

## THE EFFECT OF COGNITIVE BEHAVIORAL THERAPY ON HEADS OF FAMILIES' SMOKING BEHAVIOR AND ANXIETY

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### Abstract

Indonesia is the fifth largest producer of cigarettes and has the third highest number of smokers in the world. This has potential biological, psychological, and social consequences. The aims of this study were to investigate the effects of Cognitive Behavioral Therapy (CBT) on smoking behavior and anxiety. Quasi-experimental non-equivalent control group pretest-posttest design was used. A total of 80 respondents were selected at random from 10 districts in proportion to the number of smokers in each district. Respondents completed questionnaires and received a course of CBT conducted over five meetings. There was a significant decrease smoking behavior and anxiety ( $p < 0.05$ ) in the intervention group. Smoking behavior, nicotine dependence, and anxiety in male heads of family who smoke and who received CBT were significantly lower than in control group. The decreases in smoking behavior and anxiety were significantly correlated ( $p < 0.05$ ). The study reveals, CBT can effectively change smoking habits as well as reduce anxiety.

**Keyword:** anxiety, smoking behavior, cognitive behavioral therapy

### Abstrak

**Pengaruh Cognitive Behavior Therapy Terhadap Perilaku Merokok dan Ansietas pada Kepala Keluarga dengan Perilaku Merokok.** Indonesia sebagai penghasil rokok terbesar ke-5 dan memiliki jumlah perokok terbanyak ke-3 di Dunia, hal tersebut memunculkan masalah secara biologis, psikologis maupun sosial. Tujuan penelitian ini untuk mengetahui pengaruh dari *cognitive behavior therapy* terhadap perubahan perilaku merokok dan ansietas. Metode penelitian menggunakan desain *quasi experiment non-equivalent control group pre-test-post test*. Sampel pengambilan secara proporsional random dengan jumlah 80 responden. Pengumpulan data dengan menggunakan kuesioner kemudian responden dilakukan tindakan *cognitive behavior therapy* dengan lima kali pertemuan. Hasil penelitian menunjukkan penurunan perilaku merokok dan ansietas secara bermakna ( $p < 0,05$ ) pada kelompok intervensi. Penurunan perilaku merokok, tingkat ketergantungan nikotin dan ansietas kepala keluarga dengan perilaku merokok yang mendapatkan *cognitive behavior therapy* lebih besar secara bermakna ( $p < 0,05$ ) dibandingkan dengan yang tidak mendapatkan *cognitive behavior therapy*. Penurunan perilaku merokok dan ansietas berhubungan secara bermakna ( $p < 0,05$ ). Direkomendasikan untuk menerapkan *cognitive behavior therapy* perokok oleh perawat yang mempunyai kompetensi.

**Kata Kunci:** ansietas, perilaku merokok, cognitive behavior therapy

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### Introduction

Indonesia is the fifth largest producer and the third largest consumer of cigarettes in the world (WHO, 2013). The percentage of smokers in Indonesia has reached 36.3%, of whom 2.1% are female, and the rest are male. The highest number of smokers is among adults aged between 20 and 50 years old; they represent 34%

of the total number of smokers, data show that the number of cigarettes consumed and the number of smokers in Indonesia continues to rise. In the last seven years, the total number of smokers increased by 2% (Balitbang Kemenkes RI, 2013).

Most males in Indonesia become smokers while they are of school age. Teenagers who smoke

usually live with parents who also exhibit smoking behavior (WHO, 2013). Adults often choose to smoke as a coping mechanism to alleviate stressors and emotional response to stressors (Leventhal & Zvolensky, 2015; Bricker, Sciff, & Comstock, 2011; Perkins, et al., 2010; Slopen, et al., 2012). However, continued use of smoking as a coping mechanism leads to numerous adverse biological, social-economic, and psychological effects.

