

The Short Term Effect of Mindfulness Based Stress Reduction on Stress, Anxiety, Mood and Distress Among Medical Students

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Abstract

As we know, there is an increased amount of stress and other factors in medical school. This does affect the well-being of students. We aimed to study the effect of mindfulness meditation on stress, anxiety, mood, and distress among medical students. A randomized controlled trial was conducted among 4th-year medical students of Melaka-Manipal Medical College. A total of 60 participants were randomized into meditation and control groups, with 36 participants in the meditation and 24 in the control groups. Self-administered questionnaires were given before and after a three consecutive day intervention to compare the results of stress, anxiety, mood, and distress among the meditation group and control group. The data was statistically analyzed using Epi Info(v7.2.0.1) and GraphPad(v8.0.0). Unpaired T-test and paired T-test were used to analyze the data. From our study, we found that there was no significant difference in the results between the meditation and the control group, pre-intervention and post-intervention wise. In the meditation group, there were no significant results post-intervention. However, there is a reduction in stress, anxiety and distress, and elevation of mood. In the control group, it was found that there was a significant decrease in anxiety levels on playing mobile games. There were no other significant results even though there is a reduction in stress, anxiety, distress, and mood elevation in the control group. To conclude, there were no significant results in stress, anxiety, mood, and distress in the meditation and control groups. However, we found that there was a significant decrease in anxiety in the control group.

Keywords

Mindfulness Based Stress Reduction, Stress, Anxiety, Mood, Distress, Meditation, Medical Students

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1. Introduction

Stress is a word very familiar to medical students. Stress is the state of an individual with the environment perceived as threatening or a threat to the well-being. It is an external constraint that upsets an individual both mentally and physically [1]. Stress prevalence data in the Malaysian population is not available to obtain baseline data. In a study done in Universiti Sains Malaysia in 2010, the highest prevalence of stress was among second and fourth-year

medical students [2]. Stress can lead to anxiety and distress and also worsen mood [3]. Following a study among junior house officers in Malaysia who were followed up from their fourth year in medical school, they had a higher mean of stress than in other occupational groups [4]. Despite the awareness that medical studies are very stressful, no effective methods have been established to combine intensive learning, interest in research, and the ability to take self-care and improve mentally [5].

In a latest study, it was found that the emergency department

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is the unit with the highest percentage of burnout syndrome among healthcare professionals. These could be because of the high emotional demand that is needed arising stress and anxiety [6]. Another study conducted on residents showed that although emotional exhaustion did not significantly improve with MBSR, other factors such as personal accomplishment, worry, a mindfulness skill, self-compassion, and the perspective-taking subscale of the empathy scale showed notable improvement compared to the control group [7]. Based on a study in 2021, the results recommended that liveliness that encourages well-being may be advantageous if fused into the medical curriculum in medical schools, provided that there are a variety of wellness program options [8]. The event we are looking forward to achieving from our study is that, by including MBSR in the medical curriculum, they adapt to the stressors present in medical school and learn how to manage and adapt the same in future endeavours.

Many risk factors lead to stress, such as age, gender, information and input overload, relationship status, and fatigue [9]. In this study, we consider stressors such as lack of sleep and exercise to determine the stress levels. A study has shown that students used more active coping strategies than avoidant strategies [10]. According to a study in Pakistan, meditation has been a part of the coping mechanism among medical students besides prayers, watching movies, and online chatting [11]. There are many types of meditation, such as transcendental meditation, mindfulness, and Sahaja yoga. Mindfulness meditation helps one use focused attention to cultivate mental calmness; therefore, mindfulness is more appropriate for this study [12]. Based on two studies, meditation did reduce anxiety and distress and improve mood over time [13-14].

Mindfulness-based stress reduction [MBSR] is a clinical program that provides systematic training in mindfulness meditation for stress reduction. The technique is to focus on the breath while maintaining an upright sitting posture [15]. Hypothetically, MBSR has a positive effect on stress, anxiety, mood, and distress. MBSR training in medical students was associated with improvements in stress, physiological distress, and mood [16]. Preclinical and clinical medical students have previously been shown to benefit from an intervention on MBSR. This includes reductions in psychological distress, and perceived stress corresponds to increased self-compassion, empathy, spirituality, and mindfulness [17]. Previous studies in the United States and Australia have shown that MBSR training has beneficial outcomes. However, the studies have multiple study limitations [18-19]. As most of the studies were conducted for months to years, the study on short-term effects of MBSR on stress is lagging [18-21].

