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Effectiveness of mindfulness-based group therapy in relapse prevention for methamphetamine dependent males

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Abstract

Introduction: The present study was conducted to investigate the effectiveness of mindfulness-based group therapy (MBGT) in relapse prevention for methamphetamine dependent males.

Materials and Methods: This clinical trial used pretest-posttest control group design. Of the methamphetamine-addicted individuals admitted to Pouyandegan-e-Hasti addiction treatment center in Mashhad in 2017, 40 subjects were selected through convenience sampling after the detoxification period and were randomly assigned into two experimental and control groups. The experimental group attended 9 sessions of mindfulness-based relapse prevention model training while the control group attended the usual group therapy program of the center. The two groups completed Relapse Prediction Scale (RPS) and Beck Depression Inventory, Second Edition (BDI-II) before and after treatment and also Clinical Global Impression Scale (CGI) and Client Satisfaction Questionnaire (CSQ) in the posttest. The data was analyzed using one-way analysis of covariance (ANCOVA), independent t-test and chi-square test in SPSS-24.

Results: The results demonstrated that MBGT causes decreased drug craving ($P=0.001$), likelihood of substance abuse ($P=0.003$) and depression ($P=0.001$) and overall improvement ($P=0.032$) of the experimental group compared to the control group. Further, no significant difference was observed between the two groups in terms of treatment satisfaction ($P=0.893$), but the number of people with relapses in the control group was more than twice as much as the experimental group.

Conclusion: It seems that mindfulness-based group therapy is effective in methamphetamine relapse prevention.

Keywords: Methamphetamine, Mindfulness, Prevention, Relapse

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Introduction

Methamphetamine is a highly addictive psychic stimulus which is associated with a high rate of psychosis (1), depression (2) and cognitive and emotional problems (3,4). One of the emotional problems that plays an important role in addiction vulnerability, substance craving and its related emotional disorders is difficulty in emotion regulation (5-7) so that substance consumers believe that negative and undesirable emotions are unbearable and cannot be managed without relying on substances. This leads to continuation of abuse or relapse (7). Relapse is the reuse of on a regular basis after addiction withdrawal which brings about a further dependence on substances (8). Research shows that there is a significant direct relationship between emotional dysregulation, negative affect and depression with craving for substance abuse (7). Consequently, training the treatment methods that teach people emotion regulation skills seems to be effective in the prevention of addiction vulnerability (5) and reduced craving, relapse and associated emotional problems (6,7).

Mindfulness-based relapse prevention is a new cognitive-behavioral intervention based on the combination of more than two decades of research on relapse prevention for dependence and the mindfulness-based techniques which has been proposed by Witkiewitz, Marlatt and Walker (9) to treat use disorders. The purpose of this treatment is to create awareness and lead people to accept thoughts, feelings and emotions through mindfulness practice and use it as a coping strategy in the face of high-risk situations. Mindfulness is a state of motivated attention and awareness of what is happening at the moment which helps the individual in regulating his emotions (10). Grow, Collins, Harrop and Marlatt (11) conducted a study on 93 alcohol and substance users and found that people who spent more time at home on mindfulness-based relapse prevention

exercises have experienced less craving for substance and alcohol consumption during periods of 2 and 4 months. Thus, they argue that the use of mindfulness skills as a daily program is effective in reducing abuse and craving. Zemestani, Babamiri and Sepyani (12) also studied 63 male patients with abuse and its associated anxiety and depression. The patients underwent treatment at a community-based center for four months on a self-referred basis. The authors compared mindfulness-based relapse prevention treatment with the ordinary program of the center and maintained that participants who received mindfulness-based therapy have shown greater improvement in depression, anxiety and substance craving and have reported less relapse in a two-month follow-up. Seyyed Asiaban, Manshaee and Asgari also compared the effectiveness of schema therapy and mindfulness in psychosomatic symptoms (physical complaints, obsessive-compulsive disorder, sensitivity in interpersonal relationships, depression, anxiety, aggression, phobia, paranoia and psychosis) in stimulant-dependent individuals and concluded that both treatments are effective in decreasing the psychosomatic symptoms of these people. Besides, Kiani, Qasemi and Pourabbas (14) examined the efficacy of psychotherapy based on acceptance and commitment and mindfulness in the rate of craving and cognitive emotion regulation in methamphetamine addicts and came to the conclusion that both treatments are effective in reducing the severity of craving and regulating the cognitive components of emotions because of having common components. Studies indicate that the existence of the components underlying mindfulness such as acceptance, increased awareness, momentary mindfulness and observation without judgment improves disorders caused by dysfunction in emotion regulation such as craving, anxiety and depression (11,12,15,16). Moreover, implementing the therapy on a group basis causes the participants to experience new

