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# The Influence of Mindfulness Meditation on Anxiety Levels Among Martial Arts Athletes in Facing Competitions

**Luthfi Ayu Nafisah[1] , Endang Kumaidah[2], Hardian[2], Sumardi Widodo[2] , Tanjung Ayu Sumekar[2,3]**

*[1]Department of Medicine, Faculty of Medicine, Diponegoro University*
*[2]Department of Physiology, Faculty of Medicine, Diponegoro University*
*[3]Department of Psychiatry, Faculty of Medicine, Diponegoro University*

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*) Correspondence to:
tanjung.sumekar@fkundip.ac.id

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## ABSTRACT

**Background:** Pre-competition anxiety is a common psychological problem experienced by martial arts athletes and may negatively affect their performance. Various methods have been applied to reduce anxiety, one of which is mindfulness meditation, which has been proven to decrease stress and improve focus.
**Objective:** This study aimed to determine the effect of mindfulness meditation on the anxiety levels of martial arts athletes in facing competitions.
**Methods:** This study was true experimental with a pretest–posttest control group design. The sample consisted of 36 karate athletes under KONI Pati Regency, selected through random sampling and divided into the intervention group (n=18) and the control group (n=18). The intervention group received mindfulness meditation for 3 weeks, twice weekly, lasting 10 minutes per session, while the control group received no intervention. The instrument used was the Competitive State Anxiety Inventory-2R (CSAI-2R). Data were analyzed using Saphiro-wilk paired t-test, independent t-test, and ANCOVA
**Results:** There was a significant decrease in anxiety scores in the intervention group from 38.53 ± 6.49 to 30.53 ± 6.75 ($p < 0.001$). In contrast, the control group increased from 35.50 ± 6.13 to 36.83 ± 6.04 ($p = 0.049$).
**Conclusion:** There was a significant decrease in anxiety scores in the intervention group from 38.53 ± 6.49 to 30.53 ± 6.75 ($p < 0.001$). In contrast, the control group increased from 35.50 ± 6.13 to 36.83 ± 6.04 ($p = 0.049$).

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## 1. Introduction

Indonesia has many sports, one of which is martial arts, including karate, pencak silat, judo, boxing, taekwondo, and others.1Martial arts athletes are required not only technical skills such as strikes, dodges, blocks, locks, and throws, but also tactical readiness, strategic awareness, and strong mental conditions to achieve victory.[2] One common psychological problem experienced by athletes before a competition is anxiety.[3] Anxiety manifests as a negative feeling accompanied by physical and psychological symptoms caused by real or perceived threats.[4]

External factors such as opponents, referees, and spectators, as well as internal factors such as motivation, emotions, expectations, and mental strength, can influence the level of anxiety.[5]

Previous research Nur Azis, dkk. (2017) shows that the prevalence among martial arts athletes in Indonesia is high, 66.7% among male athletes and 75% among female athletes.[6] High anxiety can lower self-confidence, interfere with concentration on opponents and surroundings, and reduce performance during competition.[2] In karate, anxiety levels may differ between kata and kumite due to distinct physical, mental, and emotional demands. Therefore, anxiety management is crucial for athletes to achieve optimal performance.[7]

One method for reducing anxiety is mindfulness meditation. This meditation [8,9,11]emphasizes full awareness of one's thoughts, feelings, and bodily sensations in the

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present moment, helping individuals control tension and reduce anxiety. Mindfulness has been proven effective in reducing symptoms of anxiety, stress, and depression, as well as improving focus and calmness.[8] By training concentration and inner peace, athletes are expected to be better prepared to face competitive pressure.

Based on the above, this study was conducted to examine the effect of mindfulness meditation on anxiety levels among martial arts athletes, specifically karate athletes. The research is expected to contribute to finding effective psychological strategies to enhance performance and reduce anxiety.

