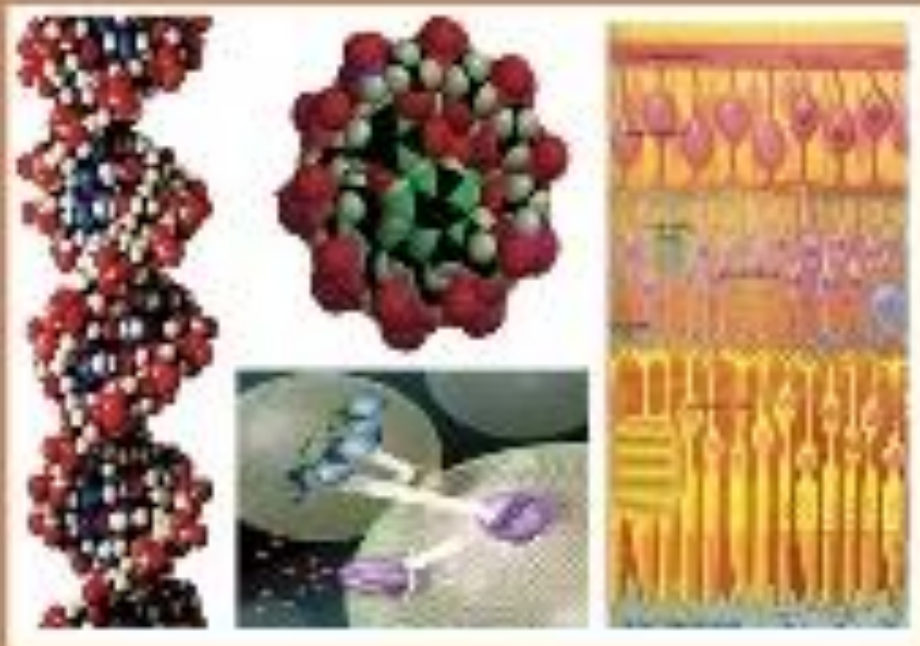




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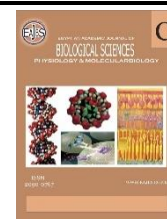
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Psychological and Socio-Religious Effects of Ramadan Fasting Among Healthy Non-Smoker Adults

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ABSTRACT

Background: Impaction of fasting on well-being was thoroughly researched, however, the psychological and socio-religious alterations during Ramadan fasting are still not well documented. Our investigation aimed to assess the impact of Ramadan fasting on psychological status and socio-religious activities among healthy non-smoker adults. **Methods:** A cohort, prospective study was carried out among a healthy volunteer group (50 subjects: 28 males, 22 females), of students and staff members, Faculty of Medicine, Gezira University, Central Sudan, during Ramadan fasting month that lasted for 30 days, and the fasting hours were 14–15 hours in moderately warm weather. A modified questionnaire from the Hamilton Anxiety Scale (HAS) was used. An online survey was sent to the same volunteer group during Ramadan and one month after. **Results:** Study findings revealed a significant ($p < 0.05$) decrease in total sleep time during Ramadan compared to the control period one month after Ramadan, among the total group (8.0 ± 1.6 , 8.5 ± 1.1). Total scores for the general psychological disorders were significantly decreased during Ramadan fasting compared to the control period one month after Ramadan fasting meanwhile the total scorings of the socio-religious activities were significantly increased during Ramadan fasting compared to the control period after Ramadan, among the total group.

Conclusion: The investigation revealed a noteworthy decline in negative psychological disorders and a significant increase in socio-religious activities throughout the month of Ramadan.

INTRODUCTION

Ramadan fasting is a unique kind of intermittent fasting (IF) known as time-restricted feeding (TRF). During the Holy month of Ramadan, individuals are permitted to consume food and beverages from dusk till dawn but are not permitted to smoke, eat, drink, or engage in any sensual activity during the day (Zubrzycki, Cierpka-Kmiec, et al. 2018, Alghafli, Hatch *et al.*, 2019). Intermittent fasting (IF) has emerged over the past 10 to 15 years as an unconventional approach to potentially reduce body weight and improve metabolic health beyond simple calorie restriction (CR). There are a variety of intermittent fasting regimens with regards to feed-and-fast cycles, such as alternate-day fasting (ADF), and time-restricted feeding (TRF), which represents Ramadan fasting (Harris, Hamilton *et al.*, 2018, Harris, McGarty *et al.*, 2018). During Ramadan month, it is a common practice to wake early to have breakfast before dawn (Suhoor), (Alghafli, Hatch *et al.*, 2019).

