EDITORIAL

The impact of Ramadan intermittent fasting on muslim and non-muslim athletes: A global perspective

L'impact du jeûne intermittent du Ramadan sur les athlètes musulmans et non musulmans: Perspective globale

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Every year, adult healthy Muslims observe Ramadan Intermittent Fasting (RIF) for 30 days, a practice that is integral and compulsory to the Islamic faith (1). This period, marked by fasting, i.e., abstinence from both food and fluids, for the period from dawn to sunset, presents unique challenges for Muslim athletes, whose rigorous training and competition schedules demand optimal physical and mental conditions (2, 3, 4, 5). The resulting implications are profound, particularly for athletes, as RIF affects psychomotor and physical performances, hydration, blood glucose levels, and energy availability, among others (1, 2, 3).

Athletes across the globe, whether Muslim or non-Muslim, might be affected (positively or negatively) in different ways by the RIF. For Muslim athletes, the physical demands and training loads, coupled with the substantially altered nutrition, hydration and sleep patterns during Ramadan, can be very challenging (2, 6). While some studies suggest that performance can be maintained with appropriate adjustments in training, nutrition, and sleep, the findings are not always consistent, and there is therefore a need to acquire more knowledge and intimate insights in the field (7, 8).

In countries or places where Muslims are predominant, athletes of the Muslim faith may often have the flexibility (arrangement) to adjust their training schedules, such as sleeping during the day and training at night to avoid fasting hours (2, 9). On the other hand, athletes in regions with different religious majorities (e.g., Oceania, Europe, and North America), such adaptability might not be as feasible. On the flip side of the coin, when training or competing in Muslim-majority countries alongside fasting athletes, non-Muslim athletes might have to make the necessary adjustments both physically and mentally, which may not be easy. In football, it has indeed been reported that non-Muslim footballers may be more susceptible to injuries due to their difficulty in adapting to the general changes in social life during Ramadan (10). Many Muslim athletes adopt various self-coping strategies (e.g., training, rest and recovery, dietary habits, physiological aspects) during Ramadan to maintain their sporting performance (11), but non-Muslim athletes might not be aware of or prepared for these strategies.

Hypothetically, non-Muslim athletes who train with Muslim teammates, could possibly offer some support during the Ramadan period in some ways, especially, in non-Muslim countries. It would be useful to learn about non-Muslim athletes' knowledge about Ramadan, and their views on their teammates who are fasting, especially the physiological and psychological challenges that their teammates face during Ramadan. We postulate that understanding and appreciating these aspects can create awareness that enhance interactions, and consequently encourage a more inclusive and supportive training environment during Ramadan. By exploring the awareness of non-Muslim athletes about Ramadan fasting practices and their perspectives about it, our project aims to offer valuable information to sports' governing bodies and stakeholders on how to promote better understanding and greater cooperation among athletes, i.e., both non-Muslims and fasting Muslims, and their surroundings. Currently, such guidelines do not exist.

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ICRA Group Launches Global Research Initiative on Ramadan in Athletes

In March 2023, the authors of this editorial established the "International Consortium of Ramadan Research in Athletes (ICRA)." Originally, ICRA group consisted of 25 members, with us serving as the leading group. The primary aim of this initiative is to investigate various Ramadan aspects from global perspectives such as training practices, performance, nutrition, sleep patterns, wellbeing (among others); with a focus primarily on Muslims and, to some extent, non-Muslim participants. This research encompasses (among others): (i) understanding the experiences of Muslim athletes during Ramadan; (ii) comparing the experiences of Muslim athletes from the different regions e.g., Southeast Asia, Middle East, and North Africa; (iii) comparing the experiences and challenges faced by Muslims athletes living and training in predominantly Muslims vs. predominantly non-Muslim countries/regions; and (iv) exploring the perspectives of non-Muslim athletes on the challenges faced while training alongside Muslim athletes during Ramadan.

