



Self-Coping Strategies Among Jordanian Athletes During Ramadan Fasting: A Questionnaire Proposal

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Abstract

This study aims to categorize the adaptation strategies of Muslim athletes who fast during Ramadan and proposes a self-coping strategy questionnaire as a complementary assessment tool. A total of 109 Jordanian Muslim athletes (mean age 20.0 ± 8.5 years) were surveyed by completing a self-coping questionnaire designed to classify an individual athlete's level of adaptation. This study was conducted during the month of Ramadan 2019 and developed based on the training, nutritional, psychological, self-control, and recovery dimensions. Seventy percent of athletes found that they developed good or very good coping mechanisms. Coping strategies vary from one dimension to another, but in general, athletes often had a positive perceived coping. Athletes expressed that they are shifting the training hours with a preference for quality training rather than quantity and associated with a longer rest time. In addition, they were in favor of food hygiene associated with a strategy of sharing meals and providing water. The majority (59%) of the athletes said they were psychologically prepared for the potential effects of fasting. This research shows that athletes develop self-adjusting strategies to counter the effects of fasting. The questionnaire on the self-coping strategies provides important and precise information on the level of coping achieved by the athletes.

Keywords: Muslim Athletes, Coping Strategies, Ramadan Fasting

1. Background

Each year during Ramadan, Muslims fast for 29 or 30 consecutive days to commemorate prophet Mohammed's revelation of the Quran. Traditional fasting includes abstaining from eating and drinking between sunrise and sunset, with no restrictions on food or beverage consumption during the night (1). Typically, Muslims eat two meals a day during Ramadan: Iftar, the first meal after sunset, and Suhoor, the smaller meal before the break of dawn. Muslims also participate in religious, cultural, and social events during Ramadan (2).

Behavioral modifications can be observed among athletes that continue to train while fasting, usually indicated by changes in their psychology, circadian rhythm, and sleep (3-5). To perform at the same or better level, fasting athletes must adopt mechanisms to preserve their physical fitness and motivation, while nutrient intake is drastically lowered (6, 7). In addition, the act of intermittent fasting during Ramadan affects important aspects of athletes' body physiology and biochemistry (6, 8-10). Although

physical activity combined with fasting adds significant pressure on their bodies, most athletes do not stop their training during Ramadan (11). Chtourou (10) concluded that Ramadan fasting may not result in severe immunological disturbances and most physiological changes related to fasting are transient and may be recovered and returned to normal values and ranges after the fasting month. However, Chaouchi et al. (6) emphasized the importance of adopting suitable coping strategies and suggested that athletes who maintain their total energy and macronutrient intake, training load, body composition, and sleep length and quality are unlikely to suffer any substantial decrements in performance during Ramadan.

Muslim athletes must train and compete during Ramadan, as the international sports season does not make allowances for the players who are fasting (12). A prominent example of this was the 2012 London Summer Olympics occurring throughout the Ramadan fasting period (7, 13). Nutritional guidelines while fasting vary by sport, duration of training, competition frequency, individual training, fluid before and during exercise, and the

general consumption of macronutrients. High-level athletes can maintain their performance during Ramadan if physical training, food, fluid intake, and sleep are appropriate and well-controlled (7, 14). Failure to meet or supplement nutritional needs during Ramadan fasting and exercising has empirically shown to negatively affect an athlete's performance (15).

2. Objectives

The aim of this study is to categorize the coping strategies adopted by Muslim athletes during Ramadan fasting and to propose a simple questionnaire to evaluate these strategies.

3. Methods

3.1. Participants

A hundred and nine Jordanian Muslim athletes practicing Ramadan fasting (aged 20.0 ± 8.5 years) from various sports at three different levels (clubs, universities, national teams) were interviewed in this questionnaire. The participants competed in football ($n = 60$), taekwondo ($n = 20$), volleyball ($n = 6$) and other sports ($n = 23$) (Table 1). The study was approved by the Research Ethics Committee of the University of Jordan (code: 2018-2019/no.4980) and participants were informed of the confidentiality of the information collected. All the participants continued their usual training during the month of Ramadan, from May 5th to June 3rd, 2019.

