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ORIGINAL RESEARCH

Targeting Smoking Triggers: A Nurse-led Intervention for Tobacco Smoking Cessation

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Abstract

Background: Nursing interventions tailored to the smoking triggers in patients with non-communicable chronic diseases are essential. However, these interventions are scant due to the nature of factors associated with smoking cessation and the poor understanding of the effect of nurse-led intervention in Iraq.
Purpose: This study aimed to determine the dominant smoking triggers and examine the effects of a tailored nursing intervention on smoking behavior in patients with non-communicable chronic diseases.
Methods: Convenience samples of 128 patients with non-communicable chronic diseases, male and female patients, who were 18-70 years old, were recruited in this quasi-experimental, randomized comparative trial in the outpatient clinic in one major teaching hospital in Baghdad City, Iraq. The intervention included simple yet specific instructions that were given both orally and in written form to the study samples to enable them to manage their craving to smoke for 6 weeks. The smoking triggers were assessed using Why Do You Smoke questionnaire. Participants were randomly allocated to receive either the nurse-led intervention or standard care. Data were analyzed using descriptive statistics, independent sample t-tests, logistic regression, and two-sided tests.
Results: Stress reduction was the dominant smoking trigger among subjects. The percentage of participants who were either able to completely quit smoking or reduce the number of smoked cigarettes per day (n=19, 29.7%; n=28, 43.8%, respectively) was greater in the study group than those in the control group (n=5, 5.8%; n=5, 5.8%, respectively). Study findings demonstrated significant differences in the inability to improve readiness to quit smoking between the intervention group and control group (p=0.000) at the sixth-week follow-up.
Conclusion: The tailored nursing intervention was effective for a successful achievement of smoking reduction and cessation among patients with non-communicable chronic diseases, and a potential to equip nurses in clinical settings to support patients to achieve this is recommended.

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1. Introduction

The tobacco epidemic has been identified as one of the public health threats that jeopardize vital aspects of individuals' life, including but not limited to physical, psycho-social, and financial aspects (World Health Organization, 2019). In spite of intensive health promotion campaigns in developing and developed countries, smoking continues to be a significant public health threat in the current century. Comprehensive recommendations have been urged for the public to quit smoking; however, a high percentage of smokers are unable to move forward in achieving successful cessation (Elshatarat et al., 2016). Multiple studies have confirmed that tobacco smoking is a major modifiable risk factor for coronary heart disease, stroke, lung and upper airways cancer, chronic obstructive pulmonary disease, peripheral vascular disease, infertility, bone and joints problems, type 2 diabetes mellitus, and hypertension (AL-Fayyadh & Mohammed, 2010; West, 2017). Premature tobacco-related deaths and illnesses can be prevented if evidence-based interventions are broadly and effectively used in low-and-middle-income countries

(Alrefaee, 2022). Iraq is one of the middle-income countries that is addressing the smoking epidemic through a public health agenda (Rabbani et al., 2016).

It has been reported that more than 30% of the Iraqi population are smokers, reflecting a serious public health problem (Ibrahim et al., 2018). Thus, effective interventions are clearly needed (Tadzimirwa et al., 2019). Moreover, as a crucial global dilemma of non-communicable chronic diseases (NCDs), World Health Organization reported an annual loss of 40 million persons due to NCDs (World Health Organization, 2017). This catastrophic number institutes about 70% of the mortality rate on an international level (Beech, 2013; World Health Organization, 2017). Besides being a major risk factor in the development of NCDs, tobacco smoking has a negative impact on NCDs' prognosis (Mikkelsen et al., 2019). In fact, targeting patients with NCDs as a vulnerable population in general, and smoker patients in particular, is useful in boosting the sustainable development of the world health agenda (Goodchild et al., 2018). This requires an engagement of all the involved health-related concerners, including community members, the patient and their family, and the health care system (Alnaqeeb, 2022). Nurses, in particular, can play an important role in meeting world health goals by improving outcomes for vulnerable persons, such as those with NCDs. Nurses are an indispensable component of any effective public health education initiative because they are armed with the essential competencies to assess a person's health-oriented deficits (Bergh et al., 2015). Those deficits can be addressed by nurses to improve their client's engagement with health maintenance and promotion practices (Miller & Spilker, 2003).

Smoking cessation, its contributing factors, and smoking triggers have not been studied and reviewed in relation to smoking cessation programs in Middle East countries (Puleo et al., 2022). The available data on the phenomena of smoking cessation has been only found in the general globe or specific developed countries (Maziak et al., 2015). The range of smoking cessation interventions can be divided into behavioral, pharmaceutical, and nontraditional approaches. Individual counseling, group counseling, and telephone counseling conducted by nurses and physicians are all examples of behavioral interventions (Iqbal et al., 2021). A nurse-led intervention has been evidenced to motivate smokers to quit smoking and has clinically significant long-term effects on cessation rates (Pleym et al., 2022). However, other studies vary with the effectiveness of the nurse-led intervention with motivational techniques to support behavioural change, such as smoking quitting among patients with cardiac diseases (Brouwer-Goossensen et al., 2021). Hence, the effectiveness of these interventions needs to be carefully assessed due to the diverse methodologies used in the studies.