## 2. Methods

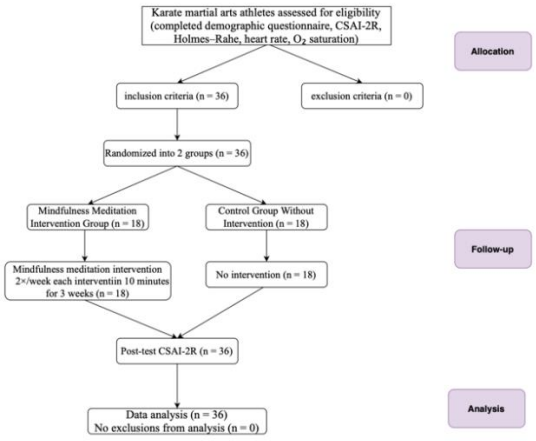



Figure 1. Consort Flow Diagram of the Study

This experimental study had a pretest–posttest control group design. The subjects were 36 karate athletes trained under KONI Pati Regency, aged 13–18 years, who met the inclusion criteria: having no history of injuries that interfered with training, not currently undergoing regular meditation, and willing to participate by signing informed consent by their parents/guardian consent. All data for Allocation will be concealment and blinding. The data will be secret by the author. Exclusion criteria included psychiatric disorders, use of medications affecting psychological conditions, and absence from intervention sessions more than twice. Subjects were selected using simple random sampling and randomly divided into two groups: intervention (n=18) The intervention group received mindfulness meditation for 3 weeks, twice weekly, lasting 10 minutes per session, while the control group received no intervention. and control (n=18) is a group who didn't get any intrvention.

The procedure began with explaining the study, completing demographic data, and administering the CSAI-2R questionnaire as a pretest to measure anxiety levels. The treatment group received mindfulness meditation guided by a 10-minute audio conducted in a calm environment twice a week for three weeks. The control group did not receive any intervention yet.

After the intervention, all participants completed the CSAI-2R questionnaire again as a posttest. Data were analyzed using SPSS. The Shapiro–Wilk test was used for normality, Levene's test for homogeneity, paired t-test or Wilcoxon for within-group differences, and independent t-test or Mann–Whitney for between-group differences, depending on data distribution. ANCOVA was used to control for confounding variables. A p-value of <0.05 was considered statistically significant.

## 3. Result

The subject characteristics were analyzed to provide a comprehensive overview of the participants involved in this study. The research subjects consisted of 36 karate athletes under the supervision of KONI Pati Regency. The subject selection and group allocation process is presented in detail in the consort diagram.

This study was conducted on karate athletes participating in a coaching program aged between 13 and 18 years. Based on the predetermined inclusion and exclusion criteria, a total of 36 research subjects were selected using a true experimental pretest-posttest control group design. All subjects met the research requirements, after which measurements were carried out according to the established variables.

Table 1. Characteristics of the Research Subject

| Characteristic | Mean ± SD (Min–Max) |
|---|---|
| Age (years) | 15,08 ± 1,40 (13 – 18) |
| District experience (times) | 4,95 ± 4,56 (0 – 25) |
| Province experience (kali) | 3,39 ± 3,73 (0 – 15) |
| Weight (kg) | 56,08 ± 8,49 (42 – 77) |
| Height (cm) | 161,83 ± 6,40 (150 – 176) |
| CSAI-2R | |
| - Pretest | 37,06 ± 6,41 (26–56) |
| - Posttest | 33,97 ± 7,05 (21–49) |

The research subjects consisted of 36 individuals aged between 13 and 18 years. Their competition experience at the district level ranged from 0 to 25 matches, while at the provincial level it ranged from 0 to 15 matches. The subjects' body weights ranged from 42 to 77 kg, and their heights ranged from 150 to 176 cm. The results of the CSAI-2R measurements showed that pretest scores ranged from 26 to 56, while posttest scores ranged from 21 to 49.



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Table 2. Uji Normalitas Data (saphiro-wilk)

| Variables | Total n = 71 | Iron Chelation Therapy | | p |
|---|---|---|---|---|
| | | Single n = 44 (62%) | Combi-nation n = 27 (38%) | |
| IRF (%)^ | 13.6 ± 7.92 | 11.62 ± 5.4 | 17.01 ± 10.0 | 0.015* |
| Reticulocyte (106/uL)^ | 0.107 ± 0.07 | 0.106 ± 0.08 | 0.110 ±0.08 | 0.83 |

The Shapiro–Wilk test was chosen for the normality test because the sample size in each group was fewer than 50 respondents.