3.2. Data Collection and Analysis

The five-part, electronic questionnaire was applied during the 4th week of Ramadan and incorporates dimensions of self-generated coping proposed by Roy et al. (13). The questionnaire succeeded in collecting qualitative data on athletes' training modifications, eating habits, psychological changes, self-control, and recovery/rest. Included in the questionnaire were socio-demographic inquiries deemed necessary to supplement the study by Roy et al. (13), including athletes' gender, age, education, practice and sports division (13). Participants were required to evaluate the effects of fasting and their coping mechanisms on their training on a scale from very benevolent to very harmful.

The data collected from this questionnaire was analyzed through R software (2.6.2) (R Foundation for Statistical Computing, Vienna, Austria) using descriptive statistics.

Table 1. Descriptive Statistics of Participants^a

Participants Characteristics	Female (N = 34)	Male (N = 75)	All (N = 109)
Age, y			
15 - 17	2 (6)	6 (8)	8 (7)
18 - 20	11 (32)	15 (20)	26 (24)
21 - 23	10 (29)	18 (24)	28 (26)
24 - 27	5 (15)	17 (23)	22 (20)
> 27	6 (18)	19 (25)	25 (23)
Level of practice			
Clubs	24 (71)	55 (73)	79 (72)
Universities	2 (6)	4 (5)	6 (6)
National teams	8 (24)	14 (19)	22 (20)
Sports practice			
Football	26 (76)	34 (45)	60 (55)
Taekwondo	2 (6)	18 (24)	20 (18)
Volleyball	0 (0)	6 (8)	6 (6)
Other sports	6 (18)	17 (23)	23 (21)

^aValues are expressed as No. (%).

4. Results

Of the 109 athletes who participated in this survey, 68.81% were men ($n = 75$) and 31.19% were women ($n = 34$) (Table 1). The majority of athletes were between the ages of 18 and 23 years, and the majority are club members (72%). The dominant sport among participants is football (55%) (Table 1).

Table 2 shows the athletes' perception of the effects of Ramadan fasting on their training habits, food, recovery and behavior, as well as their copings with the changes involved in fasting. The athletes tended to plan their training at the end of the evening by favoring the quality of training over intensity. Interestingly, more than a third of the athletes are unfavorable (18%) or strongly unfavorable (16%) to train during the day. The data on eating habits report that athletes tended to control their food intake in the evening by favoring eating small amounts between the break in fasting and evening training and eating after training. Many athletes were between favorable and very favorable to eat healthy meals (respectively; 29% and 33%) more or less rich in carbohydrates and low in fat, with an important fluid intake in the evening.

In the two psychological and self-control dimensions, most athletes have stated that they are psychologically prepared for the likely changes induced by Ramadan fasting and it is not a problem for them to adapt.

In the last proposed dimension, the recovery is sup-

ported with a longer rest time by the athletes. More than half of the athletes declared that they were favorable to very favorable to increase the rest time (respectively; 22% and 31%).

We found that it was necessary to add two questions, one on the average number of hours of daily sleep and the other on the number of weekly exercises during Ramadan, in order to complete the survey information (Table 2). Most athletes reported that their sleep time did not change or increased (respectively; 51% and 28%). On the other hand, 38% of the athletes declared that they did not change the number of weekly exercises against 34% who reduced it.

According to the results obtained in Table 2, we propose a qualitative questionnaire applied with a score and index, which provides an evaluation of the athlete in a simple way (Appendix 1 in Supplementary File). The rating scale was chosen based on the responses of the large percentage of athletes and the recommendations cited in the literature. The scale is from 1 to 5 each time, including 3, the median which corresponds to an unfavorable: "Slightly" or "no change" response. The score corresponds to the sum of the numbers corresponding to the answers chosen by the athlete. We propose four indexes which go from "very bad coping" to "very good coping", which allows to visualize the score obtained compared to the level of adaptation to Ramadan fasting.

