

EFFECTS OF RAMADAN FASTING ON LIFESTYLE, COGNITIVE, AND PHYSIOLOGICAL FACTORS: A CROSS-SECTIONAL STUDY*Syeda Naazneen Sultana**Kurikkapeedika Sharafuddin Afsana**Shivendra rai**Thekkil Mehjabin Shirin**Nasni**Syeda Naazneen Sultana**Riya Dasthageer**Kaleem Habib ulla Khan**Khudaykulov Zokir Uralovich**International Medical Students at Tashkent State Medical University**Assistant, Department of Physiology and Pathology**Tashkent State Medical University (TSMU)***Abstract:****Background:**

Fasting in Ramadan is a type of intermittent fasting practiced by Muslims worldwide. It is characterized by abstinence of food and water from dawn to dusk for the month. This dietary pattern influences sleep patterns, physical activity and metabolic processes.

Aim:

The primary aim of this study was to compare accessible physiological, lifestyle, cognitive and psychological factors between fasting and non-fasting individuals during Ramadan.

Methods:

A cross-sectional survey-based study was held among 90 participants, including 45 fasting and 45 non-fasting individuals. Data was collected through a structured questionnaire that assessed lifestyle factors, cognitive parameters, physical symptoms, and psychological well-being. Continuous variables were expressed as mean \pm SD, and comparisons between groups were performed using independent t-tests and chi-square tests, with $p < 0.05$ considered significant.

Results:

Fasting participants reported shorter sleep duration (6.4 ± 1.5 vs 7.1 ± 1.3 hours), fewer daily meals ($p < 0.001$), and lower water intake ($p = 0.012$) compared with non-fasting participants. Perceived energy level, concentration, and decision-making ability were also significantly lower among fasting individuals. No significant differences were observed in caffeine intake, physical activity, physical symptoms, stress, or mood.

Conclusion:

Ramadan fasting is associated with changes in sleep, hydration, and perceived cognitive performance, while most physical and psychological factors remained mostly unchanged.

Keywords: Ramadan fasting; physiological factors; lifestyle changes; sleep duration; cognitive performance.

Introduction:

Fasting in Ramadan, the 9th holy month of Islamic calendar, is practiced by approximately 1.9 billion Muslims globally and requires abstinence from eating, drinking, smoking and other actions from dawn to dusk throughout the month, about 29-30 days according to the lunar calendar¹. Ramadan fasting, also known as Ramadan diurnal intermittent fasting (RDIF), is a unique type of intermittent fasting (IF) which has garnered significant scientific attention for its physiological and psychological effects². Hence observing this for a continuous period of one month, each day lasting between 10-18 hours depending on the geographic location and season, can be found beneficial for the body³. This year the duration is typically 13 hours in Tashkent, Uzbekistan.

Unlike many other fasting practices, Ramadan fasting follows a time-restricted eating pattern, where meals are typically consumed during the pre-dawn meal (suhour) and the evening meal (iftar). This shift in eating patterns may affect metabolic processes, energy balance, and circadian rhythms⁴. Previous studies have suggested that Ramadan fasting may provide certain health benefits, including improvements in lipid profiles, insulin sensitivity, and body weight regulation in some individuals⁵. It has also been associated with changes in body composition and anthropometric parameters in several studies⁶. Intermittent fasting patterns similar to Ramadan fasting have also been associated with reduced inflammation and improved metabolic function⁷.

At the same time, the lifestyle changes that occur during Ramadan may lead to temporary physiological effects. Altered sleep schedules due to late-night meals and early morning waking for suhour may reduce total sleep duration and affect daytime alertness⁸. Changes in hydration and meal distribution may also influence perceived energy levels, concentration, and overall daily functioning⁹.

While several studies have examined the metabolic and clinical effects of Ramadan fasting, fewer have explored accessible physiological and lifestyle factors such as sleep duration, hydration, cognitive performance, and physical symptoms in everyday settings. Understanding these factors may provide practical insight into how fasting influences daily well-being.

Therefore, the present study aimed to compare accessible physiological, lifestyle, cognitive, and psychological factors between fasting and non-fasting individuals during Ramadan, in order to better understand the potential effects of fasting on everyday functioning.

Methodology:

A cross-sectional survey study was conducted to compare non-clinical physiological, cognitive, and lifestyle factors between individuals who were fasting during Ramadan and those who were not fasting. Data was collected using a structured online questionnaire developed through Google Forms. Participation was voluntary and informed consent was obtained prior to completing the questionnaire.

