The Effectiveness of MBSR Intervention in Alleviating Pain During Detoxification among Substance Abusers: An Experimental Study

Mojgan Hosseini

ABSTRACT
To examine the effectiveness of a 7-weeks neurofeedback training programme to improve increased range of alpha band and abnormal anxiety in patients with panic disorder. Randomized controlled trial, conducted at a psychiatric clinic in Iranian Population. Participants were randomly assigned to a neurofeedback training (n = 10) and a control group (n = 8). The neurofeedback group received a 20-session training to improve abnormal anxiety, but the control group received only routine care with no neurofeedback. Using a two-way ANOVA, the changes in mean abnormal anxiety were significantly higher in the neurofeedback group than in the control group. Furthermore, the changes in mean increased range of alpha band were significantly higher in the neurofeedback group than in the control group. An intervention involving neurofeedback significantly improved abnormal anxiety in crowded places and public places.

Key Words: Mindfulness, Perceived Pain, Substance Abusers, Detoxification

Introduction
Addiction is a complex and multifactorial phenomenon and has been studied from various biological, psychological, cultural/social and spiritual perspectives and has a high prevalence in society, especially among youth, as one of the social problems, which this could lead to various harmful social and health problems, such as damage to individual economic context, increased violence, the risk of increased AIDS, delinquency, unemployment, increased mental disorders and thoughts, and suicide (Reed et al., 2009). United Nation Office for Drug Control (2005) estimated the number of existing drug users equal to 200 million people, 5 percent of the world's total population, among the population aged 15-64 around the world, which 15 million of these people, 4% of the population, are opiate consumers and 11 million heroin users. Pain is the most common mental pressure that humans encounter with it. The pain experience consists of two dimensions, sensory and emotional. The dimension sensory pain represents the intensity of pain, and the dimension emotional pain is the amount of unhappiness a person from experiencing pain (Abdolgadery et al., 2014). American Pain Society described the term pain as a sensory and emotional experience and has defined the fifth crucial factor and believes that if the pain is checked, quantitatively and qualitatively, with the seriousness that other symptoms are controlled, it will help the treatment team during therapeutic and non-pharmacological treatments (Esmaeili et al., 2008). Over the years, physicians have been
using widespread methods to relieve pain. Today, psychological methods are also used both individually and in combination with medical methods (Pampallona et al., 2004).

Mindfulness-based stress reduction (MBSR) treatment was first developed by Jon Kabat-Zinn et al., (1979). This type of treatment is usually taught in 8-week group courses to heal physical and psychological disorders (Javedani et al., 2017). The components of mindfulness include the ability to adjust attention, focus on the immediate experience in the present, and the knowledge of the experience and attitude of accepting or non-judgmental about experience (Commons and Adhikari, 2016). The purpose of mindfulness therapies, including MBSR, is to reduce the avoidance of negative experiences (Davis and Hayes, 2011). Previous studies show that this stress reduction technique successfully affects mood and cardiovascular disorders (Zeidan et al., 2010), managing diabetes (Whitebird et al., 2009; Rosenzweig et al., 2007), controlling chronic diseases (Merkes, 2010), controlling chronic pains (Morone et al., 2008), treatment of anxiety and depression (Joo et al., 2010; Evans, 2010; Hofmann et al., 2010) and controlling severe headaches (Sun et al., 2002). It can also increase psychosocial compatibility and compliance among cancer patients (Ledesma and Kumano, 2009; Matchim et al., 2010).

The results of various studies on substance abuse show that if the training of prevention methods is combined with mindfulness, it can have relatively successful effects on the judgment and intimidation of injecting drug users (Trelloar, Laybutt, and Carruthers, 2010), reduces the negative effects of temptation (Edward, 2010), affects the substance abuse by combining with spirituality (Leigh, Bowen & Marlatt, 2005), reduces the likelihood of recurrence (Breslin, Zack & McMain, 2002), improves the sleep situation of addicts (Britton et al., 2010), reduces the amount of substance abuse, anxiety and social dysfunction in addicts (Dabbagh et al., 2008), overcomes the temptation to consume (Garland, 2011; Fernandez et al., 2010), reduces the stress (Brewer et al., 2009) and be effective in treating the addict by more control on the visual clues of alcohol consumption (Garland et al., 2010). All in all, evidence concerning direct relationships between MBSR therapy and perceived pain is weak.

The purpose of our experimental intervention study is to test the effects of a MBSR therapy program on perceived pain for substance abusers during detoxification. As an indicator of perceived pain, we used the variables pain affective, pain sensory and pain evaluative (Ngamkham et al., 2012; Melzack, 2005). Furthermore, we included perceived reduction of stress as an important stress-related outcome variable (Cohen et al., 1983).

