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Open Access Case Report

Crescent Journal of Medical and Biological Sciences
Vol. 6, No. 1, January 2019, 136–139
eISSN 2148-9696

A Single-Case Experimental Design to Study the Combination of Cognitive-Behavioral Therapy and Pharmacotherapy for Smoking Cessation

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Abstract

Bupropion is an anti-depressant drug which is a category of aminoketones. It is a norepinephrine-dopamine inhibitor, which is considered as a nicotine antagonist and is effective in smoking cessation. The patient was a single 21-year-old girl and she was a student and had been referred to Bijan Addiction Treatment Clinic in Tehran with a complaint of chronic smoking. After a period of abstinence from consumption, she experienced anhedonia syndrome and recurrence of consumption. Data were collected from October to February 2016. We used a reversal (ABAB) design with multiple baselines, in which A was the baseline and B was the intervention phase. The entire course was 12 weeks, during which bupropion was presented. In the baseline A1 and A2, only bupropion was presented, and in B1 and B2 stages, in addition to bupropion, cognitive-behavioral therapy (CBT) was also presented. Cigarette Cravings Index and Heaviness of Smoking Index (HSI) were completed at 24 time points by the subjects. Data were analyzed by semi-parametric test of generalized estimation equation. Data analysis indicated that the addition of CBT to bupropion was associated with a significant reduction in the scores of HSI and Cigarette Cravings Index compared to bupropion alone ($P<0.01$). These findings can reflect the role of complementary psychological interventions in the treatment of addiction and suggest a promising perspective in linking biological and cognitive indices in response to the addiction challenge.

Keywords: Cognitive-behavioral therapy, Bupropion, Smoking cessation

Introduction

A report by the World Health Organization (WHO) indicates that smoking is a risk factor for six of every eight deaths worldwide. Tobacco use is a risk factor for many chronic diseases such as cancer, pulmonary diseases, and cardiovascular diseases, and is one of the greatest preventable causes of premature death worldwide. However, in general, it has been shown that smoking is an ineffective coping strategy which causes undesirable outcomes. Medications such as nicotine replacement therapy (NRT), varenicline, bupropion, cytosine, and behavioral support increase the success rate of smoking cessation (1).

Bupropion (Wellbutrin and Zyban) is a category of aminoketones and is an anti-depressant drug that is effective in smoking cessation (2). On the other hand, studies have shown that bupropion along with cognitive-behavioral therapy is effective in treating smoking (3).

Previous studies have shown that the combination of pharmacotherapy and behavioral interventions increases the likelihood of success in smoking cessation (1). The results of the meta-analysis by Stead et al (4) indicated the effectiveness of the combination of pharmacotherapy and behavioral support.

On the other hand, nicotine dependency and depression have high comorbidity. A possible mechanism is that nicotine reduces neurobiological disorders associated with depression. For example, the activity of corticostriatal circuitry is intensified by nicotine, while this pathway is impaired in people with depression (5).

Studies have shown that avoiding tobacco use reduces the response to non-pharmacological therapies or anhedonia (6). Anhedonia is a tobacco withdrawal syndrome after smoking cessation. The experience of anhedonia is known to be a factor in starting to consume and continue smoking in adults (7). Considering the therapeutic

Received 11 August 2016, **Accepted** 20 January 2017, **Available online** 14 February 2017

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effects of bupropion on depression, as well as the role of cognitive-behavioral therapy in reducing depression and helping to avoid smoking, the complementary role of the two treatments is important and will have clinical implications.

Despite the research evidence, a similar study has not been conducted in Iranian society. Therefore, the present study aimed at assessing the role of supportive cognitive-behavioral therapy (CBT) in the effectiveness of bupropion in smoking cessation.

Case Report

In a single-case experimental study with multiple baselines in the form of a reversal $A_1B_1A_2B_2$ design (TCTR20180329004), between October 2016 and April 2017, a 21-year-old single female student with a complaint of high cigarette smoking was selected using a respondent-driven sampling method (8). After a 3-month period of avoiding consumption, she experienced anhedonia syndrome and recurrence of consumption. We used a reversal $A_1B_1A_2B_2$ design (9), in baseline A_1 (3 sessions) and A_2 (3 sessions) only bupropion was presented, and in B_1 (4 sessions) and B_2 (2 sessions), in addition to bupropion, CBT (weekly sessions of 60 minutes) was presented. The entire period was 12 weeks, throughout which Bupropion treatment was offered. We used 150 mg bupropion (Wellbutrin Extended-release, Abidi Pharmaceutical Company, Tehran, Iran) twice a day (once in the first 3 days) for 12 weeks. The basics of CBT treatment were presented in the main topics of the dangers of smoking, craving, coping strategies, the difficulties and benefits of treatment and relapse prevention. The Cigarette Craving Index was considered as primary outcome and the Heaviness of Smoking Index (HSI) as secondary outcome which were completed twice a week at 24 time points by the subject and the data were analyzed by semi-parametric test of generalized estimation equation (10) (IBM Corp., Armonk, NY, USA).