behaviors in a safe and receptive environment and receive positive feedback from others about the effects of their behavior through interaction with each other (17).

Based on the foregoing, mindfulness training is an appropriate way to prevent relapses and regulate emotions. Although few studies have been conducted on the impact of mindfulness therapy on stimulants, the efficacy of this type of treatment in relapse prevention is not known. Also, research about the effect of group therapy on substance craving and likelihood of substance use and particularly relapse prevention of methamphetamine which has more harmful effects than other substances can investigate the application of treatment based on the principles and techniques of group mindfulness in relapse prevention of this kind of addiction. Hence, this study was carried out to evaluate the effectiveness of mindfulness-based therapy in substance craving, likelihood of substance use, depression and the relapse rate of methamphetamine-dependent people who have passed the detoxification stage relative to a similar group attending group sessions with free topics so that a step is taken towards the selection of a more effective treatment with a lower relapse rate.

Materials and Methods

This clinical trial was conducted with the approval of the research deputy of Torbat-e-Jam Islamic Azad University and was registered in Iranian clinical trial website with the code IRCT20150413021727N2. In this clinical trial with a pretest-posttest control group design, out of methamphetamine-dependent people admitted to Pouyandegan-e-Hasti addiction treatment center in Mashhad in 2017, 40 subjects (the minimum size for experimental studies is 30 people (18) and the sample size in this research was considered to be 40 individuals by taking into account the possibility of decreasing the subjects) were selected through convenience sampling and based on the

purpose and inclusion and exclusion criteria and were randomly assigned into two experimental and control groups, each containing 20 participants. The research inclusion criteria comprised the following: Age between 18 and 50 years old, referral by a psychiatrist or physician with regard to the primary diagnosis of substance dependence based on Diagnostic and Statistical Manual of Mental Disorders-5th ed. (DSM5), passing of more than a week from successful detoxification and negative urine test for methamphetamine, an education level of at least third grade in middle school, signing a written consent to participate in the research by which the participants, in addition to announcing a written agreement, become aware their own rights including the confidentiality of personal information, immunity to any physical and mental harm and the possibility of leaving the research at any time they wish. The research exclusion criteria consisted of the following cases: The occurrence of physical or psychological problems that disturbs the results of the research, absence of more than one session, failure to comply with the accepted rules in the group (such as timely participation in sessions, maintaining discipline and doing the assignments), positive urine test result for methamphetamine or a relative's report about the use of this by the person, the individual's unwillingness to continue cooperation and receiving pharmaceutical and non-pharmacological treatments simultaneously with the study that interrupt the research results.

After choosing the subjects, a briefing was held for members of the two groups at which the purpose of this study, number and duration of sessions and procedures were explained. In this session, after signing the written consent, participants of the two groups completed Relapse Prediction Scale (RPS) and Beck Depression Inventory, Second Edition (BDI-II) with the explanations of an independent examiner (someone other than

the therapist but familiar with the tests to avoid bias in the response). Also, attempt was made to provide the explanations in such a way that the two groups do not realize they are supposed to be compared. After this session, the experimental group attended 9 one-hour sessions (twice a week) of mindfulness training for relapse prevention according to the specified schedule (Table 1). These sessions were planned based on the book "Mindfulness-Based Relapse Prevention for Addictive Behaviors" (19). The control group simultaneously with the experimental group participated in group sessions with the topics like materials science, discussion

of the effects of materials on personal and social life and life skills training. It should be noted that five subjects of the experimental group and three subjects of the control group withdrew from the study during the treatment. To maintain the equality of groups, two members of the control group were randomly removed. Therefore, the final sample consisted of 30 people. The data was analyzed using one-way analysis of covariance (ANCOVA), independent t-test and chi-square test in SPSS-24. Additionally, Levene's F test was applied to ensure the equality of variances in both groups.