Cigarettes are bad for health because the smoke contains danger chemicals. The danger chemical components that can be easily measured in smokers are levels of carboxyhemoglobin, hydrogen cyanide, and nicotine. Non-invasive measurement of carboxyhemoglobin in smokers is used as an objective measurement instrument in smoking cessation therapy (Marc, 2011). One negative impact of smoking behavior that can be directly felt by the smoker is the nicotine effect. Nicotine is an addictive substance contained in cigarettes; in the human body, it can stimulate euphoria, calmness, increased alertness, and motor activity. This effect is, however, trivial and does not last long.

Anxiety is correlated with smoking behavior. One in five smokers has a mental illness or an emotional disorder, such as anxiety. A person who has a mental illness or an emotional disorder is twice as likely to smoke as a person who does not have anxiety (Lawrence, et al., 2010). Zvolensky, et al. (2014) examined the correlation between mental-emotional disorders and smoking behavior, they found that mental-emotional disorders significantly affected smoking behavior ( $p < 0.05$ ; CI 95%).

In order to control smoking behavior in Indonesia, in 2012 the government released Regulation No. 109 concerning addictive substances in tobacco products (Kementerian Hukum dan Hak Asasi Manusia Republik Indonesia, 2012). This regulation explains the composition of the product and the responsibilities of government regarding enforcement, community participation, guidance, and supervision.

Guidance and supervision are taken in this context to refer to the provision of rehabilitation by competent health workers, as stated in Article 43, Section 2, which covers physical and mental checkups, clinical treatment, psychosocial therapy, mental therapy, and referral. Such rehabilitation also includes social recovery: the provision of motivational and psychosocial diagnosis and mental-spiritual and social-psychosocial counseling. Regulation No. 109 of 2012 appears to be comprehensive enough to control smoking behavior; its implementation is, however, far from optimal. A survey conducted by the Indonesia Basic Health Research shows that the number of smokers in 2013 was significantly higher than in 2007. This finding corroborates some previous peer-reviewed studies that suggest that there has been no adequate psychosocial rehabilitation for smoking behavior in the community.

The increasing number of smokers proves that Regulation No. 109 has not been useful in solving the issues caused by smoking behavior and that there are still insufficient measures for dealing with smoking behavior in Indonesia. Creating non-smoking areas decreases the amount of smoking in public spaces, yet it has no impact on private places, such as homes. It is crucial in the Indonesian context, because smokers there are predominantly male, and in Sundanese culture, a man is traditionally the head of the family and a role model for the other members of the family.

Previous study shows that changes in smoking behaviour can be achieved by using some psychotherapy (Assayag, et al., 2012). The psychotherapies that have been used include cognitive therapy (CT), Behavior Therapy (BT), Cognitive and Behavior Therapy (CBT), Motivational Enhancement Therapy (MET), relapse prevention therapy, relaxation therapy, and hypnotherapy (Stöffelmayer, et al., 2003; Webb, et al., 2010; Dickson-Spillmann et al., 2012; Tevyaw et al. 2009). CBT is psychotherapy that can change a person's behaviour with addictive dependence (Haaga, et al., 2012). CBT

has been widely applied in several studies abroad on various types of addictive substances. CBT applied to people in the US shows a significant increase in readiness to stop smoking and shows a significant rate of smoking cessation when CBT has been given (Hill, et al., 2013). The implementation of CBT for smoking cessation programs has been carried out in various countries with significant results that affect smoking behaviour.

CBT for smoking cessation in Indonesia has adopted in several studies, one of the studies conducted by combining CBT and varenicline, the results of therapy showed that CBT did not significantly influence changes in client smoking behaviour, only two respondent involved in the study (Palupi, 2010). CBT has also has been applied to adolescents with smoking behaviour with ten respondent; the results showed that CBT did not significantly influence changes in smoking behaviour (Fahrudina & Kumolohadi, 2007). There are differences between the results of CBT applied in Indonesia and those that have applied in research abroad. The number of samples that tend to be slightly compared with similar studies conducted abroad, based on this, the researchers are interested in re-testing CBT in the community with an increase the number of samples and the amount of interaction time with respondents.