Distribution of the scores of Craving Index is presented in Figure 1. The average craving score for each session at the first baseline phase is 13.3. This amount decreased to 6.75 in the first intervention phase. In the second baseline phase, the craving scores increased to 11.3. In the second intervention phase, the score dropped to 3.5. The difference between baseline and intervention scores was significant based on the results of the generalized estimation equation ($P<0.01$). Moreover, the difference in HSI between the baseline and the intervention was significant ($P<0.01$, Figure 2). Addition of CBT to bupropion has been associated with a significant reduction in craving compared to bupropion treatment alone.

Discussion

The results of this study showed that adding CBT to bupropion was associated with a reduction in the scores of the heaviness of smoking and smoking craving. These findings support previous studies in the general population. Along with our results, the study by Loreto et al (3) showed that the addition of CBT to bupropion and nicotine patch has been associated with a reduction in

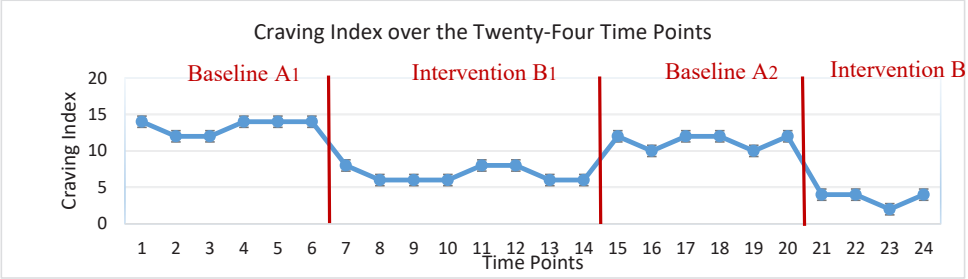

Figure 1. Distribution of Craving Index in 24 Assessment Stages During 12 Weeks

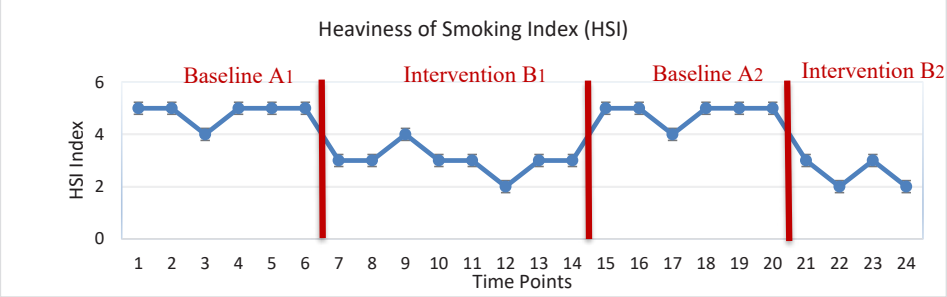

Figure 2. Distribution of HSI in 24 Assessment Stages During 12 Weeks.

the heaviness of smoking rate and the success of treatment in females. In addition, a systematic study by Stead et al (11), including 53 studies with a total of more than 25 000 participants, showed that the combination of drug therapy and behavioral support increases the overall success of smoking cessation compared to the normal cares. On the other hand, the study by Jiang et al (12) showed that the addition of bupropion to counselling was accompanied by a significant reduction in smoking compared to counselling alone.

On the other hand, the results of the study by Laude et al (13) showed that although the addition of CBT to bupropion is beneficial, prolonging CBT from 26 to 48 weeks cannot improve the long-term avoidance of smoking.

The findings of the study by Stead and Lancaster (1) also showed that the combination of pharmacotherapy and behavioral interventions increases the likelihood of success in smoking cessation. Moreover, the results of the meta-analysis by Stead et al (4) indicated the effectiveness of the combination of pharmacotherapy and behavioral support.

The results of the study by Hall et al (14) showed that the use of CBT can lead to high abstinence rate in both women and men. However, contrary to our findings, the addition of NRT did not improve the effectiveness of CBT.

The results of Killen et al (15) show that the use of CBT for 20 weeks can promote long-term smoking abstinence.

Contrary to our findings, the results of the study by Chung et al (16) indicate that the addition of a special counseling session did not have any benefits beyond routine treatment during 12 or 24 weeks of follow-up.

Studies have shown that bupropion is effective in reducing smoking as it has anti-depressant effects. There are at least three reasons for the effectiveness of antidepressant drugs in smoking cessation. First, the nicotine withdrawal may develop courses of major depression, and antidepressants can prevent the appearance of these syndromes. Second, nicotine may have anti-depressant effects that maintain smoking, and antidepressant drugs may replace these effects. Third, some antidepressant drugs may affect certain neurological pathways (such as inhibition of monoamine oxidase) or receptors (such as blocking nicotinic cholinergic receptors) underlying addiction (17).

These results indicate the role of psychological indices in the continuation of smoking, and the improvement of these indices can be an effective supplement for drug interventions in smoking cessation. These results can reflect the role of complementary psychological interventions in the treatment of addiction and provide a promising perspective on the linkage of biologic and psychological indices in response to the addiction challenge.

The findings of this study showed that the addition of CBT to bupropion was associated with a significant reduction in the scores of HSI and Cigarette Craving Index compared to bupropion alone. These findings indicate the role of psychotherapy along with drug interventions in avoiding smoking and can provide a promising perspective on linking biological and cognitive indices in response to the addiction challenge.

Conflict of Interests

None declared.

Ethical Issues

All stages of the study were based on the latest version of the Declaration of Helsinki, and written consent was obtained from the patient.

Financial Support

None.

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