Table 3 presents the scores obtained following the application of the method presented in Appendix 1 in Supplementary File. Forty-three percent of the athletes have a good coping to the Ramadan fasting and 34% a very good coping against 20% who show a poor coping. We see these results in women and men. There is a consistent level of coping between the different sports practiced in both genders. Interestingly, a higher percentage of male footballers show adaptation to the Ramadan fasting (respectively; 47% good coping and 41% very good coping).

5. Discussion

The present study evaluated the level of subjective copings of male and female Jordanian Muslim athletes from various sports disciplines regarding the impact of Ramadan fasting on the main dimensions of training and recovery, food habits and sleep, emotional and mental. Our survey, based essentially on the dimensions mentioned above, which allowed us to propose a qualitative questionnaire (Appendix 1 in Supplementary File), based on the descriptive study by Roy et al. (13). This was to provide a tool for both coaches and athletes to better plan and possibly choose the best strategy for coping with the possible effects of Ramadan fasting.

5.1. Training and Recovery

Given the meal times (Suhour and Iftar) during Ramadan, Muslim athletes adopt a strategy in which the duration and training load are reduced. To cope with certain constraints, studies have shown that the training period in a fasting day is either early in the morning or after breaking the fast, and avoiding the afternoon (13, 16-18). Such a strategy seems logical in view of the results provided by different studies. The performance of athletes practicing maximum sustained high intensity exercise is negatively affected by fasting during Ramadan (10, 19). On the other hand, during exercises at low to moderate intensities, the fasting effect in the fourth week on the body abilities is relatively absent, and the metabolic adaptation might explain some of the observed changes (20). In addition, Haventidis (21) showed that the rate of perceived effort (RPE) after endurance running training was similar for fasters and non-fasters. Meckel et al. (22) showed a 5.3% decrease of 40 m sprint performance in athletes during Ramadan. Other studies among professional footballers have also shown no effects of Ramadan fasting on certain anaerobic tests such as sprint, beep test, and vertical jump (23-25). In the present study, athletes mentioned that they were dependent on their training after Iftar and in training courses with less intensity than usual before Ramadan. In their choice of repetitions, the athletes declared favoring the quality of their training rather than quantity with a reduction in the number of sessions per week (34% for a reduction in the number of sessions). This choice of strategy has been recommended to athletes in order to avoid possible metabolic stress, which could be caused by daytime fasting, as well as by chronic sleep deprivation resulting from the cumulative loss over several days (13, 16, 26, 27).

In order to optimize the workload modification strategy, athletes opt for a strategy of lengthening the recovery time. Twenty-eight percent of athletes reported an increase in their sleep time. The difference in time between meals, the Suhour is before dawn, and the Iftar is very late in the day, which results in interference at night with waking up once or twice. Such a disturbance in sleep patterns, which could be the cause of a disturbance in eating habits and fluid intake, has a direct effect on human circadian rhythms (28-30). This can give general feelings of discomfort and fatigue, which could have a negative influence on physical performance (13, 26). Several studies have shown that an average of 8 hours of nighttime sleep, even with a cumulative decrease over the Ramadan period, Ramadan fasting does not compromise the quality of sleep (3, 31). It is interesting to note that 18% of the athletes have seen the average number of hours of sleep decrease during the month of Ramadan. Several studies have emphasized this point and have justified this reduction by a socio-cultural impact

