USE OF MINDFULNESS BASED STRESS REDUCTION ON INDIVIDUALS WITH OPIOID ADDICTION

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ABSTRACT

Background: Existing literature does documents partial success with existing intervention methods for craving management in individuals with substance addictions, but, over the years there has been a surge of interest in exploring mindfulness- based interventions in substance use. Traditionally, MBSR has been extensively used in stress and chronic pain management. **Aim:** Present study examines MBSR role in substance craving in OUD. **Methods:** Following a pre-post with control design, this study involved a sample (N=200) of treatment seeking adult males with OUD, selected through convenient sampling from de-addiction centers at Aizawl city of Mizoram, India. After obtaining institutional ethics approval and informed consent, enrolled participants, were allocated in to two groups, Intervention and Control, in equal numbers using draw-of-lots method. OCS and CEQ were used as outcome measures. MBSR sessions were demonstrated to Intervention group only, with both groups allowed to continue with their Treatment-As-Usual (TAU). Assessments conducted at Baseline, Post training and at Follow-up; on outcome measures and results were compared, using descriptive and inferential statistics. **Results:** Findings suggest significant and substantial improvement in all outcome measures for intervention group. The group, which received MBSR training, exhibits noticeable and sustained decrease in craving, at post-intervention, with these improvements was maintained even at follow-up assessment. **Conclusion:** MBSR program is effective in addressing craving issues in OUD. Such intervention methods could be further explored for use as adjunct therapy in SUD.

Keywords: Substance Use, Craving, Opioid, Mindfulness, MBSR.

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INTRODUCTION

Throughout the world, Opioid addiction continues to represent a significant health crisis, with less than 15% of such individuals seek formals treatments (Mutumba et al, 2021), which is often discontinued, leading to relapses. One of the main reasons for relapse

is that of 'craving' in individuals with opioid use. Craving, which is the subjective experience of an urge or desire to use a substance (Kozlowski et al, 1987), has been associated with activation of brain networks, leading to its conceptualization as a motivational and emotional state of an individual. The relevance of craving in clinical field is emphasized by its inclusion as one of the main diagnostic criteria for 'Dependence Syndrome' for Substance Use Disorder (SUD), in International Classification of Diseases-10 (ICD-10), among other factors. It has been well documented that, it's often the mismanagement of the desire (craving) that leads to the individuals to continue with intake of the psycho-active substance especially in case of opioid addiction. As such, opioid and its derivates were known to cause physiological and psychological dependency, in the individual quite rapidly, in comparison to the forms of psychoactive substance (Sadoock et al, 2015). Thus, it's the unmanaged craving behavior, which plays a vital role in the maintenance of the substance intake, there-by increasing the substance – use period and consequentially leading to more neuro-chemical disturbances in the individual. This leads to the increase in burden, not only on the healthcare systems but also on the society. Thus, for effective management in case of opioid addiction, minimizing and managing craving behavior becomes essential.

Traditionally, pharmacological methods were in to practice for addressing the craving issues, in substance addiction population. Some of the molecules, used, were quite effective in minimizing the severity of craving in individuals OUD. One such treatment strategy is opioid substitution therapy (OST), which basically helps the abusers, to substitute for the neutral agent having lesser addictive properties, there-by preventing the individual from more harmful effects of opioid substance. Over the years efforts were made to look for alternative modes of intervention for management of craving behavior, which have a long lasting effectiveness.

