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Effects of Tabata and Circuit Training on Mood and Sleep Quality During Ramadan in Students

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ABSTRACT

Ramadan fasting can affect mental and physical health due to changes in eating patterns and sleep patterns. This study aims to compare the Tabata training method with Circuit Training on sleep quality and mood disorders in students during Ramadan fasting. This study involved 30 male students who were randomly divided into Tabata training groups (n = 15) and Circuit training (n = 15). In Tabata training, participants did 8 rounds with 6 repetitions, while in Circuit training, participants did 6 rounds with 6 repetitions. After training, participants will fill out the Profile of Mood States (POMS) questionnaire which aims to measure mood after training and at dawn participants will fill out the Sleep Quality Scale (SQS) questionnaire for sleep quality. The results showed that Tabata training can improve sleep quality and reduce mood disorders, especially in terms of fatigue, tension, and depression compared to circuit training. These findings also show that higher intensity training such as Tabata has a good impact on sleep quality and mood during fasting. This study also explores the important role of exercise intensity and time in managing the challenges of fasting and provides insights into the use of tailored fitness programs during the fasting period.

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INTRODUCTION

Ramadan fasting is a month full of physical and psychological challenges for Muslims because there are restrictions on diet and sleep quality (Boukhris et al., 2019; Elsahoryi et al., 2025). Adjusting to these changes often affects sleep quality and mood, which has an impact on overall well-being (Hosseini et al., 2024). One way to overcome these challenges is through physical exercise, which has been shown to have significant benefits for mental and physical health (Zouhal et al., 2020). However, the type and intensity of exercise performed during Ramadan can affect the results achieved, both in improving sleep quality and an individual's mood (El-Jaziz & Lotfi, 2023; Lahouel et al., 2024).

Currently, there are various types of physical exercise High-Intensity Interval Training (HIIT) and the method that is currently known by the public one of which is Tabata (Foster et al., 2015; Kv et al., 2024). Although the training is only short-term, it is

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known that this exercise can trigger the production of endorphins which function as regulators to reduce stress hormone levels, mood, and cortisol whenever it interferes with a person's sleep quality (Min et al., 2021). Not only that, Circuit Training which focuses more on repeating movements with lower intensity compared to Tabata is also seen as an alternative that has many benefits in improving physical fitness (Martínez-Díaz & Carrasco, 2021). Meanwhile, Circuit Training which focuses more on repeating movements with lower intensity compared to Tabata is also seen as a useful alternative in improving physical fitness (Kim et al., 2018). However, the impact of these two types of training on sleep quality and mood during the fasting month has not been widely studied by many studies.

So this study aims to compare the acute impact of Tabata training with Circuit Training on the sleep quality and mood of students undergoing the Ramadan fasting. The results of this study are expected to provide insight into how high and low intensity physical exercise can contribute to maintaining physical and mental well-being during fasting. This study is very relevant considering the need to find interventions that can help someone cope with the physical and psychological challenges that arise during the month of Ramadan.

The results of this study are expected to provide scientific evidence regarding the benefits of high-intensity exercise such as Tabata in improving sleep quality and mood, as well as providing guidance for the development of fitness programs that can be adapted during Ramadan. This study is also expected to enrich the existing literature on the effects of physical exercise on mental and physical health, especially in the context of fasting and open up opportunities to design more effective and personalized exercise programs for individuals undergoing the challenges of Ramadan.

METHODS

Research Design

This study uses a descriptive research design. The total participants who participated in this study were 30 male students. Data collection for this study was carried out during the Ramadan fast on March 3, 2025. Before being given an exercise intervention, all participants were randomly sampled by dividing Tabata (n = 15) and Circuit (n = 15).

Table 1.
Profile Partisipants

Profile	n	Mean±St.Dev
Age (Years)	30	19±0,93
Body Weight (Kg)	30	69,65±12,53
Body High (Cm)	30	169,44±8,17
Body Mass Indeks (BMI)	30	24,87±3.54

Training Program

Before doing Tabata and Circuit training, all participants warmed up for 15 minutes, which included static and dynamic warm-ups and jogging. After the warm-up

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was complete, the Tabata group did 8 repetitions with 6 repetitions, where the work time interval was 2; 1(20 seconds work: 10 seconds rest), between repetitions the participants rested for 4 minutes (Talisa Emberts et al., 2013). For the group given Circuit training, participants would do 6 repetitions with 6 repetitions, the work time given was 30 work times: 10 seconds rest, for each repetition change, a 4-minute rest period. All groups were given moderate intensity between 70% and 75% of the individual's maximum heart rate intensity.

