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Effectiveness of attentional bias modification and cognitive behavioral therapy on the reduction of pain intensity in patients with chronic pain

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ABSTRACT

The aim of the study was to determine the effectiveness of Attentional Bias Modification (ABM) and Cognitive Behavioral Therapy (CBT) on the reduction of pain intensityin patients with chronic pain. This study was a quasi-experimental pretest-posttest design with control group. All patients who referred to physiotherapy clinics for pain during 2015 were participated in the study. They completed the Brief Pain Inventory-short form (BPI-SF) for assessing severity of pain. Attentional bias was evaluated using computerized Dot-Probe task. The patients with chronic pain were screened by diagnostic criteria of DSM-V; neurologic diagnosis, and interview. 36 people were selected and randomly divided to three groups computer-based ABM, CBT, and control (12 cases in each group). Group A was trained in 8 sessions-each 15 minutes with the modified computerized Dot-Probe task for attentional bias modification. Group B was trained in 11 sessions-each 45 minutes with CBT program of Turk and Ferry for the chronic pain treatment. And Placebo program was administered for group C in which they completed 8 classic Dot-Probe sessions. In the end, for the posttest (T2) the participants were tested to identify the changes in biased attention to the emotional stimuli using classing Dot-Probe tasks, and BPI questionnaire to evaluate the changes of severity of pain. Data were analyzed using one-way variance analysis(ANOVA). On the BPI-SF, CBT more reduced the pain intensitythan computer-based ABM.In addition ABM treatment is more effective in reduction of attentional bias.Both of treatments are effective but CBT is more effective than ABM in reduction of pain intensity.

Key words: Attentional Bias Modification, Cognitive- Behavioral Therapy, Chronic Pain

INTRODUCTION

Attentional bias modification (ABM) and cognitive behavioral therapy (CBT) are used in treatment of pain. Recently researches have been revealed the role of ABM in improving clinically relevant outcomes in chronic pain. ABM is a new treatment for acute and chronic pain disorders [1]. Patients with chronic pain have comorbid anxiety and depressive symptoms and ABM is effective in these psychiatric symptoms [2]. Dehghani, Sharpe, and Nicholas (2004) indicated thatABM sessions are a modified version of the visual-probe task implicitly training attention away from pain-related stimuli towards neutral stimuli. A variety of pictorial pain-related stimulus was presented at two

presentation times in ABM sessions. A standard version of the visual-probe task is used to assess changes in bias [3].Schoth, Georgallis, & Liossi (2013) reported statistically and clinically significant change in pre- to post-ABM in pain intensity, anxiety, depression and pain interference [4].

Impact of cognitive behavioral therapy (CBT) has shown in previous studies. The CBT focuses on acquisition of pain coping skills, with particular emphasis on identifying and modifying distorted or inaccurate thoughts that may influence chronic pain and pain behavior. Inaccurate cognitions and ineffective pain coping behaviors may interact with biological factors and social/environmental consequences to produce negative outcomes, including increases in pain intensity, affective distress, pain -related disability, and health care resource utilization [5-6]. The CBT is a first-line psychosocial treatment for patients with chronic pain [7]. Vakili, Neshat Dost, Asghari, et al (2009) revealed that cognitive- behavioral pain management therapy was effective in reducing depression in women patients with chronic low back pain [8]. Golchin, Janbozorgi, and Alipour (2011) reported that CBT scores of females with chronic back pain significantly decreased in maladaptive coping and back pain, compared with control group also, scores of them significantly increases in adaptive coping [9]. RahimianBoogar (2011) showed effect of group CBT on improving the multidimensional pain symptoms of the patients with chronic low back pain[10].Sajjadian, TaherNeshatdoost, Molavi, et al (2012) reported that CBT showed significant improvements in functioning pain symptoms and catastrophizing in women with chronic low back pain [11].

The aim of the present study was to comparethe effectiveness of ABM and CBT on the reduction of pain intensityin patients with chronic pain in Iran. Question research of the study is following: Is CBT more effective than ABM in reduction of pain intensityin patients with chronic pain? By responding to the question, the study will provide evidence that CBT will be an effective treatment for chronic pain compare to ABM.

MATHERIALS AND MATHODS

This study was a quasi-experimental pretest-posttest design with control group. All patients who referred to physiotherapy and pain clinicsfromKhoramabad city of Iran in 2015 were participated in the study. They completed the Brief Pain Inventory-short form (BPI-SF) for assessing severity of pain, and attentional bias was evaluated using computerized classic Dot-Probe task was made by MacLeod before and after interventions [12].

