

Decisional Balances and the Process of Change in Smoking Cessation in Patients with Coronary Artery Diseases

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Purpose. Despite many smoking cessation programs, many patients with CAD continue to smoke or re-smoke. The processes of change and self-change for smoking cessation is emphasized. The purpose of present study was to investigate decisional balances and processes of change according to stages of change for smoking cessation in the patients with CAD.

Methods. This descriptive study was performed using the self-reported questionnaires from 157 male patients with CAD who have smoking experiences. The questionnaires consisted of decisional balances toward smoking (pros/cons) and processes of change including 7 factors.

Results. 45.2% of the subjects had myocardial infarction and 54.8% for angina pectoris. Major stages of change were maintenance, contemplation, and precontemplation in 62%, 14%, and 18% respectively. The mean score of pros smoking was 31.07 and cons smoking was 32.52. The mean scores of processes of change were high in all 7 factors, especially in self determination. The pros smoking in precontemplation stage was significantly higher than those in other stages. Between contemplation and precontemplation stages, processes of change showed significant differences in stimulus control, self determination, information management, and dramatic relief.

Conclusion. This study suggests that decisional balances and processes of change are stage-specific. As this study, smoking cessation program in the patients with CAD must put priority on the patients group in precontemplation and contemplation stages, and stress self determination and dramatic relief.

Key Words: Smoking cessation, Decisional balance, Change, Process, Coronary artery disease

INTRODUCTION

Smoking is known as one of risk factors of coronary artery diseases and is a major cause of development and progress of diseases and mortality (Epstein & Perkins, 1988; McKenna & Higgins, 1997; Otsuka et al., 2001; Pitsavos et al., 2002). Despite the reports that smoking cessation after myocardial infarction reduces the recurrence rate of myocardial infarction by 50%, patients are reported to keep smoking or restart smoking after expe-

rienced coronary artery diseases (Bolman, 1998; Califf, 2000; Stillman, 1995). This suggests that it is necessary to consider in-depth the effects of intervention in smoking cessation which has been emphasized to patients with coronary artery diseases and to try to improve the efficacy of intervention in smoking cessation as well (Kim, 2001).

Most previous studies tried to understand the outcome of smoking cessation as either continuing smoking or smoking cessation. However, Prochaska & DiClemente (1983) emphasized the self-initiated changes, believing

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that the behavior of smoking cessation was a kind of process. Transtheoretical Model (TTM) is composed of three major factors; stages of change, process of change, and decisional balances (Prochaska & DiClemente, 1983; Prochaska & Goldstein, 1991; Prochaska et al., 1988), and is a verified theory considered as appropriate in explaining the self-change of behaviors related to health such as smoking cessation, alcoholism and exercise. Especially its value is highly appreciated as a process inducing and continuing the self-change by providing intervention in the patient-centered smoking cessation (Cole, 2001).

Successful self-change makes use of various processes in each stage of change, and men achieve decisional balances according to the relative importance of attitudes of pros or cons which they take on action in question (Velicer, et al., 1985). Therefore, studies attempting to verify the model on the process of change in the stages of change in smoking cessation are essential in improving the efficacy of smoking cessation programs and can be an important step in maximizing the self-help approached process (Oh & Kim, 1997).

Many studies have been conducted in various aspects such as measuring the composing factors, inferring the cause and effect among the factors, understanding the process of change in each stage of change, and verifying the appropriateness of the model, etc (Plumer et al., 2001; Pollak et al., 1998; Prochaska & Velicer, 1997). However, Transtheoretical Model has been introduced into Korea through studies on smoking cessation among college and high school students only, lacking in studies conducted in patients (Kim, 1999; Oh & Kim, 1996a, 1996b, Oh & Kim, 1997). In Korea, there are insufficient amount of studies on smoking cessation that verified the changes of action in coronary artery disease patients among whom smoking cessation is most emphasized. In this situation, basic data are necessary for the development of intervention program for smoking cessation, focusing on the patients with coronary artery diseases by identifying changes in their behavior in smoking cessation. Therefore, present study was conducted to identify the major composing factors of Transtheoretical Model such as stages of change, decisional balances and process of change, as well as to examine the differences of decisional balances and process of change according to each stage of change.