This study aims to study the short-term effects of mindfulness-based stress reduction on stress, anxiety, mood,

and distress among medical students. It will be conducted for three days on fourth-year medical students in Melaka Manipal Medical College, Muar.

2. Methods

2.1. Study Design, Place and Time, Population

We conducted a randomized control trial, an experimental study on the effect of mindfulness meditation on stress among medical students of Melaka Manipal Medical College. This study is conducted in Melaka Manipal Medical College, a private medical college in Muar. The study is held from October 2018 to December 2018. The total student population in this college is approximately 750. The targeted populations are Batch 37 and Batch 38, which comprises 300 students. Our inclusion criteria include medical students who have given written informed consent to participate in this study. Exclusion criteria in this study comprise Muslim medical students and those who meditate regularly.

2.2. Sample Size

The sample size was calculated by using this formula,

To compare continuous outcome between 2 interventions,

$$n = \frac{2K\pi\sigma^2}{\Delta^2}$$

$K = 7.84$ (type I error 5%, Power 80%)

$$\sigma^2 = \text{variance}$$

$$\Delta^2 = (\mu_1 - \mu_2)^2$$

$$n = \frac{2(7.84)(2.9)^2}{(7.9-5.2)^2}$$

$$= 18$$

$$n_{final} = \frac{n_{calculated}}{1 - non\ response}$$

$$= \frac{18}{1 - 0.1}$$

$$= 20$$

The sample size is adjusted to 30 per intervention due to the small sample size.

2.3. Sampling

Purposive sampling, non-probability sampling was done, and Batch 37 and Batch 38 were screened with a self-administered questionnaire. From the eligible participants to participate in our study, given their written informed consent and those who do not meditate regularly, a simple random sampling was done

to choose 60 participants, thirty-six of whom regularly exercise and 24 of those who do not. They were then divided into two groups. One being the intervention group and the

other, the control group by using Research Randomiser software (Figure 1).

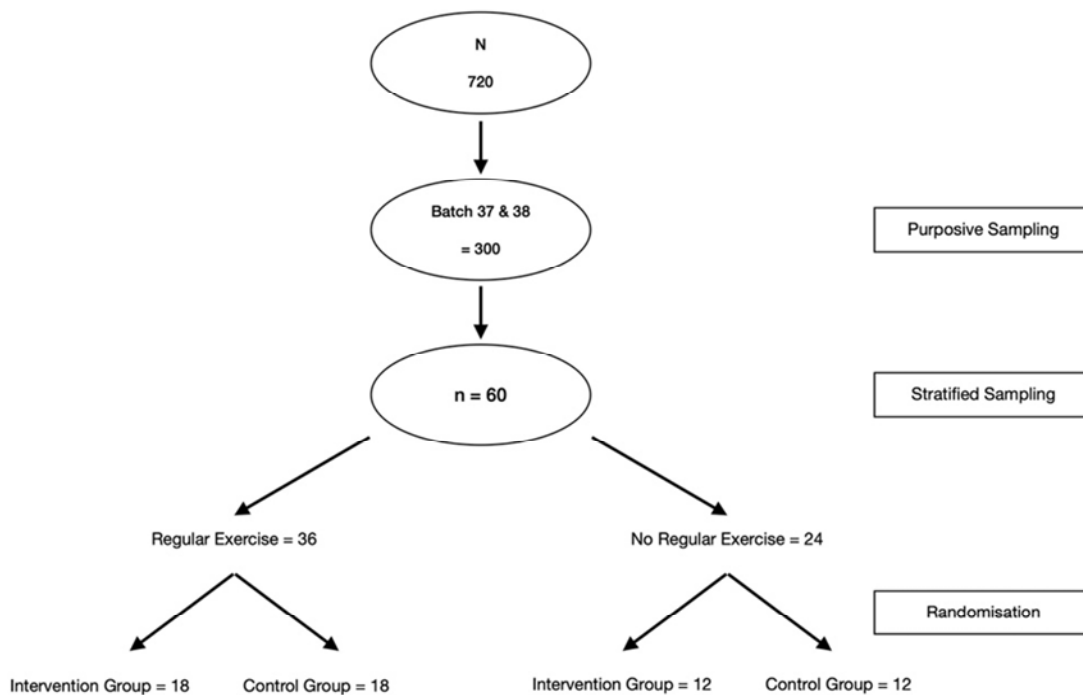


Figure 1. Flow diagram of the different phases of sampling.

2.4. Procedure and Intervention

Screening questions were initially distributed to 300 students of batch 37 and 38. This was done to exclude those who were not needed for this study. The exclusion criteria were Malays and Muslims, students who did meditation regularly (4 or more times in a week), and participants who did not give written informed consent.