Table 1. Summary of mindfulness training sessions in the experimental group

First session	Welcoming, introducing the members to each other, discussing and examining the importance of non-pharmacological treatments of addiction especially group therapy, evaluating patients' expectations and stating group rules, giving assignment (recording the effects of substance use on their lives).
Second session	Reviewing the home assignment and expressing the similarities of the consequences of substance use among patients, briefly describing the types of substances and their complications, explaining the types of stimulants with an emphasis on the background and how to build and use and the short- and long-term complications of methamphetamine, discussing and examining the importance of relapse prevention, doing raisin eating exercise (a number of raisins were given to the clients and they were asked to eat them during some steps with the presence of mind), giving feedback and discussing the exercise, defining the concept of mindfulness and its application in relapse prevention, giving assignment. In the end, a pamphlet including the definition of mindfulness, an overview on methamphetamine and raisin eating exercise and practice record sheets along with a compact disc (about methamphetamine) were given to the members.
Third session	Reviewing the home assignment and topics of the previous session, practicing body checking (the individual lies down and focuses his attention on different senses in his organs during some steps), training the concept of automatic guidance and slippage (teaching how automatic thoughts lead them to slippage) and talking about the experiences of automatic guidance and slippage of members, summing up and giving assignment and pamphlets (including the materials provided in the session).
Fourth session	Practicing body checking and reviewing the exercise, examining the previous session's assignment and talking about the general challenges in doing it, practicing thoughts and feelings on the street sidewalk (the subjects imagine a familiar person who passes by without any attention; then their thoughts and feelings are evaluated) and discussing them, awareness of long left arrows (like friends and situations of consumption) which cause substance craving and explaining effective methods to deal with them, summing up and giving assignment and pamphlet (including the session's materials).
Fifth session	Focusing on breathing for three minutes, reviewing the previous session's assignment and talking about similarities and differences between long left arrows of members, practicing surfing on temptation (the person imagines a tempting situation; then temptation is likened to a wave that will dip after peak), receiving feedback from members, summing up and giving assignment and pamphlet of the session.
Sixth session	Focusing on breathing for three minutes, reviewing the home assignment, discussing and examining the exercise of surfing on temptation and mindfulness in daily life, practicing awareness of hearing (the subjects focus their attention on all the sounds that are heard around them) and discussing it, practicing breathing meditation (focus on breathing), summing up and giving assignment and pamphlet of the session
Seventh session	Practicing awareness of hearing for three minutes, reviewing the home assignment and the previous session's materials, discussing and examining automatic guidance while implementing the assignment, practicing mountain meditation (they imagine themselves as mountains that remain firm and stable against seasonal climate [and spiritual] changes), discussing the mountain exercise and giving feedback, doing breathing space exercise (the manner of attention and momentary mindfulness with the help of breathing) and discussing it and giving feedback in this respect, summing up and giving assignment and pamphlet of the session.
Eighth session	Doing breathing space exercise, reviewing the previous session's materials, practicing awareness of seeing meditation (they observe the objects around them without judgment), giving feedback and discussing it, practicing walking meditation (slow walking while focusing on the movement of

	different parts of the leg) and talking about it and giving feedback, practicing sitting meditation (the individual in a sitting position concentrates on the sounds inside and outside and his thoughts and feelings), giving feedback and talking about it, summing up and giving assignment and pamphlet of the session.
Ninth session	Practicing awareness of seeing meditation, reviewing the home assignment and the previous session's materials, doing mindfulness practice in high-risk situations (the role of mindfulness and presence of mind at the moment in very tempting situations), examining several situations with high risk of consumption, practicing breathing space meditation in a challenging situation, giving feedback and talking about this exercise, repeating this exercise, examining and reviewing all the exercises performed, reviewing the relapses of methamphetamine, emphasizing the importance of continuing the exercises (at least 4 days a week) and finishing the session with breathing space meditation.