A total of 90 participants were included in the study. Based on fasting status, respondents were categorized into two groups: fasting (n = 45) and non-fasting (n = 45).

Data Collection:

The questionnaire collected information from several domains, including demographic characteristics, anthropometric measurements, lifestyle habits, cognitive parameters, physical symptoms, and psychological status.

Demographic variables included age, gender, residence, country, and presence of chronic medical conditions. Anthropometric data consisted of self-reported height and weight, from which body mass index (BMI) was calculated using the formula:

$$\text{BMI} = \text{weight (kg)} / \text{height}^2 (\text{m}^2)$$

Lifestyle variables included sleep duration, number of meals per day, daily water intake, tea/coffee consumption, and intentional physical activity.

Cognitive indicators were assessed using Likert-scale questions evaluating perceived energy level, concentration during work or study, and problem-solving or decision-making ability.

Participants also reported the frequency of physical symptoms such as headaches, dizziness or lightheadedness, daytime sleepiness, and physical fatigue, as well as psychological indicators including stress level and overall mood.

Statistical Analysis:

Survey responses were exported to Microsoft Excel for statistical analysis. Continuous variables were expressed as mean \pm standard deviation (SD), while categorical variables were summarized using frequencies and percentages. Comparisons between fasting and non-fasting groups were performed using independent sample t-tests for continuous variables and chi-square tests for categorical variables. A p-value < 0.05 was considered statistically significant.

Results:

Participant Characteristics:

A total of 90 responses were collected using the survey, with 45 individuals fasting during Ramadan and 45 not fasting, allowing balanced comparison between the two groups.

The demographic characteristics of the participants are summarized in Table 1. The study population consisted of 52 females (57.8%) and 38 males (42.2%) indicating a slightly higher representation of female participants. Most participants lived in apartments (47.8%), hostels (42.2%) and few in other (10%) forms of accommodation.

Most individuals are of Indian origin (93.3%), while some (6.7%) were from other countries. The mean age of participants was 24.3 ± 8.9 years indicating most of them were young adults.

Anthropometric measurements were similar between fasting vs non-fasting groups. The mean body weight in fasting individuals was 64.3 ± 13.8 kg and 65.9 ± 9.3 kg in non-fasting individuals. Similarly, the mean body mass index (BMI) was 23.4 ± 5.2 kg/m² among fasting participants and 24.0 ± 5.7 kg/m² among non-fasting participants.

Overall, the two groups were demographically and anthropometrically comparable, allowing a suitable basis for further comparison of physiological and lifestyle factors.

Table 1. Demographic Characteristics of Participants ($n = 90$)

Variable	Category	Number (n)	Percentage (%)
Gender	Male	38	42.2
	Female	52	57.8
Fasting status	Fasting	45	50
	Non-fasting	45	50
Residence	Apartment	43	47.8
	Hostel	38	42.2
	Other	9	10
Country	India	84	93.3
	Other	6	6.7
Age	Mean \pm SD	24.3 \pm 8.9	-
Height	Fasting Mean \pm SD	168.7 \pm 8.9	-
	Non-fasting Mean \pm SD	169.5 \pm 9.3	-
Weight	Fasting Mean \pm SD	64.3 \pm 13.8	-
	Non-fasting Mean \pm SD	65.9 \pm 9.3	-
BMI	Fasting Mean \pm SD	23.4 \pm 5.2	-
	Non-fasting Mean \pm SD	24.0 \pm 5.7	-

Lifestyle Characteristics:

Various lifestyle factors differed between fasting and non-fasting participants, as presented in Table 2. The mean sleep duration among fasting individuals was 6.4 ± 1.5 hours per night, which was significantly lower than 7.1 ± 1.3 hours among non-fasting participants ($p = 0.018$).

Fasting participants also reported significantly fewer meals per day (2.3 ± 0.7) compared with non-fasting individuals (3.1 ± 0.8 , $p < 0.001$). Daily water intake was lower in fasting participants (6.2 ± 2.1 glasses/day) compared with non-fasting individuals (7.4 ± 2.3 glasses/day, $p = 0.012$).

Caffeine intake was similar in both groups, with fasting candidates reporting 1.7 ± 0.87 cups/day compared to 1.5 ± 0.78 cups/day among non-fasting individuals ($p = 0.25$).

