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Article

The effect of mindfulness-based relapse prevention on substance craving compared to twelve-step therapy and cognitive behavioral therapy: a Randomized Clinical Trial

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Abstract

Background: Addictive disorders represent a severe health issue and a high economic burden on society. About 31 million people suffer from substance use disorders (SUDs) worldwide. Substance craving is an integral component of dependence syndromes and one of the main causes of relapse. In spite of the presence of multiple effective psychological therapies for managing SUDs, there is an increasing interest in alternative interventions like mindfulness-based relapse prevention (MBRP) that might yield better outcomes in treating SUDs. This study aimed to clarify if mindfulness-based relapse prevention, cognitive behavioral therapy, and twelve-step therapy target substance carving differently. *Methods:* The present randomized clinical trial was performed in Alexandria, Egypt. The study population (n=60) was opioid-dependent patients who were randomly assigned to three treatment groups (CBT, MBRP, 12-step therapy) using a computer-generated random number. The participants of three groups filled out the measurement scales immediately after detoxification as a pre-test and after the end of therapy sessions as a post-test. Finally, data from 45 patients were analyzed statistically.

Results: Craving decreased among MBRP participants at a greater level compared to CBT and 12-step through obsessive-compulsive drug use scale (OCDUS) (P=0.019*) and through desire for drug questionnaire (DDQ) (P=0.005*). Although there was a significant difference between MBRP and CBT, no significant difference between MBRP and 12-step was found. *Conclusions:* Mindfulness-based relapse prevention decreased opioid craving at a greater but non-significant level when compared to 12-step rehabilitation therapy and significantly decreased it when compared to cognitive behavioral therapy.

Keywords: mindfulness-based relapse prevention, craving, twelve-step therapy

Introduction

Substance use disorders (SUDs) affect about 31 million people worldwide. Addiction represents serious health problems and a high economic burden on society.(1)

The duration of hospitalization for addiction is on the order of several months exceeding costs of about $740 billion alone in the USA for health treatment, lost work productivity, and drug-related crime.(2)

Substance craving is a key component of opioid use disorder (OUD),(3) and is recognized as an integral component of dependence syndromes and one of the main causes of relapse.

There is a variety of effective psychological and behavioral therapies for managing SUDs such as cognitive-behavioral therapy [CBT], motivational enhancement therapy, and 12-step facilitation therapy.(4)

Accordingly, greater interest in alternative therapies that might yield better outcomes in treating SUDs has been observed in the last 2 decades. Thus, some authors hypothesized that integration between mindfulness and CBT may positively promote effective management programs for addictive behaviors.(5)

Mindfulness has been described as, "the awareness that emerges through paying attention, on purpose, in the present moment, and nonjudgmentally to the unfolding of experience".(6) According to the mindfulness perspective, addiction could be seen as an effort to either hold on to or avoid cognitive, emotional, or physical experiences. In an effort to avoid suffering, an individual either clings to positive states (e.g., craving) or avoids negative states. As craving is considered to be a temporary cognitive and affective phenomenon just like any other experience, mindfulness practice includes observing craving aiming to bring awareness to the experience of craving without judging or reacting to it.

The MBRP program consists of eight 2-hour sessions, each including formal mindfulness practices, as well as informal exercises and skills designed to bring these practices into daily life, specifically into high-risk situations when craving is high.

This study aimed to clarify if mindfulness-based relapse prevention, cognitive behavioral therapy, and twelve-step therapy target opioid carving differently in opioid abusers.

Methods and subjects

In this randomized clinical trial, the population included opioid-dependent men admitted to El Maamora hospital.

The sample size of this study was determined according to the medical research institute, department of the medical statistics depending on previous relevant studies.(7-9) For comparison of the groups in terms of the effectiveness of either mindfulness-based relapse prevention, cognitive behavioral therapy or twelve-step therapy on opioid craving, the confidence interval (CI) was 95%, the test power was 80%, using *Obsessive Compulsive Drug use Scale* and *Desire for drug questionnaire*. Fifteen people were needed minimally in each group.

