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Research Paper

Impact of Ramadan fasting on anesthesiology professionals' perioperative fatigue, concentration, and complications: a comparative study at CHU Ibn Rochd, Casablanca

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Abstract
Background: *Ramadan diurnal fasting concerns many anesthesiology and critical care professionals, in whom vigilance and rapid decision-making are essential to patient safety. Its impact on perioperative work performance and complications remains poorly characterized.*
Methods: *A comparative within-subject observational study was conducted at the Department of Anesthesiology and Critical Care, CHU Ibn Rochd, Casablanca, during Ramadan 2025. One hundred professionals (residents, specialists, nurse anesthetists) each reported on one fasting and one non-fasting working day, generating 200 paired observations. An anonymous online questionnaire collected demographic, hydration, surgical, and complication data. Comparisons used χ^2 or Fisher's exact tests and the Mann–Whitney U test; $p < 0.05$ was considered significant.*
Results: *Both groups ($n = 100$) were comparable for age (median 27.5 vs 28.0 years; $p = 0.142$), sex (59% vs 60% female), professional status, and seniority. Suhoor intake (72% vs 70%) and satisfactory hydration (63% vs 66%) were similar. No significant difference was found for intraoperative complications, including hypotension (54% vs 51%; $p = 0.777$), arrhythmia (28% vs 25%; $p = 0.749$), difficult intubation, bronchospasm, severe glycaemic events, or electrolyte disturbances. Postoperative complications, subjective fatigue (39% vs 57% moderate-to-severe; $p = 0.560$), concentration, and need for additional support did not differ.*
Conclusion: *Ramadan fasting was not associated with any significant impact on perioperative fatigue, concentration, or complications among anesthesiology professionals. These findings support an individualized approach, while larger, objectively-measured studies remain warranted.*
Keywords: *Ramadan fasting; anesthesiology; critical care; perioperative complications; fatigue; Morocco.*

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I. Introduction

Ramadan, the ninth month of the Islamic lunar calendar, is observed each year by approximately two billion Muslims worldwide through diurnal fasting from dawn to sunset, which prohibits both food and fluid intake — including water — for periods that may exceed 13 to 17 hours depending on geographic latitude and time of year[1,2].

In Muslim-majority countries, this practice concerns a substantial proportion of healthcare professionals, including those working in operating theatres and intensive care units (ICUs). Ramadan fasting induces well-described physiological changes — alterations in hydration status, glycaemic profile, sleep architecture, and circadian rhythm — that have been the subject of an expanding body of research over the past decade[1,7,10,13]. Reviews and meta-analyses indicate that, while subjective fatigue and daytime sleepiness may

transiently increase, the overall impact on cognitive and psychomotor performance is heterogeneous and largely modulated by individual factors such as sleep quality, suhoor intake, and acclimatization[5,6,9,13].

Anesthesiology and critical care are highly demanding specialties in which sustained vigilance, rapid decision-making, and fine psychomotor skills are essential to patient safety. Concerns have therefore been raised about the potential impact of fasting on perioperative complications — particularly hypotension, difficult airway management, dysglycaemia and postoperative monitoring — and on the practitioner's ability to remain alert throughout long operative shifts[2,11,12,15]. Yet, despite the very large number of Muslim anesthesiologists, residents and nurse anesthetists who fast each year, few studies have specifically addressed the impact of Ramadan fasting on the work performance and clinical outcomes of these professionals.

In a country such as Morocco, where the vast majority of anesthesiology and critical care professionals are Muslim, this question has direct organizational and ethical implications: should the activity of operating theatres be adjusted during Ramadan, and on what evidence base? The aim of the present study was therefore to compare, within the same anesthesiology and critical care professionals at CHU Ibn Rochd, Casablanca, perioperative fatigue, concentration, and the frequency of intra- and postoperative complications when working during a fasting day versus a non-fasting day during Ramadan 2025.

II. Methods

Study design and setting

This was a comparative observational study with a within-subject design, conducted at the Department of Anesthesiology and Critical Care of CHU Ibn Rochd, a tertiary university hospital in Casablanca, Morocco. The data collection period coincided with Ramadan 2025, from February to March 2025.