Detoxification is expected to lead to an increase of affective pain, sensory pain and evaluative pain in the control group. MBSR is thought to prevent such an increase. While the control group should show an increase in affective pain, sensory pain and evaluative pain, the MBSR group should not, due to the intervention. The main research question is that: Does a MBSR therapy program protect substance abusers from an increase of affective pain, sensory pain and evaluative pain at detoxification? Furthermore, MBSR is expected to have a positive impact on perceived reduction of stress.

Methods
Study design and subjects
An experimental, non-longitudinal and field clinical study was conducted at Hazratte Rsoul Hospital. As primary outcome in this study, we measured the level of adherence of the patient to the treatment process by morphine test. A sample of 31 male patients who were detoxifying per each group (MBSR and control) was required to detect 5% difference in morphine test score between MBSR and control group at 90% statistical power and at 1% significant level. Participants were requited over a period of 5 months from April to September, 2016.

We invited all eligible male patients who were detoxifying attending outpatient and inpatient settings to participate in this study. We fully informed the study conditions to the legal guardians of the participants, and they signed the study consent form. The inclusion criteria were: aged 20-45 years old, having a minimum level of education (diploma). Detoxification phase of addiction withdrawal, regularly visited the clinic for at least 1 month. The exclusion criteria were: positive urine test report during the course of treatment, use of complementary pharmaceutical and psychological therapies, and missing more than one session during treatment sessions. The participants were recruited and randomly allocated to either the MBSR group (n = 26) or the control group (n = 27). Participants in the MBSR group received a 4-week MBSR therapy program,
3 sessions per week and 50 minutes per session. Patients in the control group received a usual care. We also face-to-face interviewed at baseline visit and followed the participants twice by face and phone during 8 months (the first follow-up after 4 months and the second after 8 months). Figure 1 showed an overview of the study.

Perceived reduction of stress was evaluated using the Perceived Stress Scale (PSS-14). PSS-14 was developed and validated by Cohen et al. (1983) to assess general perceived stress in a past month, thoughts and feelings about stressful events, and controlling compromise and coping with experienced stress. It also examines the risk factors for behavioral disorders and shows the process of stressful relationships. The scale is comprised of 14 items that cover the concepts mentioned (Andreou et al., 2011). Cohen et al., (1983) obtained Cronbach’s alpha coefficients, 84-85%, in three studies. The questionnaire ranged from zero (never) to 4 (most of the time). The items 4, 5, 6, 7, 9, 10 and 13 ranged in reverse (from 4, never, to zero, most of the time). The lowest score is zero and the highest score is 56, so a higher score indicates more perceived stress.

Table 1. Overview of the purpose and objectives of the MBSR therapy program

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Purpose/Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Interview</td>
</tr>
<tr>
<td>2</td>
<td>Meet the members of the group</td>
</tr>
</tbody>
</table>
| 3        | 1) The definition of the educational-therapeutic program process and its goals for the addicts participated in the therapy program  
2) Reaffirming mutual obligations in the program  
3) Pretest |
| 4        | Conceptualization about the philosophy of mindfulness and the automatic guidance system  
1) Familiarity with breath mindfulness meditation technique  
2) Meditation of body scan  
3) Feedback and its effectiveness  
4) The technique of checking tone |
| 5        | The relax education, breathing and meditation exercises in sitting  
1) Generalization of the skills to daily life  
2) Review of the respiratory mindfulness  
3) Non-judgmental seeing and hearing exercise |
| 6        | 1) Practicing awareness of breathing and thoughts  
2) Practicing mindfulness walking |
| 7        | 1) Three-minute respiratory space exercise  
2) Assessing the effect of events on physical thoughts and feelings |
| 8        | Conceptualization of a conscious yoga |
| 9        | 1) Use of the lessons  
2) Summing up the sessions  
3) Question and answer about the possible ambiguities in the treatment process |
| 10       | 1) Running the post-test  
2) Leaving the group  
3) Determination of periodic meetings with the experimental group to provide the post-test results |

Outcome measures

The variables affective pain, sensory pain and evaluative pain was assessed by McGill pain questionnaire. McGill pain questionnaire is the most reliable pain measurement tool, especially chronic and resistant pain. Empirical evidence supported the reliability and validity of the questionnaire (Melzack, 2005; Charman, 1989; Melzack and Wall, 1989; Miller and Kraus, 1990; Waddell, 1987). The questionnaire allows the patient to express his perception of pain in three dimensions of sensory, affective and evaluative by choosing the right words. Another feature of the questionnaire is its potential value in the diagnosis of differential pains. Since the inventory of this questionnaire, 1975, many studies have been done on acute and chronic pain in different languages in clinical settings and translated into many languages of the world, and in some cases, other questionnaires have modeled using this tool. The studies based on this questionnaire indicate that the dimension of sensory perception is more relevant than other dimensions in this questionnaire (Holroyd et al., 1992; Lewis, 1993).
Mindfulness-based stress reduction intervention

A psychologist face-to-face interviewed with all participants in the MBSR and control groups in the first visit at the hospital. The psychologist explained the study to participants using simple and short sentences. Participants answered the study questionnaires during both follow-up by the psychologist. All participants in the MBSR group received the mindfulness-based stress reduction therapy program. Table 1 described the details of the MBSR program.

