Preplanned Studies

Evaluation of Smoking Cessation Intervention Effectiveness in Smoking Cessation Clinics — China, 2019–2021

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Summary

What is already known about this topic?

Since 2014, the Chinese government has advocated for the development of smoking cessation clinics (SCCs) within each provincial-level administrative division (PLAD).

What is added by this report?

In the 2019–2021 period, the self-reported 7-day point prevalence of abstinence rates (PPARs) at 1-month and 3-month follow-up were 26.2% and 23.5%, respectively.

What are the implications for public health practice?

The interventions implemented by SCCs in this investigation proved to be successful. It is imperative to employ extensive tobacco control strategies in order to enhance the motivation of smokers to seek assistance for cessation from SCCs.

In 2018, more than 308 million adults were current smokers in China (*1*). Quitting smoking has been associated with reduced risks of tobacco-related diseases, premature death, and improved quality of life (*2*). However, due to its nature as a chronic disease, tobacco dependence is often considered difficult to overcome solely through personal willpower (*3*). Substantial evidence suggests that interventions from healthcare providers can significantly increase the chances of abstinence from smoking (*4*). In 2018, a data management platform for smoking cessation clinics (SCCs) was developed. This study examined data from 448 SCCs obtained from the platform between 2019 and 2021 to evaluate the effectiveness of smoking cessation interventions. The China CDC Institutional Review Board approved the study. The findings showed that the patient self-reported 7-day point prevalence of abstinence rates (PPARs) at 1-month and 3-month follow-ups were 26.2% and 23.5%, respectively. It indicates that interventions provided by SCCs in this study were effective. Comprehensive tobacco control measures should be implemented to increase the willingness of smokers to seek support for quitting in SCCs.

The data collected from patients who visited the clinics for the first time and received follow-up care at 1 month and 3 months after the initial visit encompassed demographic characteristics, smoking status, and other factors. Eligibility criteria for patient participation included: 1) a current smoker at the time of the first clinic visit, and 2) at least 18 years old. Interventions for smoking cessation, provided by trained practitioners in the SCCs, consisted of counseling, counseling combined with first-line medications [including varenicline, bupropion, and nicotine replacement therapy (NRT)] (*5*), or counseling combined with traditional Chinese medicine (TCM, including acupuncture, ear acupuncture, and Chinese herbal). Generally, physicians recommended medication options to all smokers, particularly those with severe nicotine dependence (except for pregnant women), however, the final decision regarding the use of cessation medications was left to the patients.

Counseling services were delivered in adherence to the established clinical practice guidelines of smoking cessation (*3*,*5*), incorporating the use of the 5A's model (Ask, Advise, Assess, Assist, and Arrange follow-up) in clinical interviews, and encouraging behavior modifications for cessation utilizing the 5R's model (Relevance, Risks, Rewards, Roadblocks, and Repetition) techniques. The recommended duration for each counseling session was ≥10 minutes (*6*).

Smoking status was assessed through self-report measures. At the 1-month and 3-month follow-up assessments, patients were asked to report their smoking status by answering the question, "Have you smoked within the past 7 days?" Those who responded "no" were categorized as abstinent. Individuals lost to follow-up were presumed to be smokers. Inactive occupational status included patients who were students, retired, unemployed, and so on. The Fagerstrom Test for Nicotine Dependence (FTND) was utilized to measure nicotine dependence. Data were cleaned using Python (version 3.7.11, Python

Software Foundation, Fredericksburg, VA, US) and analyzed with SPSS (version 22, IBM Corporation, Armonk, US). The chi-squared test was employed to examine differences in categorical variables, and a logistic regression model was applied to investigate factors associated with abstinence at the 3-month follow-up. A *P*-value of less than 0.05 was deemed statistically significant in the analyses.

Between 2019 and 2021, a total of 59,239 patients visited 448 SCCs located across 29 provincial-level administrative divisions (PLADs). The average number of clinical visits at each SCC was 45, 71, and 73 for each of the 3 years, respectively. Follow-up rates at 1-month and 3-month intervals were 69.1% and 50.6%, respectively. The sociodemographic characteristics of the patients are presented in Table 1. The average age of patients was 50.5±14.9 years. Among the participants, 96.5% were male, 28.6% held a college degree, and 68.5% were not currently employed. Furthermore, 46.0% of the patients reported a monthly family income of 5,000 Chinese Yuan (CNY) or higher as shown in Table 1.

