

Shared decision-making for chronic obstructive pulmonary disease smoking cessation

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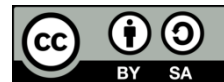
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ABSTRACT

Chronic obstructive pulmonary disease (COPD) is the main cause of death among people aged 65 years and above. Smoking cessation reduces the risk of morbidity and mortality. This study used the variables of smoking cessation behavior and psychological dependence to evaluate the effectiveness of smoking cessation shared decision-making (SDM) with traditional smoking cessation education in patients with COPD. This randomized controlled trial represents a significant positive correlation was observed among smoking duration ($p < .05$), the number of cigarettes ($p < .05$), smoking cessation behavior ($p < .05$), and psychological cigarette dependence. The intervention group ($n = 44$) underwent session of smoking cessation SDM, whereas the control group ($n = 44$) underwent session of traditional smoking cessation education. After three months of the intervention, significant improvements in psychological cigarette dependence ($p < .05$) and smoking cessation behavior ($p < .05$) were observed in both groups. The study confirmed that the success rate of smoking cessation in the intervention group is higher than the control group.

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1. INTRODUCTION

According to the World Health Organization (WHO) chronic obstructive pulmonary disease (COPD) is the third leading cause of death globally, causing 3.23 million deaths in 2019 [1], COPD affects one-tenth of the world's population and its burden is expected to increase in the coming years [2], [3]. COPD is an often severely disabling chronic lung disease with a high personal and societal burden. Current treatments for COPD only improve symptoms and prevent exacerbations, and there are no disease-modifying treatments [4].

COPD is characterized by irreversible long-term inflammation of the respiratory tract that obstructs the airway and prevents air from entering and leaving the airway smoothly. Common symptoms include cough, phlegm, stuffiness, and asthma [5]. Risk factors for COPD include long-term smoking; exposure to second-hand smoke, ambient particulate matter pollution, occupational particulate matter/gases/fumes, and workplace hazards; infection; a genetic Alpha-1 deficiency; and aging. Approximately 85 to 90% of COPD cases are caused by smoking [6], [7]. In addition, acute exacerbations of COPD may lead to respiratory failure and the long-term use of ventilators, followed by the occurrence of comorbidities, include systemic inflammation, cardiovascular diseases, muscle dysfunction, osteoporosis, anemia, and anxiety [8]. COPD not only affects patients' quality of life but also increases social and economic burden; smoking cessation is key to preventing

morbidity and mortality in COPD patients [9]; therefore, assistance must be provided to patients with COPD to quit smoking [4].

Some studies have pointed out that the smoking status of smokers will be affected by the degree of nicotine dependence, psychological factors and socioeconomics [10], most smoking cessation studies focused on the physiological addiction of nicotine, but nicotine alone alternative therapy has been shown to be insufficient to assist smoking cessation [11]. Non-nicotine psychological dependence, psychological cigarette dependence (PCD), is more direct than the effects of nicotine [12]. PCD includes two aspects. Factor 1 is smoking and life connection, which is composed of five out-of-control items, five emotional attributions, three taste sensory preferences, six prompt exposures, six positive smoking results and seven negative results. Factor 2 is health concern, consisting of three negative smoking outcomes and two cessation outcomes [13].

Collaborative healthcare decision-making between patients and physicians can be challenging as clinical contact times are often short [14], shared decision-making (SDM) is based on two-way communication between clinicians and patients. Clinicians explain diseases and treatments in a way that patients can understand and consider their preferences and values to make the most suitable treatment or care decisions for patients and their families [15]. Advantages of SDM include reduced human error and medical expenditure and increased patient compliance with treatment and increased patient satisfaction with care [16]. Smoking is affected by several factors, including environment, psychology, physiology, and social interaction. Through SDM, smokers can gain more knowledge about health hazard, compare adverse effects, and participate in making the most appropriate decisions [17]. To successfully quit smoking, people must identify the incentives for smoking, formulate countermeasures, and conduct smoking cessation counseling [18]. The SDM guidelines, prepared by clinical experts, lists different smoking cessation methods to improve patients' relatedness and to assist them in self-assessment and discussion (about the feasibility of accepting smoking cessation methods) with clinicians. This study used the variables of smoking cessation behavior and PCD to evaluate and compare the effectiveness of SDM smoking cessation education with that of traditional smoking cessation education in patients with COPD. In addition, the association among the demographic variables of patients with COPD, smoking-related variables, and disease severity variables, including the severity of expiratory airflow obstruction and patients' current symptoms, was analyzed.