Population and sampling

All anesthesiology and critical care residents, specialists, and nurse anesthetists working in operating theatres or ICUs of the institution during Ramadan 2025 were eligible to participate. Participants were Muslim healthcare professionals who chose to fast at least part of the month. Each respondent reported on two distinct working days: one fasting day and one comparable non-fasting working day (either before Ramadan, on a non-fasting day during Ramadan, or shortly after Ramadan). This design generated 200 paired observations from 100 unique respondents. A non-probabilistic convenience sampling strategy was used because of the time-limited nature of the Ramadan period and to maximize participation across all professional grades. Incomplete questionnaires were excluded from analysis.

Data collection

Data were collected through an anonymous, self-administered online questionnaire developed using Google Forms (Google LLC, Mountain View, CA, USA). The questionnaire link was distributed via institutional messaging channels (WhatsApp groups and email). The instrument comprised five sections: (i) demographic and professional characteristics (age, sex, professional status, seniority); (ii) preparation for the working day (suhoor intake for the fasting day, perceived hydration); (iii) self-reported preoperative fatigue and concentration on a graded scale; (iv) characteristics of the surgical activity (elective vs emergency, surgical specialty, American Society of Anesthesiologists [ASA] physical status, type and expected duration of anesthesia); and (v) intra- and postoperative complications observed by the practitioner, as well as subjective postoperative fatigue, concentration, and the perceived need for an additional break or supplementary assistance. Items were derived from prior questionnaires used in occupational and Ramadan-related health studies and adapted to the Moroccan anesthesiology context.

Statistical analysis

Quantitative variables were summarized as median and interquartile range (IQR); categorical variables as frequencies and percentages. Comparisons between fasting and non-fasting reports used χ^2 tests (or Fisher's exact test where expected counts were small) for categorical variables, and the Mann–Whitney U test for continuous non-normally distributed variables. A p-value < 0.05 was considered statistically significant. Statistical analyses were performed using SPSS Statistics version 26 (IBM Corp., Armonk, NY, USA).

Ethical considerations

Participation was anonymous and voluntary. All respondents provided informed electronic consent before completing the questionnaire, after being informed of the study's objectives, the absence of any identifying data, and their right to withdraw at any time. No personally identifying data were collected. The study was conducted in accordance with the Declaration of Helsinki and was reviewed and approved by the local institutional ethics committee of CHU Ibn Rochd.

III. Results

Two hundred paired observations were analysed, generated by 100 anesthesiology and critical care professionals who each reported on a fasting working day and a non-fasting working day. The two groups were closely comparable in demographic and professional characteristics, with no statistically significant difference for any baseline variable (Table 1). The median age was 27.5 years [IQR 21.0–30.0] for fasting reports and 28.0 years [22.0–31.0] for non-fasting reports (p = 0.142, Mann–Whitney U test). Women accounted for 59% of fasting reports and 60% of non-fasting reports (p = 1.000); the proportion of nurse anesthetists was 51% versus 43% respectively, with anesthesiologists accounting for 49% versus 57% (p = 1.000). The majority of respondents had less than five years of experience (92% vs 94%; p = 0.543).

Suhoor was reported by 72% of professionals on the fasting day, comparable to 70% reporting a pre-shift meal on the non-fasting day (p = 1.000). Self-reported satisfactory hydration was 63% versus 66% (p = 1.000). Importantly, preoperative fatigue (mild to severe) was reported in exactly 79% of cases in both groups (p = 0.681), and good-to-excellent preoperative concentration was reported in 87% of fasting versus 84% of non-fasting reports (p = 0.385). This baseline homogeneity supports the absence of selection or preparation bias between the two reporting conditions and provides a robust foundation for the comparative analysis of perioperative outcomes.

Table 1. Baseline demographic, professional, and pre-shift characteristics of the fasting and non-fasting reports (n = 100 each).

Variable	Fasting	Non-fasting	p-value
Age, median [IQR] (years)	27.5 [21.0–30.0]	28.0 [22.0–31.0]	0.142
Sex – female, n (%)	59 (59)	60 (60)	1.000
Sex – male, n (%)	41 (41)	40 (40)	—
Nurse anesthetist, n (%)	51 (51)	43 (43)	1.000
Anesthesiologist (MD), n (%)	49 (49)	57 (57)	—
Experience< 5 years, n (%)	92 (92)	94 (94)	0.543
Experience 5–10 years, n (%)	6 (6)	3 (3)	—
Experience> 10 years, n (%)	2 (2)	3 (3)	—
Suhoor / pre-shift meal, n (%)	72 (72)	70 (70)	1.000
Satisfactoryhydration, n (%)	63 (63)	66 (66)	1.000
Pre-op fatigue (mild→severe), n (%)	79 (79)	79 (79)	0.681
Pre-op concentration (good→excellent), n (%)	87 (87)	84 (84)	0.385

IQR: interquartile range; MD: medical doctor; n: number; %: percentage; pre-op: pre-operative. P-values from χ^2 test, Fisher's exact test, or Mann–Whitney U test as appropriate.