Of the 115 eligible participants, 60 students were randomly picked and further stratified into 36 in the meditation group and 24 in the control group. Self-administered questionnaires with scales in stress, anxiety, mood, and distress were distributed to 60 participants of intervention who did meditation and control group who played mobile games before and after three consecutive days [13]. This was done to compare their stress, distress, anxiety, and mood level and assess the effectiveness of meditation among medical students. Meditation was done for 10 - 15 minutes by doing breath awareness meditation [13]. Breath awareness is a type of mindful meditation that encourages mindful breathing (meditation group). For the control group, participants were given 10 – 15 minutes to play mobile games.

For the pre-intervention questionnaire, demographic details like age, gender, posting, and ethnicity are taken. A total of 4 scales were given to assess their stress, distress, mood, and anxiety before doing meditation. This questionnaire is given

on the first day of doing meditation. Participants were required to answer all questions based on individuality.

These questions were ranged from 0 to 10. Answers vary from 0 (very low in stress, mood, anxiety, distress) to 10 (very high in stress, anxiety, distress, and good mood). The questions were about how stress they were, how their mood was affected, if there was anxious, and how distress they were [2].

The post-intervention questionnaires, it was given on the third day, 1 hour after meditation. These questionnaires were given to the same participants who were assessed for the pre-intervention questionnaire. Similar questions were asked to assess the outcome of meditation after three days. Volunteers were required to answer all questions based on individual preference. These questions were ranged from 0 (very low in stress, anxiety, distress, and mood) to 10 (very high in stress, distress, anxiety, and in a good mood).

2.5. Data Analysis

Pre-intervention and post-intervention questionnaires were given to assess the stress, anxiety, mood, and distress levels before and after meditation among medical students in MMMC. Data collected was exported to Microsoft Excel. Data analysis is done using Epi Info software (v7.2.0.1) and Graph Pad (v8.0.0). Frequency and percentage of categorical variables such as age, gender, ethnicity, posting, and relationship status were asked. Relative risk was used as a measure of association.

Statistical tests that are used to interpret the data are paired and unpaired t-test. Paired t-test is used to compare the results of the outcome variables before and after the intervention. An unpaired t-test was used to compare outcome variables between the intervention group and the control group. The level of significance is 5% (0.05). Therefore, the P-value less than 0.05 was considered significant.

2.6. Ethical Consideration

Informed consent and self-administered questionnaire were given to the participants before the study began with well-informed information to ensure that the participant's safety is a priority. Also, the confidentiality of the participants is well maintained. Participants have the right to withdraw from this study at any given time.

3. Result

The mean age in the meditation and control groups is 22.5 and 22.3, respectively. The frequency of gender, ethnicity, religion, posting, exercise, sleep per day, and relationship status was recorded as above. In comparing the meditation group against the control group, the frequency of male to female was 46.67 to 66.67. Female was 53.33 to 33.33. In terms of ethnicity, Indians (60 to 53.33) were the most followed by Chinese (16.67 to 36.67), Punjabi (10 to 3.33) & Sri Lankan (6.67 to 6.67), and two people from other ethnicities (6.67). In terms of religion, Hinduism (46.67 to 43.33) was the most followed by Buddhism (23.33 to 30), Christianity (20 to 23.33), and lastly, Sikhism (10 to 3.33). In terms of posting, most were from Paediatrics with the frequency of 23.33 to 30, followed by community medicine with the frequency of 13.33 to 30, Surgery with the frequency of 26.67 to 10, Orthopaedics with the frequency of 16.67 to 10, lastly ONG and Medicine with the respective frequency of 10 to 10. In terms of exercise, a higher number of people are in the exercise group (36) with the frequency of 56.67 to 63.33 compared with those who do not exercise (24) with the frequency of 43.33 to 36.67. In terms of sleep per day, most sleep around 6-8 hours with a total number of 40 people with the frequency of 56.67 to 76.67, followed by <6 hours with a total of 18 people with a frequency of 40 to 20, and the least is

people who sleep >8 hours with a total number of 2 with the frequency of 3.33 to 3.33. In terms of relationships, the most were single with a total number of 32 and frequency of 53.33 to 53.33, followed by those in a relationship with a frequency of 36.67 to 46.67 and lastly, those who were in a complicated relationship were three and presented only in the meditation group with the frequency of 10.

Table 1. Baseline Characteristic between Meditation and Control.