Questionnaire

After being given the exercise intervention, participants were immediately given a questionnaire to determine the quality of their mood after the exercise given. The questionnaire given to determine the quality of mood is the Profile of Mood States (POMS) which consists of 40 statements that are divided randomly to assess the dimensions of mood (Grove & Prapavessis, 1992). The next day during sahur, participants will fill out a Sleep Quality Questionnaire which uses the Sleep quality scale questionnaire (SQS) (YI et al., 2006).

Statistics

The statistical test of this study uses a descriptive test that presents the results of the mean and standard deviation, the normality test of the data in this study uses the Shapirow-Wilk test, this study also assesses the differences between groups using the Independent t-test. However, if there is data that is not normally distributed, testing will be carried out using the Mann-Whitney U test. All results in the statistical test of this study are assessed with a significance level of p <0.05 to determine significant differences. All data in this study were statistically tested using JASP software.

RESULTS AND DISCUSSION

Table 2.
Mean Results Between Groups on Sleep Quality

Parameters	Group	n	Mean±St.Dev	Shapirow-Wilk
Sleep Quality	Tabata	15	66,53±6,99	0,888
	Circuit	15	53,53±4,62	0,656

The results in table 2 show that all data is normally distributed with a value > 0.05.

Table 3.
Independent Test Results Between Groups on Sleep Quality

Parameters	Group	df	Sig.	95% CI for Cohen's d	
				Lower	Upper
Sleep Quality	Tabata Circuit	28	<0,001	-3,095	-1,264

The results in table 3 above show that there is a difference in sleep quality in the Tabata and Circuit groups with a value of <0.001.

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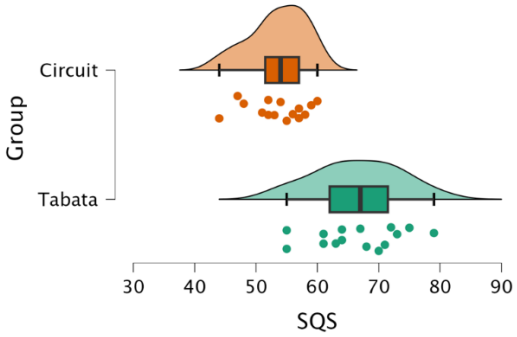

Figure 1.
Sleep Quality Results After HIIT Tabata Training

Table 4.
Descriptive Results and Normality Test on Mood States

No	Parameters	Group	df	Mean±St.dev	Sig.
1	Tension	Tabata	15	6,66±1,67	0,227
		Circuit	15	4,53±2,26	0,764
2	Depression	Tabata	15	7,66±2,35	0,434
		Circuit	15	6±2,85	0,660
3	Angry	Tabata	15	9,46±2,03	0,554
		Circuit	15	6,46±2,87	0,140
4	Fatigue	Tabata	15	9,60±2,94	0,004*
		Circuit	15	5,26±1,90	0,031*
5	Confusion	Tabata	15	12,40±3,46	0,922
		Circuit	15	15,80±3,23	0,268
6	Vigor	Tabata	15	6,73±1,83	0,134
		Circuit	15	4,26±2,34	0,862

The results of the table above show that tabata and circuit training exercises on mood show normally distributed data. However, in the fatigue section, both from the tabata and circuit training groups, the data is not normally distributed, so non-parametric testing is needed using the Mann-Whitney test.