Data management and analysis

All data were analyzed with SPSS version 19. The differences of the responses in the posttest and the first and second follow-up between the MBSR group and the control group for per variable above mentioned were examined using ANOVA with training (intervention/control) × time (T1, T2, T3, T4). The statistical significance of the study was set at p-value ≤0.05.

Results

Recruitment of participants

According to Fig. 2, at first 115 male patients were interviewed. 62 patients were not eligible, so they were excluded from the study. The sample of 53 eligible patients was randomly assigned to a MBSR therapy group (n = 26; 49%) and a control group (n = 27; 51%). There was 2 drop out in each group at the first follow-up. There also was 3 drop out in the control group and 2 in the MBSR group at the second follow-up. 44 participants completed the study. An overview of participants' recruitment is presented in Fig. 2.

Table 2 shows baseline demographic and illness-related characteristics of the study participants. There were no differences concerning start time of detoxification, family history of addiction, monthly household income and age between the MBSR and control groups.

The effectiveness of MBSR intervention

The average scores and standard deviations of the MBSR and control groups are shown in Table 3. The results of Table 3 show a significant training-time interaction for the affective pain (F (1, 50) = 4.11, p < 0.001, partial η² =0.03), sensory pain (F (1, 50) = 3.25, p < 0.001, partial η² =0.02), evaluative pain (F (1, 50) = 2.51, p < 0.001, partial η² =0.04) and perceived reduction of stress (F (1, 50) = 4.27, p <0.001, partial η² =0.04) dimensions.

The tests showed that there is a significant decrease in the MBSR group for the variables affective pain (T1: M = 17.43, SD = 3.01; T2: M = 17.12, SD = 2.46; T3: M = 17.13, SD = 2.11; T4: M = 16.02, SD = 2.25), sensory pain (T1: M = 23.64, SD = 3.37; T2: M = 22.26, SD = 3.46; T3: M = 22.84, SD = 3.19; T4: M = 20.01, SD = 3.44), evaluative pain (T1: M = 18.55, SD = 2.11; T2: M = 18.11, SD = 2.23; T3: M = 18.19, SD = 3.02; T4: M = 16.02, SD = 2.43) and perceived reduction of stress (T1: M = 31.32, SD = 2.33; T2: M = 30.46, SD = 2.12; T3: M = 30.51, SD = 3.32; T4: M = 28.14, SD = 2.71), but no significant decrease in the control group.

Figure 2. An overview of participants' recruitment
**Table 2. Baseline demographic and illness-related characteristics of the study participants**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>MBSR group ( N=26 )</th>
<th>Control group ( N=27 )</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td>0.164</td>
</tr>
<tr>
<td>Mean (%)</td>
<td>20-30</td>
<td>10 (38.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31-40</td>
<td>12 (46.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41-45</td>
<td>4 (15.4)</td>
<td></td>
</tr>
<tr>
<td>Start time of detoxification</td>
<td></td>
<td></td>
<td>0.231</td>
</tr>
<tr>
<td></td>
<td>&lt; 2 week</td>
<td>8 (30.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-3 weeks</td>
<td>13 (50)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3-4 weeks</td>
<td>5 (19.2)</td>
<td></td>
</tr>
<tr>
<td>Family history of addiction</td>
<td></td>
<td></td>
<td>0.416</td>
</tr>
<tr>
<td></td>
<td>&lt; 650</td>
<td>4 (15.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>650-1300</td>
<td>15 (57.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1301-2000</td>
<td>5 (19.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 2000</td>
<td>2 (7.7)</td>
<td></td>
</tr>
<tr>
<td>Monthly household income (US$)</td>
<td></td>
<td></td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>&lt; 650</td>
<td>4 (15.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>650-1300</td>
<td>15 (57.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1301-2000</td>
<td>5 (19.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 2000</td>
<td>2 (7.7)</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3. Interaction effects between MBSR and control group (mean and standard division)**