Objectives

The objectives of the study were:

- 1) To describe stages of change, decisional balances and process of change in smoking cessation among coronary artery disease patients.
- 2) To describe the decisional balances according to each stage of change in smoking cessation among coronary artery disease patients.
- 3) To describe the process of change according to each stage of change in smoking cessation among coronary artery disease patients.

Definition of Terms

Stages of change

Stages of changes are defined as a series of process that is experienced in changing the smoking behavior. Prochaska & Goldstein (1991) defined the stages of change as 1) Precontemplation stage : no intention to quit within next 6 months; 2) Contemplation stage: seriously thinking about quitting in the next 6 months; 3) Preparation stage: ready to quit within one month; 4) Action stage: concrete steps toward quitting and first 6 months after quitting; and 5) Maintenance stage : more than 6 months after quitting smoking, and effort to continue life free from tobacco use. In this study, it refers to stages of change are composed of five stages, based on the stages of change suggested by Prochaska & Goldstein (1991).

Decisional balances

Decisional balances is defined as any decision including both aspects of cognition and motivation on change in behavior related to health such as smoking cessation (Velicer et al., 1985). In this study, it refers to values measured by tools of decisional balances developed by Velicer et al (1985).

Process of change

Process of changes is defined as mechanism of adaptation used by subjects who try to quit smoking; Prochaska et al. (1988) suggested 10 factors, dividing into area of experiential process and that of behavioral process. In this study, it refers to values measured by mechanism tools of self-change, suggested by Oh and Kim (1996a), modified appropriately for Koreans from tools of process of change in smoking cessation that were developed by Prochaska et al (1988).

METHODS

Design

This study is a descriptive research to understand differences in decisional balances and process of change according to the stages of change in smoking cessation based on the Transtheoretical Model of patients with coronary artery diseases.

Subjects

In a cardiac clinic located in the Metropolitan area, 180 male patients with a history of smoking and diagnosed with coronary artery diseases were conveniently sampled. In the selection of the subjects, two research assistants trained for this study asked male outpatients if they had a history of smoking, and after the confirmation, the research assistants explained to the patients with a history of smoking the purpose of present study and the content of the questionnaire. After written consent was obtained, the patients were included in this study.

Instruments

Decisional balances

The decisional balances developed by Velicer et al. (1985) was used to measure the decisional balance. It was translated into Korean by researcher and bilingual Korean who had not seen the English version of the instrument, back-translated the Korean items into English. And It was confirmed the content validity by two professors in the department of the nursing science and three patients. This scale is a 5-point likert-type scale composed of 10 positive items and 10 negative items. At the time of the development of this scale, the Cronbach's alpha of positive items was 0.87, while that of negative items was 0.90. In this study, the reliability of positive items was 0.85, that of negative items was 0.75.

Process of Change

In this study, the self-change mechanism scale developed by Prochaska et al. (1988) was modified by Oh and Kim (1996a) for Koreans. It is consisted of 30 items. In detail, this scale includes 4 items in stimulus control, 7 items in self determination, 5 items in information management, 3 items in reinforcement management, 3 items in helping relationships, 5 items in dramatic relief, and 3 items in cognitive reconstruction. At the time of the de-

velopment of this tool, Cronbach's alpha of each factor was between 0.62 and 0.82. In this study, the Cronbach's alpha of each factor was in the range of 0.90 and 0.91, and the general reliability of this scale was 0.91.

Data Collection

Data were collected by self-reported questionnaire that was answered by the subject. The questionnaire was composed of questions to identify general information about the subject, stages of change, decisional balance, and the process of change. Time to complete the questionnaire was about 20 minutes. Data with unsatisfactory answers were excluded and 157 questionnaires were finally included for the analysis. Data collection period was from August 1, 2002 to August 30, 2002.