2. RESEARCH METHOD

2.1. Study design

In this two-arm randomized controlled trial, a single-session intervention was performed over three months; the trial was approved by Clinical Trials.gov with identifier: NCT05374629. Participants were divided into two groups: one group underwent a single session of SDM smoking cessation education (the intervention group) and the other group underwent a single session of traditional smoking cessation education (the control group).

2.2. Participants

Participants were COPD treated patients who have received case management in a medical center in Northern Taiwan from November 23, 2020, to February 10, 2022, were included if they were self-reported smokers, were aged 30 years or above, spoke Chinese and Taiwanese, and were ready to complete the questionnaire and provide informed consent. A physician screened and selected participants from the hospital's database; an independent researcher used computer-generated random numbers to assign the participants to the intervention and control groups. Confidentiality was ensured during the research process, whereas ethical clearance was obtained prior to data collection. Ethical clearance was approved by the Institutional Review Board (IRB) of Cathay General Hospital (Taipei, Taiwan), approval number CGH-109078.

2.3. Sample size

For detecting an effect size of 0.5 with a probability of a type-I error of 0.05 and a power of 80%, each group must have at least 40 participants. Given a 10% dropout rate, the size of each group was set at 44. Analyses were performed using G*Power 3.1 software for Windows.

2.4. Intervention

As the traditional smoking cessation education is only giving smokers smoking cessation education guidelines. The intervention group received smoking cessation SDM, which was carried out by trained and licensed smoking cessation health educator, guiding smokers to tell the smoking situations, time points, stressors and emotional changes before and after smoking in their lives, and using decision aids. The tool summarizes the factors that cause physical addiction and PCD. Smoking cessation health educator discuss with smokers, set goals for quitting smoking, let smokers control the dominance to quit smoking, believe that they have the ability to change actively, and then trigger smoking cessation behavior. The control group received

traditional smoking cessation education was conducted by another health educator who shared knowledge on the harmful effects of smoking; the benefits of smoking cessation, smoking cessation methods; and nicotine addiction. Both groups received smoking cessation education guidelines. After three months of the intervention, both groups received variables of smoking cessation behavior and PCD to evaluate and compare the effectiveness of SDM smoking cessation education with that of traditional smoking cessation education in patients with COPD.

2.5. Measurements

Smoking behavior was evaluated using the Fagerström test for nicotine dependence. The total score ranges from 0 to 10 and is divided into three categories: low addiction (0–3 points), moderate addiction (4–6 points), and high addiction (7–10 points). Hence, the higher the score, the higher the nicotine addiction [19].

To measure PCD, the PCD scale, proposed by Huang *et al.* [13], was used after obtaining author authorization. The scale consists of 37 items, including 32 items on life connection and 5 items on health concern. This scale has an internal consistency (Cronbach's alpha) of 0.94, and the 2-week test–retest reliability is 0.77.

COPD is diagnosed and treated on the basis of the international guidelines developed by the Global Initiative for chronic obstructive lung disease (GOLD). The severity of a patient's current symptoms is classified using two methods [20]. First, the severity of expiratory airflow obstruction is evaluated using a spirometer test performed after bronchodilator inhalation; severity is determined based on the forced expiratory volume in the first second (FEV1), which is divided into GOLD 1 (mild; $FEV1 \geq 80\%$ predicted), GOLD 2 (moderate; $50\% \text{ predicted} \leq FEV1 < 80\% \text{ predicted}$), GOLD 3 (severe; $30\% \text{ predicted} \leq FEV1 < 50\% \text{ predicted}$), and GOLD 4 (extremely severe; $FEV1 < 30\% \text{ predicted}$). Second, the severity of a patient's current symptoms and exacerbation risk are calculated by combining the scores of the modified Medical Research Council (mMRC) and the COPD assessment test (CAT) scales, and patients are classified into groups A, B, C, or D. The 5-point mMRC scale (grade 0 to 4) is a self-reported tool to assess patients' degree of dyspnea; the higher the grade, the more serious the patient condition. The 8-item CAT scale (each with 0 to 5 points) is a self-reported tool to assess the effect of COPD on the physical and mental health and daily life of patients; the higher the score, the more serious the effect on the physical and mental health and daily life of patients. We also calculated participants' number of acute exacerbations over the past year that required emergency department visits or hospitalization.

2.6. Statistical analysis

A Chi-square test or *t*-test was employed to assess differences in demographic variables, baseline physiological and biochemical detection, and smoking behaviors. A paired *t*-test was used to assess smoking cessation behavior, and the Pearson correlation coefficient was used to examine the variables related to smoking behavior. Finally, linear regression analysis was performed to evaluate the association of smoking behavior with disease severity and psychological dependence after adjustment for demographic variables.

