



Khadija Tariq¹, Fatima Zaffar², Asma Riaz³, Umar Hayat⁴, Saba Idrees⁵, Zainab Kausar Khan⁶

Abstract

Financial constraints usually hinder students, especially those in low-middle income countries, from seeking mental health interventions. Hence, it is necessary to identify effective, affordable and sustainable counter-stress measures for college students in low-middle income countries context. This study examines the effect of Mindfulness-Based Stress Reduction (MBSR) on psychological outcomes of students, especially when they are exposed to stressful situations. Forty-nine students with an age range from 18 to 22 years old were initially recruited (35 females; mean age = 19.9 ± 0.75 years and 14 males; mean age = 20.0 ± 0.6 years). After signing the consent form, subjects were randomly assigned into two groups: Test group – practice MBSR (N = 25) and Control group - do not practice MBSR (N = 24). The MBSR program includes 8-weeks. Perceived Stress Scale (PSS) and Depression, Anxiety, Stress Scale (DASS-42) were used as research instruments. Findings reveal that test group showed a decrease in negative emotional states after the intervention of MBRS. It is suggested that practice of MBSR might enhance the students' ability to encounter with stressful situations. In conclusion, MBSR intervention led to a sustained reduction of negative emotional states. MBSR as an effective and sustainable stress-countering approach for students in LMICs.

Keywords: Mindfulness-Based Stress Reduction, Psychological Problems

1. Introduction

Nowadays, mental health is at the centre of the debate in modern societies. Mental disorders are indeed linked to higher mortality rates, as an example, people that suffer from depression have a 40% to 60% greater chance of dying prematurely. Suicide is a leading cause of death due to mental health problems and is the second cause of death among young people worldwide (World Health Organisation, 2013). With this problem in mind, mental health became such an urgent issue that the World Health Organization (WHO) defined the Mental Health Action Plan 2013–2030, which aims to develop strategies for promotion, prevention, treatment, and recovery from mental disorders (World Health Organisation, 2013). In the last years, some alternative therapies aiming at the promotion of well-being through the prevention of mental health disorders have been developed. Mindfulness meditation and some mindfulness-based approaches have gained special attention in this field. This meditation practice has been shown to induce positive behavioural changes and improvements in brain function and connectivity (Infante et al., 2001).

Mindfulness training is usually described as the ability to pay nonjudgmental attention to the present moment (Tang et al., 2015). The learning of Mindfulness techniques involves adopting an attitude of openness and acceptance of one's experiences, which empowers the individual to react more consciously, and without automatic reactions to internal or external distractors (Zollars et al., 2019; Ibrahim & Rasheed, 2020). Regarding the psychological benefits of Mindfulness meditation, several studies pointed out declines in loneliness, depression, anxiety, stress, sleeping problems and rumination (Geiger et al., 2016). Furthermore, Mindfulness meditation has also shown interesting benefits in non-clinical contexts, such as reducing stress and anxiety in school (Felder et al., 2016; Kang et al., 2018; Rasheed, 2020) work (Heckenberg et al., 2019) or in competitive sports' settings for more detailed views on those applications (Salmon et al., 2004).

Some studies have also found correlations between the practice of mindfulness meditation and other psychophysiological benefits including improvements in functional connectivity (Tang et al., 2015), emotion elicitation (Jadhav et al., 2017), and effectiveness in handling cognitive load (Ismail & Ali, 2020; Gupta et al., 2021; Musa, 2024). Mindfulness meditation has shown beneficial outcomes even when applied in clinical contexts such as chronic pain (Kabat-Zinn et al., 1985) fibromyalgia (Grossman et al., 2007) and cancer (Carlson et al., 2005; Specia et al., 2000). Previous studies have not fully addressed whether MBSR-associated psychological effects could be sustained and what might be the neural correlates of these effects. Concomitantly, it is currently unclear whether the overall psychological effects of MBSR could link with the practitioner's ability to control their stress and anxiety levels when exposed to immediate stress stimuli. To address these inquiries, combining psychological questionnaires with real-time brain activity monitoring techniques could allow us to further understand the effect of MBSR. Electroencephalogram (EEG) is one such technique that has been widely applied to monitor the neural oscillation of distinct brainwaves such as alpha wave. An increase in alpha band power in the prefrontal and frontal lobe during meditation or eyes closed states has supported the effectiveness of the MBSR program on stress reduction and self-awareness enhancement (Aftanas and Golocheikine, 2001, Cahn and Polich, 2006, Gao et al., 2016, Morais et al., 2021, Moynihan et al., 2013; Henry, 2022).

