupation (n=392)	
Government employee	108 (27.6)
Private employee	62 (15.8)
Self employed	31 (7.9)
Retired	168 (42.9)
Unemployed	23 (05.9)
Missing =10	
Income level (SAR) (n=322)	
None	15 (4.7)
$\leq 5,000$	81 (25.2)
5,001-10,000	119 (37.0)
10,001-20,000	92 (28.5)
>20,000	15 (4.7)
Missing=80	
Nationality (n=384)	
Saudi	335 (87.2)
Non-Saudi	49 (12.8)
Missing=18	
Region (n=387)	
Central region	93 (23.1)
Eastern region	43 (11.1)
Western region	204 (52.7)
Southern region	37 (9.2)
Northern region	10 (2.6)
Missing=15	

Values are presented as mean \pm standard deviation, number and percentage (%).

had controlled hypertension (AOR=17.824, 95% CI: 1.516-209.6, $p=0.022$), **Table 5**.

Discussion. Our study found almost a quarter of participants who received care from the MOH TCC could remain abstinent from tobacco for 6 months or

Table 2- Chronic disease characteristic of respondents' attending Ministry of Health (MOH) Tobacco Cessation Clinics, Riyadh, Saudi Arabia, 2012-2017.

Characteristics	Results
Chronic diseases (n=402)	
Only diabetes mellitus (DM)	384 (95.5)
Only hypertension (HTN)	193 (48.0)
Both	175 (43.5)
Duration of DM (n=377)	
≤10 years	235 (62.7)
>10 years	140 (37.3)
Missing=25	
Duration of HTN (n=192)	
≤10 years	135 (70.7)
>10 years	56 (29.3)
Missing=210	
Type of clinic visited for medical care of DM or HTN (n=351)	
MOH-primary health care	175 (45.7)
MOH-hospital	103 (26.9)
Private hospital	69 (18.0)
Other government hospital	74 (19.3)
None	19 (04.7)
Missing=51	
Frequency of health care facility visit per year for DM follow up (n=351)	
≤8 times per year	199 (56.7)
>8 times per year	152 (43.3)
Frequency of health care facility visit for HTN follow up (n=165)	
≤8 times per year	88 (53.3)
>8 times per year	77 (46.7)
Reported level of DM control (n=402)	
Controlled	60 (16.1)
Uncontrolled	126 (33.9)
Don't know	216 (53.7)
Missing=216	
Reported level of HTN control (n=402)	
Controlled	28 (07.0)
Uncontrolled	48 (11.9)
Don't know	326 (81.1)
Last reported HbA1c (n=186) (mean±SD)	07.7±01.7
Missing=216	
Last known systolic blood pressure (n=81) (mean±SD)	143.9±27.9
Last known diastolic blood pressure (n=76) (mean±SD)	87.4±21.6
Previous Hospital Admission (n=392)	
Yes	65 (16.6)
No	327 (83.4)
Missing=10	
Reason for hospital admission (n=402)	
Thromboembolism	13 (27.1)
High blood sugar	10 (20.8)
High blood pressure	04 (08.3)
Heart disease	10 (20.8)
Other disease	11 (22.9)
Treating physician recommended tobacco cessation (n=381)	
Yes	305 (80.1)
No	76 (19.9)
Missing=21	
Self-decision to quit tobacco due to DM or HTN (n=398)	
Yes	179 (45.0)
No	219 (55.0)
Missing=4	
Values are presented as mean ± standard deviation, number and percentage (%).	

Table 3 - Medical Services provided to respondents with chronic diseases (diabetes/hypertension) attending Ministry of Health Tobacco Cessation Clinics, Riyadh, Saudi Arabia, 2012-2017.

Characteristics	Results
Type of treatment	
Behavioral	186 (46.3)
Medications	371 (92.3)
Both	166 (41.3)
Type of medication (n=352)	
Patch	156 (38.8)
Tablets	262 (65.2)
Gum	11 (02.7)
Lozenge	68 (16.9)
Type of tablet (n=262)	
Varenicline	233 (58.0)
Bupropion	04 (01.0)
Missing=23	
Days used medication (mean±SD)	
Days for patch	22.6 ± 30.9
Days for lozenges	31.9 ± 98.8
Days for varenicline	38.9 ± 48.9
Days for bupropion	15.0 ± 17.3
Days for gum	10.0 ± 0
Treatment satisfaction (n=352)	
Very unsatisfied	17 (04.8)
Unsatisfied	26 (07.4)
Unsure	45 (12.8)
Satisfied	121 (34.4)
Very satisfied	143 (40.6)
Missing=50	
Values are presented as mean ± standard deviation, number and percentage (%).	

more (n=85, 21.1%). Additionally, among those who did not quit cigarettes, 97 (42.4%) were able to reduce their consumption. The mean difference in cigarette smoking from before to after MOH TCC was 01.812 ± 5.928 (95% CI: 2.584-1.040). While the majority (72.7%) of those using other tobacco forms (other than cigarettes) could not reduce tobacco consumption. The most significant factors predicting tobacco cessation were lower level of education and controlled hypertension. Although respondents provided good satisfaction rate on services they received, yet the majority attended the clinic 1-3 times only 345 (87.3%). Saudi guidelines for tobacco cessation services recommends at least 6 visits, with weekly follow up for one month after cessation and monthly telephone follow up for 6 months.¹⁶

We compared our results with the last national tobacco survey, although this survey neither targeted chronic disease patients nor considered if participants quit tobacco through any program.⁸ Our finding is similar to the survey, in which 25.3% of the sample had successfully quit smoking at the time of survey and of them, 41.3% had at least a year of abstinence. The only

Table 4 - Bivariate analysis for the association between socio-demographics characteristics and groups of respondents attending Ministry of Health Tobacco Cessation Clinics, Riyadh, Saudi Arabia, 2012-2017.