All tests were analyzed at a 95% significance level ($p < .05$). Because the ethics policy required the data of noncompliers (those who refused participation) to be excluded from the analysis, an intention-to-treat analysis was not applied. All analyses were performed using PASW 22.0 software for Windows (SPSS, Chicago, IL, USA).

3. RESULTS

Patients with COPD who continued to smoke were mostly male (81.1%), aged 65 years and above (68.2%), and nonworking or retired (54.5%) see Table 1. Nicotine addiction was mild in 47.7% of patients; 79.5% of them belonged to GOLD 1 (mild severity) or GOLD 2 (moderate severity) groups, whereas 94.3% of patients belonged to group A or group B (non-hospitalized groups). At baseline, no significant differences were observed between the intervention and control groups.

It was found in both the intervention group and the control group; both had a significant intervention effect on PCD. Both SDM and traditional smoking cessation education assisted in reducing the degree of PCD. The smoking cessation rate of the intervention group (22.7%), the smoking cessation rate of the control group (18.2%). Although no significant difference was observed between the groups as shown in Tables 2 and 3, the smoking cessation rate was higher in the intervention group than in the control group.

Table 1. Demographic characteristics and baseline values of participants

Characteristics	Total (n=88)	Intervention group (n=44)	Control group (n=44)	p-value
Age, years (mean±SD)		68.30±7.79	68.28±7.86	0.64
31–65 (%)	28 (31.8)	15 (34.1)	13 (29.5)	
≥66 (%)	60 (68.2)	29 (65.9)	31 (70.5)	
Gender				1.00
Male (%)	72 (81.8)	36 (81.8)	36 (81.8)	
Female (%)	16 (18.2)	8 (18.2)	8 (18.2)	
Education				0.68
Junior high school and below (%)	38 (43.2)	17 (38.6)	21 (47.7)	
Senior high school (%)	31 (35.2)	17 (38.6)	14 (31.8)	
University and above (%)	19 (21.6)	10 (22.7)	9 (20.5)	
Marital status				0.11
Unmarried (%)	4 (4.5)	4 (9.1)	0 (0)	
Others (%)	84 (95.5)	40 (90.9)	44 (100)	
Occupation				0.64
No job/retirement (%)	48 (54.5)	23 (52.3)	25 (56.8)	
Working (%)	40 (45.5)	21 (47.7)	19 (43.2)	
BMI				0.78
Underweight (%)	5 (5.7)	2 (4.5)	3 (6.8)	
Normal (%)	34 (38.6)	16 (36.4)	18 (40.9)	
Overweight/obesity (%)	49 (55.7)	26 (59.1)	23 (52.3)	
Nicotine addiction				0.58
Light (%)	42 (47.7)	23 (52.3)	19 (43.2)	
Medium (%)	22 (25.0)	9 (20.5)	13 (29.5)	
Hard (%)	24 (27.3)	12 (27.3)	12 (27.3)	
CO addition				0.71
Normal (%)	20 (22.8)	8 (18.2)	12 (27.3)	
Abnormal (%)	55 (65.5)	29 (65.8)	26 (59.1)	
Symptoms and risk of worsening				
Group A+B (%)	83 (94.3)	42 (95.5)	41 (93.2)	
Group C+D (%)	5 (5.7)	2 (4.5)	3 (6.8)	
Expiratory airflow obstruction				0.29
GOLD 1+2 (%)	70 (79.5)	33 (75.0)	37 (84.1)	
GOLD 3+4 (%)	18 (20.5)	11 (25.0)	7 (15.9)	

Table 2. Chi-square test of smoking cessation behavior

Variables	Smoking cessation			p value
	Total (n=88)	Intervention group (n=44)	Control group (n=44)	
Smoking cessation				0.60
Yes	18 (20.5)	10 (22.7)	8 (18.2)	
No	70 (79.5)	34 (77.3)	36 (81.8)	

Table 3. Paired t test of psychological dependence (Mean±SD)

Variable	Psychology dependence		p-value
	Intervention group	Control group	
Baseline	110.70±32.12	104.68±29.39	0.36
Followed-up	86.41±28.05	85.55±25.34	0.88
Difference score	-24.30±26.58	-19.14±31.29	0.40
p-value	<0.001	<0.001	

Pearson correlation analysis revealed that the number of cigarettes ($r=0.25$; $p=.01$), smoking duration ($r=0.24$; $p=.02$), and psychological dependence were significantly and positively correlated. In addition, significant and positive correlations were observed between psychological dependence ($r=0.51$; $p<.001$) and smoking cessation behavior (data not shown).