Ethical considerations: This research has been reviewed and approved by the Ethics Committee of Alexandria University.

The inclusion criteria were:

(1) Age: 15-50 years.
(2) Male gender.
(3) Patients meet DSM-5(10) criteria of opioid abuse.
(4) Had completed detoxification in a treatment center.
(5) Willing to give consent they will be randomly assigned to either CBT, MBRP, or twelve-step treatment group.
(6) Patients have dual diagnoses.
(7) Patients have poly-substance use disorder.

The Exclusion criteria were:

(1) Participants with significant cognitive impairment.
(2) Participants with suicidal thoughts.
(3) Participants with any organic condition affecting stress response and so craving such as hypertension, respiratory or cardiovascular disorders.
(4) Participants taking any medications (e.g., antipsychotics in high doses) known to affect the stress response.
(5) Participants relapsed to drug abuse during therapy.

To conduct this randomized clinical trial, the authors assessed the eligibility of 75 subjects, and 15 of them were excluded based on exclusion criteria. A list of 60 eligible subjects applying for treatment was prepared and randomly assigned to the treatment condition using a computer-generated random number with the aid of trained staff at the clinic blindly to have three groups of 20 subjects, group one received CBT, group two received MBRP, and group three received twelve-step therapy. In group one, five subjects were lost to follow-up as they were discharged from the hospital. In group two, two subjects declined to participate and three subjects

were lost to follow-up as they were discharged from the hospital. In group three, five subjects declined to participate. Thus, the authors finally analyzed fifteen subjects in each group.

All participants were subjected to:

(1) Psychiatric and drug use history taking.

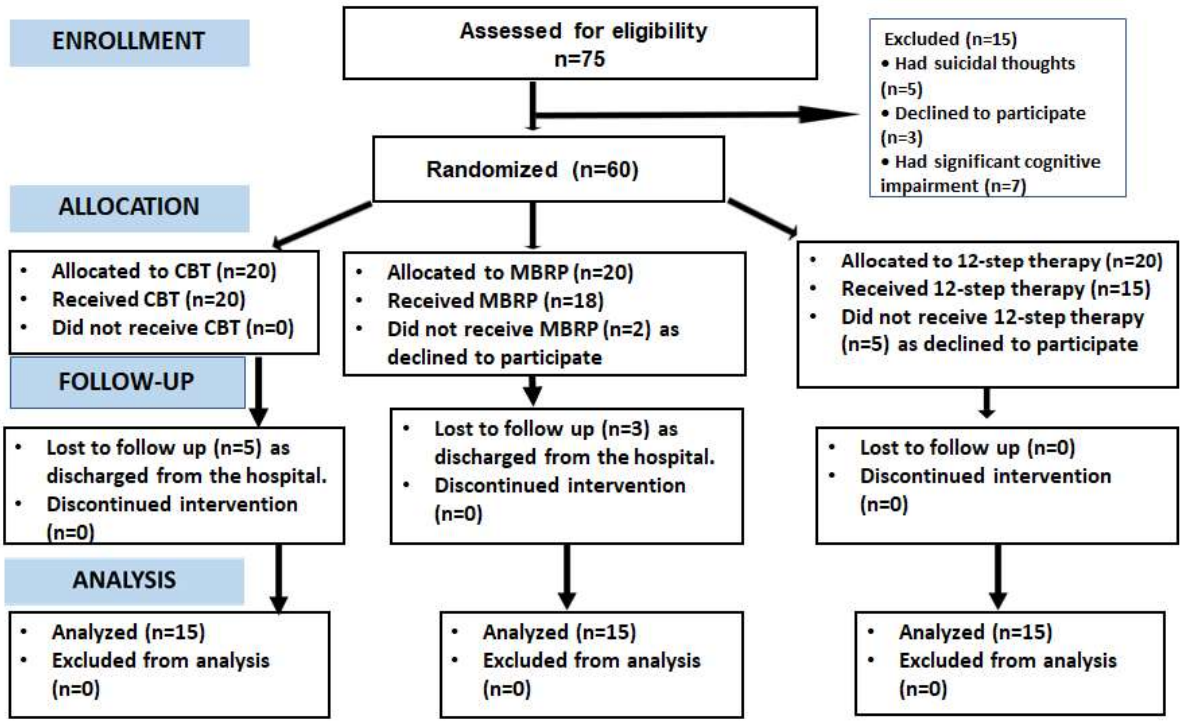
(2) Physical and neurological examination.