In terms of smoking behaviors, the average number of cigarettes smoked per day was 18.5±11.3, 79.2% of the patients smoked fewer than 20 cigarettes per day, 62.4% had moderate or high nicotine dependence (with FTND scores of 4 or higher). The average duration of smoking was 24.3±13.8 years. 70.2% of SCCs were equipped with exhaled carbon monoxide (ECO) detectors. Only 36.2% of the patients underwent ECO testing, and a mere 12.5% received a combination of first-line smoking cessation medications alongside behavioral counseling (Table 1).

The self-reported 7-day PPARs at 1-month and 3-month follow-up were 26.2% and 23.5%, respectively. PPARs significantly varied by intervention methods ($P<0.001$). Patients with higher PPARs were identified among those who were: 60 years old or above, female, holding a college degree, not actively working, having a higher family income, exhibiting low nicotine dependence, possessing a stronger willingness to quit, having undergone ECO testing, and receiving intervention with first-line medications ($P<0.05$) (Table 1).

The logistic regression analysis indicated that factors predicting abstinence at the 3-month follow-up included being 40–59 years old (*OR*=1.066; 95% *CI*: 1.014–1.122), being 60 years old or older (*OR*=1.306; 95% *CI*: 1.230–1.387), female gender (*OR*=1.184; 95% *CI*: 1.069–1.312), having a high school education (*OR*=1.062; 95% *CI*: 1.008–1.119), having a college degree or higher (*OR*=1.083; 95% *CI*: 1.015–1.155), a monthly family income of at least 5,000 CNY (*OR*=1.089; 95% *CI*: 1.042–1.138), a higher ECO test score (*OR*=1.397; 95% *CI*: 1.342–1.455), and receiving a combination intervention of first-line medication and counseling (*OR*=1.119; 95% *CI*: 1.056–1.187). Patients with an active occupation (*OR*=0.924; 95% *CI*: 0.885–0.966), moderate nicotine dependence (*OR*=0.824; 95% *CI*: 0.788–0.861), high nicotine dependence (*OR*=0.732; 95% *CI*: 0.694–0.772), planning to quit within 30 days

TABLE 1. Baseline characteristics and abstinence rates at 1- and 3-month follow-ups of patients visiting SCCs — China, 2019–2021.

Characteristic	Sample	PPAR at 1-month			PPAR at 3-month		
	n (%)	%	χ^2	*P* value	%	χ^2	*P* value
Overall abstinent rate	59,239 (100)	26.2			23.5		
Demographic characteristics							
Age group (years)							
<40	15,639 (26.4)	25.6	56.144	<0.001*	22.9	28.631	<0.001*
40–59	26,233 (44.3)	25.2			23.0		
≥60	17,357 (29.3)	28.3			25.0		
Gender							
Male	57,155 (96.5)	26.2	4.102	0.043*	23.4	10.022	0.002*
Female	2,073 (3.5)	28.2			26.4		
Education status							
Primary school or below	147,898 (25.0)	26.2	39.484	<0.001*	22.5	19.695	<0.001*
High school	27,527 (46.4)	25.2			23.5		
College degree or above	16,914 (28.6)	27.9			24.6		

TABLE 1. (Continued)