Recently, utilizing electrophysiological measures (i.e., ECG, EEG, and EDA), Morais et al. has found that MBSR is associated with an increase of alpha power in the prefrontal cortex during and after the intervention, but no significant similar increase was observed at other brain areas and especially, at two months post the training course (Morais et al., 2021). Additionally, these results are hindered by the lack of a control group, thus giving less power to the conclusion that the change in prefrontal alpha power might be associated with mindfulness training. In light of these findings, it is necessary to design the EEG study to clarify the short-term and sustained effects of MBSR on brain activity of students, especially when exposed to immediate stress conditions. These understandings will certainly shed light on the mechanism of MBSR's effectiveness.

¹ City College of Science and Commerce, University Campus, Multan, Pakistan, tariqkhadija431@gmail.com

² City College of Science and Commerce, University Campus, Multan, Pakistan, fatimazaffar59@gmail.com

³ City College of Science and Commerce, University Campus, Multan, Pakistan, asmariiaz16183@gmail.com

⁴ Ph.D Scholar Department of Business and Administration, NCBA&E Sub Campus, Multan, Pakistan, umarhayatrehmani786@gmail.com

⁵ Lecturer City College of Science and Commerce, University Campus, Multan, Pakistan, sabaidreesheikh@gmail.com

⁶ Lecturer City College of Science and Commerce, University Campus, Multan, Pakistan, zainabkhank520@gmail.com

1.1. Statement of the Problem

Chronic stress has become a prevalent issue in modern society, contributing to various physical, emotional, and mental health problems. Despite the widespread use of stress management techniques, many individuals continue to struggle with effectively reducing stress. Mindfulness meditation, a practice that involves focusing on the present moment and cultivating awareness without judgment, has gained attention for its potential benefits in managing stress. However, there is a need for further investigation into the specific effects of mindfulness meditation on stress reduction, as existing research presents mixed results. This study aims to examine the impact of mindfulness meditation on individuals' stress levels, exploring whether regular practice can significantly reduce perceived stress, enhance emotional regulation, and improve overall well-being. Understanding the relationship between mindfulness meditation and stress reduction could provide valuable insights into alternative, non-pharmacological approaches to managing stress.

1.2. Rationale of the Study

The rationale for investigating the effects of mindfulness meditation on stress reduction lies in the growing body of evidence suggesting that mindfulness practices, particularly mindfulness meditation, can have significant psychological and physiological benefits. Stress is a widespread issue that impacts mental health, physical well-being, and overall quality of life. Chronic stress is linked to various health conditions such as anxiety, depression, cardiovascular diseases, and a weakened immune system. Therefore, identifying effective interventions for stress reduction is crucial. Mindfulness meditation, which involves focusing on the present moment with a non-judgmental awareness, has been proposed as a potential method to mitigate stress by helping individuals manage their emotional responses to stressors. Previous studies have demonstrated that mindfulness meditation can reduce the body's stress response, promote emotional regulation, enhance self-awareness, and increase resilience to stress.