The literature has highlighted that many experimental studies examined different pharmacological and non-pharmacological approaches that were developed specifically to help smokers quit smoking (Eisenberg et al., 2020; Liao et al., 2018; Van den Brand et al., 2018). Some were community-based interventions, and others were targeting specific populations (Cartujano-Barrera et al., 2020; Hayes et al., 2019; Shishani et al., 2019). Some were significantly effective, while others were not (Brooks et al., 2017; Perski et al., 2022; Siewchaisakul et al., 2020). However, a literature search reveals no smoking cessation interventional studies that have targeted smoking triggers among smokers with non-communicable diseases (NCDs), particularly in middle-income countries.

This study is built on previous studies in constructing a treatment model (Rice et al., 2017). This model uses tailored nursing interventions that are designed specifically to empower smokers to achieve successful smoking cessation (Agency for Healthcare Research and Quality, 2012). This five-level nursing intervention approach (5A's and F) is consistent with Meleis Transition Theory (Meleis & Trangenstein, 1994), Pender's Health Promotion Theory (Pender, 1996), and Prochaska's Transtheoretical Model (Prochaska & Velicer, 1997). The conceptual premise of Schema theory is also consistent with this study path, predicting a positive change in a patient's behavior by arming the target person with the changed behavior needed for the desired outcome. One such change behavior is "tailored teaching", which involves a realistic understanding of a person's needs, experiences, and, most importantly, behavior triggers (Crawford et al., 2018). Tailored teaching can address a smoker's knowledge deficit about their smoking addictive behavior triggers, enabling an intervention to their trigger other than smoking. This produces a sound, knowledge-based outcome of smoking cessation. In her middle-range transition theory, Meleis emphasized that transitioning toward a health-oriented behavior can be influenced by a person's knowledge level, attitude, planning, and personal-environmental triggers (Meleis &

Trangenstein, 1994). Furthermore, Prochaska and Velicer's (1997) stages of change model is useful in that the nurses must assess the patient's readiness to change and intervene in the appropriate stage.

This study was designed to empirically test the effectiveness of a planned change in addictive behavior. The effects of the nurse-led intervention on tobacco smoking cessation and targetting its triggers are scant and need to be evaluated, specifically in middle east countries such as Iraq. This study will fill the gap in the existing literature on the effectiveness of the tailored nurse-led intervention on smoking behaviour. Therefore, this study intended to investigate the most common smoking trigger among smokers with NCDs and the effect of a tailored nurse-led intervention on smokers' readiness to quit smoking or at least to reduce the number of cigarettes per day.

2. Methods

2.1 Research design

A quasi-experimental, randomized comparative trial was conducted on 128 smokers with NCDs, who were patients in an outpatient clinic in one major teaching hospital in Baghdad City, Iraq. Study participants were recruited during routine visits for follow-up of their health problems and/or for a prescription renewal.

2.2 Setting and samples

This study was conducted in an outpatient clinic of a major teaching hospital in Baghdad City, Iraq, from June 2021-May 2022. The population was a group of patients attending an outpatient clinic for NCDs. Patients with NCDs included those who had cardiovascular disease, diabetic mellitus, cancer, and chronic respiratory diseases. The inclusion criteria included male and female patients who were 18-70 years old at the time of the data collection phase. The exclusion criteria included the subject's involvement with any other ongoing studies. Additionally, subjects who were medically diagnosed with psychiatric illness, were morbidly ill or had impaired physical and mental capacity were excluded from the trial. Patients in both groups were considered a participant when they completed at least one of the pre-test or post-test surveys. A simple randomization approach was used by the researchers in assigning participants to the treatment and control groups. The simple randomization procedure involved throwing a dice (below and equal to 3 for the control group and over 3 for the treatment group). The algorithm diagram in Figure 1 presents the study protocol from participant recruitment to the intervention in details. A power analysis was conducted for an alpha level of 0.05, an effect size of Cohen's d=0.5, and a statistical power level of 0.8 for a sample size of 128 subjects (Grove & Gray, 2018).

2.3 Intervention

To engage NCDs patients in health-related behaviors, a nurse-led intervention for tobacco smoking cessation applied the behavioral approach such as the five-level nursing intervention approach (5A's and F) (Figure 2). The (5A's and F) approach explained how these smoking triggers might impact patients' intentions or directly influence their smoking motivation behaviors. These instructions were specifically developed to help smokers whose smoking behavior was triggered by stress. The nurse-led intervention encompassed a tailored teaching about motivation to quit smoking (e.g., positive or negative effects of smoking), stress reduction (e.g., methods of control stress), handling (e.g., keeping hand busy), pleasure (e.g., relaxation and fun), addiction, and habit. The provided tailored intervention included simple yet specific instructions that were given orally and in written to the study samples to enable them to manage their craving for smoking.