Data Analysis

In this study, data were analyzed using SPSS-Win 10.0. Frequency and percentage were calculated for general characteristics of subjects and the stages of change in smoking cessation, while mean values and standard deviation were calculated for decisional balances and process of change. In addition, since differences in decisional balances and process of change according to the stages of change in smoking cessation did not show normal distribution, they were analyzed using Kruskal-Wallis test and Mann-Whitney test. Reliability of instruments was calculated using Cronbach's alpha coefficient.

Limitation

In this study, subjects were sampled conveniently from male outpatients who visited a cardiac clinic, which is a limitation in generalizing the study results. In addition, among factors comprising Transtheoretical Model, only decisional balances and process of change according to the stages of change were identified in this study. Therefore, there is a limitation in understanding the Transtheoretical Model comprehensively.

RESULTS

General Characteristics of Subjects

Majority of the subjects (44.6%) were between 60 and 69 years of age, and high school graduates were 37.6%. 48.5% of subjects had no occupation. 90.5% were married and 83.4% belonged to the middle class. Myocardial infarction was diagnosed in 45.2% of sub-

jects, and angina pectoris in 54.8%. Morbidity period was mostly less than 10 years (Table 1).

Stages of Change, Decisional Balances, and Process of Change in Smoking Cessation

The stages of change in smoking cessation were as follows: maintenance, 62% (predominant); precontemplation, 18%; contemplation, 14%. Subjects in the stages of preparation and action were 3% each (Table 2). Mean decisional balances showing positive attitude toward smoking (pros) was 31.07 (± 5.80), while mean decisional balances showing negative attitude (cons) was 32.52 (± 3.81) (Table 3). In the process of change, the average score of each process of change was as follows: stimulus control, 11.20 (± 3.46); self determination, 21.30 (± 4.79); information management, 14.85 (± 3.20); reinforcement management, 7.75 (± 2.39); helping relationships, 9.45 (± 2.35); dramatic relief, 15.68 (± 2.98); and cognitive reconstruction, 10.71 (± 2.37) (Table 4).

Differences in Decisional Balances and the Process of Change according to the Stages of Change in Smoking Cessation

Among 5 categories of the stages of change in smoking cessation, both preparation and action stages were excluded from the analysis due to the small number of the subjects (N=5). Kruskal-Wallis test has been applied to compare the differences of decisional balances according to the stages of changes among the stages of precontemplation, contemplation and maintenance. The mean rank of precontemplation was the highest in the positive attitude toward smoking (pros) showing statistically significant difference, while there was no statistical significance in negative attitude toward smoking (cons)(Table 5).

As the analysis of difference in the process of change according to the stages of change among the stages of precontemplation, contemplation and maintenance, the maintenance stages showed statistically significant differ-

Table 1. Demographic Characteristics (N=157)

Characteristics	Categories	Frequency (N)	Percentile (%)
Age (years)	39	3	1.9
	40 - 49	11	7.0
	50 - 59	44	28.0
	60 - 69	70	44.6
	70	29	18.5
Education	Elementary school	37	23.6
	Middle school	33	21.0
	High school	59	37.6
	University	28	17.8
Occupation	Company employee	14	8.9
	Independent enterprise	52	33.1
	Profession	11	7.0
	None	76	48.5
	Etc	4	2.5
Marital state	Married	142	90.5
	Unmarried	1	0.6
	Bereaved	14	8.9
Economic status	High	1	0.6
	Middle	131	83.4
	Low	25	16.0
Diagnosis	Myocardial infarction	71	45.2
	Angina	86	54.8
Duration of illness(years)	9	125	79.7
	10 - 19	31	19.7
	20	1	0.6

Table 2. Stages of Change in Smoking Cessation (N=157)

