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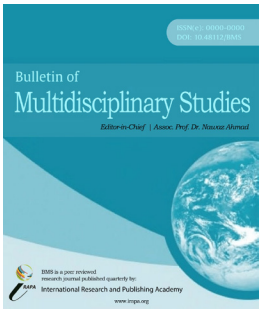

Original Article

Mindfulness-Based Relapse Prevention for Anxiety and Impulsivity in ATS Users: Insights from Pakistani Rehabilitation Context

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ABSTRACT

Amphetamine Type Stimulant (ATS) users frequently exhibit elevated levels of impulsivity and anxiety, which are significant contributors to relapse and poor treatment outcomes. In Pakistan, the increasing use of amphetamine type stimulants highlights the immediate need for impactful psychological intervention addressing these psychological factors. The purpose of the study was to assess the effectiveness of mindfulness-based relapse prevention (MBRP) in reducing anxiety and impulsivity among ATS users. A quasi-experimental design was utilised with 30 participants from the rehabilitation centres in Islamabad and Rawalpindi. Participants were assigned to two distinct groups: an experimental group (n=15) receiving 2-hour MBRP sessions and a control group (n=15) receiving treatment as usual (TAU). Data were collected using the Short UPPS-P Impulsive Scale and Beck Anxiety Inventory. An independent sample t-test was executed to assess the differences between the two groups. The findings indicated that MBRP significantly reduce impulsivity and anxiety. However, further studies with larger and more diverse populations are necessary to enhance the generalizability of these results.

Keywords: *Amphetamine-type stimulants, Anxiety, Impulsivity, Mindfulness-based relapse prevention, Relapse*

INTRODUCTION

Misuse of amphetamine-type stimulants has emerged in Pakistan as a pressing public health concern, mirroring global trends in stimulant use. According to United Nations Office on Drugs (2024), amphetamines are the world's second most used illicit substance. Alarmingly, the estimated number of methamphetamine users rose from 35 million in 2015 to 292 million by 2022, a staggering 20% increase over the past decade (Citaristi, 2022). In regions such as East and South Asia, including Pakistan, the prevalence of amphetamine uses ranges between 0.2% and 1.2%, with methamphetamine use showing a particularly steep upward trajectory. Within Pakistan, the situation is equally dire, with 6% of the population using illicit drugs annually. Punjab reports the highest number of substance users at 2.9 million, while Khyber Pakhtunkhwa leads in prescription amphetamine use, and Balochistan exhibits the highest methamphetamine consumption. Nationally, approximately 4.25 million people are dependent on substances and require professional intervention. These patterns reflect not only a growing public health crisis but also the significant social and economic burdens imposed by Amphetamine Type Stimulant (ATS) misuse, particularly due to the substances' high relapse potential (UNODC, 2013).

As a result of this growing concern, Ministry of Narcotics Control initiated the National Drug use Survey, INL and UNODC to examine the rising patterns in synthetic drug use across the country, including amphetamines (Ministry of Narcotics Control, 2022-2024). Moreover, in Pakistan, the rising consumption of smokable methamphetamine (ice), particularly among young people, constitute a severe public health and safety risk (Ahmed & Hakani, 2018). Major cities like as Karachi, Lahore and Islamabad have experienced considerable increase for its use (Tahir, 2024). However, in Islamabad, the spike in crystal meth usage has resulted in violet episodes, including killings, illustrating the drug's negative impact on mental health and behaviour, which present a substantial risk to community well-being, especially for the youth. Whereas, despite the escalating figures, the progress in the formulation and execution of specialized treatment interventions remain grossly inadequate, highlighting the need for innovative and effective methodologies to address this intensifying crisis (Dogar & Shafi, 2019).