Apart from other alternative techniques being explored, over the years, mindfulness-based interventions were also used. Mindfulness, broadly defined as "the awareness that emerges by paying attention on purpose, at present moment, and non-judgmentally to the unfolding of the experience, from moment to moment" (Kabat-Zinn, 1992). Prior studies involving mindfulness does observed that mindfulness is effectively associated with stress management & enhancing resilience (Chambers et al, 2018) ; positivity (Jain et al, 2007), improving anxiety and depressive symptoms (Gu et al, 2015), Self-compassion (Keng et al, 2011) among others. From a conceptual understanding, '*Mindfulness*' holds significance in shifting the mental focus of the individual to the present moment happenings in his life, without becoming reactive towards it. With non-judgmental awareness to the present moment, the individual could develop '*equanimity of mind'* (Hart, 1987). This stability of mind (equanimous mind) helps the individual to observe the physiological sensations happening in his body, in a non-reactive, non-judgmental manner, leading to the development of an understanding about the '*impermanence*' nature of all physiological sensations. With practice, there is a shift in the individual behavior and attitude, from reactive to non-reactive, and the understanding about '*impermanence'* nature of events, becomes more consolidated. Such developments could certainly help the individual to have a more peaceful state throughout. In substance addiction, the 'craving state' is usually characterized by physiological and psychological agitation, and under its influence, the individual usually gives up to the desire and continues/initiate his substance intake, leading to continuity of

substance addiction and/or relapse state. Therefore interventions/techniques based on 'mindfulness' could prove to be useful in addressing the craving issue, in substance addiction. However, effectiveness of mindfulness based interventions, in managing the craving behavior in individuals with substance use has not been explored substantially. Thus this study has been planned. The broad aim of this cross-sectional study was to examine the role of MBSR in managing the carving experiences of male individuals with OUD, which could help in understanding its usefulness in addressing craving issues in this population.

Objectives: The following objective were framed for the study:
To explore the usefulness of Mindfulness Based Stress Reduction in managing the craving among individuals with Opioid addiction.

Hypothesis:
Mindfulness Based Stress Reduction will have no effect on craving behavior of individuals with Opioid addiction**.**

MATERIALS AND METHODS
Sample: The study involved 200 participants, who were enrolled from various Drug De-addiction centers (Govt/Pvt) at Aizawl, Mizoram, India, by using convenience sampling technique.

Inclusion Criteria-
- Male Aged between 18-45 years.
- Participants with Opioid Dependence as per ICD-10.
- Having at least Primary level education
- Exclusion Criteria-
- Persons with Multiple Drug/Substance abuse except nicotine use.
- Any Co-morbid Major Psychiatric/ Neurological/ medical disorders.
- Any significant Physical Disability/ Handicap

Study design- Pre-Post with Control design

Tools:
1. Socio-demographic and Clinical data sheet: A data sheet was designed specifically for this study for collecting information related with various socio-demographic and clinical variables such as age, education, sex, marital status, SES, caste, religion, age of onset, duration of intake of opioid, frequency of intake, quantity of intake etc.
2. WHO-ASSIST V 3.0: The World Health Organization Alcohol, Smoking and Substance Involvement Screening Test (WHO-ASSIST), is a widely accepted tool used in health care settings, particularly in community care, to screen out individuals for substance abuse and risk behaviors related with substance intake, such as like alcohol, nicotine and other substances /drugs. Version 3.0 was used in this study. The responses could be collected using an interview method. It has acceptable validity as a screening tool in mental health settings.

3. Opioid Craving Scale (OCS): Developed by McHugh et al (2021), this scale of craving is a self- reported, 3-item tool to assess the severity of craving experience in an individual. This scale enjoys a high concurrent and discriminate validity.
4. Craving Experience Questionnaire (CEQ): Developed by May et al (2014), CEQ is a brief and psychometrically sound measure of measuring desires (craving). It is based on Elaborated Intrusion (EI) theory model. It is widely used as a short measure of assessing the craving tendencies among participant for a particular substance and is answered on a 10 point scale from '*not at all'* to 'e*xtremely*. It can be self-administered or administered by a health care worker/ clinician.

Intervention tool: Mindfulness Based Stress Reduction (MBSR) as developed by John Kabat-Zinn, was used in this study as an intervention tool. It consists of 08 weekly sessions. The broad outline of each session is depicted below:

Sl. No	Session / Week	Activities Per Session
1	Week 1 Session 1	- Introducing the concept of automatic pilot - Promoting raisin-eating - Body inspection
2	Week 2 Session 2	- Facing obstacle - Practicing yoga
3	Week 3 Session 3	- Perform Mindfulness while breathing - Doing meditation while sitting
4	Week 4 Session 4	- Staying in present - Ticking off pleasant thoughts - Mastering STOP technique
5	Week 5 Session 5	- Identifying and accepting unpleasant experiences - Discussing insights and communications
6	Week 6 Session 6	- Moving from the intrapersonal to the interpersonal world - Discovering conflict management - Managing outrage or conscious anger
7	Week 7 Session 7	- Planning for personal care - Alleviating pain - Seeking the right refuse for pain
8	Week 8 Session 8	- Recapitulating the acquired techniques - Meditation retreat

PROCEDURE

The current study, following a pre-post with control design, explores the effectivenesss of MBSR program on craving in a sample of male adults (N=200) with Opioid dependence. Participants, aged between 18-45 years, were recruited from de-addictions centers in Aizawl city, using convenient sampling method, after Institutional Ethics Committee (IEC) approval. Upon, signing the informed consent, pre-diagnosed participants having Opioid dependence as the primary diagnosis, were screened on ASSIST V 3.0 to rule out poly substance use. Those, who passed screening, were enrolled for the study and were allocated in to two groups, Intervention and Control, in equal numbers, following draw-of-lots method. The intervention group participants were provided eight sessions of MBSR program as developed by Jon Kabat-Zinn, at a frequency of one session per week. All activities were conducted at spacious hall inside the centers itself and the participants were encouraged to practice them, for remaining 6 days of weeks, under observation from the staff at centre. However they were allowed to participate in other activities at centers as well, such as games, pastoral counseling, prayer, recreational and gardening activities, as per their centre routine, during their stay at de-addiction centers. The participants of control group were not provided any session of MBSR, they were kept under observation only. During the entire process of data collection (3 months), all the participants of both groups were allowed to continue with their 'Treatment-As-Usual' (TAU). Participants were assessed on Opioid Craving Scale (OCS) and Craving Experience Questionnaire (CEQ) to measure Craving. The assessments on outcome measures (CEQ & OCS) were obtained at three different stages; baseline (before MBSR training- First), post-intervention (after 8 week of MBSR training-Second) and at follow-up (after one month of second assessment-Third) for all participants

STATISTICAL ANALYSIS

Following the data collection process, obtained data was analyzed using SPSS-29 statistical software for windows. Non-parametric analysis was carried out for analyzing the data, as obtained data does not follow measures of normality**.**

RESULTS

Table 1: Shows Demographic and Clinical Characteristics of participants.

Variables	Intervention group (n=100) Frequency	Control group (n=100) Frequency
Education		
Matriculation	41	37
Intermediate	43	52
UG	12	10
PG	4	1
Socio-Economic –Status		
Low	29	38
Medium	65	52
High	6	10
Marital Status		
Single	58	49
Married	26	36
Divorced	16	15
Employment		
Employed	32	46
Unemployed	67	54
Age (Mean)	28.4	28
Duration of intake (Mean)	8.1	6.9
Age of onset (Mean)	19.7	20.4
Last intake (Mean)	3.9	3.4

Table 2- Exhibits Descriptive statistics (Mean ± SD) and Mean ranks for participants across Baseline, Post - Intervention, and Follow-up stages of assessments on OCS and CEQ.

Variables	Assessment Stages	Intervention Group		Control Group	
		Mean (SD)	Mean rank	Mean (SD)	Mean rank
OCS	Baseline	20.57 (5.74)	92.16	21.85 (5.18)	108.85
	Post Intervention	10.33 (4.15)	57.36	21.66 (5.28)	143.65
	Follow-Up	10.59 (4.360	54.61	23.20 (4.95)	146.39
CEQ	Baseline	88.31 (13.93)	98.66	90.09 (12.38)	102.35
	Post Intervention	46.06 (10.31)	52.95	87.08 (13.29)	148.06
	Follow-up	47.34 (10.19)	52 .05	92.83 (11.88)	148.95