Participants in the intervention group received current standard care through the program plus nurse-led intervention for tobacco smoking cessation that included providing knowledge about smoking triggers using motivation and stress reduction. The current standard NCDs program includes a single one-hour tobacco smoking cessation session provided by various health care providers. The content received by both group participants was recorded and compared to check for equivalence between the groups. Each patient in the intervention group received approximately 30-45 mins of a single nurse-led intervention for a tobacco smoking cessation session. The essence of nurse-led intervention is for the nurse to be simultaneously educator and supportive, as well as directive in moving patients toward behavior change.

Prior to the project, the researchers met to discuss the project and prepare a face to face nurse-led interventions. The principal researcher frequently visited the team members while collecting data to facilitate communication, supervision, early problem detection, and feedback. Three researchers provided information that the patient may need, motivated them to quit smoking, and explored smoking triggers that kept the patients from quitting smoking. Patients in the control group were provided only with current tobacco smoking cessation, which includes the benefits of quitting knowledge and recommendations to enhance smoking reduction and promote healthy lifestyles. They completed the same surveys as the intervention group at baseline.

At the baseline level, sociodemographic data, smoking profile, and tobacco cessation were collected. A 30-45 minutes face to face session developed in the Arabic language explained the prevalence of tobacco mortality, the chemical content of cigarettes, forms and types of smoking products used by the Iraqi population, common withdrawal symptoms, the positive impact of quitting, and adaptive coping mechanisms to quit tobacco use. A team of expert nurses from cardiac, respiratory, oncology and other NCDs departments participated in preparing for tobacco smoking cessation. A pamphlet on instruction to use replacement sources of nicotine was also provided to smokers to ease the process of smoking cessation. A text-message reminder was sent daily to the nurse-led intervention group to use replacement sources of nicotine and to attend follow-ups as recommended for 10 weeks. These text messages were also sent to identify whether participants were able to get replacement sources of nicotine as prescribed. A usual standard treatment was provided to the control group. The standard treatment includes advice on medication adherence, smoking tobacco-related health issues, and a follow-up schedule.