(3) Psychiatric semi-structured assessment of DSM-5.(10)

(4) Psychometric assessment: *obsessive-compulsive drug use scale (OCDUS)*,(11) *Desire for drug questionnaire (DDQ).(12)*

(5) Weekly check-ins urine drug screen for opioids.

A flow-chart describing the trial



All participants completed the scales immediately after detoxification and after the end of therapeutic sessions.

Prior to the intervention, the rules and regulations of each session were presented, the number of the sessions and duration of each session was determined.

Either CBT or MBRP consisted of 8 sessions, once weekly and each was for 2 hours with two parts of 45 minutes and 15 minutes of rest between them.

The group therapies, either CBT or MBRP, were managed by the first author as a facilitator in all sessions and a co-facilitator, who was a psychiatrist working in El Maamora hospital. The facilitator was managing exercise practicing and discussion with clients for clarification and getting feedback while the co-facilitator was managing time and helping in discussion with the clients.

The twelve-step therapy group met once weekly for 1½ hours and was facilitated by an ex-addict working in El Maamora hospital.

Measurement tools

The Obsessive-Compulsive Drug use Scale (OCDUS) measures craving in the previous ten days and includes 13 questions. Subjects should select from 5 graded options for each question based on their experiences during last week. The items were rated as follow:1) Never; 2) Rarely; 3) Sometimes; 4) Mostly and 5) Always.(11)

The desire for drug questionnaire (DDQ), which measures instant (now) craving, is a translation of the Desires for Alcohol Questionnaire (DAQ)(12) and adapted for drugs. Response categories were the same as the DAQ.

The DDQ includes 14 questions and participants answer questions on a seven-step Likert-scale answer sheet based on what he/she feels or thinks at the moment. The items were rated as follows: 1) not at all; 2) mild; 3) mild to moderate; 4) moderate; 5) moderate to severe; 6) severe and 7) approximately complete.

Statistical analysis of the data

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using numbers and percentages. The Kolmogorov-Smirnov test was used to verify the normality of distribution Quantitative data were described using range (minimum and maximum), mean, standard deviation, median, and interquartile range (IQR). The significance of the obtained results was judged at the 5% level.

Data analysis

Chi-square test was used for categorical variables, to compare between different groups. Monte Carlo correction is a correction for chi-square when more than 20% of the cells have an expected count less than 5. Kruskal-Wallis test was used for not normally distributed quantitative variables, to compare between more than two studied groups and Post Hoc (Dunn's multiple comparisons test) for pairwise comparisons.

Results

The participants in this study had been divided into three equal groups, group I received CBT, group II received MBRP, and group III received 12-step therapy.

Regarding age, the mean age in groups I, II, and III were (27.60 ± 4.97), (33.27 ± 7.14), and (27.73 ± 7.74) in order with a statistically significant difference among groups (p=0.040*). (**Table 1**)

There was no statistically significant difference among the groups regarding the onset of OUD (MCp=0.860). (**Table 1**)

Regarding the number of abused substances, 93.3% of group I, 66.7% of group II and 100% of group III were poly-substance users with a statistically significant difference among the groups. (MCp=0.034*).(**Table 1**)

Regarding the duration of opioid abstinence before the study,40% of group I ,46.7% of group II and 100% of group III participants were abstinent for less than six months before the study with a statistically significant difference among the groups (p=0.001*). (**Table 1**)

As regard OCDUS, there was no statistically significant difference among the groups regarding opioid craving (p=0.875) before therapeutic interventions with mean craving (48.0 ± 2.51) in group I, (45.40 ± 11.11) in group II and (48.47 ± 4.91) in group III. (**Table 2**)