As evident from the table no 2, at Baseline, both groups exhibits similar mean scores on all outcome measures, indicating no significant difference between them. Further, corresponding Mean ranks range: 92.16–104.75 for Intervention and 96.26–108.85 for Control group, were balanced, confirming baseline equivalence (all p > .05).At the Post-intervention stage, Intervention group demonstrated marked improvement across all measures, while Control group showed worsening or unchanged symptom severity. For Intervention group, the mean OCS scores declined sharply (M = 10.33, SD = 4.15) compared to Control group (M = 21.66, SD = 5.28). Similar patterns were observed for CEQ (46.06 vs. 87.08). Further, parallel changes were observed in the Mean rank analysis, with Intervention group consistently yielding lower mean ranks-indicating more favorable outcomes, across all measures in comparison to Control group at the post-intervention stage (e.g., OCS = 57.36 vs. 143.65; CEQ = 52.95 vs. 148.06). At the Follow-up stage, the improvements were maintained in the intervention group, the participants of the control group exhibits further deterioration. For example, the mean score on OCS remained low for Intervention group (M = 10.59) but rose for Control group (M = 23.20). Similarly, CEQ (47.34 vs. 92.83) also demonstrated sustained improvement for Intervention group and worsening of measured features for Control group participants. Further, Mean ranks also reflected the same trend, with Intervention group maintaining the lowest ranks (Mean rank range: 51.55–56.68) and Control group exhibited further high mean ranks (Mean rank range: 144.32–149.45), as what was exhibited at baseline.

Figure1a: Comparison of Mean scores on OCS and CEQ between Intervention and Control group participants across assessment stages.

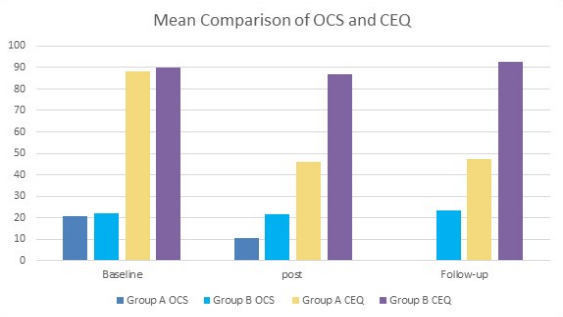

Figure1b: Comparison of Mean rank on OCS and CEQ between Intervention and Control group participants across assessment stages.

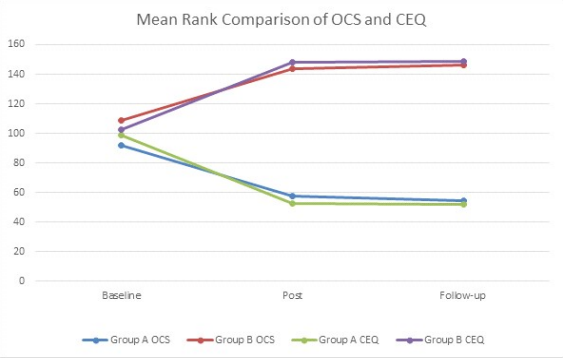

Table 3- Shows Mann-Whitney U Test Results with Effect Sizes of Intervention and Control group participants on OCS and CEQ at different assessment stages.

Assessment Stage	Variables	Mean Rank		U	Z	p	Effect Size(r)
		Int Group	Con Group				
At Baseline	OCS	92.16	108.85	4165.5	-2.05	0.041	-0.14 (small)
	CEQ	98.66	102.35	4815.5	-0.45	0.652	-0.03 (negligible)
At post Intervention	OCS	57.36	143.65	685.5	-10.557	0.00**	-0.75 (large)
	CEQ	52.95	148.06	244.5	-11.624	0.00**	-0.82 (large)
At follow -up	OCS	54.61	146.39	411.0	-11.225	0.00**	-0.79 (large)
	CEQ	52.05	148.95	155.0	-11.846	0.00**	-0.84 (large)