Table 2. Self-Coping Strategies Questionnaire^a

	I Strongly Disagree			I Disagree			Slightly			I Agree			I Strongly Agree		
	F, %	M, %	All, %	F, %	M, %	All, %	F, %	M, %	All, %	F, %	M, %	All, %	F, %	M, %	All, %
Training modifications															
I train during the day	9	19	16	15	20	18	56	31	39	15	17	17	6	13	11
I try to schedule heavy training during late evening/night time	9	5	6	3	5	5	41	23	28	32	40	38	15	27	23
I train at night/ Training after breaking the fast	9	5	6	18	15	16	41	36	38	24	25	25	9	15	13
I focus on the quality compared to the intensity	3	0	1	3	7	6	47	29	35	32	36	35	15	24	21
I reduce the intensity in training with the permission of the coach	3	4	4	18	8	11	44	40	41	29	23	25	6	19	15
Dietary habits															
I continue eating in the evening after breaking the day's fast	24	23	23	47	19	28	21	35	30	3	12	9	6	9	8
I eat more before evening workout	35	33	34	44	36	39	15	17	17	3	5	5	3	7	6
I eat a meal right before exercise so I can continue training	50	37	41	18	35	29	24	16	18	6	7	6	0	4	3
I take healthy food	3	7	6	3	9	7	32	17	22	26	31	29	35	32	33
I take food containing carbohydrate during the beginning of the fast	12	9	10	15	4	7	32	41	39	15	24	21	26	17	20
I take low fat food	6	7	6	18	19	18	44	33	37	18	20	19	15	19	17
I take extra food and supplements with short intervals in between	18	9	12	18	15	16	44	36	39	15	24	21	6	13	11
I drink water every hour at night as long as I am awake	3	3	3	6	5	6	24	17	19	38	28	31	26	44	39
Psychological aspects															
I am mentally prepared and remain strong	3	3	3	9	1	4	15	7	9	24	23	23	47	64	59
I change my attitudes and routines	3	5	5	12	9	10	21	13	16	29	35	33	35	35	35
Self-control															
I try to remain patient	0	1	1	9	0	3	12	9	10	24	37	33	56	49	51
Rest and recovery															
I take enough rest	9	5	6	21	9	13	26	24	25	12	27	22	32	31	31
I rest for a longer time	12	11	11	21	13	16	38	31	33	9	25	20	18	16	17
	Decreased a lot			Decreased			Not Changed			Increased			Increased a lot		
Complementary questions															
Average number of daily (24 h) sleep hours during Ramadan	3	0	1	24	16	18	32	60	51	38	23	28	3	0	1
Number of weekly exercises during Ramadan	6	21	17	41	31	34	32	40	38	15	7	9	3	0	1

Abbreviations: F, females; M, males.

^aTotal numbers of participants = 109; males = 75 and females = 34.

as a direct effect of Ramadan fasting (7, 13, 26, 28, 32). In addition, Margolis and Reed (33) have shown in students an adaptation of a self-regulatory process by increasing daytime hours in order to avoid an increase in sleepiness during Ramadan. To counter this loss of performance related to lack of sleeping, Wilson et al. (30) have proposed a strategy to delay waking until mid-afternoon to reduce the decrease in subjective alertness that could be induced by Ramadan fasting (30, 34).

Interestingly, there is some difference between both genders in the choice of training load management and recovery. Even in the small number of female participants compared to males (Table 2). In addition, Singh et al. have shown that this difference is linked to the difference in the athletes' perception of Ramadan fasting on performance (32). Studies have established that women do not fast during the period of menstruation, therefore, the negative influence of fasting is absent during these days of Ramadan

(32, 35).

5.2. Nutritional Habits

Ramadan fasting is a ban on eating food and drink during the day. Several studies showed that this change in the pattern of daily eating habits would cause changes in the metabolic state, including blood sugar, lipid profile, endogenous muscle glycogen levels, hematological parameters, and body weight (18, 36-39). These fluctuations negatively impact the quality and/or quantity of training performance (37). In the present study, athletes reported eating healthy, carbohydrate-rich meals with a low level of fat and no preference for supplements. Adopting a fractional food intake strategy with unrelated intake intervals, without necessarily increasing their energy intake per meal, could be the cause of a total energy intake less likely to be affected during the Ramadan period (17). Athletes have been shown to consume a similar total energy or caloric