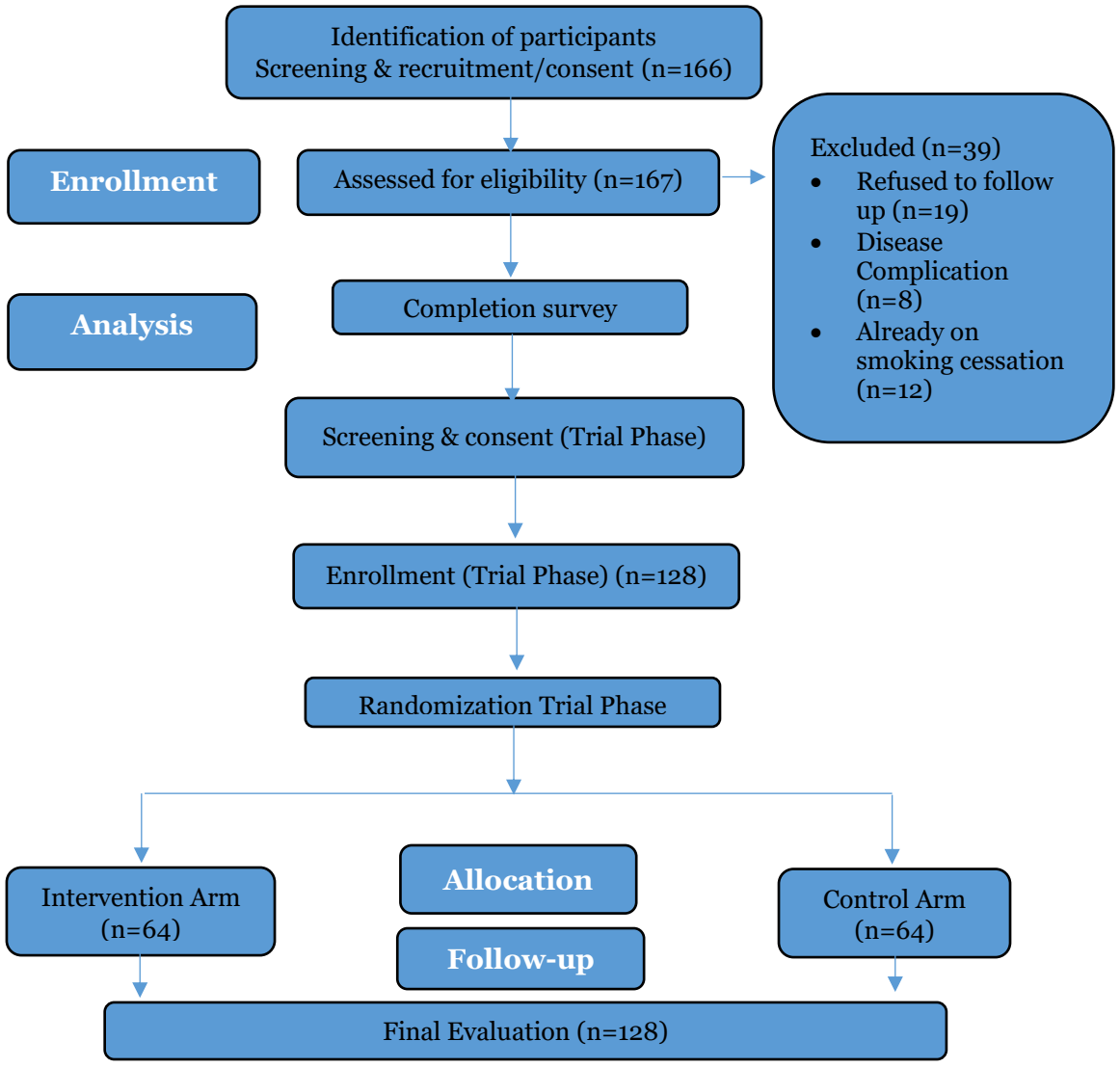

Figure 1. Study protocol

2.4 Measurement and data collection

The data collection phase occurred over a six-week period for each intervention. The "Why Do You Smoke" (WDS) questionnaire (American Lung Association, 1993), was employed in this study using the Arabic version. The WDS questionnaire is designed to identify the most common smoking triggers in NCD patients' and their motivation behaviors. The WDS is a self–assessment tool that has 18 items, which has 6 sub-scales with three items on each scale representing primary smoking motivations (stimulation, handling, pleasure, stress reduction, addiction, and habit), designed to help smokers identify their main reasons for consuming tobacco. The questionnaire had been validated in minor smokers' populations, and demonstrated acceptable internal consistency of alpha coefficients ranging from α=0.54-0.85 in smokers enrolled in a tobacco cessation program (Smith et al., 2008). The questionnaire was also piloted to five participants resulting in no issues being identified. In order to determine the WDS reliability, Cronbach's alpha was calculated. Each subscale has been evaluated for internal consistency using Cronbach's alpha, with α values for stimulation of 0.75, handling of 0.77, pleasure of 0.64, stress reduction of 0.78, addiction of 0.62 and habit of 0.66 (Smith et al., 2008). Results show that Cronbach's alpha of 0.734 signifies good internal consistency (Taber, 2018). Subjects rated their tobacco smoking behavior to each item. Each of the items was Likert-scaled as 1 (never) to 5 (always). Finally, the total score for each subscale was calculated. The one with the highest score was highlighted as the dominant smoking trigger for the particular subject (Smith et al., 2008).