p< .01

As depicted, no statistically significant between-group differences were observed, indicating substantial similarity across the outcome measures at baseline stage (Table 3). Negligible effect sizes for CEQ indicated minimal practical difference between groups at baseline with only OCS demonstrated a statistically significant between-group difference at baseline (U=4165.5, Z=-2.047, p=.041, r=-0.14). However, the small effect size indicated modest practical significance. Overall, baseline assessment scores supported adequate group randomization or matching, with all effect sizes remaining in the negligible to small range (M#"r#"=0.073). The post intervention assessment revealed dramatic group divergence on all measured variables, with all comparisons achieving statistical significance at p<.01 (Table 3). The outcome variables demonstrated large effect sizes (|r| range: 0.635–0.822), indicating profound between-group differences in treatment response trajectories, indicating substantial differential treatment response. The mean effect size at post-intervention stage was M#"r#"=0.721, which further suggested consistently large between-group differences. Follow up assessments revealed that between-group differences were persisted and intensified at the follow-up assessment stage, with all outcome variables achieving statistical significance at p<.01(table 3). Also, Effect sizes expanded further, with all variables demonstrating large effects ranging from |r| = 0.760 to 0.847, substantially exceeding the post-intervention stage effect sizes. The mean Effect size at Follow-up assessment stage was M#"r#"=0.816, reflecting even more pronounced group differentiation than at post-intervention stage.

Table 4: Exhibits Wilcoxon Signed-Rank Test Results for Within-Group Comparisons with Effect Sizes.

Group	Variable Comparison	Z	p	Effect Size (r)
Intervention Group	2 OCS-1OCS	-8.225	.001	-0.82
	3OCS-2OCS	-1.34	0.18	-0.13
	3 OCS-1OCS	-8.169	.001	-0.82
	2CEQ-1CEQ	-8.684	.001	-0.87
	3CEQ-2CEQ	-1.524	0.127	-0.15
	3CEQ-1CEQ	-8.683	.001	-0.87
Control Group	2OCS-1OCS	-1.367	0.172	-0.14
	3OCS-2OCS	-3.998	.001	-0.4
	3OCS-1OCS	-2.977	0.003	-0.3
	2CEQ-1CEQ	-3.2	0.001	-0.32
	3CEQ-2CEQ	-5.693	.001	-0.57
	3CEQ-1CEQ	-2.878	0.004	-0.29

1=Baseline score, 2=Post-intervention score, 3=Follow-up score

For the intervention group, significant reductions were observed across nearly all measures when comparing baseline to post-intervention and follow-up scores (Table 4). Specifically, results showed a statistically significant decrease in OCS (Z = -8.23, p < .001, r = .82) and CEQ (Z = -8.68, p < .001, r = .87) when comparing baseline to post-intervention scores. Though, between post-intervention and follow-up assessments (e.g., 3OCS – 2OCS) change has taken place, but, only minor, non-significant changes were observed (p > .05), suggesting that most of the treatment effects occurred early in the intervention. However, when comparing pre-intervention scores to follow up scores (e.g., 3OCS – 1OCS), large effect sizes (r > .80) yielded, indicating sustained improvement across all primary psychological outcomes. For control group participants, fewer significant changes do occurred across OCS and CEQ. No significant differences were found between baseline and post intervention measurements for most outcomes (p > .05). However, significant changes emerged in some measures between post intervention and follow up scores, including OCS (Z = –3.99, p < .001, r = .40) and CEQ (Z = –5.69, p < .001, r = .57), suggesting some fluctuations over time. But the magnitude of the effects was notably smaller than those observed in the intervention group, with most r values indicating small to medium effects. Moreover, the direction of change was inconsistent,

suggesting natural variability rather than systematic improvement

DISCUSSION

The study involved a total of 200 male participants with opioid addiction, taken from various de-addiction centers, were they are receiving treatment under supervision of qualified mental health professionals. Elevated CEQ and OCS scores, indicated strong craving at baseline in both groups with small to negligible effect sizes (Mr=0.07); and negligible effect size (-0.01) for OCS & CEQ respectively, pointing to minimal practical significance between groups. Conclusively, groups indicate no significant difference between them on CEQ and OCS at baseline stage. These finding goes in line with existing literature, which explains that persons with substance abuse are mostly influenced by external cues in the surroundings, and there by it maintain their substance taking tendencies.