Variables	MEDITATION (N=36)	Control (n=24)
MEAN		
AGE	22.5	22.3
FREQUENCY (%)		
Gender		
Male	14 (46.67)	20 (66.67)
Female	16 (53.33)	10 (33.33)
Ethnicity		
Chinese	5 (16.67)	11 (36.67)
Indian	18 (60)	16 (53.33)
Punjabi	3 (10)	1 (3.33)
SriLankan	2 (6.67)	2 (6.67)
Others	2 (6.67)	
Religion		
Buddhist	7 (23.33)	9 (30)
Christian	6 (20)	7 (23.33)
Hindu	14 (46.67)	13 (43.33)
Sikh	3 (10)	1 (3.33)
Posting		
Community Medicine	4 (13.33)	9 (30)
Medicine	3 (10)	3 (10)
ONG	3 (10)	3 (10)
Orthopaedics	5 (16.67)	3 (10)
Paediatrics	7 (23.33)	9 (30)
Surgery	8 (26.67)	3 (10)
Exercise		
Yes	17 (56.67)	19 (63.33)
No	13 (43.33)	11 (36.67)
Sleep/Day		
<6 hours	12 (40)	6 (20)
6-8 hours	17 (56.67)	23 (76.67)
>8 hours	1 (3.33)	1 (3.33)
Relationship		
Single	16 (53.33)	16 (53.33)
In Relationship	11 (36.67)	14 (46.67)
Complicated	3 (10)	

Table 2. Pre-Intervention Variables between Intervention and Control Groups.

Variables	Mean (SD)		Mean Differences (95% CI)	t-statistics	P value
	Meditation	Control			
Stress	6.73 (2.35)	5.90 (2.52)	-0.83 (-2.09 to 0.43)	1.3242 (58)	0.1906
Distress	4.10 (2.55)	3.50 (2.13)	-0.60 (-1.81 to 0.61)	0.9890 (58)	0.3268
Mood	5.77 (2.14)	6.27 (1.76)	0.50 (-0.51 to 1.51)	0.9871 (58)	0.3277
Anxiety	4.53 (2.54)	4.23 (2.11)	-0.30 (-1.51 to 0.91)	0.4971 (58)	0.6210

3.1. Unpaired-T Test

Before the intervention, the mean value for stress is higher in the meditation group (6.73) than the control group (5.90), with

a non-significant p-value of 0.1906. For distress, the meditation group has a higher mean value of 4.20 than the control group, which is 3.50, with a non-significant p-value of 0.3268. The meditation group has a lower mean value of mood,

which is 5.77, compared to the control group, which has 6.27 with a non-significant p-value of 0.3277. There is a higher mean value of anxiety in the meditation group, which is 4.53, compared to the control group, which is 4.23, with a

non-significant p-value of 0.6210. Overall, the variables shown in pre-intervention between meditation and control group are non-significant.

Table 3. Post-Intervention Variables between Meditation and Control Groups.

Variables	Mean (SD)		Mean differences (95% CI)	t-statistics (df)	P value
	Meditation	Control			
Stress	6.23 (2.10)	5.87 (2.52)	-0.37 (-1.56 to 0.83)	0.6134 (58)	0.5420
Distress	3.53 (2.24)	3.17 (1.70)	-0.37 (-1.40 to 0.66)	0.7137 (58)	0.4783
Mood	6.57 (1.77)	6.67 (1.95)	0.10 (-0.86 to 1.06)	0.2075 (58)	0.8363
Anxiety	3.60 (2.25)	3.40 (1.94)	-0.20 (-1.29 to 0.89)	0.3684 (58)	0.7139

After the intervention, the mean value for stress is higher in the meditation group (6.23) than the control group (5.87), with a non-significant p-value of 0.5420. For distress, the meditation group has a higher mean value of 3.53 than the control group, which is 3.17, with a non-significant p-value of 0.4783. The meditation group has a lower mean value of mood, which is 6.57, compared to the control group, which is 6.67, with a non-significant p-value of 0.8363. There is a higher mean value of anxiety in the meditation group, which is 3.60, compared to the control group, which is 3.40, with a non-significant p-value of 0.7239. Overall, the variables shown in post-intervention between meditation and control group are non-significant.

3.2. Paired-T Test

According to pre and post-intervention in the meditation group (intervention group), there is a reduction of stress, anxiety, distress, and mood elevation. However, there is no significance in all the variables. For stress, there is a mean difference of 0.38 with a non-significant p-value of 0.2814. For mood, there is a mean difference of -0.83 with a non-significant p-value of 0.0546. For anxiety, there is a mean difference of 0.90 with a non-significant p-value of 0.0951. For distress, there is a mean difference of 0.52 with a non-significant p-value of 0.2220. Overall, there is no significance in any variable, even though they show improvement.

