

A Medicinal Herbal Tea Increases Success Rate and Reduces Withdrawal Symptoms of Smoking Cessation in Men

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Abstract

The efficacy of a medicinal herb tea (MHT) for assisting smoking cessation and for reducing withdrawal symptoms was evaluated by a placebo controlled subjective test in 100 male smokers. The MHT group experienced less craving for the taste of tobacco, and was more successful at quitting smoking. Among the subjects continuing to the final stage, 23 subjects (38.3%) who took the MHT and 2 subjects (10.0%) who took the placebo tea succeeded in quitting smoking. In the group taking MHT, urinary cotinine concentration increased during the first 2 weeks and then greatly decreased from weeks 2 to 4. The urinary cotinine concentration in the MHT group at week 0 was 38.6 mol/L but decreased to 24.5 mol/L by the end of week 4. MHT also reduced withdrawal symptoms, a frequent reason for failure in reducing or quitting smoking. The effects of the herbal tea on smoking cessation and withdrawal symptoms may be attributed to increased metabolism of nicotine and other effects of unidentified components of the herbal ingredients.

Key words: smoking cessation, medicinal herb tea, cotinine, withdrawal symptoms

INTRODUCTION

The deleterious health effect of smoking is severe and extensive, causing impaired lung capacity, lung cancer, phlegm, cough, difficulty in breathing, bronchial trouble and vesicular emphysema (1,2). Smoking is also associated with increased risk for various kinds of heart disease and impairs the effectiveness of drugs used for treating heart disease (3,4). Smoking could be described as nicotine poisoning. According to the Orleans' report (5), the typical smoker attempts to quit 3.8 times per a year. Most smokers who desire to quit smoking fail to do so because they lack an effective method to quit smoking or to overcome withdrawal symptoms.

The withdrawal symptoms from chronic nicotine poisoning can be divided into physical and mental symptoms. The physical symptoms include phlegm, itch, vomiting, headache, constipation, diarrhea and loss of appetite. The mental symptoms are restless, uneasiness, insomnia, impaired concentration, amnesia, difficulty of time recognition and cigarette cravings (6). The diagnostic and statistical manual (DSM-IV) of the American Psychiatric Association (7) identified eight signs and symptoms that are indicators of nicotine-withdrawal symptoms. These include anxiety, difficulty concentrating,

restlessness, decreased heart rate, increased appetite or weight gain, irritability, frustration or anger, insomnia, and dysphoric or depressed mood. The withdrawal symptoms are not directly related to the amount of smoking. After quitting smoking, the withdrawal symptoms are most serious for the first 2~4 days, especially in the evening, and may last up to 3~4 weeks (8). It is essential to overcome these withdrawal symptoms to successfully quit smoking (9).

Nicotine is the major addictive component of tobacco, and is known to be the major cause of withdrawal symptoms (10,11). Mansvelter and McGehee (12) explained the cause and effect of nicotine addiction at the cellular level. Nicotine addiction starts with an interaction of nicotine with nicotinic acetylcholine receptors. The interaction leads to activation of the reward centers in the central nerve system, including the mesoaccumbens dopaminergic system, which ultimately leads to behavioral reinforcement and addiction (13). Nicotine-replacement therapies such as nicotine gum replacement (14), nicotine patch (15), and nasal spray (16) have reduced tobacco withdrawal symptoms. Another method for decreasing withdrawal symptom is to block dopamine release into the nucleus acumens with antagonists such as bupropion (17) and lobeline (18).

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Many herbal medicines with a long history of use for food and medicinal purposes have not been fully investigated for their effects on quitting smoking. In a previous study (19), medicinal herbs having well-characterized physiological activity were chosen and used to prepare a medicinal herb tea (MHT). The objective of this study was to evaluate the efficacy of the herbal medicinal tea on quitting smoking and reducing withdrawal symptoms in a human clinical trial.