PCD includes smoking with life connection and health concern. The linear regression analysis, shown in Table 4, revealed that after adjustment for occupation, nicotine addiction had a significant association with life connection ($\beta=0.28$, $p=.02$); the higher the nicotine addiction, the higher the degree of patients' life connection. For every 1-point increase in nicotine addiction, the life connection score increased by 0.28 points. In terms of occupation, patients with jobs had a 0.29-point lower life connection score than those without a job.

Table 4. Summary of linear regression analysis for factors associated with life connection

Dependent factors	Independent factors	β	p-value	R ²	F-value
Life connection	(Constant)	-25.82	0.66	0.49	2.08
	Occupation	-0.29	0.04		
	Nicotine addiction	0.28	0.02		

4. DISCUSSION

In this study, most of the patients with COPD were male. Age is 65 years and above, and nonworking or retired; these demographic characteristics were similar to those of previous studies [21], [22]. Moreover, airflow obstruction severity for 79.5% of patients was categorized as GOLD 1 (mild) and GOLD 2 (moderate); this distribution is similar to that of COPD patients in other domestic and foreign studies [23], [24].

Smoking is an addictive behavior and it is not easy to quit. In COPD patients, in addition to the use of drug therapy, non-drug therapy should actively provide smoking cessation counseling for smokers [25]. During cessation attempts, they may change their beliefs, imagining less psychological benefits and more health threats due to smoking [11]. In this study, neither the intervention group nor the control group actively prescribed smoking cessation drugs during the contact process. The success rate of smoking cessation in the intervention group is higher than in the control group because the intervention group uses SDM to increase the two-way communication between medical staff and patients. Individual counselling from a smoking cessation specialist can help smokers to make a successful attempt to stop smoking [26]. Through decision-making aids, it can promote shared decision-making, improve knowledge and risk perception [27], and some studies have also proved that it can increase smoking cessation knowledge, quality of decision-making and number of attempts to quit smoking [28]. Decision aids can facilitate shared decision making and behavior change and may be effective in helping patients quit smoking [29].

Both SDM and traditional smoking cessation education effectively reduced the degree of PCD; this may be because both methods provide psychological support [17]. Psychological support includes brief counseling, individual or group cognitive-behavioral therapy, telephone counseling, and the use of information technologies [30]. Whether through SDM or using traditional health education, patients with COPD who continue to smoke can reduce their PCD on smoking [31]. In addition, the higher degree of nicotine addiction relates to higher degree of PCD on smoking; the PCD also increases with an increase in the degree of nicotine addiction [32], [33], thereby affecting smokers' quality of life. Therefore, further subdividing the PCD into two aspects of smoking life relationship and smoking health problems, it is found that the smoking life relationship of retirees without a work is higher than workers, which is similar to Hobkirk's research [34], and retirees without a work is easier to combine smoking behavior into living habits.

This study has several limitations. First, all participants were outpatients with COPD and were in a stable condition, thereby limiting the representativeness and extrapolation of the results. To overcome this, inpatients with COPD should be included in future studies. Second, because of the COVID-19 pandemic, the carbon monoxide (CO) test and physical and psychological comparisons could not be performed. We used a self-administered questionnaire to determine the smoking cessation rate in patients with COPD; this may lead to bias in the study results. Therefore, future studies should include more objective evaluations, such as the CO insufflation test or blood nicotine content test. Third, although the smoking cessation rate of the intervention group 22.7% (10/44) was higher than the control group 18.2% (8/44), there was no significant difference between the two groups. Because during the three month follow-up of the post-test, it was found that 2 smoking cessation cases in the control group purchased smoking cessation drugs by themselves, which may have affected the results of the success rate of smoking cessation in the control group. Fourth, the smoking psychological dependence scale can only know the relationship between smoking life connection and smoking health concern, and cannot be able to delve into psychological well-being. The next research can be added to the project of mental health symptoms (anxiety, depression, and overall psychological distress) [35] for a relatively complete assessment of smoker's problems.

5. CONCLUSION

Smoking behavior of COPD patients is influenced by the interaction of nicotine addiction and PCD. Retirees without a job are more likely to integrate smoking behavior into their living habits. Smoking cessation SDM use decision aids to have a higher smoking cessation rate than traditional smoking cessation health education, but tracking time long (three months), may be affected by interference factors, SDM intervention is suitable for short-term, immediate effect evaluation. If want to see long-term results, need to increase the frequency of SDM.

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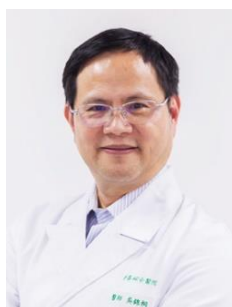
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
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