1.3. Objectives of the Study

- To investigate effect of MBSR on perceived stress, depression, anxiety and stress among college students

1.4. Significance of the Study

The significance of a study investigating the effects of Mindfulness Meditation on stress reduction lies in its potential to contribute valuable insights into the psychological and physiological benefits of mindfulness practices. As stress is a major factor contributing to various mental and physical health problems (e.g., anxiety, depression, cardiovascular disease), identifying effective and accessible interventions for stress management is crucial. Mindfulness meditation, which involves focusing on the present moment and accepting thoughts and feelings without judgment, has been increasingly popular in recent years as a tool for improving mental well-being. This study could:

- **Provide Empirical Evidence:** By systematically investigating the relationship between mindfulness meditation and stress reduction, the study would contribute to the growing body of research supporting mindfulness as a useful tool for managing stress. This can lead to more concrete evidence of its benefits and effectiveness in reducing the physiological and psychological impacts of stress.
- **Enhance Mental Health Treatment:** The findings could inform clinical practices, offering mindfulness as a cost-effective, non-invasive treatment option for individuals experiencing chronic stress, anxiety, or related conditions. It could also provide mental health professionals with additional strategies to integrate into therapeutic interventions.
- **Contribute to Public Health:** Given the widespread nature of stress in modern society, this research could have broader public health implications by promoting mindfulness meditation as a preventive measure to reduce the overall burden of stress on society. It may also help create more accessible and affordable tools for managing mental health in the general population.
- **Clarify Mechanisms of Action:** The study could explore how mindfulness meditation affects the brain and body, examining changes in brain activity, hormone regulation (such as cortisol), and the autonomic nervous system. Understanding the mechanisms through which mindfulness meditation works would deepen our understanding of its therapeutic potential.
- **Support Personal Well-Being:** On a personal level, the research can empower individuals to engage in mindfulness meditation as a means to manage their own stress levels and enhance overall emotional well-being, leading to improved quality of life. In summary, the significance of this study lies in its potential to advance both scientific understanding and practical applications of mindfulness meditation for stress reduction, with wide-ranging implications for mental health, public health, and personal well-being.

2. Method

2.1. Participants

Forty-nine students with an age range from 18 to 22 years old were initially recruited (35 females; mean age = 19.9 ± 0.75 years and 14 males; mean age = 20.0 ± 0.6 years). After signing the consent form, subjects were randomly assigned into two groups: Test group – practice MBSR (N = 25) and Control group - do not practice MBSR (N = 24). The MBSR program includes 8-weeks

2.2. Instrument

Perceived Stress Scale (PSS): The PSS includes 10 questions about the unpredictable, uncontrollable, and overloaded situations respondents encountered during the previous month. Four positively phrased items are referred to as “Perceived Coping” or “Perceived Self-Efficacy,” while six negatively phrased items are referred to as “Perceived Distress.” The PSS score is calculated by summing the reverse scores of the positive items and the score of negative items. Higher scores imply higher levels of perceived stress in a range of 0–40 total scores (Maroufizadeh et al., 2018, Roberti et al., 2006).

Depression, Anxiety and Stress Scale (DASS-42): The DASS-42 measures the negative emotional states, namely depression, anxiety, and stress. With 42 items, three subscales such as “Stress,” “Anxiety,” and “Depression” are defined with 14 numbered questions in the form. The score for each category is summed up to be classified from 0 to 42. Five severity labels – “normal,” “mild,” “moderate,” “severe” and “extremely severe” are used to describe the meaning of each subscales' scores (Crawford and

Henry, 2003, Lovibond and Lovibond, 1996). Both PSS and DASS-42 questionnaires were translated into the native language of the subjects, revised and finalized by a Vietnamese neuroscientist and a Vietnamese psychologist before being used. Considering that the main scope of our study is measuring the changes in negative emotions after MBSR training, the contents and length of these two questionnaires were most suitable, as both DASS-42 and PSS were confirmed to be valid and reliable in both clinical and non-clinical samples including the Vietnamese population, and have been widely used in previous MBSR studies (Crawford and Henry, 2003, Jovanović and Gavrilov-Jerković, 2015).

3. Results

Table 1: Mean scores of perceived stress pre-test and post-test of experimental group through MBSR

	Pre-test	Post-test
Type of Test	Perceived stress	Perceived stress
Total number of participants	25	25
Mean score	46.52	29.50

The p-value < .001.

Table 1 describes the statistically significant mean score difference of perceived stress in experimental group. Findings of the study suggest that Mindfulness-Based Stress Reduction (MBSR) reduced the tendency of perceived stress among students in posttest. Students of posttest group significantly reduced their level of perceived stress as compared to in pretest.