The information sheet asked for some demographic and clinical variables. The Brief Pain Inventory-short form (BPI-SF) isto assess the severity of pain and the impact of pain on daily functions. The BPI used for patients with pain from chronic diseases or conditions such as cancer, osteoarthritis and low back pain, or with pain from acute conditions such as postoperative pain. Assessment areas of the BPI are severity of pain, impact of pain on daily function, location of pain, pain medications and amount of pain relief in the past 24 hours or the past week. It is an 11 items self-administered questionnaire, self-report or interview and available in two formats: the BPI short form, which is used for clinical trials and is the version used for the foreign-language translations; and the BPI long form, which contains additional descriptive items that may be clinically useful (for example, items that expand the possible descriptors of pain, such as burning, tingling, etc.). Respondent responded to both behavioral and pharmacological pain interventions [13]. The patient is asked to rate their worst, least, average, and current pain intensity, list current treatments and their perceived effectiveness, and rate the degree that pain interferes with general activity, mood, walking ability, normal work, relations with other persons, sleep, and enjoyment of life on a 10 point scale [14]. The BPI-SF is a modification of the Brief Pain Inventory-Long Form, which includes additional questions on demographics (date of birth, marital status, education, employment), pain history, aggravating and easing factors, treatment and medication, pain quality, and response to treatment. The brevity of the BPI-SF makes it suitable for settings in which pain is assessed on a daily basis (e.g. in a randomized control trial), whereas the long-form may be more appropriate as a baseline measure. Time required is five minutes (short form), and 10 minutes (long form). No scoring algorithm, but "worst pain" or the arithmetic mean of the four severity items can be used as measures of pain severity; the arithmetic mean of the seven interference items can be used as a measure of pain interference. Cronbach alpha reliability of the BPI ranges from 0.77 to 0.91 [15-16]. In study of Vakilzadeh, and Nakhaee, internal constancy of the BPI by Cronbach alpha was 0.87; and it had good validity [17].

The patients with chronic pain were screened by diagnostic criteria of DSM-V; neurologic diagnosis, and interview. 42 patients were selected from 110 patients. They randomly divided to three groups computer-based ABM, CBT, and control (14 cases in each group). 6 patients did not continue the treatments (2 patients from each group). Finally 36 patients remained in the study, 12 cases in each group. Computer-based ABM group were trained in 8 sessions 30

minutes including offering 50 pairs images of related/ neutral emotional stimuli and each pair stimuli presented randomly in 4 different modes (each participant answered to a total of 200 trials in each session). The CBT program of Turk and Ferry for the treatment of chronic pain was used in 11 sessions-each 45 minutes. The CBT included two parts (education and household assignment) with key components of cognitive restructuring (learning to recognize of cognitive errors and change of negative useless thoughts associated with pain to more positive coping thoughts) relaxation training (breathing, visual imagery, progressive muscle relaxation); time table activities (learning how to become more active without doing too much of it); and providing homework to reduce avoidance of activity and re-introduce more active and healthy lifestyle. Detailed description of the CBT sessions were including introduction of chronic pain and pain cycle, models of pain (gate control theory), factors influencing pain, anxiety and its role in pain, activity: breathing techniques for relaxation, stress and relaxation, the benefits, how and when to use relaxation (progressive muscle relaxation),visualization, relaxation technique, use tape at home; goal setting, exercise to quotas not to pain, pacing of activities, activity-rest cycle, automatic thoughts and pain- cognitive illusions-ABC model, explore thoughts and beliefs about pain influence of thoughts and beliefs on behavior rationalizing: fears about pain, rest and inactivity; cognitive restructuring; stress management; maintain exercise activity, problem solving, dealing with setbacks, and relapse prevention. Control group (Placebo) assigned by computer to the condition of Attention control condition (ACC) by the classic Dot-Probe task which used in assess phase. Control group directed their attention away (without specific instruction to direct their attention away from the threat pictorial pain-related stimulus) in order to detect the probe. The ACC was identical to the AMP condition except that for trials with one neutral word and one threat pictorial pain-related stimulus, the probe appeared with equal frequency in the position of the threat and neutral stimulus. In other stimulus , participants were not implicitly more likely to direct their attention away from the threat stimulus in order to detect the probe.

Ethical considerations were considered. The purpose of the study was explained to patients and they completed consent letters. Data were analyzed throughdescriptive statistics, one-way variance analysis (ANOVA), and Tukey test using SPSS/WIN 21.0 program.

RESULTS

Findings showed that mean age of patients was 41.36, (SD=18.3). The patients more often had higher diploma, average economic level, had recruitment, and history of pain was higher 3 months. All patients took drug.