After therapeutic interventions, opioid craving decreased in all groups with a statistically significant difference among them (p<0.001*). (**Table 2**)

Opioid craving in group II decreased significantly compared to that in group I (p=0.021*) while there was no statistically significant difference regarding opioid craving decrease between group II and group III (p= 0.813). (**Table 2**)

Opioid craving in group III decreased significantly compared to that in group I (p=0.011*). (**Table 2**)

As regard DDQ, there was no statistically significant difference among the groups regarding opioid craving (p=0.953) before therapeutic interventions with mean craving (48.0 ± 5.25) in group I, (49.47 ± 18.95) in group II and (48.93 ± 14.49) in group III. (**Table 3**)

After therapeutic interventions, opioid craving decreased in all groups with a statistically significant difference among them (p=0.009*). (**Table 3**)

Opioid craving in group II decreased significantly compared to that in group I (p=0.001*) while there was no statistically significant difference regarding opioid craving decrease between group II and group III (p=0.313). (**Table 3**)

Opioid craving in group III decreased significantly compared to that in group I (p=0.028*). (**Table 3**)

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Table (1): Comparison between the three studied groups according to demographic data and history of substance use disorder

Demographic data and history of substance use disorder	Group I (n=15)		Group II (n=15)		Group III (n=15)		⚜*	p
	No.	%	No.	%	No.	%		
Age (years)								
Min. – Max.	20.0 – 40.0		23.0 – 46.0		18.0 – 46.0		F= 3.472*	0.040*
Mean ± SD.	27.60 ± 4.97		33.27 ± 7.14		27.73 ± 7.74			
Median (IQR)	27.0 (25.0–30.0)		34.0(28.0–38.50)		25.0 (22.5–34.0)			
Sig. bet. Groups	p_1=0.065, p_2=0.998, p_3=0.074							
Onset of SUD								
<5 years	1	6.7	3	20.0	2	13.3	1.184	MCp= 0.860
>5 years	14	93.3	12	80.0	13	86.7		
Number of abused substances								
Mono-substance	1	6.7	5	33.3	0	0.0	6.718*	MCp= 0.034*
Poly-substance	14	93.3	10	66.7	15	100.0		
Duration of abstinence before the study								
<6 months	6	40.0	7	46.7	15	100.0	13.803*	0.001*
≥6months	9	60.0	8	53.3	0	0.0		

χ^2: **Chi square test** MC: **Monte Carlo**

F: **F for ANOVA test**, Pairwise comparison bet. each 2 groups was done using **Post Hoc Test (Tukey)**

p: p value for comparing between **the three studied groups**

p_1: p value for comparing between **group I** and **group II**

p_2: p value for comparing between **group I** and **group III**

p_3: p value for comparing between **group II** and **group III**

*: Statistically significant at $p \leq 0.05$

Group I: CBT **Group II:** MBRP **Group III:** Twelve-step

Table (2): Comparison between the three studied groups regarding craving level through obsessive compulsive drug use scale (OCDUS)

Scale total score (Q1 – Q13)	Group I (n=15)	Group II (n=15)	Group III (n=15)	H	P
Before therapy					
Min. – Max.	44.0 – 53.0	28.0 – 61.0	36.0 – 56.0		
Mean ± SD.	48.0 ± 2.51	45.40 ± 11.11	48.47 ± 4.91	0.266	0.875
Median (IQR)	47.0(46.50–49.50)	49.0 (37.0–54.0)	49.0 (46.0–52.0)		
After therapy					
Min. – Max.	33.0 – 41.0	11.0 – 44.0	24.0 – 41.0		
Mean ± SD.	38.0 ± 2.59	24.93 ± 9.18	31.67 ± 5.47	17.555*	<0.001*
Median (IQR)	39.0(36.0–40.0)	23.0(19.0–29.50)	31.0(28.50–34.50)		
Sig. bet. Groups	$p_1<0.001^*, p_2=0.019^*, p_3=0.066$				
Decrease in carving					
Min. – Max.	6.0 – 18.0	-2.0 – 45.0	6.0 – 25.0		
Mean ± SD.	10.0 ± 2.85	20.47 ± 14.65	16.80 ± 6.01	7.899*	0.019*
Median (IQR)	10.0 (8.0–11.0)	19.0 (8.50–32.0)	17.0(12.0–22.0)		
Sig. bet. Groups	$p_1=0.021^*, p_2=0.011^*, p_3=0.813$				