Table 2: Mean scores of depression pre-test and post-test of experimental group through MBSR

	Pre-test	Post-test
Type of Test	Depression	Depression
Total number of participants	25	25
Mean score	31.03	19.81

The p-value < .001.

Table 2 describes the statistically significant mean score difference of depress in experimental group. Findings of the study suggest that Mindfulness-Based Stress Reduction (MBSR) reduced the level of depression among students in posttest. Students in posttest significantly reduced their level of depression in pretest.

Table 3: Mean scores of anxiety pre-test and post-test of experimental group through MBSR

	Pre-test	Post-test
Type of Test	Anxiety	Anxiety
Total number of participants	25	25
Mean score	28.61	16.29

Table 3 describes the statistically significant mean score difference of anxiety in experimental group. Findings of the study suggest that Mindfulness-Based Stress Reduction (MBSR) reduced the level of anxiety among students in posttest. Students in posttest significantly reduced their level of anxiety in pretest.

Table 4: Mean scores of stress pre-test and post-test of experimental group through MBSR

	Pre-test	Post-test
Type of Test	Stress	Stress
Total number of participants	25	25
Mean score	17.51	11.82

Table 4 describes the statistically significant mean score difference of stress in experimental group. Findings of the study suggest that Mindfulness-Based Stress Reduction (MBSR) reduced the level of stress among students in posttest. Students in posttest significantly reduced their level of stress in pretest.

Table 5: Analysis of perceived stress post-test of the control group and experimental group

Type of Test	Group	N	Mean	df	t-value	p-value
Perceived Stress	Experimental	25	31.89	47	11.426	.000
	Control	24	46.97			

Table 5 depict that students improve their psychological health by encountering perceived stress through Mindfulness-Based Stress Reduction (MBSR) in experimental group as compared to control group.

Table 6: Analysis of psychological problems post-test of the control group and experimental group

Type of Test	Group	N	Mean	df	t-value	p-value
Depression, Stress, Anxiety	Experimental	25	23.50	47	7.203	.000
	Control	24	29.47			

Table 6 depict that students improve their psychological health by encountering their psychological burden (depression, anxiety, stress) through Mindfulness-Based Stress Reduction (MBSR) in experimental group as compared to control group.

4. Discussion

Findings of the current study suggest that Mindfulness-Based Stress Reduction (MBSR) reduced the tendency of perceived stress among students in posttest. Students of posttest group significantly reduced their level of perceived stress as compared to in pretest. In addition, study suggest that Mindfulness-Based Stress Reduction (MBSR) reduced the level of depression among students in posttest. Students in posttest significantly reduced their level of depression in pretest. Moreover, results depict that Mindfulness-Based Stress Reduction (MBSR) reduced the level of anxiety among students in posttest. Students in posttest significantly reduced their level of anxiety in pretest. Findings of the study suggest that Mindfulness-Based Stress Reduction (MBSR) reduced the level of stress among students in posttest. Students in posttest significantly reduced their level of stress in pretest. Furthermore, students improve their psychological health by encountering perceived stress through Mindfulness-Based Stress Reduction (MBSR) in experimental group as compared to control group. Lastly, students improve their psychological health by encountering their psychological burden (depression, anxiety, stress) through Mindfulness-Based Stress Reduction (MBSR) in experimental group as compared to control group. In the previous studies, the MBSR was shown to effectively reduce the stress levels in several subject groups such as Social Anxiety Disorder patients (Faucher et al., 2016), and university students (Galante et al., 2018), and employees (Janssen et al., 2018). However, it is unclear if a student group in the LMICs context could also benefit from MBSR. Some studies have also found correlations between the practice of mindfulness meditation and other psychophysiological benefits including improvements in functional connectivity (Tang et al., 2015), emotion elicitation (Jadhav et al., 2017), and effectiveness in handling cognitive load (Gupta et al., 2021). Mindfulness meditation has shown beneficial outcomes even when applied in clinical contexts such as chronic pain (Kabat-Zinn et al., 1985) fibromyalgia (Grossman et al., 2007) and cancer (Carlson et al., 2005; Speca et al., 2000). Previous studies have not fully addressed whether MBSR-associated psychological effects could be sustained and what might be the neural correlates of these effects. Concomitantly, it is currently unclear whether the overall psychological effects of MBSR could link with the practitioner's ability to control their stress and anxiety levels when exposed to immediate stress stimuli. To address these inquiries, combining psychological questionnaires with real-time brain activity monitoring techniques could allow us to further understand the effect of MBSR. Electroencephalogram (EEG) is one such technique that has been widely applied to monitor the neural oscillation of distinct brainwaves such as alpha wave. An increase in alpha band power in the prefrontal and frontal lobe during meditation or eyes closed states has supported the effectiveness of the MBSR program on stress reduction and self-awareness enhancement (Aftanas and Golocheikine, 2001, Cahn and Polich, 2006, Gao et al., 2016, Morais et al., 2021, Moynihan et al., 2013).