Characteristic	Sample	PPAR at 1-month			PPAR at 3-month		
	n (%)	%	χ^2	*P* value	%	χ^2	*P* value
Occupational status							
Inactive	40,571 (68.5)	27.1	48.802	<0.001*	24.1	23.572	<0.001*
Active	18,658 (31.5)	24.4			22.3		
Family income/month (CNY)							
<5,000	25,882 (43.7)	26.7	120.995	<0.001*	23.1	173.424	<0.001*
≥5,000	27,256 (46.0)	27.1			25.3		
Don't know or won't say	6,091 (10.3)	20.4			17.5		
Smoking status							
Number of cigarettes smoked/day group							
≤10	18,829 (31.8)	31.0	365.596	<0.001*	26.7	183.210	<0.001*
11–20	28,068 (47.4)	24.9			22.8		
21–30	6,763 (11.4)	22.2			21.2		
≥31	5,569 (9.4)	21.7			19.5		
Duration of smoking group (years)							
<20	38,734 (65.4)	26.0	3.709	0.054	23.3	3.199	0.075
≥20	20,495 (34.6)	26.7			24.0		
Nicotine dependence group (score)							
0–3 (low)	22,293 (37.6)	28.6	150.393	<0.001*	25.5	96.315	<0.001*
4–6 (moderate)	22,954 (38.8)	26.0			23.1		
≥7 (high)	13,982 (23.6)	22.8			21.1		
Past-year quit attempts							
None	34,651 (58.5)	26.4	1.222	0.543	23.5	0.497	0.780
1–5 times	21,712 (36.7)	26.2			23.5		
>5 times	2,865 (4.8)	25.5			24.1		
Willingness to quit							
Within 7 days	35,809 (60.5)	32.8	2227.820	<0.001*	28.5	1492.844	<0.001*
Within 30 days	9,928 (16.7)	21.3			21.1		
30 days later	13,491 (22.8)	12.5			12.2		
Intervention							
Exhaled carbon monoxide test							
No	37,757 (63.8)	23.7	336.174	<0.001*	20.8	419.059	<0.001*
Yes	21,472 (36.2)	30.6			28.3		
Intervention methods							
Counseling	49,537 (83.6)	25.5	80.043	<0.001*	22.9	98.222	<0.001*
Combination of TCM and counseling	2,303 (3.9)	30.1			23		
Combination of first-line medications and counseling	7,388 (12.5)	29.8			28.1		
Year of intervention (Number of SCCs)							
2019 (220)	10,013 (16.9)	28.0	177.35	<0.001*	25.8	848.895	<0.001*
2020 (306)	21,836 (36.9)	28.7			29.2		
2021 (371)	27,380 (46.2)	23.7			18.2		

Abbreviation: SCCs=smoking cessation clinics; TCM=traditional Chinese medicine; PPAR=point prevalence of abstinence rate; CNY=Chinese Yuan.
*P<0.05.

(*OR*=0.652; 95% *CI*: 0.618–0.688), and planning to quit after 30 days (*OR*=0.373; 95% *CI*: 0.352–0.395) were less likely to exhibit abstinence at the 3-month follow-up (Table 2).

DISCUSSION

In the present study, self-reported 7-day PPARs at 1-month and 3-month follow-up were found to be 26.2% and 23.5%, respectively. When compared to very brief interventions (*7*), this study's interventions provided by SCCs exhibited greater effectiveness. Nevertheless, these rates are lower than those reported in previous studies involving interventions provided by SCCs (*8*–*10*). These studies demonstrated that self-reported 7-day PPAR at 1-month follow-up ranged

TABLE 2. Predictors of abstinence at 3-month follow-up of patients visiting SCCs — China, 2019–2021.

Predictors	*P* value	*OR* (95% *CI*)
Age group (years)		
<40		1
40–59	0.013*	1.066 (1.014–1.122)
≥60	<0.001*	1.306 (1.230–1.387)
Gender		
Male		1
Female	0.001*	1.184 (1.069–1.312)
Education status		
Primary school or below		1
High school	0.036*	1.062 (1.008–1.119)
College degree or above	0.025*	1.083 (1.015–1.155)
Occupational status		
Inactive		1
Active	0.015*	0.924 (0.885–0.966)
Family income/month (CNY)		
<5,000		1
≥5,000	<0.001*	1.089 (1.042–1.138)
Don't know or won't say	<0.001*	0.733 (0.681–0.789)
Nicotine dependence group (score)		
0–3 (low)		1
4–6 (moderate)	<0.001*	0.824 (0.788–0.861)
≥7 (high)	<0.001*	0.732 (0.694–0.772)
Willingness to quit		
Within 7 days		1
Within 30 days	<0.001*	0.652 (0.618–0.688)
30 days later	<0.001*	0.373 (0.352–0.395)
Exhaled carbon monoxide test		
No		1
Yes	<0.001*	1.397 (1.342–1.455)
Intervention methods		
Counseling		1
Combination of TCM and counseling	0.126	1.083 (0.978–1.201)
Combination of first-line medications and counseling	<0.001*	1.119 (1.056–1.187)