Table 4. Pre and Post Intervention of Meditation Group.

Variables	Mean (SD)		Mean Difference (95% CI)	t-statistics (df)	P-value
	Pre	Post			
Stress	6.83 (2.39)	6.45 (2.16)	0.38 (-0.33 to 1.09)	1.0984 (28)	0.2814
Mood	5.72 (2.19)	6.55 (1.74)	-0.83 (-1.67 to 0.02)	2.0065 (28)	0.0546
Anxiety	4.69 (2.47)	3.79 (2.18)	0.90 (-0.17 to 1.96)	1.7276 (28)	0.0951
Distress	4.24 (2.50)	3.72 (2.17)	0.52 (-0.33 to 1.37)	1.2491 (28)	0.2220

Based on the table for the control group, there is a reduction of stress, anxiety, distress, and elevation of mood post-intervention compared to pre-intervention. In this group, anxiety is a significant variable. For stress, there is a mean difference of 0.03 and a non-significant p-value of 0.9168. For mood, there is a mean difference of -0.40 with a

non-significant p-value of 0.2504. For distress, there is a mean difference of 0.24 with a non-significant p-value of 0.4347. On the other hand, anxiety has a significant p-value of 0.0203 with a mean difference of 0.83. Overall, only anxiety is a significant variable, even though the rest showed improvement.

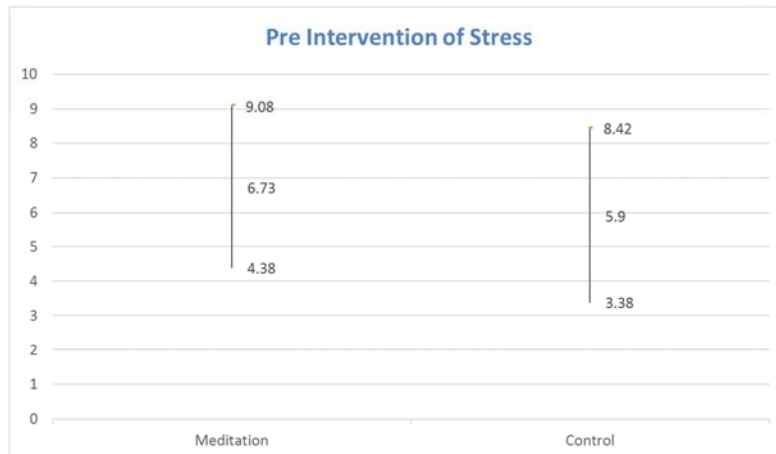


Figure 2. Pre-intervention mean value for stress in the meditation group and the control group.

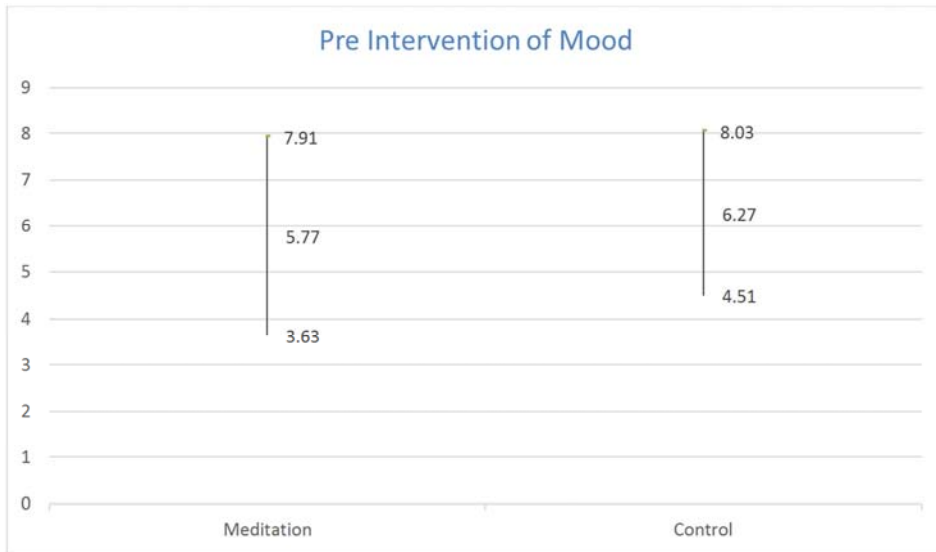


Figure 3. Pre-intervention mean value for mood in the meditation group and the control group.

