

# A Snapshot of Pre- and Post-intervention Changes Among Cardiovascular Disease Patients Participating in the New Smoking Cessation Program

## Abstract

**Background:** The study evaluates the changes of pre and post stages of behavioral change, motivation level, and smoking status among cardiovascular disease patients, participating in the new smoking cessation program in Hospital Tengku Ampuan Afzan, Kuantan. **Methods:** A total of 65 adult cardiac patients were randomly distributed into two groups, i.e., intervention and control group, who were baseline smokers and assessed in three phases. Initially, the first, second, and third phase collected the information about their demographic details, their smoking status, and smoking status using cotinine amylase strip, respectively. **Results:** It showed that behavioral change was significant for the control group ( $P$  value = 0.031), while motivation level improved for both groups (i.e., control,  $P$  value = 0.000 and intervention group,  $P$  value = 0.001). The smoke quitting status percentage was higher for intervention group 41.9% and lower for control group 20.6%; however, the  $P$  value was insignificant for both control group (1.000) and intervention group (0.250). **Conclusions:** This study suggests a need for more personal testimonial videos to focus on other smoking-related diseases.

**Keywords:** Cardiovascular disease, intervention, tobacco cessation program

## Introduction

Smoking is said to be a strong and consistent risk factor contributing to cardiovascular disease (CVD). It is well-known that CVD-related deaths are not only the primary cause of mortality in the world but also continued to increase in the low- and middle-income countries like Malaysia.<sup>[1]</sup> Few of the studies have suggested fear-arousal message as a promising technique in increasing cessation rate among smokers.<sup>[2-4]</sup> CVD contributes up to 36% of total death in Malaysia recently in 2017.<sup>[5]</sup> Therefore, it is imperative to tackle one of the most common contributing factors for CVD in Malaysia, that is, cigarette smoking.

Nicotine, present in cigarettes, is associated with physical withdrawal symptoms; therefore, the attempts initiated to quit smoking are challenging. There are several barriers in the process of smoking cessation despite the effective treatments for smoking cessation.<sup>[1]</sup> Therefore, policy-level interventions are needed to aid smoking cessation programs. This is likely to have a significant long-term impact on an individual's health. There

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are various strategies in smoking cessation techniques, including fear-arousal message technique that has been applied commonly in smoking cessation programs globally. Fear appeals have been widely used in the Western countries in attempts to change attitude and behaviors on a wide variety of topics, including cigarette smoking. A few studies suggested fear-arousal message as a promising technique in increasing cessation rate among smokers.<sup>[6-8]</sup>

Messages that elicit a strong emotional response such as personal testimonials and viscerally negative content produce stronger and more consistent effects on audience recall, knowledge, beliefs, and quitting behaviors.<sup>[9]</sup> However, a novel fear-arousal message in the form of personal testimonial video for a smoking cessation program is not common in Malaysia. Therefore, there is a dire need to experiment with the newly developed fear-arousal message video for a smoking cessation program, specifically for CVD patients. The present study aims to evaluate the changes of pre and post stages of behavioral change, motivation level, and smoking status among CVD patients participating in the new smoking cessation program in Hospital Tengku Ampuan Afzan (HTAA), Kuantan. The findings of the

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study are assumed to assist in planning a tobacco control program in Malaysia. Moreover, the use of intervention is also hoped to alter the smoking behavior of smokers, which may decline the postoperative morbidity.

## Methods

### Selection and description of participants

An interventional study was carried out with one control group (patients who were given brief advice on smoking cessation) and an intervention group (patients who were given brief advice on smoking cessation plus fear-arousal message). It was a single-blinded study, as patients were unaware to which group they belonged.

The study was conducted in the Cardiac Unit, HTAA, Kuantan Pahang. The CVD patients were recruited through purposive sampling, who were previously screened in accordance with the study inclusion and exclusion criteria [Table 1].

Prior to the study, the researcher also obtained approval from the International Islamic University Malaysia, Research Ethical Committee (IREC/536). The patients were requested to sign the consent letter and were sought permission before recruiting them in the study. The patients who refused to give informed consent were excluded from the study. The patients were assured that the collected information is to be kept confidential. The data were collected on a different day of the week for each of the study group to prevent any data contamination. It started after completing the video development and receiving ethical clearance.

A pilot study of 20 samples from the target population was performed before the actual data collection process for the reliability of the tool. The data in this study were collected in three phases:

- First phase: The participants were asked to answer a set of questionnaires regarding their demographic characteristics, their past and current smoking status, their current stages of behavioral change, and also their motivation level as the baseline data. For testing these changes, Nemar's assessment was conducted, which uses yes/no questions. This was performed when participants were discharged from the hospital where telephonic interviews were conducted.