Thus, energy intake is restricted to evening, nighttime, and very early morning in a bimodal pattern. Fasting has many health benefits in that it helps treat a variety of physical illnesses, including those of the digestive system, such as indigestion, recurrent stomachaches, colon inflammation, and liver disorders (Tibi, Ahmed, *et al.*, 2023) and conditions such as obesity (de Toledo, Grundler *et al.* 2019, Aaseth, Ellefsen *et al.*, 2021), arteriosclerosis and hypertension (Golbidi, Daiber *et al.*, 2017, Alam, Gul *et al.*, 2019).

Several investigations have examined how the Ramadan fast affects people's moods and irritability. These investigations consistently demonstrate that during the midday fast, there is a decrease in subjective perceptions of alertness (Boukhris, Trabelsi, *et al.*, 2019) and an increase in fatigue and irritation (Watkins and Serpell 2016, Stovner, Nichols, *et al.*, 2018). However, some studies have shown that observing a fast during the month of Ramadan can effectively reduce stress, anxiety, and depressive symptoms (Erdem 2018, Ibrahim 2018, Berthelot, Etchecopar-Etchart *et al.*, 2021). Reduced cognitive function has also been demonstrated (Cherif, Roelands, *et al.* 2016, Boujelbane, Trabelsi, *et al.*, 2022). However, this is not a general result (Gudden, Arias Vasquez, *et al.*, 2021).

Sleep duration was well maintained during Ramadan observance, and this could explain why no significant changes in cognitive performance were demonstrated (Bouhlel, Latiri, *et al.*, 2014) (Chamari, Briki *et al.*, 2016). Changes in typical circadian cycles, which result in people becoming more active throughout the evening and night while increasing daytime sleepiness, may contribute to alteration in cognitive function as well as sleep lack (Boukhris, Trabelsi, *et al.*, 2019).

An increased frequency of headaches is a commonly mentioned issue associated with Ramadan fasting (Pakkir Maideen, Jumale, *et al.*, 2017, AlAmri, AlMuaigel *et al.*, 2021), whereas fasting throughout Ramadan seems to be the main

trigger for migraines (Al-Hashel, Abokalawa, *et al.*, 2021). There was a clear correlation between the length of the fast and the number of headache patients (Tahir, Macassa, *et al.*, 2013, Mehmood, Moin *et al.*, 2015, El-Mitwalli 2019).

Muslims engage in more spiritual activities than normal during Ramadan, the most holy month in the Islamic calendar, such as praying and reading the Qur'an (Ludwig 2015). Furthermore, care is required to prevent hatred, jealousy, and enmity towards others, which contravene the ideals of fasting (Koenig and Al Shohaib 2014).

Ramadan emphasizes community and family relationships, as families, friends, and relatives should assemble after sundown to break the fast, these traditions might lead to increased "peace of mind," which is a recognized Ramadan benefit (Ajibola, Azeez, *et al.*, 2021). However, other researchers have discovered that during the day, people may experience unfavorable symptoms such as fatigue, irritation, drowsiness, and lack of focus, which might negatively impact their capacity to work and learn (Ovayolu, Ovayolu, *et al.*, 2016, Watkins and Serpell 2016). These negative consequences might be caused, at least in part, by fasting-induced hypoglycemia as well as a reduction in daily sleep hours during Ramadan (Boukhris, Trabelsi, *et al.*, 2019). In order to get up early for the pre-dawn meal, people typically stay up late watching TV, listening to the radio, praying, or reading the Qur'an (Ibrahim 2018).

Because of the contradictory results in the literature about the impact of Ramadan fasting on the psychological status and socio-religious activities among fasting Muslims, this study set out to evaluate the impact of Ramadan fasting on the psychological status and socio-religious activities among a group of apparently healthy nonsmokers' adult Sudanese subjects.

MATERIALS AND METHODS

1. Subjects:

Participants were 50 volunteers (28 males, 22 females), including students and staff

members of the Faculty of Medicine, University of Gezira, Sudan. Participants were adults, their ages varied from 19 to 45 years old (mean age = 25.6 years), 80% of them were single and 20% were married. The percentages of male and female participants were 56.0% and 44% respectively.

A- Inclusion criteria: All participants must not be of current psychiatric or somatic illness, not use any medication during the study period of two months, and non-smokers.

B- Exclusion criteria: Participants who do not fit our inclusion criteria such as fasting less than 21 days, not addicted including cigarette smoking, pregnant female, or using contraceptives.