Research instrument

A) *Relapse Prediction Scale (RPS)*: It is a self-assessment tool with 45 questions that has been developed by Wright and translated by Goudarzi (20). Each question embraces a hypothetical situation in which the intensity of substance craving and the likelihood of substance use are evaluated. Each of these two parts in every question is scored between 0-4 based on a 5-point Likert scale (0-none, weak, medium, strong, very strong-4). The minimum and maximum scores of the subject on this scale are 0 and 180 respectively and higher scores represent greater substance craving and likelihood of use (20). Firouzabadi (21) has reported the internal consistency of this scale to be 0.74 for substance craving and 0.78 for the likelihood of substance use using alpha coefficient. In their study, Kafi, Mollazadeh, Nouri and Salehi (22) announced alpha coefficient to be 0.81 for substance craving and 0.78 for the likelihood of substance use, which show good validity of the scale. Researchers in the field of addiction have found this scale to be valid and reliable (20,21).

B) *Beck Depression Inventory, 2nd ed. (BDI-II)*: This questionnaire is a revised version of Beck Depression Inventory which has been developed to assess depression and consists of 21 items. Its scores range from zero to 63 and the items are scored in a continuum from 0 to 3. The scores between 0-13 indicate minor depression, scores 14-19 represent mild depression, scores 20-28 show moderate depression and scores 29-63 suggest severe depression (23). Wang and Gorenstein (24) calculated the internal consistency of this questionnaire to be around 0.9 and its test-

retest coefficient to be between 0.73 and 0.96 and approved its validity. Dabson and Mohammadkhani (25) conducted a study on 354 people diagnosed with major depression and reported the overall reliability of this scale to be 0.91 and approved the validity of this test. The above evidence shows the high reliability and validity of this scale.

C) *Client Satisfaction Questionnaire (CSQ)*: This questionnaire was developed by Larsen (26) to evaluate the client's satisfaction with the services provided during treatment. It encompasses 8 questions, each having 4 responses. The responses take a score between 1-4 based on their degree of positivity or negativity (4-very positive, positive, negative, very negative-1). The minimum and maximum scores of the subject on this scale are 8 and 32 respectively. Higher scores indicate greater treatment satisfaction. The internal consistency coefficient of this questionnaire has been reported to be 0.93 and it benefits good construct and content validity (27). This questionnaire was translated into Persian by Shareh through translation and retranslation and its content validity was confirmed by clinical psychologists and psychiatrists and its reliability was estimated to be 0.93 with an interval of one week through test-retest method in a sample of 23 individuals with obsessive-compulsive disorder (28).

D) *Clinical Global Impression Scale (CGI)*: This scale is the second subscale of Clinical Global Impression Scale was prepared by Guy and is completed by the client at the end of treatment (posttest and follow-up) to assess the rate of response to treatment. The scale includes a question with a 7-point Likert scale, based on which

the client receives a score between 1-7 (1-very great improvement, great improvement, slight improvement, no change, slight deterioration, significant deterioration, very significant deterioration-7). Higher scores suggest less improvement. This questionnaire was translated into Persian by Shareh through translation and retranslation and its content validity was approved by clinical psychologists and psychiatrists and its reliability was estimated to be 0.91 with an interval of one week through test-retest method in a sample of 23 individuals with obsessive-compulsive disorder (28).

Results

The participants were aged between 18 and 50 years (the average age of 28.41 years)

and their education was as follows: 22 subjects in third grade middle school to below diploma (73%), 5 subjects with diploma (16.7%), 2 subjects with associate degree (6.7%) and one subject with bachelor’s degree (3.3%). No significant difference was observed between the subjects of both groups in any of the above-mentioned characteristics and the research variables studied in the pretest. But in the posttest, the experimental group members showed a greater decrease (improvement) in all variables except the client satisfaction (two groups were almost similar) compared to the control group (Table 2).