Correspondingly, a multitude of factors contribute to the methamphetamine epidemic in Pakistan. The presence of porous borders, weak law enforcement, economic instability, unemployment and limited access to healthcare and rehabilitation services (Tahir, 2024). Nonetheless, in Pakistan, amphetamine type stimulants effects entire communities by increasing crime and insecurity. Additionally, it puts families under financial and emotional burden and add increase the strain on the healthcare system to offer assistance and treatment. Certainly, the pervasive use of methamphetamine substantially undermines societal law and order, as numerous violent offenses, including homicides, thefts, and assaults, are correlated. The drug's widespread availability, even within affluent demographics, has exacerbated this pressing issue. Notably, methamphetamine elevates dopamine levels by 600% above baseline, resulting in significant organ damage and a markedly reduced life expectancy (Khan, 2023).

Furthermore, it has also been extensively documented that addictive disorders manifest as chronic and recurrent conditions (Marlatt et al., 1986; Brandon et al., 2007) and according to National Institute on Drug Abuse, relapse remains a central challenge in treating substance use disorders, with global relapse

rates are reported to range from 40% to 60%. The relapse rate for methamphetamine users is even higher, with data from SAMHSA (1994-2004) showing 52.2% of methamphetamine users relapses (Regan, 2025). It is even more alarming in Pakistan where the relapse rate is 90%, primarily because of inadequate family and community support systems (Yaqub, 2013). Along with that, studies also indicates that more than two-thirds of those suffering from substance use disorders suffer from severe anxiety (Hodgson et al., 2016). Moreover, anxiety and panic are commonly reported psychiatric symptoms among methamphetamine users (Paz-Ramos et al., 2023), highlighting the importance of addressing anxiety in recovery-focused intervention. Not only that, but individuals also who use methamphetamine typically exhibit escalation in impulsivity (Mihan et al., 2018).

Even though with these efforts, the management of drug use, particularly methamphetamine use, remains a critical challenge due to fever treatment options and with unclear and inconsistent guidelines. However, this gap, combined the rising prevalence of methamphetamine use and fragmented approaches to care, highlights the urgent need for evidence-based intervention to address this escalating crisis (Dogar & Shafi, 2019). Further empirical investigation is warranted to devise more effective strategies for engaging methamphetamine users in therapeutic contexts (Hamilton & Dunlop, 2006). However, recent research concerning Mindfulness-Based Relapse Prevention indicates that clinical evidence supports a significant association between mindfulness practices during recovery and decline in substance use and cravings intensity in persons affected by substance use disorders (SUD) (Witkiewitz et al., 2013; Witkiewitz et al., 2014). In addition to that, it augments adaptability in response to environmental stimuli, diminishes the likelihood of recurrence, and fortifies self-efficacy. Additionally, it encompasses educational components regarding breaches of abstinence and the management of positive outcome expectations (Bowen et al., 2009). Substance abuse treatment programs are increasingly incorporating this therapeutic methodology, either as a standalone intervention or as a complement to existing therapeutic modalities (Black, 2014).

LITERATURE REVIEW

Stimulant use disorder, classed under substance use disorder in the DSM-5TR, is the compulsive use of stimulants such as amphetamines, methamphetamines and cocaine. It has essential characteristics with other substance use disorders, including loss of control, dangerous usage, social impairment and pharmacological dependence (American Psychiatric Association, 2022). Amphetamine is a stimulant that enhance brain activity, alertness and mood. It belongs to a group of psychoactive substances which includes amphetamines, cocaine and certain prescription drugs. Methamphetamine, an amphetamine derivate, increasingly popular in the 1940s to 1950s, prescribed for various conditions (Vearrier et al., 2012). Notwithstanding the implementation of more stringent international regulations around the year 1970 aimed at curtailing misuse (Rasmussen, 2015), methamphetamine continues to rank as the second most prevalently utilized illicit substance following marijuana (UNODC, 2024). The rate of its use and distribution has experienced a notable escalation across the regions of Asia, Australia and America (Goyal & Kaur, 2023).