Stage	Frequency (N)	Percentile (%)
Precontemplation	27	18.0
Contemplation	22	14.0
Preparation	5	3.0
Action	5	3.0
Maintenance	98	62.0

Table 3. Mean Scores of Decisional Balances (N=157)

	N	Mean \pm SD	Minimum	Maximum
Decisional Pros	157	31.07 \pm 5.80	17.00	50.00
Balances Cons	157	32.52 \pm 3.81	21.00	47.00

Table 4. Mean Scores of Process of Change

		N	Mean \pm SD	Minimum	Maximum
Process of change	Stimulus control	157	11.20 \pm 3.46	4.00	19.00
	Self determination	157	21.30 \pm 4.79	7.00	35.00
	Information management	157	14.85 \pm 3.20	6.00	23.00
	Reinforcement management	157	7.75 \pm 2.39	4.00	14.00
	Helping relationships	157	9.45 \pm 2.35	3.00	15.00
	Dramatic relief	157	15.68 \pm 2.98	7.00	24.00
	Cognitive reconstruction	157	10.71 \pm 2.37	3.00	15.00

ence compared to other stages by Kruskal-Wallis test. Therefore the difference between the precontemplation and contemplation stages was tested by Mann-Whitney test. The mean rank of the contemplation stage was higher statistically than precontemplation in the subcategories such as stimulus control, self determination, information management, and dramatic relief (Table 6).

DISCUSSION

Sixty-two percent of the subjects were in the stage of maintenance. In this group, all the seven processes of change were significantly higher than in the stage of either precontemplation or contemplation. Maintenance stage is defined as continuation of life free from smoking and healthy life style (Prochaska & Goldstein, 1991). These subjects can control the emotion related to smoking and manage the positive information related to smoking cessation. And their cognitive reconstructions are well reflected to subjects' actions taken in their daily life. It suggests that the subjects in the maintenance stage use self determination which is already well-acquainted. That is, subjects make good use of process of change actively to modify the environment and experience in order to prevent the relapse.

Stage of maintenance is an active stage, rather than a stage without any change (Prochaska et al., 1988). Prochaska & DiClemente (1983) and Prochaska et al. (1988) reported that subjects in the maintenance stage mainly uses environmental reevaluation and counterconditioning. Therefore these subjects consider the effects of

physical and social environment that the smoking is harmful and problematic behavior and they do something else instead of smoking when they need to relax.

The decisional balance on the change of smoking behavior is composed of pros and cons. In the results of present study, subjects in the stage of precontemplation showed positive attitude toward smoking, it seems to reflect that these subjects still consider the advantage, rather than the disadvantage of smoking. Velicer et al (1985) also mentioned that people in the stage of precontemplation put more weight on the positive aspect toward smoking, while in the stage of contemplation, pros and cons showed balance. In addition, mean total score of cons was higher in the stage of contemplation than in the stage of maintenance. Subjects in the stage of contemplation tend to show open attitude to smoking cessation by responding to the information or education. They applied process of change such as consciousness enhancement and self reevaluation and act emotionally and cognitively (Pollack et al., 1998; Prochaska & DiClemente, 1983; Prochaska & Velicer, 1997). In the meanwhile, since subjects in the stage of maintenance who continue abstinence from smoking took actual behavioral activities already, they tend to show lower negative decisional balances than in the stage of contemplation.

Self determination comprehends the cognitive, emotional, and behavioral aspects for quitting smoking (Oh & Kim, 1996a, 1996b). Oh & Kim (1996b) reported that important process of change in smoking cessation were in the order of self-determination, reinforcement man-

Table 5. Differences in Decisional Balances According to Stages of Change (N=157)

	Decisional Balances: Pros					Decisional Balances: Cons				
	N	Mean rank	X2	df	P value	N	Mean rank	X2	df	p value
Maintenance	98	60.11				98	71.15			
Contemplation	22	85.17	26.9	2	0.00	22	80.16	1.56	2	0.45
Precontemplation	27	105.27				27	65.44			