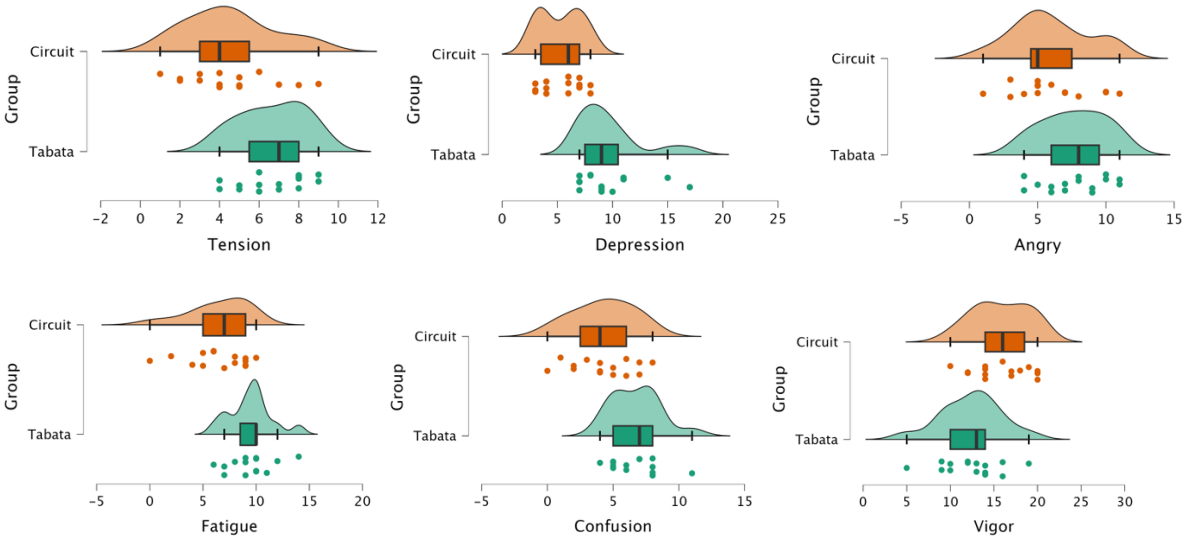

Figure 2.
Mean Results on Mood States of Both Groups

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Table 5.
Independent Test Results On Mood States

No.	Parameters	Statistics	Sig.
1	Tension	2,933	0,007
2	Depression	1,746	0,092
3	Angry	3,301	0,003
4	Fatigue	4,781	<0,001
5	Confusion	-2,781	0,010
6	Vigor	3,212	0,003

The results of table 5 above show that tabata training and circuit training have differences in mood. However, in the depression section, there is no difference between the two groups.

The purpose of this study was to determine the acute impact of Tabata and Circuit Training on sleep quality and mood in college students during the Ramadan fast. This study found that Tabata training had a more significant impact on improving sleep quality and reducing depression problems compared to Circuit Training. The findings of this study are in line with previous studies showing that high-intensity training has a positive impact on sleep quality during fasting (Frimpong et al., 2021).

In this study, Tabata training was shown to be more effective in improving sleep quality which can be seen through the physiological effects of high-intensity training (Figure 1). HIIT training can significantly increase the production of endorphins which play a very important role in reducing anxiety and stress, and affect sleep quality (Kawinchotpaisan et al., 2025; Min et al., 2021). Not only that, previous studies have found that high-intensity training in Tabata can also reduce cortisol levels, which is a stress hormone that can interfere with sleep quality (Ambroży et al., 2021; Bonato et al., 2020). This problem is in line with the results of previous studies showing that high-intensity exercise can improve sleep quality by increasing parasympathetic relaxation and reducing stress-related sleep disorders (Xie et al., 2024). During the Ramadan fast where sleep duration is very limited and also often experiences irregular eating patterns, Tabata training makes a significant contribution to students' physical and psychological recovery.

On the other hand, although Circuit Training also showed some benefits in improving mood and overall physical fitness its effects on sleep quality and depression were not as strong as those found with Tabata training. This suggests that although Circuit Training offers movement variety and overall fitness benefits, the lower intensity of the training compared to Tabata may not be enough to trigger the same strong physiological responses. Tabata with its shorter but more intense training duration, appears to be more effective in stimulating the central nervous system and producing positive effects on sleep quality, particularly in reducing symptoms of depression, which is often a problem for individuals experiencing psychological stress due to changes in sleep schedules during Ramadan.

In addition, the findings of this study provide a deeper understanding of the relationship between sleep quality and mood. As revealed in a study by Scott et al., (2021)

improvements in sleep quality are directly related to improved mood, where individuals who experience better sleep tend to have more stable moods. In this case, high-intensity exercise such as Tabata not only improves sleep quality but also reduces depressive symptoms, which act as a mediator between good sleep quality and improved mood. This improvement in mood is crucial especially during Ramadan when psychological stress and sleep disturbances can impact students' productivity and emotional well-being.

These findings also emphasize the importance of choosing the type of exercise that suits the physiological and psychological conditions of students during Ramadan. High-intensity exercise performed at the right time can improve the balance between physical demands and the need for quality sleep. In this case, an exercise program involving high-intensity Tabata exercise can have a positive impact not only on physical fitness but also on mental health, helping students overcome the physical and psychological challenges faced during fasting. This is also relevant to previous research findings showing that physical exercise performed at the right time, with consideration of appropriate intensity, can improve the quality of life and psychological well-being of individuals (Evans et al., 2017).

CONCLUSION

Overall the results of this study contribute significantly to our understanding of how physical exercise can be optimized during Ramadan to improve sleep and mood. Tabata training, with its more intense characteristics, was shown to be more effective in inducing profound physiological and psychological responses, which directly contribute to better sleep quality and reduced depression.

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