Factor	Group of patients		P-value*
	Case (quit) (n=85)	Controls (not quit)(n=317)	
Age			
≤60 years	63 (74.1)	247 (77.9)	0.459
>60 years	22 (25.9)	70 (22.1)	
Gender			
Male	83 (97.6)	310 (97.8)	0.936
Female	2 (02.4)	7 (02.2)	
Marital status			
Single	1 (01.2)	12 (03.9)	0.224
Married	83 (98.8)	299 (96.1)	
Educational level			
High school or below	53 (65.4)	206 (66.7)	0.834
Diploma or higher	28 (34.6)	103 (33.3)	
Occupation			
Employed	42 (51.2)	159 (51.3)	0.991
Unemployed	40 (48.8)	151 (48.7)	
Income level (SAR)			
≤10,000	35 (57.4)	165 (67.1)	0.155
>10,000	26 (42.6)	81 (32.9)	
Nationality			
Saudi	71 (85.5)	264 (87.7)	0.601
Non-Saudi	12 (14.5)	37 (12.3)	
Reported level of DM			
Controlled	14 (35.69)	46 (31.3)	0.584
Uncontrolled	25 (64.1)	101 (68.7)	
Reported level of HTN			
Controlled	08 (57.1)	20 (32.3)	0.081
Uncontrolled	06 (42.9)	42 (67.7)	

Results are expressed as number and percentage (%). *P-value has been calculated using Chi-square test. DM: diabetes mellitus, HTN: hypertension

other study carried out in Saudi Arabia that evaluated general population tobacco cessation after specialized program attendance indicated an abstinence rate of 38.3% for at least 6 months.²¹ One possible explanation that our quit rate is lower than this result is because the previous study's population was generally younger, as they were not sampling patients with chronic diseases. Indeed, the reported mean age for successful cessation in that study was younger than that of smokers who continued smoking (22.98 ± 5.66 years and 27.07 + 9.33 years, respectively). A systematic review of patients with diabetes revealed more intensive programs were more effective than less intensive programs (relative risk 1.32).²⁴ Studies mentioning specific interventions for chronic disease patients have shown higher cessation

Table 5 - Multivariate analysis predicting group of patients as case versus control from the socio-demographics characteristics, of respondents attending Ministry of Health Tobacco Cessation Clinics, Riyadh, Saudi Arabia, 2012-2017.

Factor	OR	95% CI	P-value*
Age, years			
≤60 vs. >60	0.537	0.036-8.123	0.654
Educational level			
High school or below vs. diploma or higher	17.011	1.000-289.2	0.050†
Occupation			
Employed vs. unemployed	6.258	0.446-87.744	0.173
Income level (Saudi Riyal)			
≤10,000 vs. >10,000	0.490	0.047-5.113	0.551
Nationality			
Saudi vs. non-Saudi	0.829	0.411-1.673	0.601
Reported level of DM			
Controlled vs. uncontrolled	1.429	0.130-15.739	0.771
Reported level of HTN			
Controlled vs. uncontrolled	17.824	1.516-209.6	0.022†

OR: odds ratio, DM: diabetes mellitus, HTN: hypertension, vs: versus, †Indicates significant p-value.

rates than studies with less intensive interventions. For instance, 2 randomized controlled studies in India²⁵ and Indonesia²⁶ showed that adding diabetes-specific tobacco counseling increased cessation odds. In India, those whose doctors advised quitting and who received specific 30-minute diabetes counseling by a non-doctor had a higher cessation rate (52%) after 6 months than those who only received quitting advice.²⁵ In Indonesia, those who received doctor advice and education had a quit rate of 30% versus 37% for those who received doctor advice plus cessation clinic referral.²⁶ Conversely, another randomized tobacco trial using diabetic patients showed that adding moderate-intensity education sessions by a trained nurse and educational leaflets had no effect after 6 months of follow-up compared to those who received usual care.²⁷ Evidently, there is much heterogeneity in defining less and more intense interventions. The most recent systematic review on smoking cessation interventions for diabetics mentioned that more intense interventions used medications plus diabetes-specific counseling.²⁵ As far as we know, MOH TCC uses behavior therapy and medication with all smokers; no specific counseling targets those with chronic diseases. Studying customized approaches for tobacco cessation in patients with chronic diseases could be studied in future researches. Our results showed that those using other tobacco forms could not

quit and the last national tobacco survey mentioned increase in shisha use in both men and women in all age groups-men: 3.3% (STEPwise study) to 7.4%; women aged 15 to 64 years: 0.5% to 1.3%.⁸ We recommend physicians working in chronic disease clinic to do reinforcement of cessation messages during follow-up visits and inform them regarding MOH TCC services.

Study limitations. Our study might be affected by interviewer bias since we had multiple data collectors. The study was also limited by recall bias, the fact that the findings were based on self-report and not objectively measured-in particular those on abstinence and on blood pressure and HgA1c. We only included those who had diabetes and hypertension and did not include other chronic diseases, this might have caused some bias. We had a lot of missing data and the data was not normally distributed. There were few studies to compare with locally and internationally in the topic of tobacco cessation in patients with hypertension and diabetes.

In conclusion, to increase abstention rates, methods like specific behavioral therapy for chronic disease patients counseling with regular follow-ups, informing patients of tobacco cessation clinic services, and providing toll-free telephone services should be considered. More effort is needed to reduce non-cigarette tobacco consumption.

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