The surgical activity profile was likewise comparable. Procedures were predominantly elective (86% vs 87%; p = 1.000), and the distribution of expected operative duration did not differ significantly between groups (< 1 h: 8% vs 15%; 1–3 h: 75% vs 61%; > 3 h: 17% vs 24%; p = 0.092). Surgical specialties were similarly distributed (digestive 24% vs 36%; orthopaedic 22% vs 11%; neurosurgery 15% vs 19%; ear-nose-throat 10% vs 12%; gynaecological 9% vs 7%; thoracic 7% vs 2%; urological 13% vs 13%; p = 0.136). General anaesthesia was used in 82% of fasting versus 87% of non-fasting reports (p = 1.000), and ASA scores (I/II/III) did not differ significantly (30/50/20% vs 42/41/17%; p = 0.209).

Intraoperative haemodynamic and respiratory monitoring revealed comparable rates of incidents between fasting and non-fasting reports (Table 2). Transient hypotension (systolic blood pressure [SBP] < 90 mmHg) was observed in 54% versus 51% of cases (p = 0.777), and excessive hypertension (SBP > 180 mmHg) in 9% versus 8% (p = 1.000). Cardiac rhythm disorders were reported in 28% versus 25% (p = 0.749) and haemodynamic instability in 47% versus 44% (p = 0.776). Difficult intubation occurred in 11% versus 10% (p = 1.000), bronchial aspiration in 14% versus 12% (p = 0.833), bronchospasm in 19% versus 21% (p = 0.860), and hypoxaemia (peripheral oxygen saturation [SpO_2] < 90%) in 15% in both groups (p = 1.000). Severe glycaemic disturbances (hypo-/hyperglycaemia) were reported in 9%/9% of fasting reports versus 8%/8% of non-fasting reports (p = 1.000), and electrolyte disturbances in 10% versus 14% (p = 0.514). None of the comparisons reached statistical significance.

Table 2. Intraoperative complications in fasting and non-fasting reports.

Complication	Fasting (%)	Non-fasting (%)	p-value
Hypotension (SBP < 90 mmHg)	54	51	0.777
Hypertension (SBP > 180 mmHg)	9	8	1.000
Cardiacrhythmdisorder	28	25	0.749
Haemodynamicinstability	47	44	0.776
Difficult intubation	11	10	1.000
Bronchospasm	19	21	0.860
Hypoxaemia (SpO_2 < 90%)	15	15	1.000
Bronchial aspiration	14	12	0.833
Severehypoglycaemia / hyperglycaemia	9 / 9	8 / 8	1.000
Electrolytedisturbance	10	14	0.514

SBP: systolic blood pressure; SpO_2: peripheral capillary oxygen saturation. P-values from χ^2 or Fisher's exact test.

During the immediate postoperative period, complications remained infrequent and again did not differ significantly between groups (Table 3). Persistent hypotension was observed in 26% of fasting versus 33% of non-fasting reports (p = 0.352), inadequately controlled postoperative pain in 31% versus 34% (p = 0.763), delayed awakening beyond 30 minutes in 28% versus 26% (p = 0.873), and postoperative nausea or vomiting in 32% versus 36% (p = 0.654). Early infection (< 48 h) was reported in 9% versus 8% (p = 1.000). Subjective postoperative outcomes are summarized in Table 4. Moderate-to-severe postoperative fatigue was reported by 39% of professionals on the fasting day, compared with 57% on the non-fasting day (p = 0.560). Medium-to-low postoperative concentration was reported by 48% versus 44% (p = 0.642), and 50% of fasting versus 52% of non-fasting reports indicated that an additional break or supplementary assistance would have been beneficial (p = 1.000).

Table 3. Postoperative complications in fasting and non-fasting reports.

Postoperative complication	Fasting (%)	Non-fasting (%)	p-value
Persistent hypotension	26	33	0.352
Inadequatelycontrolled pain	31	34	0.763
Delayedawakening (> 30 min)	28	26	0.873
Nausea / vomiting	32	36	0.654
Early infection (< 48 h)	9	8	1.000
Other complications	0	0	—

h: hours; min: minutes. P-values from χ^2 or Fisher's exact test.