Participants who stated that they have discontinued smoking were found to be successful, while others are still struggling. In addition, the reason for assessing motivation was its close association with the development of a positive attitude for abstaining from smoking

- Second phase: The level of carbon monoxide among the patients was assessed by blowing in the piCO+™ Smokerlyzer™ CO monitor, which confirmed their current smoking status. All the recruited participants were given a brief advice session regarding their smoking habit. This session was guided by the Clinical Practice Guidelines on Treatment of Tobacco Use Disorder (Ministry of Health Malaysia, 2016). After this, the intervention group was shown the newly developed personal video testimony. The video was 2 to 3 min long and included exsmokers testimonies along with the graphical narration of quitting benefits. It also explained how the cessation program could facilitate abstinence. The video was prepared by an internal team of the hospital, which encompasses nursing educators, and media experts to make it culturally adequate and nonjudgemental. After watching the video, the participants were asked to complete the post stages of change and motivation level questionnaire. Approximately four weeks later, the participants were asked to come to the clinic for their first follow-up in the second phase
- Third phase: The third phase was conducted after 12 weeks, which was the repetition of the second phase. The smoking status of the participants was assessed through self-reported smoking status, and they were asked on how they are coping with their cessation progress. They were to blow again into the piCO+™ Smokerlyzer™ CO monitor to confirm on their smoking status. The entire session lasted for 30 min. NicAlert strip test was used to confirm their smoking status biochemically.

### Statistics

In this study, IBM SPSS version 23 was used for the data analysis. Using the descriptive analysis, frequency and percentage were calculated for patient's baseline characteristics. These include age, education, and marital status, as well as a number of smoking packets per day.

**Table 1: Inclusion and exclusion criteria**

Inclusion criteria	Exclusion criteria
Aged $\geq 19$ and $\leq 60$ years old	Below 19 years or above 60 years
Regular smoker (smoking daily for the past 3 months)	Nonsmokers
Can speak and understand English or Malay language	Cannot speak either Malay or English language
Reachable by telephone	Not-reachable by telephone
Stable CVD	Unstable CVD
Coronary artery disease such as ischemic heart disease and stable angina	Coronary artery disease such as congenital heart disease, septal defect, and rheumatic heart condition

The pre and post changes in the smoking status for CVD patients were determined using McNemar's test. Moreover, the *P* value was calculated using Chi-square, which significance rate (*P* value) was set at 0.005.

## Results

The baseline characteristics of the patients are demonstrated in Table 2. It shows that the majority of patients were aged 37–45 years (32.3%), following which is 28–36 years group (18.5%). The number of packet consumption was reported to be 2 or more than two packets, i.e., 44.6%. Educational analysis of the participants revealed that majority possessed a graduation degree (47.7%), followed by a master degree (21.5%). Employment status of the patients showed that the majority were employed (63.1%), whereas 27.7% were not. The participant's sample constitutes of married and single participants more, i.e., 36.9% and 44.6%, respectively.

Using the McNemar test, the changes in the stages of behavioral change and motivation level of the CVD patients

**Table 2: Demographic characteristics of adult CVD smokers**

Items	Responses	<i>n</i>	(%)
Age	19 to 27 years	8	12.3
	28 to 36 years	12	18.5
	37 to 45 years	21	32.3
	46 to 54 years	13	20.0
	56 to 60 years	11	16.9
Number of packets (per day)	Less than one packet	13	20.0
	1 packet	23	35.4
	2 packets and more	29	44.6
Educational level	Intermediate	10	15.4
	Graduate	31	47.7
	Masters	14	21.5
	Others	10	15.4
Employment status	Employed	41	63.1
	Unemployed	18	27.7
	Self-employed	6	9.2
Marital/Partner status	Single	29	44.6
	Married	24	36.9
	Divorce	9	13.8
	Widow	3	4.6

were calculated. Table 3 presents the results of the behavioral changes based on pre and post test. The behavioral change post intervention for the control group was observed to be 11.8%, whereas for the intervention group, it was 16.1%. Concerning the contemplator preparation to action taker, 88.2% were more inclined to take actions, while for the intervention group, it was 83.9%. The significant effect was observed to be for the control group as evident from the achieved *P* value (*P* = 0.031), which was insignificant for the intervention group (*P* = 0.063).

Table 4 presents the effect on the motivational level of the students. It showed that the motivation level of the intervention group improved as 51.6% positively responded towards it, whereas for the control group, the response was lower, i.e., only 41.2%. The results were found to be statistically significant for both groups, i.e., a *P* value of 0.000 for the control group and *P* value = 0.001 for the interventional group.

Table 5 presents the changes in the smoking status after four-week and twelve-week follow-up. It shows that the quitting percentage for the control group (17.6%) was lower compared to the intervention group (32.3%). The percentage of the quitting has improved with time such as at 12-week follow-up, 20.6% for the control group, whereas 41.9% for the intervention group. However, the achieved *P* value indicates a significant impact of the control group over the intervention group.