C- Duration of the study: Data was collected on two occasions, the first occasion was in the 3rd and 4th week of Ramadan, and the second time was in the 3rd and 4th week of the month after (Shawwal month of Hijri year).

D- Ethical considerations: All volunteers signed written informed consent before participation in the study.

2. Methods:

This prospective cohort study was conducted at Gezira University, Sudan, where Ramadan month lasted for 30 days, and the fasting hours were 14 – 15 hours in moderately warm weather. Information was given by the subjects about the psychological, social, and religious daily activities and feelings were collected on two occasions. The first occasion was in the third week of Ramadan, and the second time was in the third week of the month after (Shawwal month of Hijri year).

Typically, the fasting month begins with little planning. People abruptly change their way of life, which affects not only the length and rhythm of their sleep but also their eating patterns. The individual needs to adjust to these adjustments at the start and conclusion of each month. As a result, the patients were evaluated both after Ramadan ended and throughout the third week of the fast. Evaluations were placed from 2 to 4 p.m., on the first day of each week, each being chosen by them as a “typical” day.

The questionnaire was divided into three parts; the first part comprised inquiries concerning sociodemographic traits (e.g. age, gender, tribe, marital status, economic status, job, height and weight), in addition to some information about the physical activity during and after Ramadan fasting month (type, duration and mode), Tarawih's prayers, and alteration of sleeping patterns during Ramadan fasting (habit of naps and usual number of hours of sleep). Also, the questionnaire included information about eating habits during and after Ramadan fasting e.g. changes in meal frequency, and pre-dawn (Suhour) meal intake.

The second part of the questionnaire, which was administered by a psychiatrist, was a clinical test of anxiety and depression modified from the HAS (Hamilton Anxiety Scale); which was a rating scale used for the assessment of somatic and psychological anxiety and depression (Hamilton 1960, Bruss, Gruenberg *et al.*, 1994, Thompson 2015). This questionnaire included 19 questions for the assessment of the somatic and psychological disorders of the study group during Ramadan fasting compared to the control status after Ramadan e.g. daily performance, irritability, tension, headache, sadness and depression, tiredness (fatigue), and lack of concentration. Each of the 19 items was scored from 0 to 4, with 0 indicating an absence of the specific disorder and 4 indicating an extreme disorder felt or shown by the subject.

The third part of the questionnaire included 8 questions concerning the social and religious dimensions during the holy month of Ramadan compared to the control days one month after the end of Ramadan fasting e.g. participation in events, visiting relatives, cooperation with the community, financially, morally, or actually. In addition to some questions about adherence to religious and spiritual rites e.g. obligatory prayers (Fard), and non-obligatory prayers (Naafil), Each of the 8 items was scored from 0 to 4, with 0 indicating the absence of specific social or religious activity and 4 indicating extreme activity done by the subject.

3. Statistical Analysis:

All calculations were done using the SPSS-V21 and GraphPad statistical software for analysis of the data. Each volunteer served as self-control by comparing his Ramadan with post-Ramadan scores. Scores were expressed as mean \pm SD and analyzed by paired – samples student's t-test. All differences were considered significant at

P<0.05.

RESULTS

1. Total Sleep Time During Ramadan:

Table (1) illustrates that total sleep time was significantly decreased during Ramadan compared to control in the total group and in the male group separately, (8.1 \pm 1.8, 8.5 \pm 1.4); (8.0 \pm 1.6, 8.5 \pm 1.1); p<0.05), respectively.

Table 1. Alteration of total sleep time (hours) during Ramadan fasting compared to control days among males (n=28), females (n=22) and total subjects (n=50).

Total sleep time (hours)	Non-Ramadan period	Ramadan Period
Male	8.5 \pm 1.1	8.0 \pm 1.6*
Female	8.6 \pm 1.7	8.2 \pm 2.1
Total	8.5 \pm 1.4	8.1 \pm 1.8*

Results presented as mean \pm SD.

*Significant at P<0.05.

2. Psychological Effects of Ramadan Fasting on The Study Group:

The global rating of the negative psychological status of the study population is presented in Figure (1). These illustrations showed that the mean scores of negative psychological statuses were significantly decreased during Ramadan fasting compared to control days for both male and female

subjects, which indicates that the general psychological status is far better during Ramadan fasting than non-fasting month.

The results of the effect of fasting during Ramadan on the scores of irritability, sadness, and depression, decreased daily performance, tension, and headache are presented in Table 2.