Table 4. Subjective postoperative fatigue, concentration, and perceived need for additional support.

Subjective postoperative variable	Fasting (%)	Non-fasting (%)	p-value
Moderate-to-severe postoperative fatigue	39	57	0.560
Medium-to-low postoperative concentration	48	44	0.642
Need for additional break or assistance	50	52	1.000

%: percentage. P-values from χ^2 test.

Overall, none of the comparative analyses reached statistical significance (all p > 0.05). These results indicate the absence of any detectable impact of Ramadan fasting on perceived fatigue, concentration, or the frequency of intra- and postoperative complications in this cohort of anesthesiology and critical care professionals.

IV. Discussion

This comparative within-subject study of 100 anesthesiology and critical care professionals at CHU Ibn Rochd, Casablanca, generated 200 paired observations covering both fasting and non-fasting working days during Ramadan 2025. The principal finding is unequivocal: across more than thirty perioperative and postoperative outcome variables, no statistically significant difference emerged between the two conditions. Practitioners reported equivalent levels of preoperative fatigue and concentration, similar surgical activity

profiles, and comparable frequencies of intra- and postoperative complications, including those most plausibly linked to fasting physiology — transient hypotension, dysglycaemia, electrolyte disturbance, hypoxaemia, and difficult intubation. To our knowledge, this is the first comparative analysis of perioperative practice during Ramadan focused specifically on the practitioner rather than the patient.

These findings can be interpreted in light of three converging bodies of literature: the physiology of Ramadan fasting, the literature on cognitive-psychomotor performance during Ramadan, and the small but growing literature on Ramadan and surgical or perioperative outcomes. The first underscores that, despite measurable shifts in plasma osmolarity, glucose, and circadian markers, healthy adults broadly maintain physiological homeostasis during Ramadan, particularly when suhoor is consumed and hydration is preserved between iftar and suhoor[1,7,10]. In our cohort, more than 70% of fasting reports included suhoor and approximately two-thirds described their hydration as satisfactory — a profile consistent with adequate metabolic preparation for the working day.

The literature on cognitive and psychomotor performance during Ramadan is markedly heterogeneous. While some studies have identified transient impairments — particularly in the late afternoon and during the final week of Ramadan — others have found preserved or even improved sustained attention and reaction time, especially in the morning hours and when total sleep duration is maintained[5,6,13]. A recent meta-analysis on athletes likewise concluded that, although subjective fatigue and sleep architecture may be affected, objective cognitive and physical performance is largely preserved[9,13]. Our results, in which preoperative fatigue and concentration were essentially identical between the two conditions and in which postoperative subjective fatigue tended numerically to be lower in fasting reports (39% vs 57% moderate-to-severe), align with this latter pattern. The non-significant directionality may also reflect a behavioural compensation: fasting practitioners may pace themselves more carefully, prioritize lighter tasks during the late afternoon, and benefit from the structured rhythm of Ramadan (suhoor, iftar, naps).

With respect to perioperative complications, the small but growing literature on Ramadan and surgical outcomes has consistently failed to demonstrate excess risk in well-prepared patients[11,12]. In a recent cohort of 376 patients followed throughout Ramadan in the year after metabolic and bariatric surgery, only 2.9% required an emergency department visit or intravenous rehydration, and no significant difference in adverse outcomes was observed across surgical procedures[12]. An international survey of complications after bariatric surgery in fasting patients identified specific late events but did not establish causality with fasting itself[11]. Our findings extend this reassuring picture from the patient to the practitioner: comparable rates of hypotension (54% vs 51%), arrhythmia (28% vs 25%), difficult intubation (11% vs 10%), bronchospasm (19% vs 21%), and severe glycaemic events (9%/9% vs 8%/8%) suggest that the operating-room safety profile is not measurably degraded when the anesthesiologist or nurse anesthetist is fasting, in this institution and during this Ramadan.

Several plausible mechanisms may explain this stability. First, anesthesiology and critical care professionals working during Ramadan in a Muslim-majority country benefit from an institutional and societal context that facilitates fasting: scheduling adjustments, shared experience among colleagues, and the structured timing of suhoor and iftar[2,3]. Second, our population was young, with 92–94% of respondents having less than five years of experience — an age group in which physiological adaptation to fasting tends to be efficient[5,6,7]. Third, the within-subject design limits inter-individual variability and allows each professional to act as their own control, minimizing the influence of unmeasured personal characteristics on the comparison.