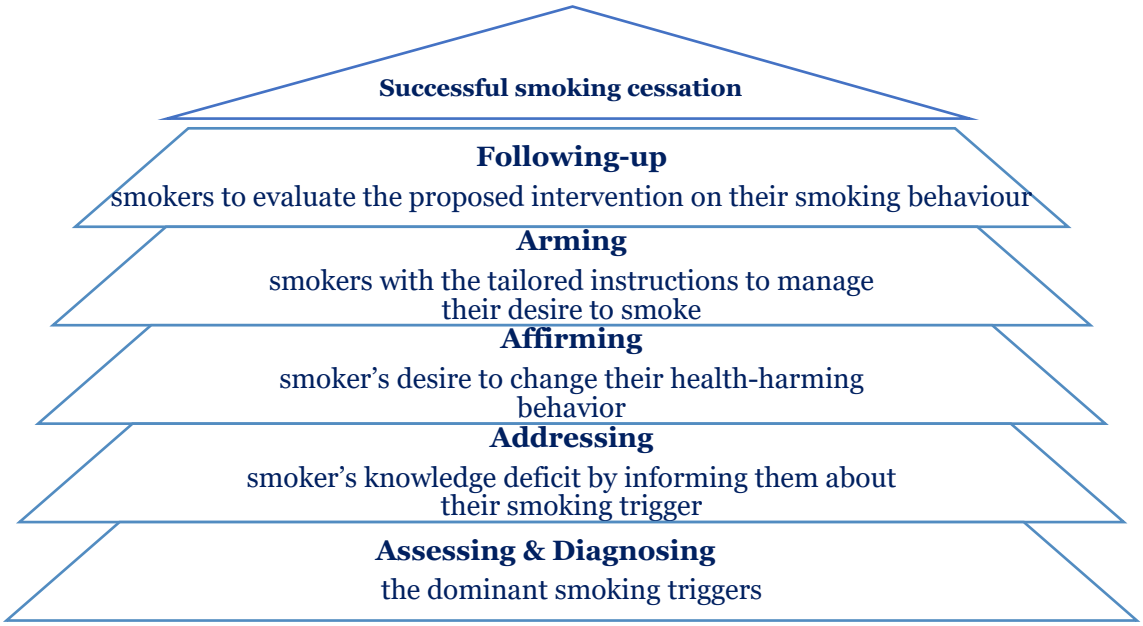

Figure 2. The 5A's & F conceptual model of smoking cessation intervention

2.5 Data analysis

The questionnaires were analyzed using IBM SPSS version 23. Descriptive statistics and inferential procedures were utilized to analyze patients' sociodemographic data and tobacco smoking behavior. To consider whether any of the variables included in the demographic data may potentially affect smoking cessation, a statistical significance was set at p=0.05. The Chi-square test compared the scores of the treatment and control groups after the intervention. The Mann-Whitney U test and the Chi-square test was used to determine the homogeneity of the individual and clinical features between the nurse-led and control group. Intention to treat analysis (ITT) was utilized, and patients who failed for follow-ups were assumed to be smokers or tobacco users. Statistical tests were conducted with a significance set at 0.05.

2.6 Ethical considerations

The Institutional Review Board (IRB) of the School of Nursing, University of Baghdad, approved the study proposal. The IRB approval reference number was 2395 on 21 December 2020. The National Institute of Health (NIH), office of extramural research had certified that the

author of this research paper had successfully passed the protecting human research participant course. All the data collection and other research-related activities were designed to respect and protect human rights, including confidentiality, voluntary participation, informed consent authentication, study protocol description, participation risks and benefits explanation, and the right to withdraw without prior notice. At the study completion, control group subjects were afforded the same educational intervention as the experimental group subjects. The study protocol was successfully approved by the Iranian Registry of Clinical Trials (IRCT). The trial ID was 44600, while the IRCT ID was IRCT20190809044485N2. The clinical trial registration detail can be retrieved from: https://www.irct.ir/trial/44600. The CONSORT checklist for reporting a randomized controlled trial can be seen in Table 1 (See Appendix 1).

3. Results

3.1 Characteristics of respondents

Table 2 shows that the underlined numbers represent the highest percentages of the selected variables for both the treatment and the control groups. Almost half of both the treatment group (n=27, 42.2%) and the control group (n=29, 45.3%) were classified as elderly individuals (≥59 years). The vast majority of both the treatment group (n=54, 84.4%) and the control group (n=58, 90.6%) were males. In terms of educational levels, the majority of subjects in both the treatment group (n=22, 34.4%) and the control group (n=28, 43.8%) were high school graduates. The significant majority of both the treatment group (n=59, 92.2%) and the control group (n=61, 95.3%) were living in urban areas. Almost three-quarters of both the treatment group (n=44, 68.8 %) and the control group (n=48, 75.0%) reported that their income was sufficient to cover their life-related expenses.

Table 2. Sociodemographic characteristics of respondents

Characteristics	Treatment (n=64)		Control (n=64)		*p*
	f	%	f	%	
Age (Years)					
39-48	12	18.8	16	25.0	*p*=0.54*
49-58	25	39.1	19	29.7	
≥59	27	42.2	29	45.3	
Gender					
Male	54	84.4	58	90.6	*p*=0.82**
Female	10	15.6	6	9.4	
Educational level					
Unable to read and write	4	6.3	3	4.7	*p*=0.61**
Able to read and write	2	3.1	3	4.7	
Primary School Graduate	9	14.1	4	6.3	
Secondary School Graduate	13	20.3	7	10.9	
High School Graduate	22	34.4	28	43.8	
College Level Graduate	14	21.9	19	29.7	
Residency					
Rural	5	7.8	3	4.7	*p*=0.34**
Urban	59	92.2	61	95.3	
Income					
Sufficient	44	68.8	48	75.0	*p*=0.47**
Barely sufficient	10	15.6	11	17.2	
Not sufficient	10	15.6	5	7.8	

*Notes. *Mann-Whitney U test, **Chi-square test, p=0.05*

Table 3 indicates that more than one-third of both the treatment group (n=25, 39.1%) and the control group (n=28, 43.8%) were smoking 11-20 cigarettes per day. Results of the smoking history showed that more than three-quarters of both the treatment group (n=50, 78.1%) and the control group (n=52, 81.3%) were smokers for more than three years. Diabetes mellitus type 2 (DMT2) was the most prevalent NCDs among both groups (n=20, 31.2% and n= 23, 35.9% for the treatment and control groups, respectively).