For determination of normality of the data, Kolmogorov-Smirnov test was used. As for the normality distribution of data, parametric statistical tests were used to analyze the data. For equality of variances, Levene's test was used. According to the prerequisites of independent random samples, normality distribution of data and equality of variances, and One-Way ANOVA, and post-hoc test (Tukey) was used to analyze the data. Figure 1 shows comparison of varieties of severity of pain in three groups of ABM, CBT and control.

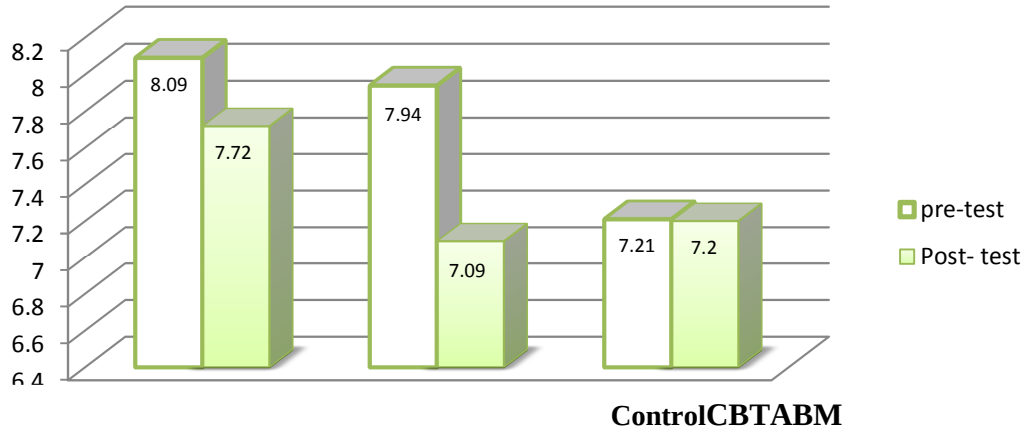

Figure 1- Comparison of varieties of pain in three groups of ABM, CBT and control

Findings showed that there were significant differences between severity of pain(F=7.36, df=35, p<.000) (See Table 1).

Table 1- One-Way ANOVA effects of ABM and CBT on the Brief Pain Inventory (BPI)

Source	Df	Mean Square	F	P
Brief Pain Inventory (BPI)				
Between Groups	2	25.17	7.36	.0001
Within Groups	33	47.0		
Total	35			

On the BPI, there was a significant difference between ABM and CBT at the 0.05 level (See Table 2).

Table 2- Post Hoc test (Tukey) for determination mean differenceof severity of pain

Groups	CBT	Control
ABM	*1.53 **0.001	*0.83 **0.015
Control	*2.36 **0.001	* Mean difference ** Significant level

DISCUSSION

The findings of the present research showed that there was a significant difference between severity of pain scores in pre-test and post-test in both groups of ABM and CBT; and the control group obtained significantly higher scores in severity of pain scores than two experimental groups. The CBT more reduced severity of pain scores in post-test than ABM. Many studies have shown that CBT reduced severity of pain. Our findings are similar to results of other studies [9-10, 18-27].

The CBT by influencing biopsychosocial components involving to chronic pain, and changing counterproductive cognitions decrease low back pain and using maladaptive coping strategies and increase using adaptive coping strategies [9]. The CBT for chronic pain identifies the effect of bio-psychosocial factors by incorporating the whole range of factors which generate and maintain the pain, into treatment plan [11]. Effect of CBT on the reduction of severity of pain can justify by training for closing the gate that causes more stopping of transfer pain messages to brain and reduction of pain.Relaxation techniques (abdominal breathing, progressive muscle relaxation, visualization imaging), introduce automatic thoughts and cognitive restructuring,planning of pleasant activities as well as training of timetablecauses to make appropriate activities, and a balance between work, entertainment, recreation and finally reduction in pain intensity.

The present study had some limitations including no follow-up phase, and high costly and difficulty in extraction of Persiansoftware protocols of Dot-Probe taskand its construct by software engineers.

The following suggestions are offered for future researches: Using long-term follow-up to investigate the stability of the results; replication of attention bias modification; to investigate the interventional role of reinforcement and punishmentalong with ABM; to study of different neurotransmitters, especially dopamine in an ABM with reinforcement and punishment and comparison of the release of dopamine in the face of pain-related stimuli before and after this intervention; using CBT and ABM eclectic methodsin order to more effective and reliable effectiveness.It is important to note that the findings of this study are based only on Iranian and Muslim patients with chronic pain. The results need to be generalized to other cultures before reliable conclusions can be drawn. So, the generalizability of the present findings to other patients with different types of pain merits further investigation.

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