Some clinically relevant nuances nevertheless deserve attention. The proportion of fasting reports in which an additional break or supplementary assistance would have been welcomed (50%) was virtually identical to that of non-fasting reports (52%), suggesting that this perception reflects the inherent demands of the specialty rather than fasting per se. The numerical — though non-significant — reduction in moderate-to-severe postoperative fatigue in the fasting group (39% vs 57%) deserves cautious interpretation; it may reflect a true behavioural pacing effect during Ramadan, but could equally reflect social-desirability bias, with fasting professionals reluctant to attribute fatigue to fasting in self-report. Larger studies with objective measures of fatigue (such as reaction-time testing or actigraphy) and of physiological status (blood glucose, hydration markers) would be needed to disentangle these mechanisms[5,6,9,13].

From an organizational standpoint, our findings provide preliminary evidence to support the autonomy of anesthesiology professionals in deciding whether to fast during Ramadan, without requiring systematic restriction of operating-room activity. They are consistent with the conclusions of recent occupational-medicine reviews, which have not identified convincing evidence of impaired neuro-performance or alertness attributable to Ramadan fasting in healthy adults, and which advocate individual risk assessment and reasonable workplace adjustments rather than blanket restrictions[2]. At the same time, our results should not be read as a license for inaction: optimization of suhoor composition, encouragement of adequate hydration between iftar and suhoor, the possibility of a short qailulah (afternoon nap) when feasible, and adaptive scheduling of long or particularly demanding cases to morning hours appear reasonable measures, supported by both physiological and ergonomic evidence[1,2,7].

This study has several limitations. First, it is monocentric, with all participants recruited from a single Moroccan tertiary university hospital, which may limit external validity to centres in other latitudes (where fasting hours differ) or with different organizational cultures. Second, all outcome data — including complications — are self-reported by the practitioner, which introduces possible recall bias and social-desirability bias; objective intra-operative monitoring data, electronic anaesthesia records, or independent observer assessments would strengthen future work. Third, the comparison was made between a single fasting day and a single non-fasting day per respondent, which may not capture cumulative fatigue effects over the full month or the late-Ramadan period[3,5,6]. Fourth, the fasting-period dependent variables (e.g.suhoor, sleep duration) were collected categorically rather than quantitatively. Fifth, although the within-subject design is methodologically robust, the relatively limited sample size and the rarity of some complications reduce the statistical power to detect small but clinically relevant effects, and the absence of significance should not be equated with proof of equivalence[8,14]. Finally, our study cannot inform on the practice of more vulnerable subpopulations (older practitioners, those with chronic conditions, or pregnant colleagues), in whom individualized counselling remains essential[4,15].

V. Conclusion

This comparative within-subject study of anesthesiology and critical care professionals at CHU Ibn Rochd, Casablanca, found no statistically significant impact of Ramadan fasting on perioperative fatigue, concentration, or the frequency of intra- and postoperative complications. These reassuring findings — the first specifically focused on the practitioner rather than the patient in this setting — support a balanced and individualized approach to fasting for healthcare professionals in anesthesiology and critical care. They argue against routinely restricting operating-room activity during Ramadan in well-prepared, healthy practitioners, while supporting reasonable organizational measures (adapted scheduling, encouragement of suhoor and proper rehydration, and the possibility of short rest periods) that may further protect both practitioner well-being and patient safety. Larger, multicentric studies with objective measures of cognitive performance, physiological monitoring, and full-month assessment are needed to confirm these results and to guide the development of evidence-based recommendations adapted to the Moroccan and broader Maghreb anesthesiology community.

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Conflict of interest

The authors declare no conflict of interest, financial or otherwise, in relation to the subject matter of this manuscript.

Artificial Intelligence (AI) Use Declaration

The authors declare the following AI use during manuscript preparation:

- **Tool used:** Large language model (general-purpose writing assistant).
- **Purpose:** Language editing, structural reorganisation in line with the journal template, and reference formatting.
- **Stage applied:** Final manuscript drafting and formatting; the AI tool did not generate, analyse, or interpret the study data, which were collected, analysed, and validated entirely by the authors, who take full responsibility for the content of this manuscript.

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