MATERIALS AND METHODS

Materials

(-)-Nicotine, (-)-cotinine, barbituric acid and sodium acetate were purchased from Sigma Chemicals (Mo, USA). Chloramine T and sodium metabisulfite were purchased from Aldrich Chemicals (Mo, USA). NOSMOKING (Nosmo Co. Ltd., Korea), manufactured based on the former report (19), was used as the medicinal herb tea (MHT). A blend of *Glycyrrhiza uralensis* Fisch and *Liriope platyphylla* Wang et Tang (1:4) was used as a placebo tea.

Subjects and sample preparation

A total of 100 healthy male smokers were recruited from schools, governments and companies as volunteers. The subjects were divided into two groups. One group of 80 male smokers took the MHT, while the other 20 male smokers took the placebo tea. Each subject took 3.5 gram of the MHT or placebo tea with 200 mL warm water three times per a day. Prior to the beginning of this study, subjects were questioned about smoking habits with a Fargerstrom questionnaire sheet and tested for basal levels of craving, perceived cigarette taste and withdrawal symptoms. Urine analysis and interviews were conducted once a week. Success or failure of quitting smoking was confirmed by survey data and cotinine content of urine.

Evaluation of craving, cigarette tasting, withdrawal symptoms

Craving of cigarette taste was assessed using a Likert scale of 1 (very definitely not) to 5 (very definitely). The effects of MHT were evaluated by subtracting the value of week 1 value from the value of week 2. Negative and positive scores indicated decreasing and increasing effects, respectively for craving and perceived cigarette taste.

Quantitative analysis of cotinine

Urinary cotinine concentrations were measured to evaluate daily cigarette consumption by a slightly modified method of Barlow et al. (20). The reaction mixture contained 1,000 μ L of sample or standard, 500 μ L 4 M sodium

acetate buffer (pH4.7), 200 μ L 1.5M KCN, 200 μ L 0.4M chloramine T and 1,000 μ L 78mM barbituric acid (in 50% acetonitrile), which were sequentially added and mixed well for 10 seconds. The mixture was reacted for 15 min at room temperature and then stopped by adding 200 μ L 1M sodium metabisulfite. The absorbance of the reacted sample was measured at 490 nm and the amount of cotinine was determined from a standard curve obtained from pure cotinine.

Evaluation of withdrawal symptoms

Withdrawal symptoms were most intense during the first 7 days after quitting smoking (15). However, in our study, all the subjects were not highly motivated to quit smoking, and the beginning time was different among the subjects depending on their own willpower. Withdrawal symptoms were assessed with a total withdrawal scale (TWS), which was designed for this study and consisted of 5 items (difficulty concentrating, restlessness, increased appetite, insomnia, and depressed mood) which were scored on a Likert scale of 1 (very definitely not) to 5 (very definitely). The sum of total score ranged from 5 to 25. Higher scores indicated more severe withdrawal symptoms.

Statistics

All data were expressed as means \pm standard deviation. The significance of the effect of MHT was analyzed by SPSSPC. Individual differences were evaluated by a paired t-test and one way ANOVA.

RESULTS AND DISCUSSION

Subjects

The average subject was 40 years old, smoked 20 cigarettes per a day, and had been smoking for 12 years. More than 40% of the subjects scored higher than 6 points on the Fargerstrom scale (21), indicating serious nicotine poisoning. The subjects had previously tried to quit smoking an average of 0.9 times. Background characteristics of the two groups, using the medicinal herb tea (MHT) or placebo, were compared by Student's t-test. As shown in Table 1, these groups did not differ significantly for any of the characteristics. During experiments, 20 subjects who took the MHT, and 3 subjects who took the placebo tea were excluded in the middle of the study because of non-compliance with tea use.

