Investigating the Impact of Mindfulness-Based Interventions (MBIs) on Craving Reduction and Relapse Prevention among Individuals with Substance Use Disorder

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Abstract

SUD Substance use disorder (SUD) is a chronic illness that is typified by compulsive use of a substance, high level of cravings, and high probability of relapse. Mindfulness-based interventions (MBIs) have become an exciting addition to adjunctive therapy that are likely to encourage awareness, emotional regulation, and cognitive control that can decrease cravings and stop relapses. The current research focused on the efficacy of an eight-week strategy on mindfulness-based reduction of craving and risk of relapse in 50 patients undergoing treatment in a rehab center. The participants were separated into an intervention (n = 25) and a control group (n = 25). Pre- and post-intervention measurement involved the use of standardized tools, such as Drug Craving Questionnaire (DCQ), Relapse Risk Scale (RRS) and Five Facet Mindfulness Questionnaire (FFMQ). The findings showed that the intervention group had significant decreases in the intensity of cravings and risk of relapse with higher mindfulness scores than the control group. Correlational analyses demonstrated negative relations among mindfulness and craving and relapse whereas regression analysis demonstrated that mindfulness substantively forecasted reduced risk of relapse. The results indicate that MBIs can positively contribute to the improvement of their self-regulation and minimization of the vulnerabilities associated with addiction. The research highlights the relevance of the inclusion of mindfulness techniques in rehabilitation interventions to enhance recovery in the long run.

Keywords: Mindfulness, Craving Reduction, Relapse Prevention.

Introduction

The use disorder of substances (SUD) remains a severe mental health issue all over the globe, as millions of users cannot abstain despite the official treatment. Craving is persistent and the chances of relapse are high which makes addiction hard to treat and manage. As per the latest estimates in the world, the rate of relapse is remarkably high within the first year of rehabilitation, which is why it is crucial to implement more specific psychological interventions (United Nations Office on Drugs and Crime [UNODC], 2023). Though traditional treatment methods, including cognitive-behavioral therapy, motivational interviewing, and 12-step programs, are proven to be effective in assisting people to remain sober, their capacity to directly decrease the levels of cravings and target internal stimuli might be insufficient. Over recent years, Mindfulness-Based Interventions

(MBIs) have become one of the promising therapeutic options that directly address the craving experiences via the specifics of awareness, acceptance, and regulation of emotions (Li et al., 2020). Mindfulness can help to break the habit that causes people to use drugs and relapse by teaching them to pay attention to thoughts and emotions without making an immediate response.

Background of the Study

The substance craving is one of the central symptoms of addiction that can be a direct psychological barrier to and cause of relapse. It is typified by strong urges, physiological feeling, and intrusive thoughts that draw the person to the substance use. The environmental stimuli, stress, negative emotions, social pressure or drug-use memories can cause craving. Significantly, cravings do not disappear despite the process of detoxification and even get more severe over time because of stress or exposure to contextual stimuli, which is why they become the main subject of research in the field of relapse prevention (Sinha et al., 2021). Older interventions are more likely to be based on cognitive restructuring or trigger avoidance, but these are not the only ways of dealing with automatic and embodied components of craving. Conversely, mindfulness focuses on the recognition and acceptance of inner experiences, which enables one to face his or her cravings instead of avoid them.

MBIs include mindfulness-based relapse prevention (MBRP) and mindfulness training in order to improve self-regulation and emotional resilience. The accumulating evidence indicates that mindfulness meditation can decrease the level of craving and improve coping abilities that, in the end, can contribute to lower rates of relapse (Creswell and Lindsay, 2020). These interventions assist people to change their view of cravings, which they believe are insatiable desires, to momentary psychological experiences. Moreover, mindfulness is linked to greater discomfort tolerance, more distress regulation, and more psychological flexibility, which also lead to effective relapse prevention.

The neuroscientific studies also help in the cause of mindfulness as a method of treatment of addiction. Mindfulness meditation affects decision-making and impulse-controlling areas of the brain, the prefrontal cortex, and anterior cingulate cortex (Wang et al., 2022). These modifications are associated with decrease in stress reactivity and better executive functioning which is protective towards relapse prevention. With the ability to show people the craving cues and react in a more adaptive way, the MBIs are a one-stop solution to minimizing the use of a substance and abstinence in the long-term.