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>Partial ( \eta^2 )</th>
<th>Group</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective pain</td>
<td>4.11*</td>
<td>0.03</td>
<td>Control</td>
<td>17.23 (2.21)</td>
<td>17.19 (2.24)</td>
<td>17.51 (2.09)</td>
<td>17.32 (2.41)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MBSR</td>
<td>17.43 (3.01)</td>
<td>17.12 (2.46)</td>
<td>17.13 (2.11)</td>
<td>16.02 (2.25)</td>
</tr>
<tr>
<td>Sensory pain</td>
<td>3.25*</td>
<td>0.02</td>
<td>Control</td>
<td>23.16 (3.51)</td>
<td>23.25 (3.45)</td>
<td>23.42 (3.15)</td>
<td>23.18 (3.25)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MBSR</td>
<td>23.64 (3.37)</td>
<td>22.26 (3.46)</td>
<td>22.84 (3.19)</td>
<td>20.01 (3.44)</td>
</tr>
<tr>
<td>Evaluative pain</td>
<td>2.51*</td>
<td>0.04</td>
<td>Control</td>
<td>18.34 (2.29)</td>
<td>18.25 (2.12)</td>
<td>18.54 (2.19)</td>
<td>17.81 (2.10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MBSR</td>
<td>18.55 (2.11)</td>
<td>18.11 (2.23)</td>
<td>18.19 (3.02)</td>
<td>16.02 (2.43)</td>
</tr>
<tr>
<td>Perceived reduction of stress</td>
<td>4.27*</td>
<td>0.04</td>
<td>Control</td>
<td>31.44 (3.11)</td>
<td>31.55 (2.73)</td>
<td>31.36 (2.55)</td>
<td>33.40 (2.45)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MBSR</td>
<td>31.32 (2.33)</td>
<td>30.46 (2.12)</td>
<td>30.51 (3.32)</td>
<td>28.14 (2.71)</td>
</tr>
</tbody>
</table>

**Discussion**

Addiction has a close relationship with physical and mental harms, and subsequently threatens the health and safety of individuals. The purpose of this study was to evaluate the effectiveness of mindfulness-based stress reduction on alleviating pain during detoxification among substance abusers. The first hypothesis, detoxification lead to an increase of affective pain, sensory pain and evaluative pain in the control group, could be partially supported. As expected, participants reported an increase of affective pain, sensory pain and evaluative pain during the detoxification in the control group. As further hypothesis, the male patients in the MBSR group reported an increase of perceived reduction of stress, whereas the patients in the control group did not.

Mindfulness in a two-way action can improve mental and physical health (Grossman et al., 2007; Bishop, 2002) and establish an artistic interaction between physical, cognitive and emotional (Michalak et al., 2012). The current study indicates that the intensity of pains among participants in the MBSR group was lower during the study compared with participants in the control group. As further hypothesis, the male patients in the MBSR group reported an increase of perceived reduction of stress, whereas the patients in the control group did not.

Mindfulness in a two-way action can improve mental and physical health (Grossman et al., 2007; Bishop, 2002) and establish an artistic interaction between physical, cognitive and emotional (Michalak et al., 2012). The current study indicates that the intensity of pains among participants in the MBSR group was lower during the study compared with participants in the control group. The effectiveness of mindfulness on the severity of pain and its dimensions in patients who were detoxifying concludes that these findings are consistent with previous findings that showed mindfulness treatments improve the situation of addicts (Javedani et al., 2017; Asl and Barahmand, 2014; Shahyar and Jomehri, 2017; Witkiewitz et al., 2005; Bowen et al., 2007).

The current study recommends the integration of mindfulness-based stress reduction (MBSR) therapy program in clinical visits, especially for addicts who are detoxifying and suffer from mind problems. With a 12-week MBSR intervention, an increase in affective pain, sensory pain and evaluative pain could be diminished. The results of this study indicate that mindfulness-based stress reduction (MBSR) therapy programs appear to be a helpful tool.

**Conclusion**

This is the first experimental study worldwide that evaluates the effectiveness of mindfulness-based stress reduction (MBSR) on optimizing pain care in substance abusers who are detoxifying. Our study was able to demonstrate that applying clinical MBSR therapy program intervention using different clinical measure tools optimizes pain care in substance abusers who are detoxifying. Clinical MBSR therapy program intervention improved affective pain, sensory pain and evaluative pain. So,
implementation of MBSR intervention program can improves perceived reduction of stress and perceived pain.

References
Abdolghadery M, Kafee M, Saberi A, Aryapouran S. The effectiveness of mindfulness-based cognitive therapy (mbct) and cognitive behavior therapy (cbt) on decreasing pain, depression and anxiety of patients with chronic low back pain. Journal of Sadoughi Shahid University of Medical Sciences 2014;21(6):795-807.


Bevan E. The effect of mindfulness training on drug craving is moderated by level of negative affect (Doctoral dissertation, Marywood University), 2010.


Melzack R. The McGill Pain Questionnaire: From Description to Measurement. The Journal of the
Hosseini M., The Effectiveness of MBSR Intervention in Alleviating Pain During Detoxification among Substance Abusers: An Experimental Study