Effect of medicinal herb tea (MHT) on the smoking behaviors

Fig. 1 shows changes in the intensity of cigarette cravings after 4 weeks. Craving in the MHT-treated group was significantly decreased, but increased in the placebo

Table 1. Subject characteristics

Characteristics	MHT ¹⁾ (n=80)	Placebo (n=20)	Difference
Mean age (\pm SD ²⁾)	39.71 \pm 9.7	40.25 \pm 10.2	NS ³⁾
Mean years of smoking (\pm SD)	11.5 \pm 7.9	13.7 \pm 8.6	NS
Mean cigarettes smoked per day (\pm SD)	20.3 \pm 7.4	19.7 \pm 4.8	NS
Previous attempts at quitting smoking for longer than 1 week	0.9	0.9	NS
FTQS ⁴⁾	4.9	4.8	NS
Fagerstrom Score \geq 6 (%)	35 (43.8)	8 (40.0)	NS

¹⁾Medicinal herb tea.

²⁾Standard deviation.

³⁾NS (non significant; $p < 0.05$).

⁴⁾Fagerstrom tolerance questionnaire score.

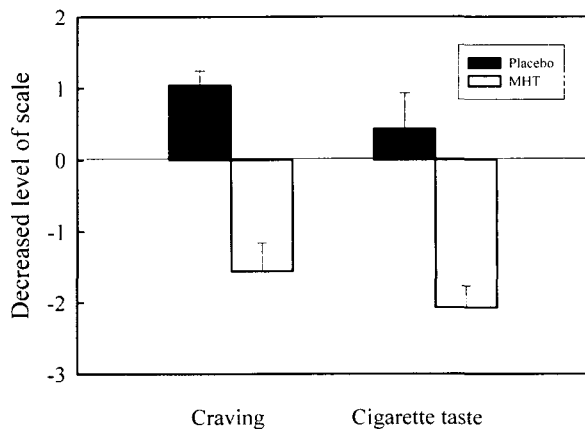


Fig. 1. Changes in craving and taste preference for cigarettes after 4 weeks of treatment with medicinal herb tea (MHT) or placebo tea.

group ($p < 0.10$). The figure also shows that subjects taking the MHT had a change in how they perceived the taste of cigarettes, a change that may play a great role in diminishing the craving ($p < 0.10$). After the subjects took the MHT for 4 weeks, they were questioned about their success in quitting smoking, and the data were analyzed by the paired t-test method. The number of cigarettes smoked per a day in MHT-taking group was significantly reduced to approximately half ($p < 0.01$) (Fig. 2), but it was only slightly decreased in placebo group. Among the subjects continuing to the final stage of the study, 23 subjects (38.3%) who took the MHT and 2 subjects (10.0%) who took the placebo tea succeeded in quitting smoking. Therefore, subjects using the MHT were almost four times more likely to quit smoking than those using the placebo. The results indicate that the chances of success of quitting smoking were greatly improved by drinking the MHT.

Changes in urinary cotinine after taking the medicinal herb tea (MHT)

The amount of cotinine excreted in urine increased during the first 2 weeks in the MHT group (Fig. 3). The initial increase in cotinine excretion in urine is believed

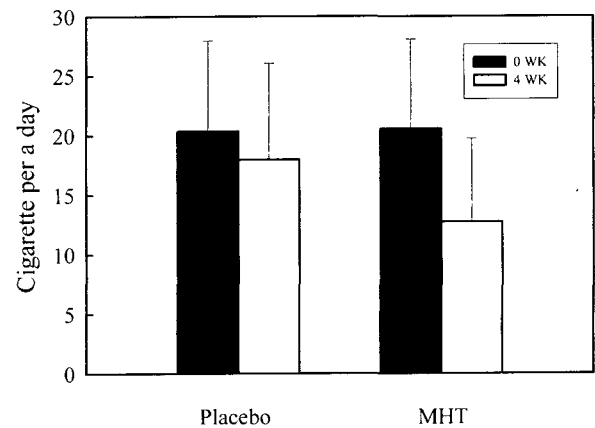


Fig. 2. Changes in mean number of cigarettes smoked per a day by subjects.