Table 2. Mean and standard deviation of substance craving, likelihood of substance use, depression, clinical global Impression and treatment satisfaction in both groups in the pretest and posttest

Variable	Groups	Pretest		Posttest		Posttest removing after the pretest effect		
		Mean	SD	Mean	SD	Mean	SD	
Relapse prediction	Substance craving	Experimental	91.47	13.25	67.36	13.41	-24.11	12.47
	Control		92.33	14.21	79.25	14.18	-13.08	12.39
	Likelihood of substance use	Experimental	57.37	11.29	36.2	13.41	-21.17	12.14
		Control	59.14	13.33	48.29	13.43	-10.85	13.1
Depression	Experimental	29.4	6.18	17.14	5.59	-12.26	5.57	
	Control	31.27	7.17	26.31	6.64	-4.96	6.13	
Clinical global Impression	Experimental			3.21	1.45			
	Control			4.11	1.29			
Treatment satisfaction	Experimental			24.63	6.41			
	Control			25.04	6.78			

Results of one-way analysis of covariance (Table 3) showed a significant difference in favor of the greater effectiveness of mindfulness-based therapy in the variables of substance craving (F=35.8, P<0.01), likelihood of substance use (F=10.2, P<0.01) and depression (F=15.49, P<0.01) in the posttest. Further, Cohen's d index was indicative of the high efficacy of this treatment for substance craving (d=0.78) and its average effectiveness for the likelihood of substance use (d=0.41) and depression (d=0.46). It is worth mentioning that the data contained the necessary assumptions for analysis of covariance and homogeneity of variances (substance craving (F=1.33, P=0.244), likelihood of substance use (F=2.15, P=0.137) and depression (F=0.98, P=0.421)) and equality of regression slopes (substance craving (F=3.11, P=0.112), likelihood of substance use (F=3.4, P=0.076) and depression (F=3.5, P=0.072)).

Table 3. Analysis of covariance results of the effectiveness of mindfulness in the variables of substance craving, likelihood of substance use and depression

	Sources of change	SS	Df	MS	F	Sig	D
Relapse prediction	Substance craving	9905.14	1	9905.14	35.8	0.001	0.78
	Likelihood of substance use	153.54	1	153.54	10.2	0.003	0.41
	Depression	203.78	1	203.78	15.49	0.001	0.46

Although the results of Chi square test for the scores of methamphetamine relapse rate after treatment showed no significant difference between the two groups ($X^2=3.59, P=0.058$), out of 15 subjects in the experimental group, urine test for substance use was positive for three individuals. But in the control group, this number reached eight which suggests that people with relapses in the control group

were more than twice as much as the experimental group.

Results of the scores of Clinical Global Impression Scale (Table 4) showed a significant difference ($t=1.8, P<0.05$) so that the lower mean of the experimental group indicates a greater clinical global impression in this group since the scores closer to 1 represent greater improvement and the scores closer to 7 suggest less improvement.

Table 4. Independent t-test results of the scores of clinical global impression and client satisfaction in both groups after treatment

Test	Group	Number	Mean	SD	Levene's F test	Sig	T	Df	Sig
Clinical global impression	Experimental	15	3.21	1.45	0.86	0.544	1.8*	28	0.032
	Control	15	4.11	1.29					
Satisfaction	Experimental	15	24.63	6.41	1.82	0.127	0.07	28	0.893
	Control	15	25.04	6.78					

In Client Satisfaction Scale completed after the end of treatment session, the mean of the two groups showed high satisfaction with the treatment sessions, but no significant difference was found between them ($t=0.07, P>0.05$) (Table 4).

Discussion

The current study was conducted aimed at investigating the effectiveness of mindfulness-based group therapy in methamphetamine relapse prevention. Given that the relapse rate is closely associated with important variables such as substance craving, likelihood of substance use and depression, these variables were also examined. Although the obtained results showed no significant statistical difference in the variable of relapse rate due to the small sample size, subjects of the control group showed relapses more than twice as much as the experimental group members. Besides, the experimental group compared to the control group had a significant decrease in the variables of substance craving, likelihood of substance use and depression rate which are considered as crucial factors in relapse. In confirmation of the above results, Cohen's d index demonstrated the high effectiveness of mindfulness method in reduced substance craving and the average effectiveness of this method in the likelihood of substance use and depression