Intentional physical activity was reported by 21 fasting participants (46.7%) of 45 and 24 non-fasting participants (53.3%) of 45, while the remaining reported no regular physical activity. The difference was not statistically significant ($p = 0.53$).

Table 2. Comparison of lifestyle factors between fasting and non-fasting participants.

Variable	Fasting (n = 45)	Non-fasting (n = 45)	P-value
Sleep duration (hours/night)	6.4 \pm 1.5	7.1 \pm 1.3	$p = 0.018$
Meals per day	2.3 \pm 0.7	3.1 \pm 0.8	$p < 0.001$
Water intake (glasses/day)	6.2 \pm 2.1	7.4 \pm 2.3	$p = 0.012$
Caffeine (cups/day)	1.7 \pm 0.87	1.5 \pm 0.78	$p = 0.25$
Intentional physical activity	Yes: 21 (46.7%)	Yes: 24 (53.3%)	$p = 0.53$
	No: 24 (53.3%)	No: 21 (46.7%)	

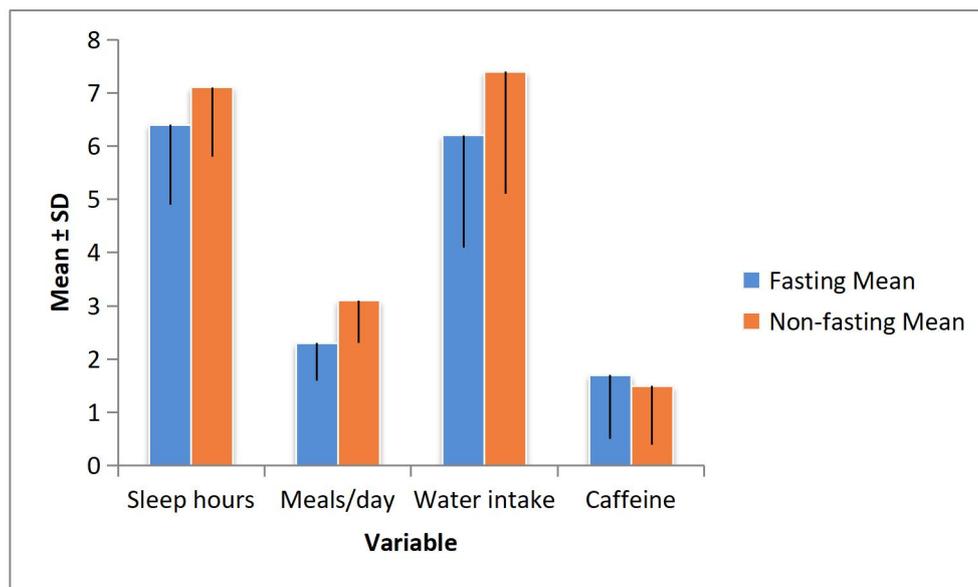


Figure 1. Comparison of sleep hours, meals per day, water intake, and caffeine intake between fasting and non-fasting individuals. Data is presented as mean \pm standard deviation (SD).

Cognitive Function and Mental Performance:

The comparison of cognitive parameters between fasting and non-fasting participants is presented in Table 3, while the graphical representation of key variables is shown in Figure 2.

Differences were observed in several self-reported cognitive parameters. Fasting individuals reported lower perceived daytime energy levels (3.1 ± 0.9) compared with non-fasting participants (3.5 ± 0.8 , $p = 0.028$). Similarly, concentration during work or study was lower among fasting participants (3.2 ± 0.9) compared with non-fasting participants (3.4 ± 0.8) ($p = 0.032$).

Problem-solving and decision-making ability scores were also slightly lower in fasting participants (3.2 ± 0.8) compared with 3.5 ± 0.7 in non-fasting participants, with the difference reaching statistical significance ($p = 0.048$).

Difficulty in remembering information was reported as “often” by 16 fasting participants (35.6%) compared with 11 non-fasting participants (24.4%), though this difference was not statistically significant ($p = 0.24$). Brain fog was reported “frequently” by 18 fasting participants (40.0%) compared with 12 non-fasting participants (26.7%), which also did not reach statistical significance ($p = 0.18$).