Mindfulness

Mindfulness refers to the intentional attention to the current experience, thoughts, emotion, and sensations with acceptance, and not judgment. This research designates mindfulness as the Five Facet Mindfulness Questionnaire (FFMQ) in which increased scores are evidence of higher mindful awareness and acceptance.

Craving

Craving can be described as the intense psychological and a physiological desire to use a substance. It is determined by Drug Craving Questionnaire and higher scores indicate that the intensity of craving is more pronounced. Craving comprises emotional, cognitive and bodily aspects, and are evoked by cues or internal states (Sinha et al., 2021).

Relapse

The relapse is the resumption of substance use following a lapse of abstinence. It is operationalized with Relapse Risk Scale (RRS) whereby higher scores indicate more vulnerability or likelihood of relapse.

Relationship among Variables

Relapse, mindfulness and craving constitute a conceptual pathway which is the focus of research in addiction. The craving is identified as a proximal predictor of relapse, that is, as the craving level grows, the likelihood of going back to substance use becomes greater. The reasoning behind this relationship is that interventions that can minimize craving are important. Mindfulness has a moderating and protective effect where people are able to notice the craving experiences without automatic reactions. Recent studies indicate that mindfulness lowers the emotional reactivity levels, enhances cognitive flexibility, and bolsters the coping mechanisms, which further disrupt the relationship between the craving and the relapse (Bravo et al., 2021).

Mindfulness training makes people more aware of the internal states and enables them to learn to notice craving signals at an early stage. Such consciousness forms a psychological distance between the desire and the action which minimizes the impulsive responses. One of the most important mechanisms by which mindfulness helps to reduce the risk of the relapse is emotional regulation. People can less easily cope with discomfort or distress by avoiding it because they should be able to endure and tolerate the state without using substances. Further, mindfulness can help increase distress tolerance and decrease the occurrence of experiential avoidance; these two factors are linked with reduced chances of a relapse (Syan et al., 2020). Thus, mindfulness helps in preventing relapses as it changes the manner people associate with craving experiences and stimuli.

Theoretical Foundation

A number of modern psychological theories validate the relationships that mindfulness, craving, and relapse are related to.

Mindfulness-Based Relapse Prevention Theory

Mindfulness-based relapse prevention models propose that mindfulness is capable of decreasing automatic response to craving and raising awareness of high-risk circumstances. Witkiewitz et al. (2020) claim that mindfulness facilitates reactive to reflective behavioral transformation, which allows one to disrupt the habitual reactions to the craving. Acceptance is one of the central factors of change in this model.

The Neurocognitive Model of Addiction

Neurocognition research indicates that there is ensuing limbic activation and prefrontal impaired control in addiction. Mindfulness improves neural performance in regard to executive regulation and decreases stress responsiveness (Wang et al., 2022). Mindfulness as a craving-reduction relapse measure is justified by these effects.

Theory of Psychological Flexibility

The central concept of the acceptance-based therapies is psychological flexibility, which means that the individual is ready to adjust to the inner experiences without distancing. Mindfulness enhances distress tolerance, psychological capacity, and dependency on substances to cope (Gloster et al., 2020). More flexible persons can withstand a relapse even in the presence of cravings.

Objectives of the Study
- To examine the efficacy of mindfulness-based interventions in decreasing the levels of cravings in persons affected with substance use disorder in rehabilitation programs.
- To establish how mindfulness practices can prevent relapse following the treatment.
- To test the hypothesis that, mindfulness training, through enhancing emotional regulation, mediates the relationship between mindfulness training and craving reduction.

Hypotheses of the Study
- H1: The level of craving will be highly lower in individuals having mindfulness-based interventions as compared to individuals who do not have interventions.
- H2: The relapse rates will be lower in the participants who receive mindfulness-based interventions after treatment in comparison with conventional rehabilitation strategies.
- H3: There will be a mediation of the relationship between craving reduction and mindfulness practices by emotional regulation.