The aim of the present research is, therefore, to investigate the effectiveness of Cognitive Behavioral Therapy (CBT), with fewer sessions and meetings than in previous studies, in reducing the smoking behavior, nicotine dependence, and anxiety in smokers.

## Method

This study employed a quasi-experimental non-equivalent control group pretest-posttest design. A total of 80 respondents participated in the study, with 40 respondents in the control group and 40 in the intervention group, all respondent are male and heads of family. The researcher selected provinces from the top ten

regarding some smokers and then identified the district with the most significant number of smokers in that province. A subdistrict of that district was selected at random, and two Citizen Associations (RW) with similar socioeconomic characteristics were selected within the subdistrict. The screening was conducted to confirm the number of smokers in the selected RW, and then samples were chosen from each Neighborhood Association (RT) in proportion to the number of smokers in each RT.

A questionnaire was used to identify respondents' smoking behavior and levels of nicotine dependence and anxiety. The questionnaire included the following elements: characteristic data of the respondent, nicotine dependence measurement (the Fagerström test of nicotine dependence/FTND), smoking behavior measurement (the Glover–Nilsson Smoking Behavioral Questionnaire/GN-SBQ), and anxiety measurement (Hamilton Anxiety Rating Scale/HARS).

FTND has been used in research on nicotine dependence and the influence of cigarettes in Indonesian Language version. FTND has gone through a series of validity tests, content validity, construct validity and face validity, the reliability test results show alpha cronbach number  $> 0.6$ . (Hidayat, Wiarsih, & Mulyono, 2012).

GN-SBQ was first used in the Indonesian version. Therefore, the researchers conducted a series of validity tests used the correlation method between scores of each variable with the total score. A variable (question) is said to be valid if the variable score correlates significantly with the total score. Correlation technique used Pearson product moment correlation. The instrument validity test was carried out on 30 respondents, and the results of the validity test showed all valid questions items (11 question),  $r$  results (0.663-0.945)  $> r$  table (0.367).

HARS Indonesian version has been tested for validity in previous studies with results (Alpha

> 0.9) greater than *r* table values (0.355) its mean HARS Indonesia Version valid and reliable (Dewi, Hamid, & Mustikasari, 2011).

The researcher screened the prospective respondents first using characteristics questionnaire including *Level of Education, Occupation and Income Age Characteristics* Amount of cigarette consumption. Screening results were randomized according to the location of the respondent's residence to be included in the control group and the intervention group. The sampling technique used is stratified random sampling. Pre-test was carried out in the control group and intervention group at the same time.

The intervention group was given 5 sessions of CBT which were held in the homes of each respondent. CBT is carried out in five sessions, the meeting is held according to the agreement of the researcher with the respondent, generally around 30 minutes. The meeting is held every two days, and then proceed with the work of each CBT therapy session independently. One session can be held in several meetings.

CBT session I: in this session respondents were asked to identify negative thoughts and behaviours after that will be trained to fight the first negative thoughts and behaviours. In this study, the researcher uses therapeutic communication to explore feelings, complaints, worries and hopes of the entire respondent.

CBT session II: evaluation of negative thoughts and behaviour whether there are additions or not, then whether previous negative thoughts and behaviours can be overcome or not. Evaluation the first negative thoughts and behaviour and then trained to fight the second negative thoughts and behaviours.

CBT session III: evaluation of negative thoughts and behaviour whether there are additions or not, then whether previous negative thoughts and behaviours can be overcome or not. Evaluation of the second negative thoughts and

behaviour and then trained to fight the third negative thoughts and behaviours.

CBT session IV: evaluation of negative thoughts and behaviour whether there are additions or not, then whether previous negative thoughts and behaviours can be overcome or not. Evaluation of the third negative thoughts and behaviour and then trained to fight the fourth negative thoughts and behaviours.

CBT session V: negative thoughts and behaviours that still exist or not, thought evaluation and negative behaviour 1,2 3,4, termination preparation and post-test preparation that will be conducted one week after the last session of the CBT session.