Table 6. Differences in Processes of Change between Contemplation and Precontemplation (N=49)

	Contemplation			Precontemplation			U	p value
	N	Mean rank	Sum of rank	N	Mean rank	Sum of rank		
Stimulus control	22	31.45	692.00	27	19.74	533.00	155.00	0.04
Self determination	22	34.00	748.00	27	17.67	477.00	99.00	0.00
Information management	22	30.82	678.00	27	20.26	547.00	169.00	0.01
Reinforcement management	22	26.05	547.00	27	23.30	629.00	251.00	0.49
Helping relationships	22	28.41	625.00	27	22.22	600.00	222.00	0.13
Dramatic relief	22	30.25	665.50	27	20.72	559.50	181.50	0.02
Cognitive reconstruction	22	24.75	544.50	27	25.20	680.50	291.50	0.91

agement, dramatic relief, cognitive reconstruction, helping relationship, and information management. Present study also revealed that the mean score of the self determination was the highest, which suggests that self determination is the most important change mechanism.

In present study, subjects in the stage of contemplation used stimulus control, self determination, information management and dramatic relief more frequently than those in precontemplation stage. In the study with male college students attending the course, "public health and fitness", Oh & Kim (1997) identified the dramatic relief as an important process of change because it is mainly used in the subjects of both precontemplation and contemplation. Dramatic relief is an expression of one's own experience and emotion on a problem or action. It seems desirable to include the issue reinforcing the dramatic relief in the stage of precontemplation and contemplation in the nursing intervention program for smoking cessation. For example, psychodrama or role playing is recommended in the planning an intervention (Cole, 2001; Prochaska & Goldstein, 1991).

Based on the results of present study, further studies are needed to understand the behavior of smoking cessation of patients with coronary artery disease. These include the study to identify causal relationship between decisional balances and process of change in smoking cessation, and study to reinforce the feedback on the intervention program of smoking cessation provided by adapting the Transtheoretical Model. Since present study tried to understand the Transtheoretical Model only in part by identifying the decisional balances and process of change according to the stages of change, comprehensive study is needed to verify the Transtheoretical Model for the smoking cessation of coronary artery disease patients by including factors such as self efficacy and temptation.

CONCLUSIONS

Present study was performed to describe the differences in decisional balances and process of change according to the stages of change in smoking cessation in patients with coronary artery diseases. 157 subjects enrolled in this study; they had a history of smoking and were diagnosed with coronary artery diseases. Data were collected through self-questionnaire. In the data analysis, percentage, mean value and standard deviation were calculated in the process of change, decisional bal-

ances and process of change. Decisional balances and process of change were analyzed using Kruskal-Wallis test and Mann-Whitney test.

45.2% of subjects had myocardial infarction, and 54.8% had angina pectoris. 62% were in the stage of maintenance. The mean score of positive decisional balance toward smoking was 31.07, while the mean score of negative decisional balance toward smoking was 32.52. The mean scores of all the seven processes of change showed high; the mean scores of self determination, information management, dramatic relief and cognitive reconstruction were especially high. In the positive decisional balance toward smoking, the mean rank in precontemplation showed to be higher with statistical significance, while there was no statistically significance difference in the negative decisional balance. In addition, in the stage of contemplation, processes of change such as stimulus control, self determination, information management, and dramatic relief showed to be higher with statistical significance than in the stage of precontemplation.

Based on the results of this study, further studies are suggested;

- 1) Studies are required to examine the causal relationship between decisional balances and process of change.
- 2) Studies are required to verify the Transtheoretical Model comprehensively, including factors such as self-efficacy and temptation.
- 3) Development of intervention is required that can reinforce the feedback on the intervention of smoking cessation based on Transtheoretical Model.
- 4) Since smoking cessation is a slow action requiring long-term period, longitudinal studies are necessary to understand continuous process of change on this.

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