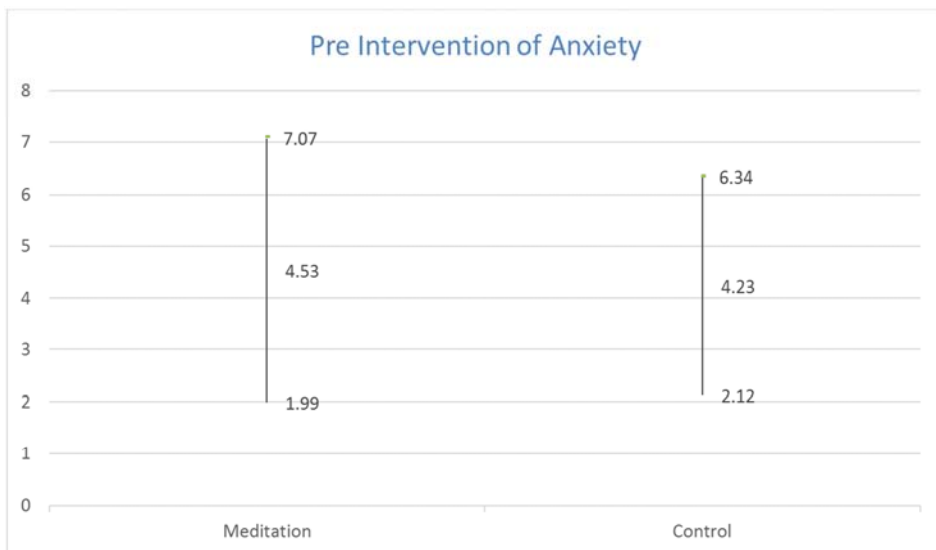


Figure 4. Pre-intervention mean value for anxiety in both the meditation and control groups.

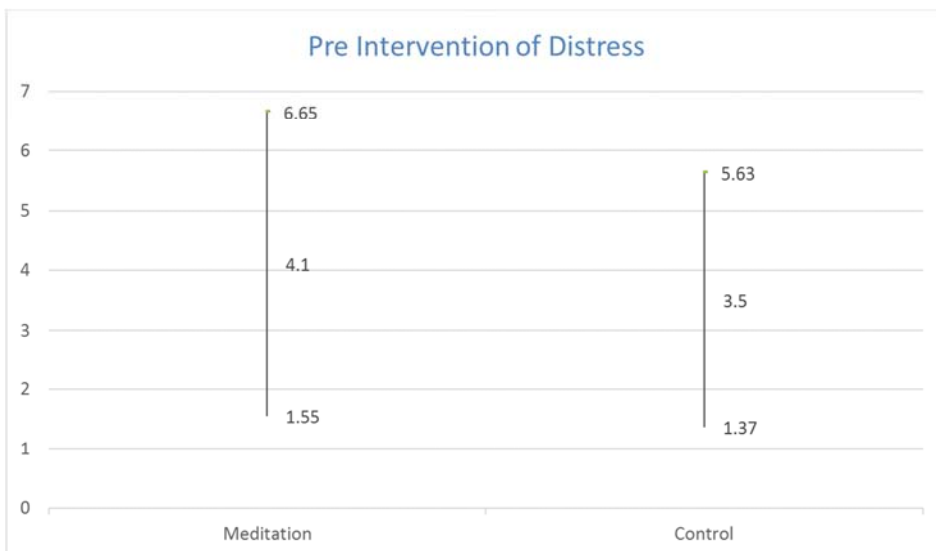


Figure 5. Pre-intervention mean value for distress in both meditation and control groups.

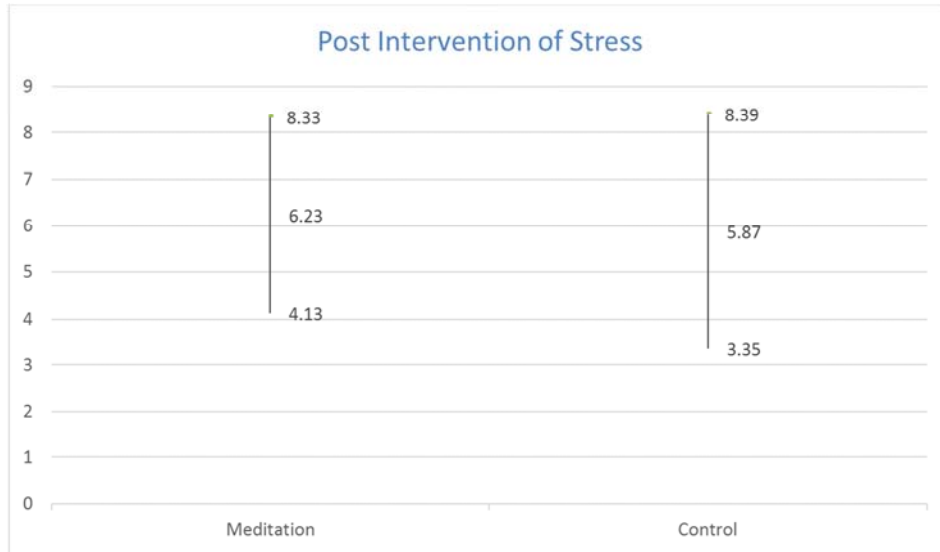


Figure 6. Post-intervention mean values of stress in the meditation and control groups.