Normality testing using the Shapiro–Wilk test showed that the pretest scores were normally distributed in both the treatment group (p = 0.108) and the control group (p = 0.227), as were the posttest scores in the treatment group (p = 0.249) and the control group (p = 0.088). As all p-values were greater than 0.05, the data were confirmed to be normally distributed, and parametric tests (paired t-test and independent t-test) were subsequently used for further analysis.

Table 3. ANCOVA

| Variabel | F | Sig. |
|---|---|---|
| Posttest | 3,333 | 0,077 |

Significant if p-value > 0.05, indicating homogeneous variance between groups. The homogeneity of variance test was conducted using ANCOVA.

The results showed F = 3.333 with p = 0.077 (p > 0.05), indicating that the variance of posttest scores between the treatment and control groups was homogeneous. Thus, the assumption of homogeneity was met, and parametric analysis could proceed.

**Comparison Analysis of Anxiety Levels Between the Treatment and Control Groups**

Table 4. Comparison of Anxiety Levels Between the Treatment and Control Groups

| | Group | |
|---|---|---|
| | Control | Treatment |
| Pretest | 35,50 ± 6,13 | 38,53 ± 6,49 |
| Posttest | 36,83 ± 6,04 | 30,53 ± 6,75` |
| p | 0,049* | 0,001* |
| r | 0,769 | 0,480 |
| n | 18 | 18 |

p = significance value; r = correlation coefficient; n = sample s

Based on Table 4, the control group had a mean anxiety score of 35.50 ± 6.13 at pretest and 36.83 ± 6,04 at posttest, with p = 0.049 and r = 0.769. Meanwhile, the treatment group showed a decrease from 38.53 ± 6.49 to 30.53 ± 6.75, with p = 0.001 and r = 0.480. These results indicate that the intervention had a significant effect in reducing anxiety levels in the treatment group, whereas the control group experienced a significant increase in anxiety.

**Comparison of Cognitive Anxiety, Somatic Anxiety, and Self-Confidence Scores Between the Intervention and Control Groups**

Table 5. Comparison of subscale of CSAI-2R Between the Intervention and Control Groups

| Subscale | Pretest intervention | Posttest Intervention | Pretest control | Posttest control |
|---|---|---|---|---|
| Cognitive | 45,2 | 45 | 45,2 | 46,8 |
| Somatic | 35 | 34,6 | 33 | 40 |
| Self-confidence | 41,6 | 27,4 | 24 | 55 |

Based on Table 5, the cognitive anxiety score in the intervention group decreased slightly from 45.2 at pretest to 45.0 at posttest, while the control group increased from 45.2 to 46.8. The somatic anxiety score also decreased in the intervention group, from 35.0 at pretest to 34.6 at posttest, whereas the control group showed an increase from 33.0 to 40.0. Regarding self-confidence, the intervention group decreased from 41.6 at pretest to 27.4 at posttest, while the control group increased from 24.0 to 55.0. These findings describe differences in the patterns of change across the CSAI-2R subscales between the intervention and control groups.

**Analysis of Differences in Anxiety Levels Among Martial Arts Athletes Before and After Mindfulness Meditation Between the Treatment and Control Groups**

Table 6. Comparison of Pretest Scores Between Groups

| Group | n | Mean ± SD | p |
|---|---|---|---|
| Treatment | 18 | 38,53 ± 6,49 | |
| Control | 18 | 35,50 ± 6,13 | 0,174 |

p = significance value; n = sample

In the treatment group, there was a significant decrease in anxiety scores from 38.53 ± 6.49 and the control group showed in anxiety scores from 35.50 ± 6.13 (p = 0.174).



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Table 7. Comparison of Posttest Scores Between Groups

| Group | n | Mean ± SD | p |
|---|---|---|---|
| Treatment | 18 | 30,53 ± 6,75 | |
| Control | 18 | 36,83 ± 6,04 | 0,049 |

p = significance value; n = sample

Table 7. Bivariate analysis using the independent t-test showed a significant difference in posttest anxiety scores between the treatment group (30.53 ± 6.75) and the control group (36,83 ± 6,04), with a p-value of 0.049 ($p < 0.05$). This indicates that mindfulness meditation had a significant effect in reducing anxiety levels among martial arts athletes.