Compounding the challenge is the pharmacological profile of amphetamine-type stimulants, which exert both psychoactive and sympathomimetic effects. They exhibit a prolonged duration of action than other stimulants such as cocaine, remaining in the bloodstream ranging from 8-13 hours versus 1-3 hours of cocaine (American Psychiatric Association, 2022). It has been demonstrated that prolonged exposure to these substances increases their addictive potential and reduces the amount of use required to maintain dependence (Castro et al., 2000). Moreover, anxiety is one of the key psychological factors that complicate the recovery process from ATS use. There are evidences that psychostimulants such as amphetamines exhibit an exacerbated anxiety response, thereby increasing psychological distress during both active use and withdrawal (Vorspan et al., 2015). Also, numerous studies have analyzed the intricate link involving anxiety, mood disorders and substance use. However, no definitive casual pathway has been established to explain why anxiety can lead to drug use as a maladaptive coping mechanism (Abraham & Fava, 1999).

In addition to substance use and anxiety, impulsivity also contributes to addiction vulnerability. Often, people with SUDs report heightened impulsivity, which either contributes to the onset of substance use or exacerbates cycle of use and relapses (Stanford et al., 2009). An individual may exhibit impulsivity as a trait or because of chronic stimulant use, resulting in deteriorated self-control and increased risk-taking behaviours (Dalley et al., 2011). It is important to stress that this bidirectional relationship underscores impulsivity's role as both a precursor and a consequence

of the use of ATS, which further complicates treatment and recovery. Additionally, individuals who engage in methamphetamine consumption demonstrate elevated levels of impulsivity and diminished resilience, which adversely affects their capacity to navigate life's challenges and maintain self-regulation (Mihan et al., 2018). Methamphetamine represents a highly addictive stimulant frequently linked to chronic relapse and dependence. The fleeting euphoria which is linked with methamphetamine use lead to positive reinforcement whereas the craving and the withdrawal sensation led to negative reinforcement which results in continuous use and relapse risk behaviours (Scott, 2024).

Moreover, researches have shown the maximum individuals around two-third of it relapse within few months after completing their treatment (Sumnall et al., 2008). Also, more than 85% individuals relapse within one year after completing their treatment (Dodge et al., 2005). These data demonstrate the urgent need for effective and evidence-based therapies which can improve long term sobriety and lessen relapse rate. After considering these constraints, and the complexity of SUDs MBRP is now widely acknowledged as an impactful intervention where it provides individual to develop emotional management and self-awareness (Bowen et al., 2009). Likewise, Witkiewitz et al., (2013) found that mindfulness-based relapse prevention can be highly beneficial for those experiencing severe substance use disorder (SUD), especially when anxiety levels are high. According to Witkiewitz et al., (2014), MBRP helps to decrease cravings and substance use by influencing brain regions, involved in relapse primarily by reducing the release of chemicals in these brain areas. In accordance with neuroimaging evidence, MBRP is capable of reversing addiction-related neuroplastic changes, thereby laying a strong foundation for long term recovery. Further studies have demonstrated MBRP's effectiveness in reducing anxiety, stress and relapse risk while simultaneously enhancing emotional regulation and tolerance to distress (Vadivale & Sathiyaseelan, 2019). Moreover, it has been shown to mitigate depression symptoms and aggressive symptoms, particularly when combined with other therapeutic modalities (Ramadas et al., 2021).

In Pakistan, where amphetamine addiction poses escalating treatment challenges, such interventions are particularly necessary. Despite the increasing prevalence of ATS use, therapeutic interventions remain limited and inconsistent, lacking the cultural adaptation and empirical support necessary for meaningful impact (Dogar & Shafi, 2019). Both urban and rural populations are increasingly exposed to methamphetamine, along with other substances like marijuana and heroin, yet an inadequate infrastructure exists to address these disorders (Hussain & Saleem, 2021). Alarmingly, relapse rates for methamphetamine dependence can exceed 50%, often surpassing those for other drugs (Brecht & Herbeck, 2014). Given the absence of comprehensive psychosocial intervention, MBRP presents a viable, structured framework for addressing the root causes of relapse, such as emotional triggers, stress and automatic behavioural patterns (Witkiewitz et al., 2014).