Data quality assurance comprised editing and checks on the completeness, clarity, relevance, and consistency of the responses to the questionnaires. These checks were performed one day after the pretest and again after the post-test, in order to check that all the questionnaires were filled completely. Coding was carried out by converting the data into numbers to facilitate processing and analysis, and it was completed concerning the directions in the questionnaire. At this stage, the researcher found no problems with the completeness of the responses. A computer was used to process the data, and a cleaning process was carried out to check for any data-entry mistakes. At this stage, the researcher found that some data had been overlooked, and it was necessary to re-check the missing data from the relevant responses.

Univariate analysis of the variables was carried out by calculating the distribution of frequency and its proportion in order to establish the characteristics of the research subjects. Bivariate analysis was employed to examine homogeneity in order to identify relevant similarities between the intervention group and the control group. Variables with categorical scale (nominal and ordinal) were analyzed using the chi-square test. Variables with interval and

ratio scale were analyzed using an independent t-test. When tests had confirmed the homogeneity between the intervention group and the control group, bivariate analysis was carried out (Table 1). The bivariate analysis aimed to confirm the hypothesis of this study, CBT decreases smoking behavior and anxiety in heads of family who smoke.

## Result

The level of education with the most significant number of smokers was in an elementary school (SD), with 38 people (47.5%). The homogeneity test confirmed that there was no significant difference ( $p \geq 0.05$ ), in the level of

education between the intervention group and the control group, it can be summed up between intervention and control group in the equivalent level of education. The occupation with the most significant number of smokers was a laborer, with 59 persons (72.8%), 32 of them in the intervention group (80% of that group) and 27 in the control group (67.5% of that group). The homogeneity test confirmed that there was no significant difference in occupation between the two groups ( $p \geq 0.05$ ). The level of income with the largest number of smokers was in the range of IDR 500,000 to IDR 1,000,000, with 35 persons (43.8%). It was also confirmed as showing no significant difference between the two groups ( $p \geq 0.05$ ).

Table 1. Level of Education, Occupation and Income of Respondent (n=80)

Characteristic	Intervention group (n=40)		Control group (n=40)		All		p
	N	%	N	%	N	%	
Education							
a. No school	2	5.0	3	7.5	5	6.2	0.682
b. Elementary school (SD)	20	50.0	18	45.0	38	47.5	
c. Junior high school (SMP)	11	27.5	15	37.5	26	32.5	
d. Senior high school (SMA)	7	17.5	4	10.0	11	13.8	
Occupation							
a. Farmer	2	5.0	4	10.0	6	7.5	0.607
b. Laborer	32	80.0	27	67.5	59	73.8	
c. Entrepreneur	6	15.0	9	22.5	15	18.7	
Income (IDR)							
a. 500,000–1 million	16	40.0	18	45.0	35	43.8	0.827
b. 1–1.5 million	18	45.0	13	32.5	31	38.8	
c. 1.5–2 million	3	7.5	6	15.0	11	13.8	
d. 2–3 million	2	5.0	1	2.5	1	1.3	
e. >3 million	1	2.5	2	5.0	2	2.5	

Table 2. Age Characteristics of Respondent (n=80)

Characteristic	Group	N	Mean	SD	Min–Max	95% CI	p
Age	Intervention	40	35.25	7.030	23–48	33.00–37.50	0.293
	Control	40	36.20	6.080	25–47	34.26–38.14	
	Total	80	35.73	6.549	23–48	35.69–35.50	
Age of starting smoking	Intervention	40	17.35	4.833	12–28	15.80–18.90	0.519
	Control	40	18.25	5.143	10–27	16.61–19.89	
	Total	80	17.80	4.979	10–28	16.69–18.91	

The age characteristics measured were age during the study and age of starting smoking, presented as a numerical variable for analysis using measures of central tendency followed by a test of homogeneity using an independent t-test (Table 2). The mean age of smokers was 35.25, the youngest being 23 years old and the oldest 48 years old. On average, the respondents had started to smoke at 17.8 years old, with the youngest of them starting to smoke as a child (at ten years old). Homogeneity among these variables between the intervention group and the control group was confirmed ( $p \geq 0.05$ ).