A noticeable decline in mean scores among intervention group participants, indicated significant improvements in their craving at post intervention stage, which also witnessed significant group difference ($p<0.01$) in terms of their desire for opioid intake (OCS & CEQ). This finding is significant, as both groups participants were not only receiving similar pharmacological treatment (OST) at their de-addiction centers, but also sharing matched socio-demographic background and following similar routines at de-addiction centers like, games, pastoral counseling, prayers and gardening during their course of stay at their de-addiction centers. Thus, the group which has received 8 weeks of MBSR training is more instrumental in bringing significant decline in craving behaviors, as a whole. MBSR program basically aims to develop a sense of mindfulness awareness, related with present, non-judgmentally, leading to equanimity of mind. This, not only helps the learner to develop awareness and complete focus with regard to present events but with a non-judgmental attitude, but also develops an understanding about impermanence of events. Such changes, in SUD, could not only, had been helpful in recognizing that physiological/ psychological changes, that fueled the desire to take a substance will automatically cease away after some time and also due to the enhanced awareness about present event, the participant was least bothered with past/ futuristic thinking related with substance use, their-by modifying the substance taking behavior. The probable mechanism for this change lies in the various '*mindful*' activities that were a part of MBSR training sessions spreading over 8 weeks. Such activities, like yoga, raisin eating, meditation, breathing exercises body-scaning etc, have the potential of developing an understanding of the concept of '*impermanence'* of physiological sensations/ drives/thoughts etc, there-by leading to the attainment of '*equanimous mind'* in the individual (Hart, 1987) . With 'equanimity of mind', the psychological/physiological yielding (craving) to take substance (opioid), gets delayed or take a back seat, gradually leading towards the elopement of same. So, while established treatment procedures, may decrease the craving experience cross-sectionally, mindfulness-based training adds extra long-term benefits. Post-intervention, larger reduction of craving severity, in the Intervention group is in line with previous research that shows mindfulness-based interventions enhance emotion regulation and impulse control, key factors in addictive behaviors (Bowen et al., 2014), make aware of craving thoughts and sensations without acting on them. Also the significant reduction of Craving in Intervention group may reflect the intervention's emphasis on acceptance and distress tolerance; skills that help individuals cope with withdrawal symptoms and cravings without using (Witkiewitz et al.,

2013). Between group differences on OCS and CEQ is also maintained on effect size analysis, as well, with OCS (-0.75) & CEQ (-0.82) demonstrated significantly large effect sizes on both measures (r range:0.64-0.82), indicating profound between group differences related with craving experiences at post training (after 8 weeks), suggesting substantial differential treatment response. Broadly, this could also aligns with neuro-cognitive research indicating that mindfulness disrupts automatic craving responses by reducing activation in craving-related brain regions (Zgierska et al., 2019).

Mean scores, expanded effect sizes and significant group differences ($p<0.01$) at follow-up stage for OCS and CEQ continue to support better scores among intervention group participants suggested that post-mindfulness training changes were not only substantial but maintained over time, indicated by reduced craving. These observations, depicts the effectiveness of MBSR in bringing a long lasting change in the attitude of the learner that could be maintained over time, were consistent with previous findings (Bowen et al, 2009) highlighting applicability of mindfulness-based intervention as an adjunct therapy, if not mono-therapy, in addressing craving issues in OUD. With-in group analysis also supports robust treatment effect and clinically relevant changes in intervention group, indicated significant differences in pre-post data comparison, on CEQ and OCS, which maintained during follow-up and post-intervention analysis. However, for non MBSR group, fewer changes suggested natural variability rather than systematic improvement. These findings reinforce the efficacy of the MBSR intervention in reducing psychological distress and enhancing adaptive functioning compared to the control condition. Though the study exhibits promising findings, but also has certain limitations. The major limitation relates with its generalization, study findings cannot be generalized on females and the study has limited Cross-cultural applicability of findings. The study fails to address the influence of personal factors in craving management in substance use.

CONCLUSION

Study concluded that mindfulness-based intervention was effective in addressing craving tendencies in individuals with Opioid dependence. These findings contribute to the growing evidence base supporting the use of mindfulness-based interventions as a promising approach in craving management in Opioid addiction, their-by establishing MBSR as an alternative treatment mode in this population.

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