Abbreviation: SCCs=smoking cessation clinics; TCM=traditional Chinese medicine; PPAR=point prevalence of abstinence rate; CNY=Chinese Yuan.
*P<0.05.

from 34.1% to 38.6% and at the 3-month follow-up, it ranged from 28.4% to 36.4%. Potential reasons for these comparatively lower rates may include the low proportion of patients receiving smoking cessation medications and relative low follow-up rate.

Based on substantial scientific evidence, a combination of counseling and pharmacotherapy is the optimal treatment for smoking cessation, demonstrating greater efficacy compared to either intervention alone (*2*). This study supports this conclusion. However, due to the lack of reimbursement for pharmacotherapy costs in China and the relatively high expense, first-line medications for smoking cessation were underutilized. Previous research indicates that insurance coverage for smoking cessation treatment can increase the utilization of these services, resulting in higher rates of successful quitting (*2*). We suggest that first-line medication needs to be included in the medical insurance directory in China to enhance the use of effective interventions.

Research suggests that TCM is a well-received and secure treatment when properly administered, however, its efficacy may be inferior to evidence-based interventions when utilized independently (*11*). In the present study, integrating TCM with counseling resulted in enhanced smoking cessation outcomes at 1-month compared to counseling in isolation. Nonetheless, this distinction failed to reach statistical significance at the 3-month interval. Consequently, these findings imply that TCM may furnish temporary advantages for smoking cessation, yet its enduring effectiveness warrants additional exploration.

Previous research (*12*) has shown that the ECO test is effective in increasing patients' willingness to quit smoking. The current study also found that the ECO test can improve abstinence rates. However, only 70.2% of SCCs were equipped with ECO detectors, and only 36.2% of outpatients underwent testing. It is essential to provide and encourage the use of ECO detectors within SCCs to enhance testing rates and potentially improve patient outcomes.

A recent study (*13*) has shown that discontinuing smoking before the age of 40 can substantially reduce the risk of tobacco-related diseases by up to 90%. In the current study, only 26.4% of patients who sought professional help from SCCs were under the age of 40. Consequently, enhancing public awareness campaigns is necessary to encourage younger smokers to seek assistance for cessation at SCCs. More evidence-based research and study on mobile smoking cessation tools for young people can be developed in the future.

Willingness to quit reflects an individual's motivation to stop smoking. The present study found that patients with a stronger willingness to quit demonstrated higher abstinence rates. Effective tobacco control measures, such as increasing cigarette prices and implementing smoke-free legislation, can enhance smokers' willingness to quit. Therefore, reinforcement of these measures may lead to greater awareness among smokers, encouraging them to seek support for quitting at SCCs and ultimately reducing the risk of tobacco-related illnesses. Moreover, the current study's findings reveal that patients with lower nicotine dependence, higher education levels, and higher family income reported higher abstinence rates, which aligns with previous research (*14*–*15*).

A potential limitation of the current study is the assessment of smoking status at only the 1- and 3-month follow-up time points. Future research would benefit from incorporating longer follow-up intervals to evaluate the long-term effects of smoking cessation interventions. Moreover, the cessation outcomes in this study relied on patient self-report, without corroborative biochemical confirmation. As such, discrepancies between reported and actual outcomes may exist. At last, the data used in this study were from the SCCs that used the platform, the data from some parts of SCCs that did not use the platform were not included.

In conclusion, the interventions provided by SCCs in this study proved effective. However, clinic visits to SCCs in China remain low. Greater publicity should be given to SCCs, and comprehensive tobacco control measures must be implemented to increase smokers' willingness to seek support for quitting at SCCs. Furthermore, the underutilization of first-line medications for smoking cessation was observed; we recommend including these medications in the medical insurance directory in China to enhance the use of effective interventions.

Conflicts of interest: No conflicts of interest.

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