H: H for **Kruskal Wallis test,** Pairwise comparison bet. each 2 groups was done using **Post Hoc Test (Dunn's for multiple comparisons test)**

p: p value for comparing between **the three studied groups**

p_1: p value for comparing between **Group I** and **Group II**

p_2: p value for comparing between **Group I** and **Group III**

p_3: p value for comparing between **Group II** and **Group III**

*: Statistically significant at $p \leq 0.05$

Group I: CBT **Group II:** MBRP **Group III:** Twelve-step

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Table (3): Comparison between the three studied groups regarding craving level through desire for drug questionnaire (DDQ)

Scale total score (Q1 – Q14)	Group I (n=15)	Group II (n=15)	Group III (n=15)	H	P
Before therapy					
Min. – Max.	40.0 – 55.0	20.0 – 85.0	29.0 – 68.0		
Mean ± SD.	48.0 ± 5.25	49.47 ± 18.95	48.93 ± 14.49	0.096	0.953
Median (IQR)	50.0(43.50–51.50)	55.0(34.0–64.0)	49.0(37.0–62.50)		
After therapy					
Min. – Max.	30.0 – 45.0	14.0 – 48.0	15.0 – 44.0		
Mean ± SD.	38.0 ± 5.04	26.67 ± 10.91	32.60 ± 8.59	9.378*	0.009*
Median (IQR)	39.0(33.0–42.0)	21.0(20.0–36.0)	35.0 (27.50–39.0)		
Sig. bet. groups	p_1=0.002*,p_2=0.116,p_3=0.136				
Decrease in craving					
Min. – Max.	7.0 – 13.0	-4.0 – 54.0	-6.0 – 42.0		
Mean ± SD.	10.0 ± 1.65	22.80 ± 15.40	16.33 ± 13.71	10.776*	0.005*
Median (IQR)	10.0(9.0–11.0)	18.0 (14.0–34.0)	18.0(8.50–24.50)		
Sig. bet. groups	p_1=0.001*,p_2=0.028*,p_3=0.313				

H: H for **Kruskal Wallis test,** Pairwise comparison bet. each 2 groups was done using **Post Hoc Test (Dunn's for multiple comparisons test)**

p: p value for comparing between **the three studied groups**

p_1: p value for comparing between **Group I** and **Group II**

p_2: p value for comparing between **Group I** and **Group III**

p_3: p value for comparing between **Group II** and **Group III**

*: Statistically significant at $p \leq 0.05$

Group I: CBT **Group II:** MBRP **Group III:** Twelve-step

Discussion

Preliminary evidence in support of MBRP is provided by a growing body of literature on meditation-based interventions for substance use disorders, with reductions in the use of substances including stimulants, cannabis, nicotine, and opiates reported, relative to supportive or educational control conditions.(13)

In addition, different processes through which mindfulness interventions affect substance use outcomes have been recently investigated, and include approach coping with corresponding reductions in thought suppression, decreased automatic, non-mindful responding, and changes in affect regulation which, in turn, alters its relationship to craving (14).

Thus, we carried out this study to compare the effect of MBRP on opioid craving relative to evidence-based therapies for substance use disorders, CBT, and 12-step therapy.

Findings from this study showed that the mean age of participants in CBT, MBRP, and 12-step groups were (27.60±4.97), (33.27±7.14) and (27.73±7.74) in order with a statistically significant difference among groups (p=0.040*). A statistically significant difference was also found among the groups regarding the duration of opioid abstinence before the study and the number of abused substances. However, there was no statistically significant difference among groups regarding the onset of OUD.