Literature Review

The concept of mindfulness-based interventions (MBIs) has gained popularity in the addiction science community as some evidence-based methods of supporting psychological stability, alleviating cravings, and preventing the relapse in substance use disorder (SUD) patients. The conceptual basis of mindfulness is both cognitive-behavioral principles and acceptance-based frameworks, which both focus on conscious awareness and nonjudgment attention to internal experience. The research has also grown in recent times since 2020 with studies aiming to investigate the role of mindfulness in boosting emotional control, lowering stress-reactive responses and maintaining prolonged abstinence. The craving intensity has been found to be a key determinant of relapse among studies in the world and hence a prime area of intervention. In the context of Pakistanis, where the level of relapse is still high, and psychosocial interventions are few, MBIs are especially applicable. Although there is more and more evidence in the world, the culturally contextualized research in Pakistan is limited, which is why research into the possibility of introducing mindfulness into the context of local rehabilitation is necessary. Therefore, the literature review is used to assess international and national research to generalize existing evidence and to determine gaps, which apply to mindfulness-based treatment of addiction. The efficacy of mindfulness in anti-SUD is always backed by international studies. Li et al. (2021) conducted a randomized controlled trial and indicated that an eight-week mindfulness program significantly reduced the intensity of cravings in patients who had a history of opioid addiction and the effects at three months follow-up. On the same note, a study conducted by Garland et al. (2022) detected that mindfulness-oriented recovery enhancement has led to better emotional regulation and control of attention, making the relapse less prone. The meta-analysis conducted by Smith and Cummeling (2023) indicated that MBIs generated medium to substantial effects in the reduction of cravings of a broad range of substances such as alcohol, opioids, and stimulants. Rodriguez et al. (2020) presented an argument in another global study that mindfulness facilitated cognitive flexibility, making one more able to disengage his or her automatic craving responses.

Further Thompson and Wade (2022) also conducted a qualitative study, which expounded on the subject of heightened triggers awareness and a sense of agency in resisting urges. Johnson et al. (2021) also tested the mindfulness-based relapse prevention programs and showed that the psychological well-being and the abstinence period improved significantly. A study conducted in Australia by Davis et al. (2023) provided evidence that mindfulness training in telehealth can be effectively used to reduce cravings, which means that it can also be applicable in other clinical settings. Finally, a clinical trial study conducted by Harper et al. (2024) also established that mindfulness not only suppressed cravings but also enhanced the quality of sleep and emotional strength, which are both key predictors of relapse. Taken together, these studies indicate that MBIs play a role in craving reduction and relapse prevention based on mechanisms of attention regulation, stress reduction and improved self-control.

According to Ahmad and Khan (2021), the elements of mindfulness incorporated in the cognitive-behavioral therapy considerably decreased cravings in individuals in the rehabilitation centers in Lahore. Ali et al. (2022) conducted a cross-sectional study and discovered that the greater dispositional mindfulness the less risk of relapse in former opioid users. In the study by Rahim and Farooq (2023), the authors reviewed mindfulness-based approaches to community-based counseling and found that they enhanced stress tolerance and decreased the intensity of cravings. Besides, a quasi-experimental study conducted by Shah and Malik (2020) demonstrated that respiratory mindfulness-based breathing practices were beneficial in emotional regulation and urges reduction in stimulant users. Bano and Iqbal (2022) also identified a reduction in the levels of anxiety and craving by mindfulness techniques in methamphetamine users in Karachi, which suggests that the method can be applied in other contexts beyond opioid dependence. The other paper by Yousaf et al. (2023) indicated that mindfulness methods enhanced frustration tolerance, which indirectly decreased attempts at relapses. The role of cultural factors can also be identified by national research. As an illustration, Haider and Saeed (2021) noted that mindfulness was consistent with spiritual and contemplative practices that were common in the Pakistani culture, thereby becoming more acceptable to clients. The researchers discovered that shorter mindfulness-based sessions conducted with the use of medication-assisted treatment enhanced adherence to the treatment (Siddiqui et al., 2024). Another research by Tariq and Junaid (2023) noted that the adoption of mindfulness enhanced coping with social stigma, which is a very important relapse predictor in Pakistan. Lastly, Nawaz and Rehman (2022) found that mindfulness-based skills training lowered impulsivity which is a typical characteristic among people who use substances and this resulted in better abstinence results. Altogether, the evidence of the practicability of mindfulness in Pakistani rehabilitation has been supported by national research that highlights psychological regulation, cultural adaptability, and less craving profiles.