The analysis of smoking behavior, as measured by the GN-SBQ, before and after CBT intervention revealed that, before CBT intervention, the mean score for smoking behavior was 25.63 (58.25%), which is classified as strong; after intervention, it was only 20.23 (45.97%), which is classified as medium (Table 3). There was a significant decrease in smoking behavior in the intervention group ( $p \leq 0.05$ ). In the control group, by contrast, there was an increase in smoking behavior (GN-SBQ): before the intervention, the level of smoking behavior was 26.88; after the intervention, the level increased to 27.05 (61.47%). Both conditions are classified as strong, although the change was not statistically significant ( $p \geq 0.05$ ).

The change in smoking behavior before and after CBT was confirmed by data concerning cigarette consumption and carbon monoxide exhalation levels. The average number of cigarettes consumed in the intervention group before CBT was 14.48 cigarettes per day, and the carbon monoxide exhalation level was 2.43 ppm (7–10 ppm); after CBT, the number of cigarettes decreased to 9.83 per day, and the carbon monoxide exhalation level was 1.70 ppm (0–10 ppm). These findings were significant ( $p \leq 0.05$ ). Meanwhile, the number of cigarettes consumed and the carbon monoxide levels in the control group before CBT were 15.45 cigarettes per day and 2.55 ppm (7–15 ppm), respectively. After CBT, those levels increased to 15.83 cigarettes per day and 2.63 ppm (7–15 ppm), respectively. The increased cigarette consumption and carbon monoxide levels were, however, not significant ( $p \geq 0.05$ ).

The analysis of nicotine dependence before and after CBT intervention also showed a significant decrease ( $p \leq 0.05$ ). In the intervention group, the average nicotine dependence before CBT was 4.23 (42.3%), which was categorized as low; the average nicotine dependence decreased after CBT to 2.65 (26.5%), which was categorized as very low. In the control group, there was no significant difference in nicotine

Table 3. Analysis of Smoking Behavior Before and After CBT (n=80)

Variable	Group	Mean before CBT	Mean after CBT	Mean diff	SD	CI 95%	T	p
Smoking behavior								
a. GN-SBQ	Intervention	25.63	20.23	5.4	3.418	4.31–6.49	9.99	0.000
	Control	26.88	27.05	-0.175	0.747	-0.414–0.06	-1.481	0.147
b. Amount of cigarette consumption	Intervention	14.48	9.83	4.6	2.869	3.732–5.568	10.25	0.000
	Control	15.45	15.83	-0.375	1.531	-0.865–0.115	-1.549	0.129
c. Level of carbon monoxide	Intervention	2.43	1.70	0.725	0.554	0.548–0.901	8.275	0.000
	Control	2.55	2.63	-0.75	0.350	-0.187–0.037	-1.356	0.183
Anxiety	Intervention	8.78	6.08	2.7	2.564	1.880–3.520	6.660	0.000
	Control	10.03	10.30	-0.175	0.931	-0.473	0.123	0.242

dependence before and after the intervention, at 4.80 (48%) and 4.93 (49.3%), respectively. Both values are classified as low-medium.

The analysis of changes in levels of anxiety related to smoking cessation before and after CBT intervention showed a significant decrease ( $p \leq 0.05$ ). In the intervention group, the average anxiety level before CBT was 8.78 (15.68%), which was categorized as trivial; the average anxiety level after CBT decreased to 6.08 (10.85%), which was also categorized as trivial. In the control group, there was no significant change. Before the intervention, the anxiety level was 10.03 (17.91); after the intervention, it was 10.30 (18.39%). Both conditions are classified as trivial.

## Discussion

Findings of the present study, shows correlations among smoking behavior, number of cigarettes consumed, and carbon monoxide exhalation levels (Blank, 2007). Significant correlations among smoking behavior, the number of cigarettes consumed, and carbon monoxide levels measured in a laboratory or through carbon monoxide exhalation.