## Discussion

The results have shown significant improvement in post intervention motivation level not only for the intervention group but also for the control group. Some other associated factors may influence the improvement of the motivation level of the participants in control groups, such as family support and peer encouragement. A large number of unmotivated participants in the control group compared to the intervention group at baseline might influence the significant changes in the motivation level between both the groups. For the stages of behavioral change, both of the groups have shown improvement in their stages of behavioral change between pre and post intervention. However, the control group was statistically significant, with a *P* value of 0.031. Both the groups were given a standard brief face-to-face counseling to improve the stages of behavioral change of the participants leading to a positive outcome, i.e., smoking cessation. This evidence was supported by a study conducted by Berndt *et al.*<sup>[10]</sup>

**Table 3: Stages of behavioral change among adult CVD smokers**

Variable	Control group		<i>P</i>	Intervention group		<i>P</i>
	Pre-test (%)	Post-test <i>n</i> (%)		Pre-test <i>n</i> (%)	Post-test <i>n</i> (%)	
Behavioral change post intervention	10 (29.4)	4 (11.8)	0.031	10 (32.3)	5 (16.1)	0.063
Contemplator preparation to action taker	24 (70.6)	30 (88.2)		21 (67.7)	26 (83.9)	

\*McNemar Test

**Table 4: Motivational level among adult CVD smokers**

Motivational level	Control group		P	Intervention group		P
	Pre-test (%)	Post-test n (%)		Pre-test n (%)	Post-test n (%)	
Not strong at all	10 (29.4)	2 (5.9)	0.000	2 (6.5)	2 (6.5)	0.001
Not very strong	9 (26.5)	8 (23.5)		13 (41.9)	7 (22.6)	
Quite strong	13 (38.2)	10 (29.4)		14 (45.2)	16	
Very strong	2 (5.9)	14 (41.2)		2 (6.5)	(51.6)	

\*McNemar Test

**Table 5: Smoking status among adult CVD smokers**

Smoking status	Control group		P*	Intervention group		P*
	At 4-week follow-up n (%)	At 12-week follow-up n (%)		At 4-week follow-up n (%)	At 12-week follow-up n (%)	
Still smoking	28 (82.4)	27 (79.4)	1.000	21 (67.7)	18 (58.1)	0.250
Quit	6 (17.6)	7 (20.6)		10 (32.3)	13 (41.9)	

\*McNemar Test

The participants' changes in behavioral change and motivation level were significantly improved after the intervention. Furthermore, the smoking status post intervention of these patients was improved at the final follow-up. It is hoped that this new smoking cessation program would be a great benefit for a future tobacco control program in Malaysia. The "personal testimonial" video in the intervention program was developed, specifically for smokers with cardiac disease, which might not apply to other smoking-related diseases such as cancer, respiratory diseases, and periodontal diseases. It would be a good effort to develop more "personal testimonial" videos focusing on other smoking-related diseases for a broader special disease target population that suit the local population in future studies. Furthermore, a randomized control trial is recommended for future study to get better results.

The present study has highlighted the importance of face-to-face counseling in improving one's behavioral and increasing short-term abstinence rate. Overall, the study demonstrated that the newly developed personal testimonial video in the cessation program would have beneficial effects on the smokers' stage of behavioral change, motivation level, and cessation rate. This was assessed in the short term, i.e., in a three-month follow-up. These findings were consistent with the previous studies showing the benefits of fear-arousal message in cessation programs.<sup>[2,11-14]</sup> The intervention program is highly recommended in Malaysia's cessation plan as the results showed that the intervention was effective in promoting smoking cessation by improving the stage of behavioral change and the motivation level.

It has been shown that cardiac patients are increasingly motivated to quit smoking after the cardiac event because they are at high risk for cardiovascular events.<sup>[14]</sup> Although there is a scarcity of trials studying the efficacy of pharmacotherapies among the CVD patients, the benefits of

smoking cessation are well-established as it decreases the risk of stroke and myocardial infarction.<sup>[15]</sup> Similar to the present study, Eisenberg *et al.*<sup>[16]</sup> showed that the highest long-term smoking cessation rates are achieved through intensive smoking cessation interventions combined with motivational counseling. Moreover, smokers suffering from any chronic disease like CVD are significantly motivated to quit smoking by intensive intervention associated with smoking cessation programs.

## Conclusions

The strength of the study is based on its effectiveness to demonstrate smoking cessation program effectiveness in Kuantan Pahang. The findings demonstrate that this initiative reduces smoking rates among CVD patients. It also shows that testimonial videos in the program improve the participant's motivation, which can be used for expanding the services and enhancing its effectiveness. The limitation of the study is related to its sample and region (Malaysia). Since the sample was derived from one hospital only, the generalizability aspect of the results is limited. In addition, the same size needs to be improved. Accordingly, the same results cannot be applied to a different population based on various socio-economic characteristics. Moreover, intervene effect can also be reduced by instigating a double-blinded study design. Further, to achieve a more accurate effect, each group can have an equal number of participants, which can be attained by undergoing more studies in the same discipline.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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