Table 3. Clinical characteristics of respondents

Characteristics	Treatment (n=64)		Control (n=64)		*p*
	f	%	f	%	
Number of smoked cigarettes					
11-20 Cigarette	25	39.1	28	43.8	*p*=0.37*
21-30 Cigarette	12	18.7	5	7.8	
31-40 Cigarette	14	21.9	26	40.6	
≥41 Cigarette	13	20.3	5	7.8	
Smoking history					
1-2 Years	14	21.9	12	18.7	*p*=0.62*
≥3 Years	50	78.1	52	81.3	
Medical Diagnosis					
Hypertension (HTN)	16	25.0	19	29.7	*p*=0.57*
Myocardial infarction (MI)	16	25.0	8	12.5	
Cerebrovascular accident (CVA)	6	9.4	6	9.4	
Chronic obstructive pulmonary disease (COPD)	6	9.4	8	12.5	
Diabetes mellitus type2 (DMT2)	20	31.2	23	35.9	

*Notes.*Chi-square test, p=0.05*

3.2 Smoking triggers of NCDs' patients

The WDS questionnaire was used to classify smokers with NCDs according to their smoking trigger(s). Results showed that almost half (48.4%) of the study samples' smoking behavior could be attributed to stress reduction. Whereas the dominant smoking trigger of patients with NCDs in this study was stress reduction triggers, as shown in Table 4.

Table 4. Classification of smokers with NCDs according to their smoking trigger(s)

Smoking trigger(s)	f	%
Motivational trigger	11	8.6
Keeping hand busy trigger	10	7.8
Relaxation & fun trigger	14	10.9
Stress reduction trigger	62	48.4
Addiction trigger	24	18.8
Habit trigger	7	5.5
Total	128	100

3.3 The comparison of smoking behavior between groups

Table 5 illustrates that the percentage of smoking quitting among the treatment group who were either able to completely quit smoking (n=19, 29.7%) or reduce the number of smoked cigarettes per day (n=28, 43.8%) was greater than their counterparts in the control group. Conversely, results showed that the percentage of the control group subjects who were not able to completely quit smoking (n=54, 84.4%) was greater than their counterparts in the treatment group. There was a statistically significant difference in the participants' tobacco smoking behavior (t (126) 6.677=0.000, $p<.05$) between the treatment group and the control group, which indicated that the nurse-led intervention was effective.

Table 5. Post-intervention comparison between groups

Post-intervention outcomes	Treatment (n=64)		Control (n=64)		Chi-square	*df*	*p*
	f	%	f	%			
I failed quitting smoking	17	26.5	54	84.4	13.34	2	0.001*
I managed to reduce the number of smoked cigarettes	28	43.8	5	7.8			
I completely managed to quit smoking	19	29.7	5	7.8			

*Notes. *Chi-square test, p=0.05*

4. Discussion

From a health promotion perspective, this study was designed to determine the most common smoking trigger among smokers with NCDs and to tailor a nursing intervention to help smokers with NCDs to quit smoking or at least reduce the number of smoked cigarettes per day. The current trial is designed to test the efficacy of a nurse-led intervention and determine which of the smoking triggers are more dominant in tobacco cessation in patients with non-communicable chronic diseases based on Schema theory (Crawford et al., 2018). This study results showed that the nurse-led intervention had significantly improved tobacco smoking behaviors and cessation to quit tobacco use at six weeks of follow-ups. This finding is in line with previous studies conducted on tobacco smokers, which found the intervention useful in improving abstinence and addiction scores among tobacco smokers (Siewchaisakul et al., 2020). Previously, it has been argued that nurse-led intervention using face-to-face and telephonic counseling is effective in improving stress reduction in the early stages of tobacco cessation and post quitting phase (Le Grande et al., 2022). The importance, readiness, and confidence to quit smoking are determined by the positive and negative effects on psychological status. Additionally, the use of text messaging and ongoing follow-up reduced smoking cessation. It is also suggested to use the intervention on a large scale (Lee et al., 2019).

Moving to the interventional phase, this study used the WDS questionnaire to determine the chief drive for smoking tobacco among smokers with NCDs. The study revealed that half of the respondents' smoking behavior can be attributed to stress reduction, signifying that it was the dominant trigger. The biopsychosocial literature has connected stress reduction and smoking with the phenomenon of self-medication and drug abuse. The psychoactive properties of tobacco provide a means of stress coping mechanism and mood regulator (Fathi et al., 2012). A significant percentage of smokers connected their smoking behavior with tobacco's anxiolytic and calming characteristics (Kassel et al., 2003). Furthermore, Slopen et al. (2013) in their study also reported that within the immediate family of smokers' social-relationship-related stress, perceived disparity, and critical problems are the dominant stressors to which smokers attributed their smoking behavior. It might be true that smokers may feel less stressed during smoking and directly after it. However, they are probably unaware that, although smoking may provide emotional relief, it is actually increasing the smokers' physical stress level (Almallah, 2018). Smokers are trapped in this vicious cycle, which makes successful cessation difficult. Several psycho-social, cognitive-behavioral, educational, and even pharmacological interventions have been used to help smokers to quit smoking (Fanshawe et al., 2017; Thurgood et al., 2016).