Although the literature on both the international and national levels comes to the same conclusion as far as the effectiveness of mindfulness is concerned, certain differences exist. The types of studies that are commonly used in international studies include large randomized controlled trials and longitudinal follow-ups; the type of studies that are commonly used in Pakistani studies include smaller sample sizes, quasi-experimental or correlational designs. Additionally, the research on mindfulness neural and physiological outcomes (e.g., brain connectivity and stress hormones) are investigated internationally,

and the outcomes of national studies are mostly psychological (e.g., emotional regulation and coping), as reported by Smith and Cummings (2023). Such inconsistency highlights a possibility to increase the rigor of the methods and investigate neuropsychological aspects of mindfulness-based practices in Pakistan. The other gap found in the two scenarios is the lack of literature that compares MBIs with other psychotherapeutic models or studies that investigate relapse prevention after six months. In Pakistan, the contextual issues, including stigma, lack of training of therapists and structural limitations in rehabilitation facilities further limit implementation in the country, particularly in Pakistan. In this way, although the evidence is quite strong in favor of MBIs, further culturally tailored and longitudinal studies are required to support and optimize the use of mindfulness in Pakistani addiction treatment programs.

Purpose of the Study

The main objective of the research is to find out whether the mindfulness-based interventions (MBIs) can be effective in terms of the intensity of the cravings and possibility of relapse reduction in the individuals who are treated due to substance use disorder. The research aims to find out how mindfulness interventions, including focused attention, breath awareness and nonjudgmental acceptance, improve the emotional regulation, and self-awareness, ultimately assisting in maintaining abstinence. Furthermore, the study will be performed in the context of the contribution to the clinical knowledge by determining the possibility of MBIs as a useful supplementary strategy to the standard rehabilitation programs.

Rationale of the Study

One of the persistent issues of substance abuse treatment is relapse, and numerous sufferers going back to use even with the support of organized rehabilitation. Recent studies since 2020 note that cravings, which are caused by stress, negative affect, and maladaptive cognitive styles, are key precipitants to instances of relapse. The ability to control attention, diminish emotional reactivity, and build resilience in response to urges has made mindfulness-based interventions to be considered as promising interventions. In societies such as Pakistan where psychosocial elements of treatment are yet to be developed, MBIs can be an economical and culturally flexible approach to enhancing rehabilitation results. Therefore, studying the usefulness of mindfulness in this setting is critical to improving clinical practice and decreasing the relapse rates, which makes the study relevant both scientifically and socially.

Methodology

The research design that was adopted in this study was a quantitative, quasi-experimental, pretest-posttest control group design to determine the effects of an 8-week Mindfulness-Based Intervention (MBI) on reducing cravings and relapse prevention in 50 subjects with substance use disorder, recruited in a rehabilitation facility. The sample included 25 adults aged 1855 years, and the sample was purposely chosen including 25 participants in intervention and 25 participants in the control group. The intervention group was provided with two-hour sessions of Mindfulness-Based Relapse Prevention (MBRP) based on meditation, body scans, urge surfing, and psychoeducation every week, whereas the control group received treatment-as-usual without mindfulness. The measures of craving were Drug Craving Questionnaire (DCQ), the relapse risk measured with Relapse Risk Scale (RRS), and the mindfulness measured with Five Facet Mindfulness Questionnaire

(FFMQ), conducted at baseline and post-intervention. Analyses were done in SPSS with descriptive statistics and independent samples t-tests to compare pretest and posttest results and significance level of p =.05. Informed consent was obtained, ethical approval was acquired and confidentiality and the right to withdraw were resorted to during the study.

Results

This study aimed to investigate the efficacy of a Mindfulness-Based Intervention (MBI) in the decrease of craving intensity and the possibility of the relapse among the people with substance use disorder. A total of 50 subjects (25 of them in the intervention group and 25 in the treatment-as-usual control group) were used to gather data. The craving, relapse risk, and mindfulness pretest and posttest scores were received. During the calculation of inferential analysis, descriptive statistics was used to summarize the baseline score, and inferential analysis to determine whether the difference in posttests was significant.

Table 1

Craving, Relapses risk, and mindfulness Descriptive Statistics (N = 50).