5. Conclusion

Academic pressure tends to affect the mental health of college students negatively. This study aims to clarify an effective MBSR program for college students by assessing the sustained efficacy of the intervention on stress alleviation. Our results indicated that MBSR effectively reduced stress scores in the Test group after completing the MBSR training. In conclusion, the sustained effects of MBSR were successfully demonstrated based on the reduction of subjective stress perception score. In conclusion, mindfulness meditation has shown to be a highly effective practice for reducing stress. Regular mindfulness practice enhances an individual's ability to regulate their emotions, foster a sense of awareness, and cultivate a calmer state of mind. Furthermore, mindfulness meditation helps individuals develop a greater capacity for managing difficult situations by promoting acceptance and non-judgment, which reduces stress reactivity. These benefits are observed across diverse populations, including those experiencing chronic stress, anxiety.

5.1. Contribution of the Study

The study on the effects of Mindfulness Meditation on Stress Reduction makes several valuable contributions to the field of psychology, mental health, and wellness:

- **Understanding Mechanisms of Stress Reduction:** This research can offer insights into how mindfulness meditation influences the physiological and psychological aspects of stress. By exploring brain activity, hormone levels (such as cortisol), and emotional regulation, the study could highlight the specific mechanisms through which mindfulness meditation helps in reducing stress.
- **Validating Mindfulness Meditation as a Stress Management Tool:** The study strengthens the evidence base for mindfulness meditation as an effective intervention for managing stress. This is important for promoting mindfulness as a viable, non-pharmacological treatment for stress, anxiety, and related disorders.
- **Broader Applicability:** If the study demonstrates that mindfulness meditation is effective across different groups (e.g., students, professionals, or individuals with high-stress jobs), it could encourage the widespread adoption of mindfulness practices. It could also inspire organizations and educational institutions to incorporate mindfulness programs into their wellness initiatives.
- **Long-Term Benefits:** Investigating the long-term effects of mindfulness meditation could contribute to our understanding of whether the stress-reducing benefits last over time, even after the formal meditation practice is discontinued. This could have significant implications for promoting sustainable mental health practices.
- **Comparative Effectiveness:** If the study compares mindfulness meditation to other stress-reduction techniques (such as exercise or cognitive-behavioral therapy), it can provide valuable data on the relative effectiveness of mindfulness. This would help clinicians and individuals make more informed choices about the best approaches to managing stress.
- **Expanding the Scope of Mindfulness Benefits:** By examining the role of mindfulness meditation in reducing stress, the study might explore its broader mental health benefits, such as improved focus, emotional regulation, and overall well-being. This could encourage a holistic approach to stress management that includes mindfulness as a key component.

- **Contribution to Evidence-Based Practice:** For healthcare providers, psychologists, and mental health professionals, this study would contribute to evidence-based practices, allowing them to recommend mindfulness meditation as part of their treatment plans for stress and anxiety. In summary, the study's contribution lies in providing scientific evidence on the effectiveness of mindfulness meditation for stress reduction, exploring its underlying mechanisms, and enhancing its credibility as a valuable tool in stress management and mental health care.

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