On the other hand, this study proposed a unique intervention: a tailored face-to-face counseling approach that fits smokers' characteristics. Tailored or individualized nursing interventions are assessment-based customized interventions. They are highly sensitive to individuals' characteristics, culture, personal goals, health status, attitude, and resource availability (Stolt & Suhonen, 2019). The high success rate of tailored interventions can be explained by the high-sensitivity level of these interventions to subjects' unique characteristics when compared with standardized interventions. This study used a tailored nurse-led intervention approach to activate the health-promotion role of nursing to help vulnerable populations, particularly smokers with NCDs, by providing professional counseling. Nurse-led intervention is considered one of the effective approaches for tobacco smoking cessation and targeting smoking triggers. The use of behavioral approaches was found effective in enhancing an individual's impetus to change their addictive behavior in comparison to the drugs alone. The nurse-led intervention is a consciously prepared form of behavior intervention capsule, which is found conducive to changing the behavior of an individual to quit tobacco. Various studies used nurse-led interventions, which were found effective in increasing smoking quitting and higher abstinence among smokers (Lopez-Olivo et al., 2022). However, there are only a few studies that tested the effectiveness of the nurse-led intervention to target smoking triggers and tobacco smoking cessation (Phang et al., 2020).

The tailored intervention in this study was both descriptively and inferentially authenticated. Equipped with core educational competencies, nurses are uniquely prepared to make a substantial difference in smokers' lifestyles by engaging the target population in health maintenance and promotion practices (AL-Fayyadh & Diener, 2017). Smoking cessation was started by measuring the smokers' desire to quit by using "The 5'As: ask, advise, assess, assist, and arrange" with the outcomes "quit" or "not quit". The results of this study revealed that the

intervention group had more desire to quit or reduce smoking cigarettes than participants in the control group. The results also showed that participants who were not willing to quit smoking were more in the control group than those in the treatment group, which indicated the slight impact of the nurse-led intervention. In their classification of nursing interventions, Butcher et al. (2018) supported that "even if standardized interventions are available and found to be effective, a tailored or targeted intervention may promote better adherence, achieve better outcomes, and be more cost-efficient" (p.17). A systematic review conducted by Rice et al. (2017) indicated that nurse-led smoking cessation interventions could enhance a person's success in the cessation of smoking in community settings or in health care centers. Such success can be attributed to the high-sensitivity level of these interventions to subjects' unique characteristics when compared with standardized interventions (Butcher et al., 2018). Therefore, Alexis-Garsee et al. (2018) intensified that using tailored-theoretical based nursing interventions is highly advisable for smokers with chronic health problems as they may face difficult smoking cessation experiences when compared with other populations.

The theoretical framework and the developed conceptual model stated in this study were essential to guide and explain the achieved results of the proposed intervention. This claim can be authenticated by the "5A's and F" model high-sensitivity and flexibility level in dealing with every person as a unique human being. This resulted in a thorough and multi-level assessment of every targeted person's smoking triggers before moving on to the next step. This model is unique in its ability to personalize the intervention based on the target person's smoking behavior trigger after addressing the knowledge deficit and affirming the person's desire to change. The model then addressed arrangements for the follow-up to both support the individual during the change journey and to evaluate the effectiveness of the proposed intervention. Poor information, a bad attitude, and insufficient organizational support for health promotion materials and nicotine replacement therapy were all factors that increased the likelihood of poor smoking control during the pre-contemplation phase (Lee et al., 2019). The environmental context and resources (e.g., lack of time), social influences (e.g., smoking norms within the social network), and intentions are potential factors affecting supporting smoking cessation or temporary abstinence in mental health settings (e.g., lack of positive intentions to deliver support) (Huddlestone et al., 2022).

Investing in the motivational counseling approach to deal with the target individual was a successful approach, which explains the positive outcome of applying the "5A's and F" models. This can be highlighted by showing smokers the positive impact of smoking cessation on diverse aspects of their life. The "5A's and F" model believes that a fear-inducing message showing smokers the negative impact of smoking on their health is necessary (Netemeyer et al., 2016). However, it should not be emphasized more than the positive impact of successful smoking cessation. This premise is well-supported in the literature on smoking cessation interventions (Ruiter et al., 2014). Furthermore, the fear-based educational message is short-lived, while the positive message lasts longer. Therefore, when targeting the sustainable effectiveness of an intervention, the fear-based educational message should not be over-emphasized.