Table 3. Level of Adaptation of Athletes Depending to Gender and Sports Practice According to the Type of Questionnaire Offered (See Appendix 1 in Supplementary File)

	Very Poor Adaptation-Score, %	Poor Adaptation-Score, %	Good Adaptation-Score, %	Very Good Adaptation-Score, %
Gender				
Females	0	29	47	24
Males	4	16	41	39
All	3	20	43	34
Sports practice-both genders				
Football	2	17	47	35
Taekwondo	5	25	40	30
Volley-ball	0	17	33	50
Other sports	4	26	39	30
All sports	3	20	43	34
Sports practice-females				
Football	0	27	46	27
Taekwondo	0	0	50	50
Other sports	0	50	50	0
All sports	0	29	47	24
Sports practice-males				
Football	3	9	47	41
Taekwondo	6	28	39	28
Volley-ball	0	17	33	50
Other sports	8	18	35	41
All sports	4	16	41	39

intake between Ramadan and non-Ramadan (20). In addition, Ahmadi et al. (40) reported that Ramadan fasting had resulted in details of eating habits, increased consumption of fruit and decreased consumption of bread, cereals, and oil, as well as an increased percentage of carbohydrates, received compared to total energy and a decrease in certain vitamins and minerals. However, in a recent study, no difference was observed in the effects of Ramadan fasting on body composition, glucose metabolism, and cognitive function (41).

Ramadan is the time when Muslims who practice the prescribed fasting pattern for the duration of the month are likely to experience some dehydration during the fasting period (42). In addition, dehydration affects thermoregulatory as well as muscle function and therefore, negatively affects performance. A few hours of fluid deprivation can alter cognitive tasks that depend on speed and precision (43). However, 70% of the athletes in the present study indicated that they agreed and strongly agreed with the hourly water intake during the night. Interestingly, the athletes live and train in a warm environment, which means that they have consciously adopted an increase

in their fluid consumption during the authorized period with a fractional and regular intake such as that observed in the diet. Such a compensatory strategy is considered to be an early adaptation strategy (13, 17).

5.3. Behavioral and Cognitive Function

The direct effects of Ramadan fasting on sports performance remain unclear due to contradictory results in the literature. Farooq et al. (7) have linked pre-existing knowledge and beliefs in Muslim athletes to the effects of Ramadan fasting through knowledge acquired, as well as socio-cultural and religious influences from an early age. At the same time, the authors found that 30% of athletes gave incorrect answers about the effects of fasting on certain parameters, which makes them subjective to adapting to Ramadan fasting. In the present study, 82% of participants declared to be of agreement to strongly agree by mental preparation and a change of attitudes (65%) to face the difficulties caused by Ramadan fasting. Roy et al. (26) highlight the important role of the socio-cultural and religious environment and they suggested that the closure of most restaurants in predominantly Muslim countries

could be a major factor in the contextual adjustment to facilitate self-control. Eighty-four percent of the athletes in the present study said that they agreed and strongly agreed to try to be patient with changes in attitudes and routines. On the other hand, studies have associated an adequate mental management to fight against the constraints, in particular, fatigue at the change of time and the architecture of sleep, caused by the fast of Ramadan and this by improving their state of mood (44).