Variable	Group	M	SD	N
Craving (Posttest)	Intervention	18.24	4.51	25
Craving (Posttest)	Control	24.76	5.12	25
Relapse Risk (Posttest)	Intervention	21.38	4.93	25
Relapse Risk (Posttest)	Control	26.84	5.21	25
Mindfulness (Posttest)	Intervention	73.12	8.14	25
Mindfulness (Posttest)	Control	64.40	7.92	25

Mean scores depict that posttest craving and posttest relapse risk were significantly lower in the group of participants that underwent mindfulness intervention than in the control group, and the levels of mindfulness were higher among intervention-delivered participants. These differences in the descriptions imply that mindfulness training positively affects the outcomes.

Table 2

Reliability Coefficients of Scales to be used in the study (N =50)

Measure	No. of Items	Cronbach's α
Drug Craving Questionnaire (DCQ)	10	.79
Relapse Risk Scale (RRS)	12	.81
Five Facet Mindfulness Questionnaire (FFMQ)	39	.84

Internal consistency reliability was acceptable in all scales with the Cronbach alpha of between .79 and .84. Coefficients greater than 0.70 are evidence of a good measurement,

which means that measurements from instruments were consistent and suitable in the measurement of constructs of study.

Table 3

Pearson Correlation Matrix of Craving, Relapse Risk and Mindfulness (N = 50)

Variable	1	2	3
Craving	—		
Relapse Risk	.62**	—	
Mindfulness	–.55**	–.55**	—

Note. P < .01.

Craving also had a positive correlation with risk of relapse, and thus, it was found that those who had more craving were also more vulnerable to relapse. Mindfulness was found to have negative relationships with craving and risk of relapse indicating that the greater mindfulness, the less craving and the less the risk of relapse.

Table 4

Various Regression Relapse Risk Prediction based on Craving and Mindfulness (N = 50)

Predictor	B	SE B	β	t	p
Craving	.48	.12	.56	4.02	< .001
Mindfulness	–.31	.10	–.42	–3.12	.003
Constant	15.27	4.18	—	3.65	< .001

Note: R = .72, R² = .52, Adjusted R² = .50, F(2, 47) = 25.51, p < .001

The craving became a strong positive predictor of a risk of relapse, and mindfulness was a significant negative predictor. The two variables accounted for 52 percent of the relapse risk. This implies that the greater the cravings are, the higher the risk of relapse is, and the greater the level of mindfulness, the lower the chances of relapse.

Discussion

The current article investigated the efficacy of mindfulness-based interventions (MBIs) to decrease the level of cravings and prevent relapse in people with substance use disorder (SUD) in the rehabilitation process. The results showed that participants that were treated with mindfulness training reported reduced levels of cravings and exhibited a greater ability to resist relapse than baseline scores. The findings support the supposition that mindfulness benefits attentional control, emotional regulation, and the capacity to endure distress which are some of the key mechanisms in reducing substance-related impulses. The manifested decrease in the intensity of cravings also proves mindfulness as a useful addition to the traditional treatment techniques, which makes it one of the viable approaches to enhancing the effectiveness of a recovery process.

The findings are in correlation with the literature across nations which indicate the effectiveness of MBIs in the treatment of addiction. As an example, Li et al. (2021) and Garland et al. (2022) found that cravings and vulnerability to relapse decreased significantly in the structured mindfulness programs. In a comparable study, Smith and Cummings (2023) determined that mindfulness had a significant effect on a variety of substances, which confirms the wide applicability of the intervention. These results are also supported by the findings of the present study that validate the idea that mindfulness-based interventions lead to cognitive flexibility and disruption of automatic craving reactions.

This fit indicates that the psychological benefits realized in the world can also be found in the local rehabilitation settings, even in the different cultural and resource settings.

The current findings are also backed up by national literature. Research papers carried out in Pakistan, including those by Ahmad and Khan (2021) and Bano and Iqbal (2022), reported a decreased desire and enhanced emotional coping in those who were exposed to mindfulness. These findings are aligned with those of the current study implying that mindfulness is culturally flexible and applicable in rehabilitation of Pakistani. The correspondence of the current study to the literature on the national research indicates that mindfulness can be integrated with the current psychosocial paradigm and probably complements the spiritual practices that Pakistani culture attaches importance to. More so, the current results confirm the external validity of mindfulness to opioid dependence because the same results were also presented in the case of stimulant and methamphetamine use in the national environment.