METHODOLOGY

Quasi experimental research, a pretest-posttest control group design was adopted as it is more feasible in real-world setting such as rehabilitation centres. As this method is employed in multiple studies of same nature (Lawan & Gabou, 2024). A Mindfulness-Based relapse Prevention intervention was conducted at accredited rehabilitation centres in Rawalpindi and Islamabad. A study involved 40 male participants who were purposively selected based on DSM-5-TR criteria for stimulant use disorder. There were 15 participants in each group, with 10 additional participants included in of participants dropped out during the process.

Inclusion Criteria & Exclusion Criteria

To qualify for the inclusion, participants age aged 20 to 40 years were included, targeting the high-risk period of early to middle adulthood for substance use and recovery challenges. They were required to have a minimum matriculation level of education, to be able to speak and understand Urdu and English and to provide informed consent and were diagnosed with stimulant use disorder. Exclusion criteria ruled out individuals with dual diagnoses, severe medical or psychiatric conditions, those in detoxification, or receiving treatments outside of TAU and MBRP.

Measures

Short UPPS-P Impulsive Scale

The abbreviated version comprises four items per scale, culminating in a total of 20 items distributed across five factors. The brief version has consistently demonstrated internal consistency (0.74–0.88 across subscales). It exhibits commendable reliability, with Cronbach's alphas ranging from 0.70 to 0.84 (Billieux et al., 2012).

Beck Anxiety Inventory

It is a questionnaire measuring common symptoms of clinical anxiety. The BAI constitute of 21-item self-report inventory thereby respondents indicate the extent to which they experience distress from each symptom. Each symptom is evaluated on a 4-point scale with the following classification: Not at all (0 points); Mildly; it does not cause me significant discomfort (1 point); Moderately; it was considerably unpleasant, but I could endure it (2 points); and Severely; I could barely tolerate it (3 points). The total of the items yields a score that may vary from 0 to 63 (Jolly et al., 1993).

Procedure

The study was approved by the Ethics committee from the Institutional Review Board of the National University of Medical Sciences, Rawalpindi. Permissions were subsequently obtained from rehabilitation centres in Rawalpindi and Islamabad. Researchers briefed administrative staff and eligible participants on the study's objectives and procedures. Informed written consent was secured from all study participants. After orientation, participants were randomly allocated to one of the two group, experimental group (receiving MBRP + TAU) or the control group (receiving TAU only). Pre-tests were conducted for both groups before the intervention. The experimental group underwent eight MBRP sessions over two months, after which post-tests were administered to assess the intervention's impact.

Mindfulness based Relapse Prevention Intervention

The MBRP (Mindfulness-Based Relapse Prevention) group will attend eight weekly sessions, each with duration of 2 hours. A trained psychotherapist will conduct these sessions, adhering to the MBRP protocol developed by Bowen et al., (2009). The content of each MBRP therapy session will follow the schedule outlined below.

Table 1
Summary of mindfulness training sessions in the experimental group

First session	Central theme: Automatic Pilot and Relapse This section examines the propensity to engage in behaviours mechanically or unconsciously. The raisins exercise and body scan meditation are introduced as practical application.
Second session	Central theme: Awareness of Thoughts and Emotions related to Triggers and Craving. Introduced the concepts of triggers, desires and thoughts related to substance use without resorting to an automatic reaction. Participants were encouraged to observe the way the triggers manifested in their thoughts, emotions and physical sensation.
Third session	Central theme: Mindfulness Practices in Day-to-day Life The Sober space concept provides a framework apply mindfulness in daily life activities. Due to which individuals get more aware and it coexists with arising physical and emotions beyond formal practice. Additionally, 3rd session initiated the exercise of formal seated mediation.
Fourth session	Central theme: Mindfulness Practices in High-Risk Situations. This session emphasizes the importance of remaining present in contexts or with individuals previously associated with substance use, employing mindfulness as a tool to face distress or urges without engaging in substance seeking behaviour. Participants will recognize their own relapse risks and instigate strategies to manage the intensity of emotions that arise in high-risk circumstances.
Fifth session	Central theme: Acceptance and Skilful Action It may often appear paradoxical to accept unwelcome thoughts, feelings and sensations. Nevertheless, this acceptance might represent the initial step toward meaningful change. Acknowledging present experience serves as a crucial insight into the appropriate actions to undertake. Techniques such as the breathing space are practiced with a focus on their application in tough situation. This session transition from recognizing alert signs and leaning to pause to implementing skilful actions in both high-risk contexts and day to day life.
Sixth session	Central theme: Seeing Thoughts as Thoughts This session delves into the awareness of the relationship with ones thinking, concentrating on the experience of thoughts as mere thoughts (even when they may seem undeniably true). We investigate the role that thoughts have in the relapse cycle identify those thoughts that appear problematic and explore skilful methods to engage with these thoughts.
Seventh session	Central theme: Self-Care and Lifestyle Balance The current session canters on identifying individual's own cautionary signs for relapse and discerning effective responses when such warning signs manifest. Discussion includes wider lifestyle habits, achieving equilibrium, fostering self-kindness and recognizing significance of incorporating enriching activities as integral components of comprehensive balanced life.
Eighth session	Central theme: Social Support and Continuing Practice In the conclusion session, we revisit the techniques acquired throughout this course and address the critical significance of stabling a support network. Participants review their learning experiences and individual strategies for integrating mindfulness practice into their daily lives.