Table 1. Steps and actions for questionnaire development, online surveys, and manuscript preparation

Steps	Actions
Survey design (first phase)	• Three main investigators (leading group) discussed and created the initial draft, including general survey information (e.g., introduction, objectives, and methods). • The same leading group then produced full drafts of the survey questionnaire (Muslim and non-Muslim surveys) based on the concepts of interest, objectives, and literature review. • The questionnaires were edited by the core research team (with several experts in Ramadan and training research) to establish content validity, ensuring all questions are relevant. • Subsequently, face and construct validity were verified by a second independent group of researchers to confirm appropriateness, and eliminate irrelevant questions. These were then reviewed and updated by the leading group.
Pilot study (*Ramadan 2023*)	• This step was conducted to test and validate the data collection methodologies and tools, including design issues, allowing researchers to refine and modify the study design as necessary.
Survey design (second phase)	• The questionnaire sets were updated by the leading group and the first batch of co-authors (n=25). • A second batch of co-authors (n=25) was invited to collaborate and participate in input-update process. • The full surveys were finalised.
Translation	• We opted for a 3-step procedure that involved: (i) Translation of the English text into a specific language using an online tool; (ii) Checking and updating of the translated document, with particular parts highlighted for discussion and refinement; (iii) Proofreading and editing process by different individuals, followed by a discussion among everyone involved in the translation.
Testing of online survey	• Questionnaires were uploaded on Google Forms. A series of cross check was carried out (checking each item, and completing the full survey) – and updated as necessary. • Online surveys were tested with athletes; and then, updated accordingly based on the feedback received. • Full surveys finalised.
Data collection (*Post-Ramadan 2024*)	• All authors were required to recruit as many athletes (participants) as possible from their respective countries through direct contact and online platforms. These co-authors were responsible for coordinating the local recruitment of participants and facilitating the global dissemination of surveys (online) to ensure a broader participant base.
Data cleaning and statistics (*Post-data collection*)	• Data cleaning process involves preparing raw data for analysis and is overseen by a biostatistician in conjunction with leading authors to ensure accuracy, consistency, and usability of data. This includes identifying and correcting errors, such as typos, mislabelled categories, or incorrect numerical entries. Missing data is treated accordingly. Additionally, data are also transformed or converted into formats that can be analysed. • Statistical procedures employed include (among others) descriptive analysis (e.g., mean, median), inferential analysis (e.g., hypothesis testing, comparison), and data visualisation to aid interpretation).
Writing of the manuscript	• The first draft of manuscript will be prepared by the first author and then discussed among the "core" researchers. All members are expected to read the drafts, which includes the analysed data, tables, and figures, and provide their input and/or feedback. All authors are required to involve in the data interpretation, collaboratively edit and update the manuscript.
Final draft and approval	• All authors will be notified regarding the final draft, and will be required to read and approve the final manuscript. Names could be withdrawn from the authors' list if any member decide to step-out from the study, or if it has been decided by the leading authors (e.g., lack of contribution). • Depending on journal requirements, the signatures of all authors will be obtained to confirm this agreement.

Global studies and collaborations with authors from many nations are vital in today's world. From our own experiences (12, 13), such efforts bring together experts from various/diverse countries, cultures, and background, and such diversity leads to a broader/richer range of perspectives. In the context of Ramadan, understanding the performance and challenges faced by athletes from multiple disciplines is crucial, necessitating cross-disciplinary insights (e.g., training, nutrition, and wellbeing) through collaborative efforts. With specifically developed questionnaires for both Muslim and non-Muslim athletes, in conjunction with the initial members of the ICRA group, we obtained ethics approval for our broad project, and were ready to conduct a pilot study for Ramadan 2023 (14). We ended up having the participation of ~100 athletes from different countries in each survey. Importantly, this step provided a strong foundation for what would be investigated in a larger, and subsequent global study.

We further expanded our collaboration with key and interested researchers worldwide. As of April 2024, the

ICRA group has increased to 53 members, affiliated in 26 countries. The ICRA researchers have further refined and improved the study design and questionnaires from the pilot 2023 study. These now incorporate both pre-set answer and open-ended questions to better capture the nuances of athletes' perception of Ramadan and sporting performance, as well as their daily routines and challenges during Ramadan. The ICRA group also emphasised vigorous methods in research, and more importantly, our research is conducted globally using consistent methodologies. To ensure validity, quality and integrity of the data, several steps and actions were undertaken (Table 1). This approach facilitates meaningful analysis and interpretation, enabling informed and robust conclusions and recommendations. Moreover, ICRA members are committed to transparency, and fully aware that our group does not support anonymous authors or "passengers" (15).

Our global study on athletes' training, nutrition, sleep and wellbeing during Ramadan is more than a mere academic endeavour. As alluded above, it's a step towards understanding, respecting (different athletes/cultures), and accommodating the diverse practices and beliefs of athletes. The research aims to offer insights "beyond the athletic field" that enhance inclusivity (welcoming) and understanding for everyone.

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