of subjects (moderate to high values of Cohen's d refer to the effectiveness of treatment). Additionally, results of treatment satisfaction and clinical global impression tests revealed the two groups' nearly similar rates of satisfaction with the interventions received and significant greater improvement of the experimental group. These results indicate that mindfulness-based group therapy for relapse prevention is more effective than the common group therapy of the center received by the control group and are consistent with the suggestion of Witkiewitz, Marlatt and Walker (9) stating that mindfulness-based relapse prevention is an effective coping strategy in dealing with high-risk situations in the treatment of substance dependence because of creating awareness and acceptance of thoughts, emotions and feelings. Findings of this study are also congruent with the research by Zemestani, Babamiri and Sepyani (12) indicating that this treatment is effective in the improvement of depression and anxiety and reduced substance craving and relapse. Kiani et al. (14) investigated the impact of acceptance and commitment therapy and mindfulness-based therapy on reduced rate of craving in methamphetamine addicts and argued that both treatments are effective due to the existence of common mechanisms in them so that when the

person is mixed up with his thoughts (like substance craving) and their resulting emotion, he cannot distinguish between his subjective judgment of reality and the reality itself. As a result, in these treatments, the individual accepts to be only an observer instead of acting based on his own thoughts and feelings through momentary mindfulness and separation of the thoughts and feelings from self while understanding the physiological and emotional sensitivities of the and its impact on his behavior. Witkiewitz, Bowen, Douglas and Hsu (15), Grow et al. (11), Iranshahri and Jenaabadi (16), Dabbaghi, Asgharnejad Farid, Atef Vahid and Bolharie (32), Kaldavi, Borjali, Falsafinejad and Sohrabi (33) and Salimi, Haqnazari, Ahmadi Tahour Soltani and Zohreh Vand (34) have also maintained that mindfulness-based therapy is effective in reduced substance craving and relapse prevention because of the components underlying mindfulness such as acceptance, increased awareness, momentary mindfulness and observation without judgment.

In explaining the aforesaid results, it can be stated that high mindfulness enables people to create a fundamentally different relationship with the experience of inner feelings and external events (35) such that through the creation of moment-to-moment awareness and behavioral orientation based on wise responsibility and instead of automatic reaction (35), the individual can effectively control the emotional reactions through inhibition of limbic cortex by applying high functions of mind such as attention, awareness and kindly attitude (35) and reflect on events instead of responding involuntarily to them (36). Moreover, the findings are consistent with the results of the study by Witkiewitz and Bowen (37) who demonstrated that the mindfulness-based relapse prevention model affects cognitive and behavioral responses to depressive symptoms and causes to reduce use and also with the results obtained by Sattarpour, Ahmadi and

Sadeqzadeh (38) and Azargoun, Kajbaf, Molavi and Abedi (39) who believe that mindfulness training is effective in reduced depression. In justifying the effect of mindfulness on depression, it can be mentioned that the existence of underlying mechanisms in mindfulness such as the experience of the present time with a judgment-free attitude along with acceptance (15) leads to reduced anxiety and non-application of repetitive thoughts such as rumination and worry resulting in emotional regulation (40) and prepares the way to use flexible cognitive styles in problem-solving (41). Nauman (42) states the following three ways in which mindfulness reduces depression: First, a depressed person learns how to have some alternatives to choose by recognizing the reactions and coordinating them with the needs and emotions of others instead of reacting automatically to negative emotions caused by the fear of being rejected or judged. Second, the individual is enabled to face his fears and understand them and say "no" to himself. This makes him reach equilibrium and increases his self-confidence and assertiveness. Third, being in the present moment with others leads to paying more attention to the relationship and receiving positive feedback from others and consequently continuation of the relationship.

In this study, the problem of access to a wider sample including male and female methamphetamine users has led to limiting the choice to men consuming this from a center through purpose-based method, which imposes some limitations in the field of proper screening and generalization of results. Additionally, lack of a follow-up period is another weakness of this research. Hence, to overcome these problems, it is recommended to use a larger sample size and subjects of both genders along with follow-up periods of at least 3 and 6 months in future studies.

Conclusion

Results of the present study reveal that mindfulness-based therapy is effective in

reducing the variables of substance use relapse, substance craving, and likelihood of substance use and depression of methamphetamine-dependent individuals who have been detoxified. It is suggested that in future research, the effectiveness of this treatment in smokers and tobacco users be addressed and be compared with other group therapies like dependency management and matrix treatment.

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