Table 3. Comparison of cognitive function indicators between fasting and non-fasting participants

Variable	Fasting (n = 45)	Non-fasting (n = 45)	P-value
Perceived energy level during the day (1-5)	3.1 ± 0.9	3.5 ± 0.8	0.028
Concentration during work/study (1-5)	3.0 ± 0.9	3.4 ± 0.8	0.032
Difficulty remembering information	Often: 16 (35.6%)	Often: 11 (24.4%)	0.24

Problem-solving / decision making (1-5)	3.2 ± 0.8	3.5 ± 0.7	0.048
Brain fog frequency	Often: 18 (40.0%)	Often: 12 (26.7%)	0.18

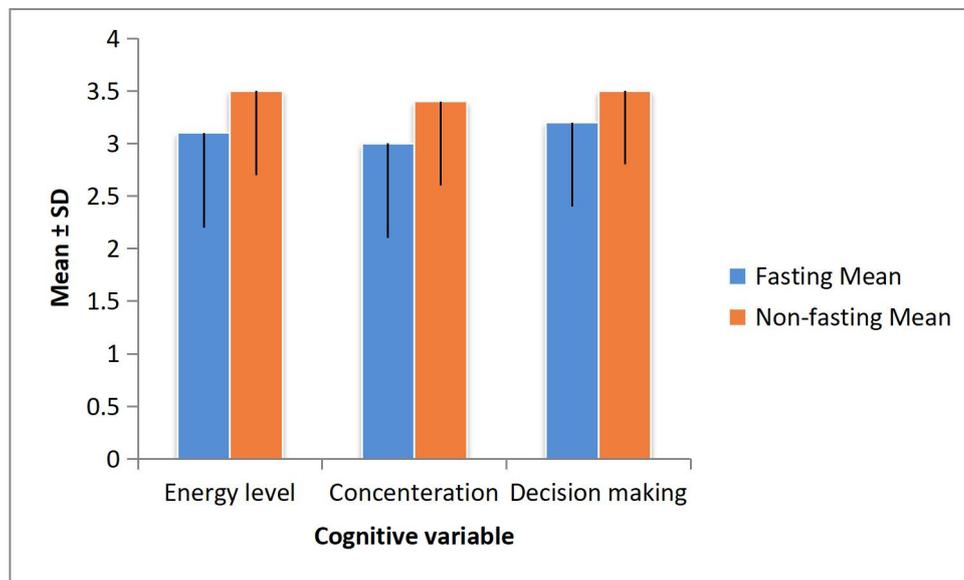


Figure 2. Comparison of perceived energy level, concentration, and decision making scores between Fasting and Non-fasting Individuals. Bars represent mean ± standard deviation.

Physical Symptoms:

Many physical symptoms were reported more frequently among fasting participants, although none showed statistically significant differences, as presented in Table 4, with graphical representation shown in Figure 3.

Excessive daytime sleepiness (EDS) was reported “often” by 20 fasting participants (44.4%) compared with 14 non-fasting participants (31.1%) ($p = 0.19$). Headaches were reported by 17 fasting participants (37.8%) compared with 11 non-fasting participants (24.4%) ($p = 0.17$).

In a similar way, dizziness or lightheadedness was experienced “often” by 14 fasting participants (31.1%) compared with 8 non-fasting participants (17.8%) ($p = 0.14$). Feeling physically tired even after rest was reported by 19 fasting participants (42.2%) compared with 13 non-fasting participants (28.9%) ($p = 0.18$).

Table 4. Frequency of physical symptoms among fasting and non-fasting participants.

Variable	Fasting (n = 45)	Non-fasting (n = 45)	P-value
Excessive daytime sleepiness (EDS)	Often: 20 (44.4%)	Often: 14 (31.1%)	0.19
Headaches	Often: 17 (37.8%)	Often: 11 (24.4%)	0.17
Dizziness / lightheadedness	Often: 14 (31.1%)	Often: 8 (17.8%)	0.14
Physically tired even after rest	Often: 19 (42.2%)	Often: 13 (28.9%)	0.18