RESULTS & FINDINGS

The study involved 30 male participants diagnosed with methamphetamine use disorder, with an average age of 27.7 years. They were evenly assigned to experimental (MBRP + TAU) and control (TAU only) groups. Most participants were unmarried, not employed, and had attainted education up to the matriculation. Inhalation was the predominant method of substance use, and the majority reported receiving support from family or peers during treatment. All participants used methamphetamine, with most having a usage history of 0–5 years and undergoing treatment 0–3 times.

Table 2

Descriptive Statistics and Alpha Reliability Coefficient for anxiety and impulsivity (N=30)

Variable	N	A	Min	Max	Mean	SD	skewness	Kurtosis
Pre-anxiety	30	.84	8	50	21.8	10.1	.92	.60
Pre-impulsivity	30	.75	39	63	48.7	5.2	.29	.78
Post anxiety	30	.89	0	38	8.53	8.1	1.9	4.8
Post impulsivity	30	.81	24	61	42	8.8	.34	.59

Note, N= Total number of item, a=Alpha reliability, M= Mean, SD= Standard Deviation

The alpha reliability coefficients were acceptable, ranging from .75 to .89, indicating consistent measurement. Skewness and kurtosis values suggest that data distribution was within acceptable limits for both variables.

Hypothesis

There will be significant reduction in anxiety and impulsivity among amphetamine-type stimulant users in experimental group compared to Treatment as Usual (TAU) control group after 8 sessions of MBRP.

Table 3

Independent Samples t-Test Comparing Anxiety and Impulsivity Between Experimental and Control Groups

Variables	Experimental group		Control group		T	P
Pre	**M**	**SD**	**M**	**SD**		
Anxiety	22.80	9	20.80	11.32	.535	.597
Impulsivity	48.80	6.61384	48.60	3.68	0.102	0.919
Post	**M**	**SD**	**M**	**SD**		
Anxiety	5.13	4.5	11.93	9.5	-2.49	0.021
Impulsivity	32.00	8.00	42.30	9.68	-2.30	0.026

Note, f = Frequency, % = Percentage, M= Mean, SD= Standard Deviation

Impulsivity scores also were reduced significantly among participants in the experimental group (M = 32.00, SD = 8.00) compared to the control group (M = 42.30, SD = 9.68; t= 2.30, p = 0.026). Similarly, anxiety levels were significantly lower post-intervention in the experimental group (M = 5.13, SD = 4.50) in contrast to the control group (M = 11.93, SD = 9.50; t= -2.49, p = 0.001).