Several procedures were used to measure the behavior of heads of family who smoke. The first instrument used was the GN-SBQ questionnaire, which aims to measure smoking behavior explicitly based on cravings and thinking about cigarettes. The questionnaire was created to measure smoking behavior independently via self-reporting (Glover, Nilson, & Westin, 2005). The number of cigarettes consumed and the carbon monoxide levels were also included in order to maximize the objectivity of the results.

Statistical tests indicated significant differences in the intervention group for smoking behavior, some cigarettes consumed, and carbon monoxide levels, before and after CBT. The average score for smoking behavior after the intervention was significantly lower ( $p \leq 0.05$ ),

with an average decrease of 5.4 (from 58.25%, classified as strong, to 45.97%, classified as a medium). Webb, et al. (2010) implemented CBT for smokers ( $n=154$ ) with an average consumption of 13 cigarettes per day and carbon monoxide exhalation of  $> 8$  ppm. They found that the group who received CBT showed a decrease in smoking behavior 2.57 times greater at seven days after the intervention than those who did not receive CBT. The number of sessions in that study was six, and the decrease in smoking behavior was accompanied by decreases in negative thoughts and behavior.

Study findings, CBT offered heads of family who smoke the opportunity to identify negative thoughts and behavior as possible effects of smoking cessation. This treatment strategy focused on the problems they faced in their attempts to quit smoking. Another strategy involved making agreements by the individual's condition and capability; for example, the individual might commit to stop smoking, or he might be shown several ways to understand and deal with negative thoughts and behavior. The most critical strategy in the implementation of CBT is the building of the therapeutic relationship, and the researcher, therefore, used Sundanese (local language) to speak to all the respondents. Rector (2010) outlined some strategies for ensuring effective implementation of CBT, such as being organized, maintaining focus on the specified problem and purpose, teaching new skills for facing problems, and maintaining a productive therapeutic relationship between the client and the therapist.

Nicotine dependence from low to medium levels can be the effect of smoking behavior. It takes a long time to determine whether someone has nicotine dependence. The primary criterion for diagnosis is tolerance to nicotine, which can be seen in increased daily consumption of cigarettes with the aim of maintaining the effects of nicotine. Consumption of the same amount of nicotine will have diminishing effects, and therefore a person who suffers

from nicotine dependence is likely to spend many time-consuming cigarettes in order to fulfill the desire for nicotine. Moreover, a person who is addicted to nicotine will feel strongly that it is difficult to stop or even to reduce smoking.

In the present study, respondents stated that it was difficult for them to stop smoking because whenever they tried to quit, they would feel the adverse physical effects of nicotine dependence. Addiction to nicotine involves three primary mechanisms in the body: ganglion transmission, the central nervous system, and nicotine acetylcholine receptors (nAChRs), which interact with nicotine, stimulate the dopaminergic pathway and cause mood changes. If the stimulation worsens, it affects the more sensitive GABAergic neuron, decreasing the GABAergic inhibitor function on dopamine and triggering nicotine dependence syndrome (Pistilo, 2015; Mishra et al., 2015). This syndrome is the primary biological cause of continuing to smoke.

Smoking behavior was primarily triggered by physiological factors; it served as a coping mechanism in the face of stressors and was mainly associated with avoidance coping. The presence of stress, adoption of coping strategies, and commencement of smoking behavior at a young age are known to have a significant effect on smoking behavior ( $p < 0.001$ ,  $n = 159$ ) (White-Chaleff, 2004).

## Conclusion

The present study investigated the effects of CBT on smoking behavior in heads of the family as measured by GN-SBQ score, cigarette consumption, and carbon monoxide exhalation levels. After the implementation of CBT, there was a significant decrease smoking behavior in the intervention group, and the level of smoking behavior was classified as medium. The control group showed an increase in smoking behavior; the increase but not significant, and

the level of smoking behavior was still classified as strong (EU, INR).

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