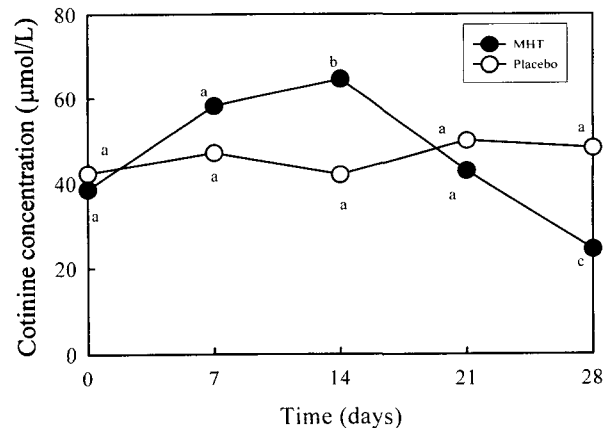


Fig. 3. Urinary concentration of cotinine excreted by subjects taking the medicinal herb tea (MHT) or placebo tea. Different subscripts indicate significantly different cotinine concentrations by a paired t-test ($p < 0.05$).

to be due to the increase in the elimination of nicotine from the body. It may also be related to the accelerated conversion of nicotine to cotinine by the MHT. This result agrees with the previous report (19) using PLC/PFR5 human liver cells. In that experiment MHT showed a 1.24 value for high nicotine degradation activity at a 0.3% concentration. In this test, there was almost no change in cotinine concentrations in the placebo group

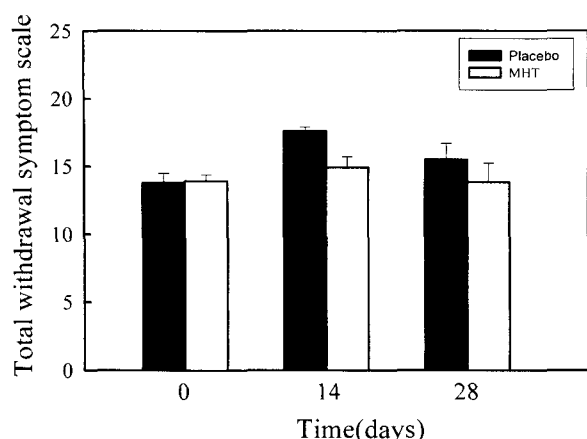


Fig. 4. Effect of MHT on total withdrawal symptom scores during the 4 weeks of the study.

(data not shown), but there was significant increase in the MHT groups during the first 2 weeks ($p < 0.05$) followed by a subsequent substantial decrease in of cotinine excretion during weeks 2 to 4, which may be due to the decreased intake of nicotine after 2 weeks because of the reduced amount of smoking (Fig. 2). The amount of cotinine in the urine was reduced from 38.6 mol/L to 24.5 mol/L after 4 weeks, and was statistically significant by a paired t-test ($p < 0.01$).

Effect of medicinal herb tea (MHT) on withdrawal symptoms

Withdrawal symptoms were evaluated at 3 time points (0, 2, and 4 weeks). Fig. 4 shows the means of the aggregates of withdrawal symptom scores during the testing period. Withdrawal symptoms were more intense (higher score) in the placebo group than in the MHT group. Especially, total withdrawal symptom scale scores between two groups were significantly different at 2 weeks after quitting smoking when urinary cotinine concentrations were highest. These results raise the question: How can the MHT decrease the withdrawal symptom? We can propose two possibilities. First, MHT decreased nicotine concentration faster by accelerating its conversion to cotinine, therefore having a similar effect as nicotine replacement treatments (16). Shiffman and Jarvik (22) also reported that quitting smoking abruptly is a superior method for diminishing withdrawal symptoms to gradual reduction. The second possibility is that MHT may have some alkaloids which can act as an antagonists to nicotine, because it comprises so many unknown components (23). However, further research is needed to determine more definitely what kind of chemical components act as critical effectors that decrease withdrawal symptoms.

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