Discussion

The present investigation was carried out to evaluate the efficacy of Mindfulness-Based Relapse Prevention (MBRP) in reducing anxiety and impulsivity. Anxiety also showed a highly significant decrease ($p < 0.021$, $\eta^2 = 0.24$), reflecting the large effect size. These results reflect that MBRP was helpful particularly in managing anxiety and impulsivity among those who use amphetamine type stimulants. This data is also corroborated by research conducted by Witkiewitz et al., (2013), which showed that MBRP can effectively lower the anxiety level in individual who are suffering from mental disorders and substance use disorder. Furthermore, the current research's result indicted decrease in impulsivity by ($p=0.026$, $\eta^2 =0.159$ which shows large effect size. These result supports the conclusions that MBRP enhance the ability of individual to regulate impulsive behaviour. Devis et al., (2019) found that urgency related impulsivity is significantly reduced by MBRP whereas according to Yaghubi, et al., (2017), there is noticeable reduction in relapse risk and impulsivity due to MBRP. When these conclusions are seen through the prism of distinct culture of Pakistan it holds significance as cultural influences such as family relationships, societal expectations and religious views have an impact on SUDs and along with its rehabilitation.

It is important to note, in Pakistan the stigma around the substance use is a significant obstacle to get treatment. Apart from that it puts limit on access to employment, healthcare, insurance, legal rights but also leads to internalized shame and social isolation. As an impact of this, people usually report increased isolation, damaged relationships, poor mental health and enhanced addiction severity. Similarly, according to Khalid et al. (2020) stigma can contribute to low self-esteem and depression due to which involvement in treatment as well as recovery is limited. To effectively address substance use, solutions must be evidence based and culturally acceptable by considering the target's population lived experiences and beliefs. Moreover, the efficacy of MBRP has shown to be highly promising. Sohail and Sadaf (2022) found that administering an MBI to a 21years old with substance use disorder considerably deceased in his withdrawal symptoms and increase in his over well-being. This study emphasizes the importance of MBIs in Pakistani culture where values like spiritual grounding, self-regulation and introspection are strongly ingrained. Furthermore, a

systematic review by Hussain and Saleem (2021) that impulsivity, uncontrolled aggression and relapse was reduced due to MBRP in amphetamine type stimulants users, which highlight its relevance.

These results, finally, highlights the need for the holistic therapeutic techniques which include skill development, emotional regulation and mindfulness. As mindfulness-based relapse strategies have been proven to reduce suffering and enhance overall well-being (Khoury et al., 2013; Sinatra & Black 2018). When combined with recreational activities and support from family and friends, it significantly enhances the likelihood of long-term recovery (Litt et al., 2009). In addition to it, according to Khalid et al. (2020) to challenge stigma, public awareness programs are required and highlighting the biopsychosocial model of addiction to educate masses that will enhance accessibility to treatment as well as reintegration into the community.

CONCLUSION

The study shows that MBRP is effective in reducing anxiety and impulsivity in patients with amphetamine type stimulant use in rehabilitation canters of Pakistan. The study further highlights MBRP prospects as culturally appropriate intervention which aligns with cultural norms by promising reflection, self-regulation, and grounding. The study emphasizes Pakistan's particular sociocultural obstacles such as stigma surrounding drug use and promote MBRP as an adaptive technique for addressing impulsivity and anxiety in resource limited contexts. As a pioneering initiative, this research contributes to global health goals by offering insights into relapse prevention strategies and advocating for the mindfulness-based practices into national treatment frameworks. By addressing both clinical and cultural dimension of substance use, MBRP hold promise for improving recovery outcomes in Pakistan and beyond.

Limitations

This research study contains some limitations which should be considered prior assessing the results. As the study lack a controlled design which in turns limits its ability to attribute the progress only to MBRP, as it was provided along with treatment as usual. Moreover, the small sample size has made it challenging to determine its impacts. Moreover, the study was conducted is Islamabad and Rawalpindi as well as the inclusion of males only which reduces its generalizability. Follow-up data on the long-term impact of MBRP is limited due to time and resource constraints, however, earlier studies has shown the benefits beyond a 12-month timeframe. Further to address these adequacies, future research should include RCTs with diverse population. Developing culturally appropriate mindfulness techniques, assess its acceptance and include follow ups. Also is it recommended to include mix method techniques which encompass both subjective and objective measurements.

Competing Interest

The authors had no competing interests.

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