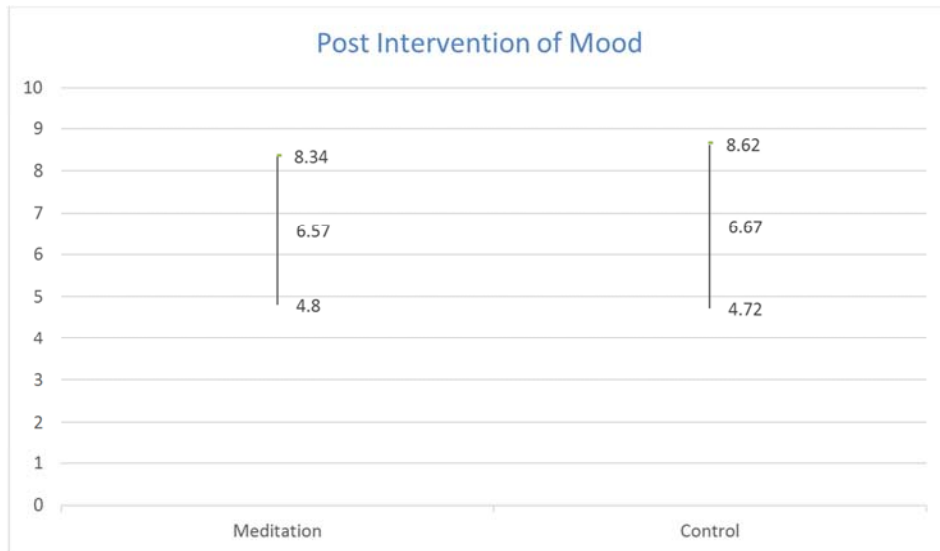


Figure 7. Post-intervention mean value for mood in the meditation and control groups.

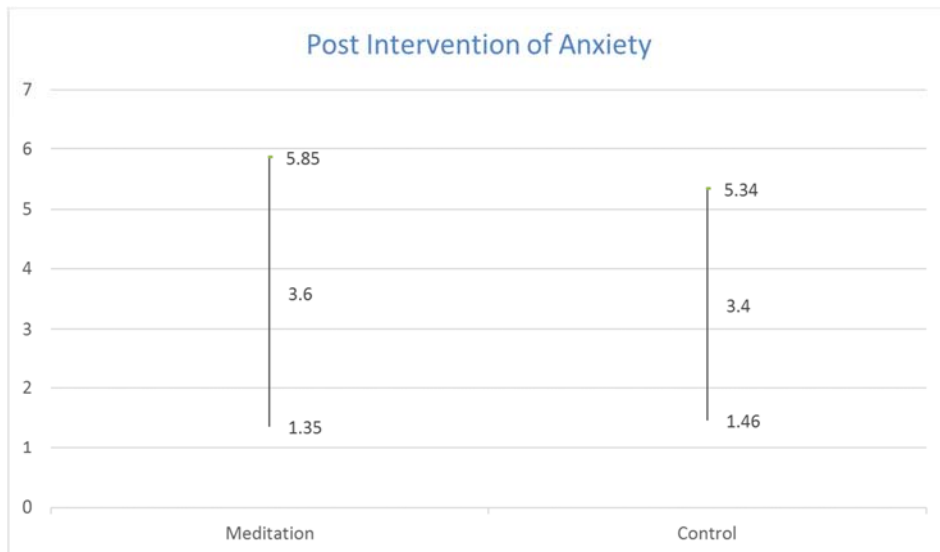


Figure 8. Post-intervention mean values of anxiety in the meditation group and the control group.