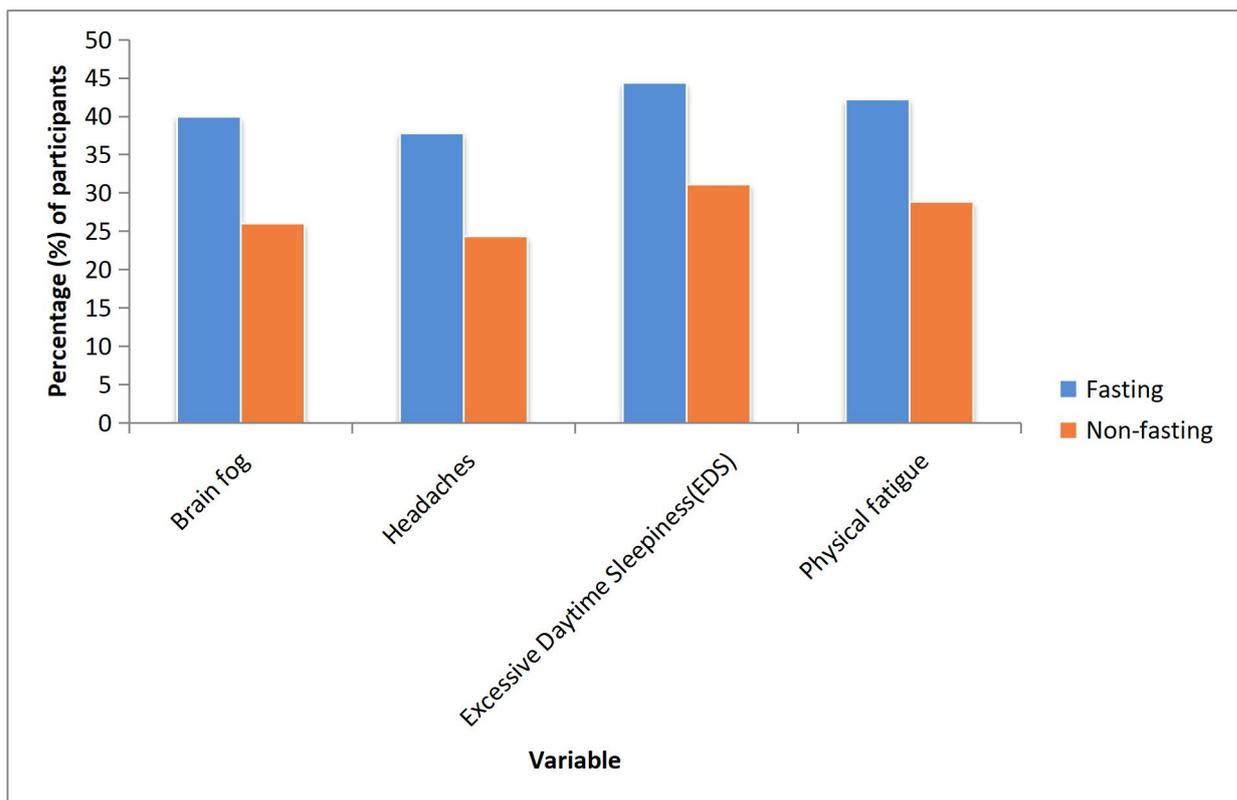


Figure 3. Percentage of participants reporting physical symptoms during Ramadan in fasting and non-fasting groups.

Psychological Well-being:

Psychological variables are summarized in Table 5, with graphical representation shown in Figure 4.

Psychological parameters showed minimal differences between groups. The mean stress level score was 3.3 ± 0.9 among fasting participants and 3.1 ± 0.8 among non-fasting participants ($p = 0.27$). Overall mood scores were 3.4 ± 0.8 in fasting participants and 3.6 ± 0.7 in non-fasting participants ($p = 0.21$).

Lack of motivation to complete tasks was reported often by 15 fasting participants (33.3%), compared with 10 non-fasting participants (22.2%), though this difference was not statistically significant ($p = 0.23$).

Table 5. Comparison of psychological well-being indicators between fasting and non-fasting participants.

Variable	Fasting (n = 45)	Non-fasting (n = 45)	P-value
Stress level (1-5)	3.3 ± 0.9	3.1 ± 0.8	0.27
Overall mood (1-5)	3.4 ± 0.8	3.6 ± 0.7	0.21
Lack of motivation to complete tasks	Often: 15 (33.3%)	Often: 10 (22.2%)	0.23