## 4. Discussion

This study demonstrated that mindfulness meditation significantly reduced anxiety levels among martial arts athletes. The treatment group exhibited a notable decrease in anxiety, whereas the control group showed an increase. This finding suggests that athletes anxiety naturally tends to rise prior to competitions if not properly managed, and that mindfulness meditation serves as an effective strategy to regulate such responses.[2,3,5]

The results are consistent with previous research. Sariyani et al. (2023) reported that mindfulness meditation enhances attention and focus, thereby alleviating anxiety symptoms.8 Similarly, Keumala Sari et al. (2023) found a significant reduction in anxiety following mindfulness training.11Widhi Harita et al. (2022) also observed that Mindfulness Sport Performance Enhancement (MSPE) effectively reduced competitive anxiety among karate athletes.[12] Furthermore, Surya Putra and Bintari (2024) confirmed that mindfulness helps lower stress and promotes faster recovery in athletes.[13]

From a neurophysiological perspective, anxiety arises from the hyperactivation of the sympathetic nervous system and the hypothalamic–pituitary–adrenal (HPA) axis. When exposed to stressors, this system releases corticotropin-releasing hormone (CRH) and adrenocorticotropic hormone (ACTH), resulting in increased secretion of cortisol and adrenaline. These hormones heighten alertness, heart rate, and muscle tension as part of the body's "fight or flight" response.[15] Chronic overactivation of this pathway can lead to persistent anxiety and impaired cognitive focus.[16]

Mindfulness meditation helps regulate this mechanism by balancing HPA-axis activity and enhancing parasympathetic dominance, thereby promoting relaxation.[16,17] In addition, mindfulness increases the activity of gamma-aminobutyric acid (GABA)—an inhibitory neurotransmitter that suppresses excessive neuronal firing—and improves serotonin function, both of which contribute to emotional stability and calmness.[17–19] The strengthened control of the prefrontal cortex over the amygdala further reduces the intensity of stress reactions.[19] These neurobiological effects explain the decreased somatic anxiety symptoms observed in the treatment group, such as slower heart rate, reduced muscle tightness, and improved breathing control.[15–19]

Even with relatively brief sessions 10 minutes twice per week for three weeks mindfulness practice produced measurable improvements in athletes' psychological well-being12,14 This indicates that incorporating simple psychological interventions into athletic training programs can yield substantial benefits.3,6 The observed increase in anxiety among control participants may be attributed to external factors, such as the approaching competition, or internal factors, such as limited emotional regulation.6 This underscores that without psychological intervention, pre-competition anxiety tends to increase naturally.

Moreover, student-athletes often experience dual pressures from both academic and athletic responsibilities, which can heighten stress levels and negatively impact mental health particularly during overlapping examination and competition periods.[20] Overall, these findings reinforce that mindfulness-based psychological interventions are not only beneficial for the general population but are also highly relevant for martial arts athletes.[8,11,13] Mindfulness enhances focus, concentration, and self-confidence, all of which contribute to optimal athletic performance.

## 5. Limitations

This study has several limitations. First, the sample size was relatively small, limiting generalizability to other martial arts. Second, the intervention lasted only three weeks, so long-term effects remain unknown. Third, the CSAI-2R questionnaire is self-reported, which may introduce subjectivity. Fourth, external factors such as sleep quality, diet, daily activities, and social support were not controlled, all of which may influence anxiety levels.

## 6. Conclusion

Mindfulness meditation was proven effective in reducing anxiety levels among martial arts athletes. The intervention group experienced a significant decrease compared to the control group, with strong effect size. Mindfulness can be recommended as a simple and practical psychological strategy to help athletes manage anxiety, build confidence, and prepare for competition pressure.

## 7. Recommendations

Future studies should involve a larger and more diverse athletic population, include longer intervention durations, and measure physiological variables such as heart rate and heart rate variability before and after competitions to evaluate long-term effects and consistency.

## Ethical Approval

Ethical clearance was obtained from the Health Research Ethics Committee (KEPK), Faculty of Medicine, Diponegoro University (No. 085/EC/KEPK/FK-UNDIP/IV/2025).



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## Conflicts of Interest
The authors declare no conflict of interest in this study.


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