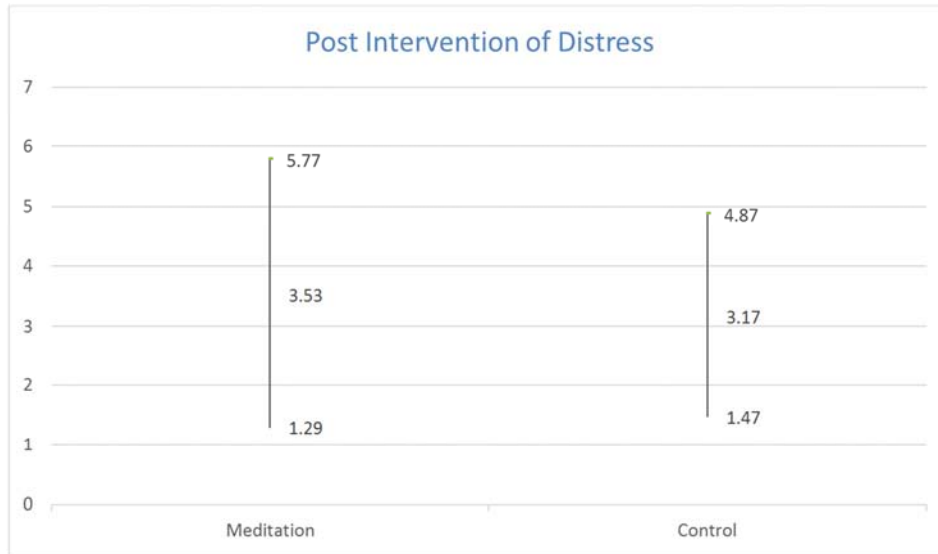


Figure 9. Post-intervention mean value for distress in the meditation group and the control group.

Table 5. Pre and Post Intervention of Control Group.

Variables	Mean (SD)		Mean Difference (95% CI)	t-statistics (df)	P-value
	Pre	Post			
Stress	5.90 (2.52)	5.87 (2.52)	0.03 (-0.61 to 0.68)	0.1054 (29)	0.9168
Mood	6.27 (1.76)	6.67 (1.95)	-0.40 (-1.10 to 0.30)	1.1728 (29)	0.2504
Anxiety	4.23 (2.11)	3.40 (1.94)	0.83 (0.14 to 1.53)	2.4559 (29)	0.0203
Distress	3.50 (2.13)	3.21 (1.72)	0.24 (-0.38 to 0.87)	0.7926 (28)	0.4347

4. Discussion

We conducted a randomized control trial to study the short-term effect of mindfulness-based stress reduction (MBSR) on stress, anxiety, mood, and distress among medical students. This study was conducted among the 3rd and the 4th year medical students of Melaka Manipal Medical College, Muar, for three consecutive days by having meditation and control groups. From our study, we found that there was no significant difference in the results between the meditation and the control group, pre-intervention and post-intervention wise. In the meditation group, there were no significant results post-intervention. However, there is a reduction in stress, anxiety and distress, and elevation of mood. In the control group, it was found that there was a significant decrease in anxiety levels on playing mobile games. There were no other significant results even though there is a reduction in stress, anxiety, distress, and mood elevation in the control group. Compared with a previous study on mindfulness-based stress reduction on stress among medical students, there were significant reductions in tension and anxiety within ten weeks of MBSR [12]. According to another study in Tasmania, participants in the MBSR group demonstrated significant reductions in scores on the Perceived Stress Scale (-3.44, 95% confidence interval -6.20 to -0.68; $p < 0.05$) and the anxiety component of the Depression, Anxiety, Stress Scale (-2.82, 95%

confidence interval -4.99 to -0.64; $p < 0.05$). The study was followed up to the 8th-week post-trial, and intervention was maintained [13]. In a 7-week study of MBSR, there was a moderate effect on mental distress and a negligible effect on subjective well-being following the intervention. Gender differences were also discussed in this study. It is shown that female medical and psychology students experienced significant improvements in mental distress and study stress, and well-being after the study [15]. Our study shows a difference in results compared to these studies short term.

5. Limitation

There was attrition in this study due to a lack of active participation. This was because participants had different hectic schedules every day for three consecutive days and could not meet at a scheduled time. Besides that, small sample size was taken; thus, it does not represent the entire group of medical students, and it increases the error margin. Post-intervention follow-up could not be done in such a short time. Furthermore, this study was mainly conducted in one particular medical school. Thus it lacks the diverse stressors present in the medical community.

6. Conclusion

To summarize, our study aims to study the short-term effects

of mindfulness-based stress reduction (MBSR) on stress, anxiety, mood, and distress among medical students. Based on our study, there were no significant results in stress, anxiety, mood, and distress in the intervention group. However, we found that there was a significant decrease in anxiety in the control group. More detailed and enhanced research should be conducted to study the short-term effects of MBSR among medical students.

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