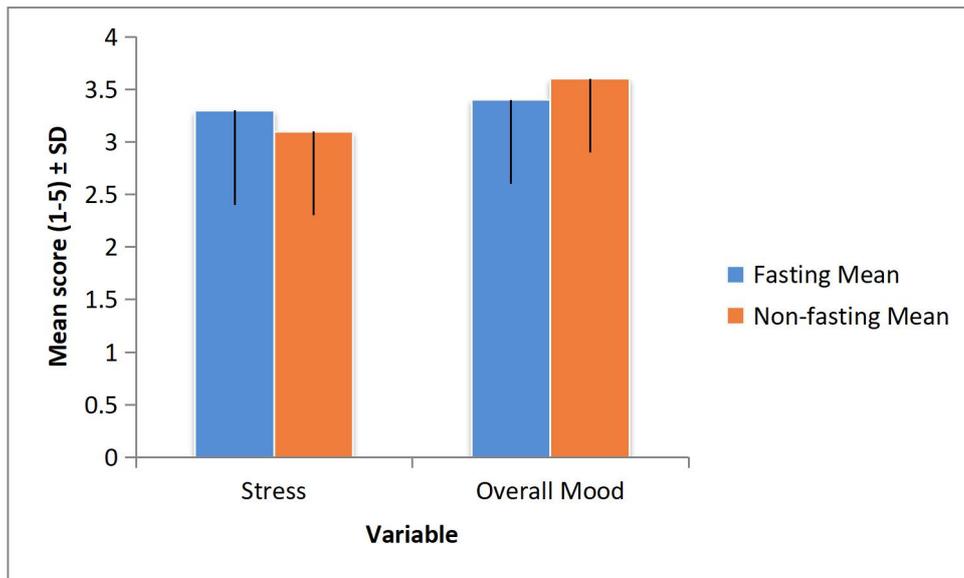


Figure 4. Comparison of psychological parameters including stress level and overall mood between fasting and non-fasting individuals.

Discussion:

This study looked into various physiological, lifestyle, cognitive, and psychological elements affecting both fasting and non-fasting individuals during Ramadan. The results revealed that those who were fasting tended to have shorter sleep durations, fewer meals throughout the day, and lower water intake. They also reported feeling less energetic, less focused, and reported greater difficulty with decision-making than their non-fasting counterparts. Interestingly, factors like caffeine consumption, physical activity levels, physical symptoms, stress, and overall mood didn't show significant differences between the groups.

The shorter sleep times for fasting participants align with the typical changes in lifestyle that occur during Ramadan. With late-night iftar meals and early morning suhoor, sleeping patterns often get disrupted, leading to less overall sleep. Research has documented how circadian rhythms can shift during this month, possibly leading to increased daytime tiredness and lower energy levels⁴.

There were notable differences in hydration and eating habits as well. Fasting individuals reported drinking less water and having fewer meals, likely due to the limited eating hours during Ramadan⁸. This reduction in hydration and caloric intake could impact their energy levels and cognitive performance, especially during the fasting hours.

Cognitive abilities, such as feeling energetic, maintaining focus, and making decisions, were significantly diminished among those who fasted⁹. These results could be linked to temporary metabolic changes that occur during fasting, like variations in blood glucose levels, mild dehydration, and alterations in sleep patterns¹⁰. However, the lack of significant differences in memory issues and brain fog suggests that the overall effect on cognitive function might be relatively limited and subjective.

While fasting participants did report more instances of physical symptoms like daytime sleepiness, headaches, dizziness, and ongoing fatigue, these differences were not significant enough statistically¹¹. This implies that although some individuals may experience mild discomfort during fasting, these experiences may not be widespread across the entire fasting population.

Psychological indicators such as stress levels, mood, and motivation showed no significant differences between fasting and non-fasting participants¹². This outcome is consistent with earlier research indicating that Ramadan fasting does not inherently have a negative effect on psychological well-being and may, in some instances, contribute to enhanced emotional or spiritual health¹.

However, several limitations must be acknowledged when interpreting these findings. Firstly, the study relied on self-reported data, which could lead to reporting bias. Secondly, the cross-sectional nature of the study design prevents establishing causal relationships between fasting and the observed results. Furthermore, the majority of participants were from a single country and represented a relatively young age group, which may restrict the applicability of these findings to more diverse populations.

Despite these limitations, the study offers valuable insights into the practical and accessible physiological factors linked to Ramadan fasting, particularly in areas such as sleep, hydration, and perceived cognitive performance.

Conclusion:

In conclusion, this study found that individuals fasting during Ramadan experienced shorter sleep duration, reduced daily water consumption, fewer meals, and slightly diminished perceived cognitive performance compared to those who were not fasting. However, there were no significant differences between the two groups regarding physical symptoms, psychological well-being, caffeine consumption, or levels of physical activity.

Overall, these findings indicate that while Ramadan fasting may affect certain lifestyle habits and cognitive aspects, most physiological and psychological factors remain relatively consistent, suggesting that fasting is generally well-tolerated by healthy individuals. Future research with larger and more diverse populations, alongside objective physiological assessments, is recommended to gain a deeper understanding of the broader health effects of Ramadan fasting.

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