In addition, a decrease in alertness and mood, which is correlated with an increase in central fatigue due to sleep loss and a reduction in energy intake, could influence mental performance and irritability during Ramadan, even during low-intensity physical activity (17, 45). What has been reported by Roky et al. (8) where they indicated that the major changes during the Ramadan fast are rather biological and behavioral. This perceived fatigue is, therefore, subjective because most participants of this study declared that they were mentally prepared to remain strong. This could be justified by an early adaptation and/or the existence of environmental, socio-cultural, and religious influencing factors since the participants come from a country of Muslim dominance. In contrast, Chamari et al. (46) have shown that the increase in perceived fatigue and the modification of the architecture of sleep have no negative effect on cognitive function in cyclists. This would suggest a possible involvement of athletes in the process of self-regulation during the month of Ramadan. However, Boukhris et al. (47) have demonstrated the absence of the intermittent fasting effect of Ramadan on fatigue and mental stress. In addition, Tian et al. (48) show that during the fast of Ramadan the performances in cognitive functions requiring rapid and sustained responses were better in the morning than in the afternoon, which is not the case of the performances in precision measurements not dependent on speed where we see no change (43, 48). On the other hand, we have integrated these different points brought by the literature on the scale of our proposed questionnaire in the different dimensions (Appendix 1 in Supplementary File).

5.4. Practical Implications of the Proposed Questionnaire

It would appear that a large proportion of Muslim athletes used to training normally throughout Ramadan have coping strategies that allow them to prepare for competition during Ramadan fasting. The questionnaire that we proposed in this study has been validated in 109 athletes from different disciplines (Appendix 1 in Supplementary File). Five main dimensions were used in this questionnaire: 1) Changes in training; 2) eating habits; 3) psychological aspects; 4) self-control; and 5) rest and recovery. It is concise very clearly, where we proposed a very simple

scale which goes from 1 to 5. The allocation of this scale is reflected on the basis of the results and recommendations that have been made in the literature (see above). The questionnaire also gives an indication of the adaptation to the users. The index is calculated very easily, the sum of the scales corresponding to the different responses, and is represented on four forms of coping (Appendix 1 in Supplementary File): 1) Very poor coping; 2) poor coping; 3) good coping; and 4) very good coping. These qualitative or numerical results obtained by the questionnaire can give an idea of the level of coping perceived by the athlete. The outcome of the questionnaire also allows the coach and/or the athlete to target the dimension in which to intervene. Then coaches can adopt different training strategies such as adjusting the training load or changing the training time to suit the needs and situations of current athletes. In addition, the questionnaire makes it possible to see adaptations to the standard of living such as food or rest which are important for adjusting the workload.

Admittedly, the result of a good or very good perceived coping by the athlete is a good indicator, but the coach must, and even under the obligation, review the different dimensions in order to improve performance. On the other hand, poor coping results require rapid intervention in the athlete's training program or a healthy lifestyle. Although the questionnaire may provide information on the level of coping perceived by the athlete, it would be interesting to complete it with a performance evaluation on the field or an RPE test in order to establish a complete evaluation of the effect of the Ramadan fast on the athlete.

5.5. Study Limitation

This study has several limitations. Although the results demonstrated by the questionnaire are interesting and provide valuable information on the perceived and subjective accommodation measures of Muslim athletes, it would be interesting to retest this study in another larger group with a survey during the month of Ramadan in order to have more validity of this questionnaire in addition to studying lifestyle prior to Ramadan for comparative reasons. The questionnaire offers no explanation of the mechanisms of coping strategies for athletes. It remains for the athlete and/or the coach to take note of the latest recommendations in order to adjust his intervention to improve his performance and guarantee the protection of the health of his athlete. Finally, the lack of data on the physical performance of athletes did not allow us to make a correlation between the results obtained by the questionnaire and the effects of the Ramadan fasting on performance.

5.6. Conclusions

Male and female athletes show similarity in the choice of coping strategies. We also find this similarity in the different sports. The different results probably indicate an early adaptation strategy acquired through socio-cultural and religious influence. The evaluation of the adaptation by the self-generated coping questionnaire could be an important tool for the choice of the strategy in order to counter the effects which could be negative from the Ramadan fasting on the performance in athletes.

Supplementary Material

Supplementary material(s) is available [here](#) [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Authors' Contribution: Both of Haidar Djemai and Rami Hammad contributed equally to this work by the data analysis and writing the article. Salem Al Qarra is the data collector person. Ibrahim M Dabayeb is the coordinated the work.

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