The study clarified that craving decreased among MBRP participants at a greater level compared to CBT and 12-step participants through OCDUS (P=0.019*). Although there was a significant difference between MBRP and CBT (P=0.021*), no significant difference between MBRP and 12-step was found (p=0.813).

In a similar manner, the DDQ scale clarified that craving decreased greatly among MBRP participants compared to CBT and 12-step. (p=0.005*). There was a significant difference between MBRP and CBT (P= 0.001*) while the absence of this significance was found between MBRP and 12-step (P=0.313**).**

Consistently, Bowen et.al,(15) Zemestani M et al.,(16) Hsin Hsu S et al.,(17) and Shorey A. et al.(18) clarified that craving decreased to a greater extent among MBRP relative to 12-step therapy participants. In addition, substance use decreased to a greater extent among MBRP versus 12-step therapy participants according to alcohol and other drug use scale (AOD). Specifically, the MBRP group showed an average 86% decrease in substance use for each 2-month increase in linear time.

Moreover, the research done by Garland et al (19, 20) to examine the effects of mindfulness-based therapy on pain intensity and affective experience and their relations with changes in medication misuse among a sample of chronic pain patients receiving long-term opioid pharmacotherapy indicated that relative to the 12-step program, mindfulness-based therapy was associated with statistically significant reductions in momentary pain experience, mainly pain unpleasantness but not pain intensity, and positive shifts in the affect from moment-to-moment. Patients treated with mindfulness were 2.75 times more likely than patients in the 12-step to have positively regulated affect over the course of treatment and exhibited significantly greater reductions in medication misuse.

As well, Eric L. Garland et al. (19) reported significantly greater decreases in opioid wanting, urge, and having greater self-control over cravings in mindfulness-based therapy compared to 12-step and cognitive-behavioral coping skills.

In addition, the study done by Garland et al (21) clarified that MBIs were associated with modest statistically significant improvements in post-traumatic stress symptoms, craving, and positive and negative affect from pre-to-post treatment versus the CBT group. Also, Witkiewitz K et.al (22) offered evidence through a randomized clinical trial comparing the effect of two evidence-based treatments, (MBRP) and (CBT) among women referred by the criminal justice system as regard drug use days and addiction severity. Women in MBRP, compared to women in CBT, reported significantly fewer drug use days and lower addiction severity, based on the Addiction Severity Index.

In contrast to the current study finding**,** Bowen et al (15) clarified no difference between MBRP, RP, and 12-step–oriented programs regarding the risk of relapse to drug use. The limited urinalysis data in this research may raise doubts about this outcome which was not the case in the current study.

Moreover, John F. Kelly et al reviewed the most rigorous studies that employed an RCT/quasi-RCT design for comparing twelve-step therapy to treatment with a different theoretical orientation (e.g. CBT).they concluded that all studies clarified the absence of difference between twelve-step therapy and CBT at the end of treatment regarding relapse rate. The spiritual and religious concept of twelve-step therapy may be highly considered in Arab countries, where the current study was carried out. Thus participants of the twelve-step therapy group in the current study, compared to those in the previously mentioned study, might be highly committed to therapy resulting in better outcomes relative to CBT.(23)

Limitations

1. This research did not study the sustainability of the intervention effect on craving.
2. Small sample size of the current study is due to restricted addiction service provision during a covid-19 pandemic.

Conclusions

1. Mindfulness-based relapse prevention, 12-step therapy, and cognitive behavioral therapy can decrease craving for opioids.
2. Mindfulness-based relapse prevention decreased opioid craving at a greater but non-significant level when compared to 12-step rehabilitation therapy and significantly decreased it when compared to cognitive behavioral therapy.

Recommendations

1. To compare mindfulness-based relapse prevention, 12-step rehabilitation, and cognitive behavioral therapy regarding their effect on substance craving on a larger sample size.
2. To follow sustainability of the effect of different therapeutic models on substance craving over months and years.

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Data analysis

Data analysis was done by the authors.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Alexandria University. All participants gave written informed consent.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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