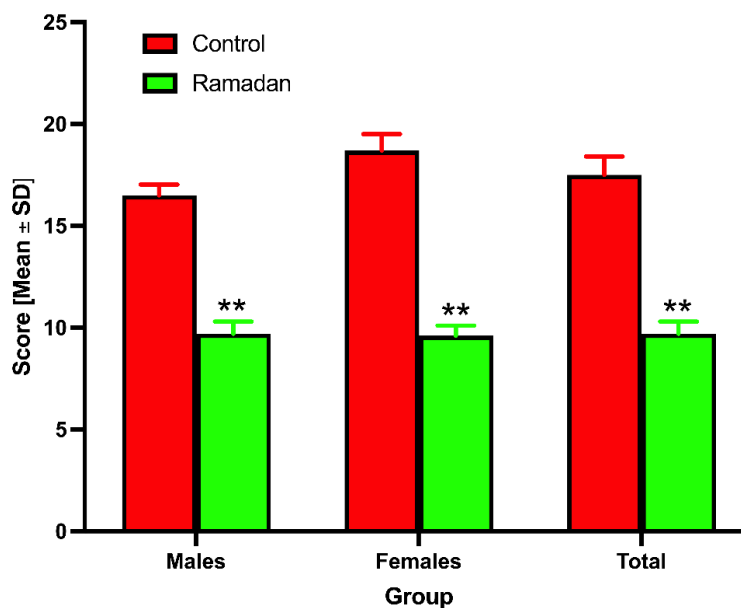


Fig. 1. Decreased scores † for general psychological disorders during Ramadan month compared to control days among a group of males (n=28), females (n=22), and total (n=50). † derived from a scale where 0: absent disorder and 4: extreme disorder.

Table 2. Psychological disorder scores were observed in Ramadan fasting among a total group of 50 subjects compared to the control period one month after Ramadan.

Parameter	Group	Control score ‡	Ramadan score ‡
Tiredness (Fatigue)	Total	1.9±0.8	1.6±0.7*
Irritability	Total	1.4±0.9	0.8±0.9*
	Males	1.36±0.9	0.86±0.8*
	Females	1.55±0.8	0.82±0.7*
Sadness & depression	Total	0.8±0.7	0.2±0.5*
	Males	0.82±0.8	0.11±0.4*
	Females	0.77±0.7	0.23±0.8
Decreased daily performance	Total	1.6±0.6	1.8±0.8
	Males	1.32±0.5	1.64±0.6
	Females	1.91±0.6	1.91±0.5
Tension	Total	1.4±0.8	0.9±0.8*
	Males	1.39±0.7	0.93±0.8*
	Females	1.45±0.6	0.86±0.7*
Headache	Total	1.31±0.5	0.77±0.6*
	Males	1.21±0.8	0.86±0.7*
	Females	1.41±0.6	0.68±0.5*

Results presented as mean± standard deviation.

* Significant difference between controls and Ramadan (P <0.05)

‡ derived from a scale where 0: absent disorder and 4: extreme disorder.

3. Effect of Ramadan Fasting On The Socio-Religious Activities Of The Study Group:

The total scorings of the socioreligious activities were presented in Figure 2, they illustrated a significant increase in mean scores during Ramadan fasting compared to control days in both genders,

which indicates that the socio-religious activities are improved during Ramadan fasting compared with the non-fasting months. The scores of some selected categories of socio-religious activities during Ramadan fasting compared to control days are demonstrated in Table 3.

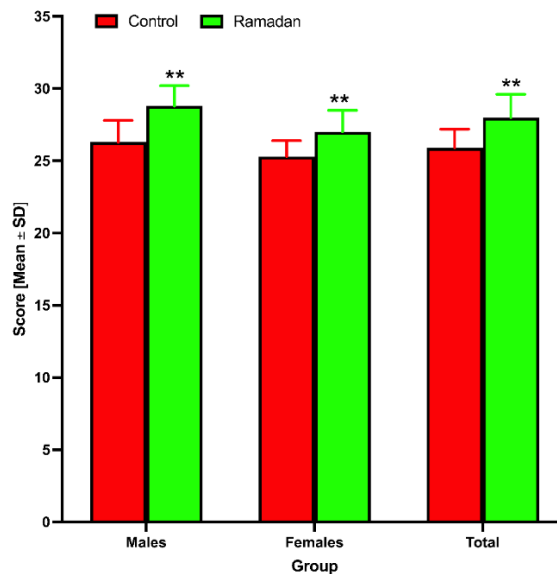


Fig. 2. Increased scores ‡ for total socio-religious activity during Ramadan compared to control non-fasting days among a group of males (n=28), females (n=22), and total (n=50).