5. Implications and limitations

More attention is required to the role of nurses in assessing NCDs patients' smoking triggers and promoting innovative forms of follow-up that enhance their role in providing tobacco smoking cessation. An effective tobacco smoking quitting follow-up will be a crucial component in building an encouraging plan to achieve treatment plan goals. Tailoring nurse-led interventions to target NCDs patients' stress reduction may be an effective method to enhance patients' ability to quit tobacco smoking and the efficacy of this intervention to increase the patients' awareness about the importance of this smoking trigger. A tailored approach which is designed specifically to empower smokers to achieve successful smoking cessation based on assessing their specified smoking trigger(s) is an effective approach to help smokers with NCDs to quit tobacco smoking successfully. Therefore, the findings of this study have the potential to equip nurses in the clinical setting(s) with a tailored nursing intervention to help their patients achieve smoking cessation successfully. The strength of this study is that this research is relevant, novel, and has advanced published knowledge, as all relevan**t** and similar previous studies were inconclusive.

However, the results of this study are not generalizable to the population in terms of follow-up duration as in to authenticate the intervention's ability to produce a sustainable and generalizable outcome and as a whole. Therefore, future studies using multi-follow-up designs to

overcome this limitation are warranted. The reliance on the self-reported outcome is another limitation of this study, and future studies should use more objective parameters to determine the effectiveness of the proposed intervention.

6. Conclusion

The study concluded that the main smoking trigger among study participants was stress reduction, which should consider to be the main focus when applying the nurse-led intervention for tobacco smoking cessation. The nurse-led intervention was demonstrated as an effective approach in managing patients to quit smoking. The study results offer some insightful information on the subject that can be crucial for improving clinical practice. This study highlights the importance of designing mixed methods research by utilizing randomized controlled trials with bigger samples and objective measurement to assess the effectiveness of the proposed nurse-led intervention and to detect potential smoking triggers succussed by smoking cessation interventions. The results of the study recommend developing a new strategy for helping patients who are struggling to quit. The nurse-led intervention that targets stress reduction may be a practical and affordable method to offer a patient-specific active follow-up to reduce the effort of quitting smoking in patients with NCDs. Finally, nurses' feedback can motivate the patients to continue abstaining.

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Author contribution

All authors (SAF, AHAAG, MMA, SMH, LC, AAS, and MS) were involved in the initial conception of the paper and in the design of the randomized controlled trial. All authors contributed to the preparation of the final manuscript. All authors have agreed on the final version by drafting the article or revising it critically for important intellectual content.

Conflict of interest

The authors declare that they have no conflict of interest.

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Appendix 1

Table 1. The CONSORT 2010 checklist of information to include when reporting a randomised trial
Targeting Smoking Triggers: A Nurse-led Intervention for Tobacco Smoking Cessation: A Quasi-Experimental, Randomized Comparative Trial

Section/Topic	Item No	Checklist item	Reported on page No
Title and abstract			
	1a	Identification as a randomized trial in the title	√ Page No 1
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance, see CONSORT for abstracts)	√ Page No 1
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale	√ Page No 1-2
	2b	Specific objectives or hypotheses	√ Page No 2-4
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial), including allocation ratio	√ Page No 5
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	N/A
Participants	4a	Eligibility criteria for participants	√ Page No 6-7
	4b	Settings and locations where the data were collected	√ Page No 4
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	√ Page No 4, 6
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	√ Page No 5
	6b	Any changes to trial outcomes after the trial commenced, with reasons	N/A
Sample size	7a	How sample size was determined	√ Page No 7
	7b	When applicable, explanation of any interim analyses and stopping guidelines	N/A
Randomization:			
Sequence generation	8a	Method used to generate the random allocation sequence	√ Page No 4
	8b	Type of randomization; details of any restriction (such as blocking and block size)	√ Page No 4
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	√ Page No 4-5
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	√ Page No 4
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	N/A
	11b	If relevant, description of the similarity of interventions	√ Page No 6
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	√ Page No 7
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	N/A

Table 1. Continued

Section/Topic	Item No	Checklist item	Reported on page No
Results			
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analyzed for the primary outcome	√ Page No 11
	13b	For each group, losses and exclusions after randomization, together with reasons	√ Page No 4-5
Recruitment	14a	Dates defining the periods of recruitment and follow-up	√ Page No 4-5
	14b	Why the trial ended or was stopped	N/A
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	√ Page No 9-10
Numbers analyzed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	N/A
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	√ Page No12
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	√ Page No 7
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	N/A
Harms	19	All-important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	√ Page No 7
Discussion			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	√ Page No 16
Generalizability	21	Generalizability (external validity, applicability) of the trial findings	√ Page No 16
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	√ Page No 13-16
Other information			
Registration	23	Registration number and name of trial registry	√ Page No 6
Protocol	24	Where the full trial protocol can be accessed, if available	√ Page No 4
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	N/A