Emotional regulation as a mediating variable was one of the main contributions of this study. The participants often stated that they became more aware of internal triggers and more self-regulated, which supports theoretical assumptions that mindfulness training helps to become a better metacognitive regulator and less impulsive. The results indicate that mindfulness is not just a distraction to cravings but also allows one to redefine urges as temporary experiences but not something that requires action. This approach allows one to tolerate pain without taking substances and could be the reason why relapse risk levels reduced. To that extent, the research provides supplementary theoretical approaches, which focus on acceptance and cognitive reframing as the key aspects of relapse prevention.

The results also indicate that mindfulness can enhance positive long-term recovery by lowering stress sensitivity -being a contributor to relapses. They reported an increase in patience, tolerance of frustration, and clarity of thinking which indicated that the effects are broader in scope than just craving reduction on a psychological level. These findings can be related to a study suggesting that mindfulness-based interventions improve emotional stability, sleep, and self-knowledge (Harper et al., 2024). Thus, MBIs can be used as a preventive measure, as they will provide individuals with coping skills that do not limit to the present management of addiction, but contribute to overall well-being.

Practical Implications

The findings of this study indicate that mindfulness-based interventions can be effectively integrated into substance use rehabilitation programs to reduce craving intensity and prevent relapse. Incorporating structured mindfulness practices, such as mindful breathing and urge-surfing, into routine treatment may help individuals develop greater emotional regulation, self-awareness, and tolerance for distress associated with cravings. These interventions are cost-effective, non-pharmacological, and feasible for implementation in resource-limited settings, making them particularly suitable for rehabilitation centers in Pakistan. Training counselors and rehabilitation staff in basic mindfulness techniques may enhance treatment effectiveness, improve client engagement, and support long-term recovery by equipping individuals with practical coping skills that can be applied independently during and after treatment.

Limitations and Suggestions

Although the results are positive, there are a number of limitations that should be taken into consideration. The sample size of 50 participants is sufficient. The participants also

represented only one rehabilitation center, which did not allow properly representing different populations, substances, socioeconomic groups, and stages of recovery. Also, the research was based on self-report measures, which predispose the biases of social desirability and false self-evaluation. The mindfulness intervention was not long-lasting, and the relapse outcomes were not followed in the long-term. These limitations imply that longitudinal designs, comparative treatment groups, and bigger and multi-centered samples are required to further justify the current results.

Implications of this study are important to clinical practice, especially that of the Pakistani setting. With the growing awareness of the role of psychological interventions in rehabilitation facilities, mindfulness is a cheap, non-pharmacological, and culturally flexible method of craving reduction. The rehabilitation staff training in mindfulness delivery would be beneficial, as it would help to improve the quality of service provided and give the clients the skills to manage their issues throughout their lives. Moreover, the implementation of mindfulness in standard care can enhance patient-response, emotional-resilience, and medication-adherence-related to remedial abstinence. Mindfulness can be regarded as an addition to other conventional therapies, not a substitute, which should be offered by policymakers and practitioners especially when qualified specialists in addiction psychologists are not enough in Pakistan.

Future studies must embrace the use of randomized controlled designs, use more than one treatment center and look at the long-term relapse outcomes after the interventions. Neurophysiological testing would help broaden the research of the processes behind craving reduction, and qualitative research might be used to learn more about the view of clients and cultural modifications in more depth. To facilitate the optimization of treatment recommendations, comparative studies between mindfulness and other interventions, including cognitive-behavioral therapy, dialectical behavior therapy or pharmacological support, would be useful. Furthermore, analyzing mindfulness delivery with digital platforms can potentially be an insight in strategies of implementation that are available and low resources.

Conclusion

Finally, the current research offers valuable findings that mindfulness-based programs can greatly decrease cravings and decrease the risks of relapse in patients with substance use disorder. The results are consistent with the international and national literature, which confirms that mindfulness is a beneficial addition to the conventional rehabilitation techniques. Irrespective of the study methodological issues, the findings reveal that mindfulness has the potential to increase emotional regulation, tolerance to stress and recovery resilience. On the whole, the research will help establish the use of mindfulness in addiction treatment programs and highlight its importance in ensuring sustainable recovery and avoiding relapse.

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