‡ derived from a scale where 0: absent activity and 4: extreme activity

Table 3. Socio-religious activity scores in Ramadan fasting compared to the control period one month after Ramadan among a total group of 50 subjects.

Parameter	Groups	Control score ‡	Ramadan score ‡
Communality (events participation)	Total	2.98±0.71	3.10±0.81
Family ties (visiting relatives)	Total	3.00±0.73	3.12±0.82
Obligatory prayers (Fard)	Total	3.68±0.51	3.98±0.14*
	Males	4±0.45	3.64±15*
	Females	3.95±0.4	3.73±0.35
Non-obligatory prayers (Naafil)	Total	2.36±0.70	3.64±0.50*
	Males	2.29±0.80	3.71±0.60*
	Females	2.45±0.70	3.55±0.50*

Results presented as mean± standard deviation.

*Significant difference between controls and Ramadan ($P < 0.5$)

‡ derived from a scale where: 0: absent activity and 4: extreme activity.

DISCUSSION

In this study, a group of volunteers, as students and staff members in the Faculty of Medicine – University of Gezira, was observed during the holy month of Ramadan to determine the impact of abstaining from food and liquids for a period of about 14 hours from dawn until dusk, on their psychological well-being and socioreligious activities. These statistics were compared for the month of Ramadan to a reference period that was four weeks after the month-long fast.

Our results demonstrated a slight, but significant decrease in total sleep time during the Ramadan fasting period compared to the control period, one month after Ramadan month, for the total study group. Our finding is in line with (Boukhris, Trabelsi *et al.*, 2019). In contrast, other reports demonstrated no shift in overall sleep duration at the conclusion of Ramadan fasting (Bouhlel, Latiri, *et al.*, 2014).

Our study's findings demonstrated a noteworthy decline in the scores for negative psychological status during Ramadan fasting, a finding which was supported by (Nugraha, Ghashang, *et al.*, 2017, Erdem 2018, and Ibrahim 2018).

The scores for the social activities were significantly increased during Ramadan fasting compared to control non-fasting days, one month after Ramadan and this effect was

demonstrated among both male and female subjects as well as for the total group, and this result is in agreement with (Ahmad, Goel *et al.*, 2012, Shalihin, Yulia *et al.*, 2021).

Our research revealed high scores for religious activity during Ramadan fasting, a finding which is consistent with (Alghafli, Hatch *et al.*, 2019).

Ramadan, as a central, communal event, fosters more harmony and collaboration among Muslims worldwide. The stronger social support that the community provides and the tighter contact that each Muslim develops with Allah a vital type of social relationship—are two important factors that contribute to this impact. Positive psychology study shows that religion is a useful source of social support, promotes positive views, and increases the pleasure of its adherents (Beit-Hallahmi and Argyle 2014, Alghafli, Hatch *et al.*, 2019).

Our Results align with the Pargament model. This model demonstrates how interpersonal, social, cognitive, behavioral, and mental aspects all contribute to the explanation of the religious coping mechanism (Pargament, Smith, *et al.*, 1998, Gall and Guirguis-Younger 2013).

Conclusion:

Millions of Muslims observe fasting in a wide variety of climatic conditions every year. However, epidemiological research is

sparse, especially in relation to psychiatric disorders and socioreligious activities. The current study results demonstrated that fasting in the month of Ramadan has been effective in diminishing negative psychological disorders and increasing socio-religious activities. However, it needs to be more elaborated and confirmed through further investigations in the future. Our study had some limitations, including a small sample size and the exclusion of anybody under the age of 19 years or above the age of 45 years. We recommend that the study in a larger sample size, including a representative sample of the general population, should be performed in further investigations, besides considering other factors such as caffeine, nicotine, and alcohol withdrawal, drug misuse, and other psychological impairments during this month. One of the strengths of the study must also be acknowledged, including the within-subjects design whereby participants acted as their own controls.

Declarations:

Ethical Approval: All volunteers signed written informed consent before participation in the study.

Conflict of interests: The authors declare no conflict of interest.

Authors Contributions: I hereby verify that all authors mentioned on the title page have made substantial contributions to the conception and design of the study, have thoroughly reviewed the manuscript, confirm the accuracy and authenticity of the data and its interpretation, and consent to its submission.

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Availability of Data and Materials: All datasets analysed and described during the present study are available from the corresponding author upon reasonable request.

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