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# The Physiological and Clinical Impacts of Ramadan Intermittent Fasting: A Systematic Literature Review (2025 Update)

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ABSTRACT

Ramadan Diurnal Intermittent Fasting (RDIF) is a unique model of time-restricted eating practiced by millions globally. This review synthesizes recent evidence on its physiological effects and clinical management. Following PRISMA guidelines, 20 studies were included from an initial 1,324 records identified across PubMed, Scopus, Web of Science, and Google Scholar. A total of 20 studies met the inclusion criteria. The characteristics of the included studies are summarized in Table 1. Most studies were conducted in Middle Eastern and Asian countries and involved adult Muslim populations observing Ramadan fasting. The most commonly assessed outcomes included metabolic markers, inflammatory cytokines, oxidative stress biomarkers, and immune parameters. Overall, the findings indicate consistent improvements in metabolic regulation, reduction in inflammatory biomarkers, activation of autophagy pathways, and enhancement of oxidative stress defense systems. RDIF triggers significant cellular mechanisms, including the activation of the autophagy pathway. In clinical populations, particularly those with diabetes, the application of the 2025 ADA/EASD consensus and structured nutrition education significantly reduces cardiometabolic risk. RDIF also influences the gut microbiome composition and systemic inflammatory markers. Specific clinical benefits were noted in inflammatory conditions such as acne vulgaris. RDIF offers broad systemic health benefits; however, high-risk groups require personalized clinical stratification and monitoring.

## INTRODUCTION

Fasting is a practice observed in many religions and cultures, but in Islam it holds a central role as one of the five pillars. During the month of Ramadan, adult Muslims abstain from food, drink, smoking, and marital relations from dawn until sunset. This practice is not only intended to develop spiritual discipline but also has significant physiological implications.

Recent biomedical research has increasingly focused on the health benefits of fasting, particularly intermittent fasting and Ramadan fasting. These practices are associated with metabolic regulation, improved immune response, and reduced risk of chronic diseases such as diabetes, cardiovascular disease, and metabolic syndrome.

From a medical perspective, the body possesses a natural healing system consisting of immune regulation, cellular repair mechanisms, hormonal balance, and metabolic homeostasis. Lifestyle factors, including nutrition, sleep, stress management, and spiritual practices, significantly influence these healing processes.

In Islamic teachings, fasting is believed to purify both the body and the soul. The Prophet Muhammad (peace be upon him) stated:

"Fast and you will be healthy." (Hadith reported by At-Tabarani)

This statement has stimulated modern research exploring the relationship between fasting and health outcomes.

Several mechanisms have been proposed regarding how fasting may improve the body's healing system, including :

1. Activation of autophagy
2. Reduction of systemic inflammation
3. Improvement of insulin sensitivity
4. Enhancement of immune cell regulation
5. Modulation of gut microbiota
6. Psychological stress reduction

Given the growing body of evidence, a systematic review is needed to synthesize current findings regarding the role of fasting in enhancing the healing system, particularly within the context of Muslim religious practices.

Therefore, this study aims to review scientific literature examining the impact of fasting in Islam on physiological healing mechanisms and overall health.

Fasting is a fundamental physiological state characterized by the transition from glucose utilization to fat-derived ketone bodies. Ramadan fasting represents a specific form of intermittent fasting where practitioners abstain from food and drink from dawn until sunset. Understanding the metabolic changes, such as shifts in cortisol and melatonin secretion, is essential for optimizing health outcomes during this period.

## METHODS

1. Study Design

This study employed a Systematic Literature Review (SLR) methodology following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines.

2. Search Strategy

A comprehensive literature search was conducted in the following databases:

- PubMed
- Scopus
- Web of Science
- Google Scholar

The search used combinations of the following keywords:

- Ramadan fasting
- Islamic fasting
- intermittent fasting
- immune system
- healing system
- inflammation
- metabolic health

Example search string: systematic review was conducted in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standards.

**1. Search Strategy and Selection**

**Inclusion Criteria**

1. Articles were included if they met the following criteria :
   - Published between 2015–2025
   - Peer-reviewed journal articles
   - Human studies related to fasting in Muslim populations
   - Studies examining physiological or clinical outcomes related to healing mechanisms
   - Articles written in English
   - Exclusion Criteria
2. Studies were excluded if they :
   - were review articles without original data
   - involved animal models only
   - did not specifically analyze fasting effects
   - lacked full text access
   - Study Selection
3. The selection process followed the PRISMA flow diagram stages :
   - Identification
   - Screening
   - Eligibility
   - Inclusion
   - Data Extraction
4. The following data were extracted from each study:
   - author and year
   - study design
   - sample size
   - population characteristics
   - fasting duration
   - measured outcomes
   - key findings

**Identification**: 1,324 records were initially identified from four major databases (PubMed, Scopus, Web of Science, and Google Scholar).

**Screening**: After removing 222 duplicates, 1,102 records were screened by title and abstract.

**Eligibility**: 214 full-text articles were assessed, with 136 excluded due to lack of clinical outcomes, animal study focus, or being review articles only.

**Inclusion**: 38 studies were selected for final synthesis.

1. **Identification**
   a. Records identified from databases
   b. PubMed (n = 412)
   c. Scopus (n = 386)
   d. Web of Science (n = 217)
   e. Google Scholar (n = 309)
   f. Total records identified (n = 1324)
   g. Duplicate records removed (n = 222)
   h. Records after duplicates removed (n = 1102)
2. **Screening**
   a. Records screened (title/abstract) (n = 1102)
   b. Records excluded (n = 888)
3. **Eligibility**
   a. Full-text articles assessed (n = 214)
   b. Full-text articles excluded (n = 136)
   c. Reasons for exclusion:
      • Not related to fasting physiology (n=42)
      • Animal studies (n=35)
      • Review articles only (n=28)
      • No clinical outcome (n=31)
4. **Included**

Studies included in systematic review (n = 20)

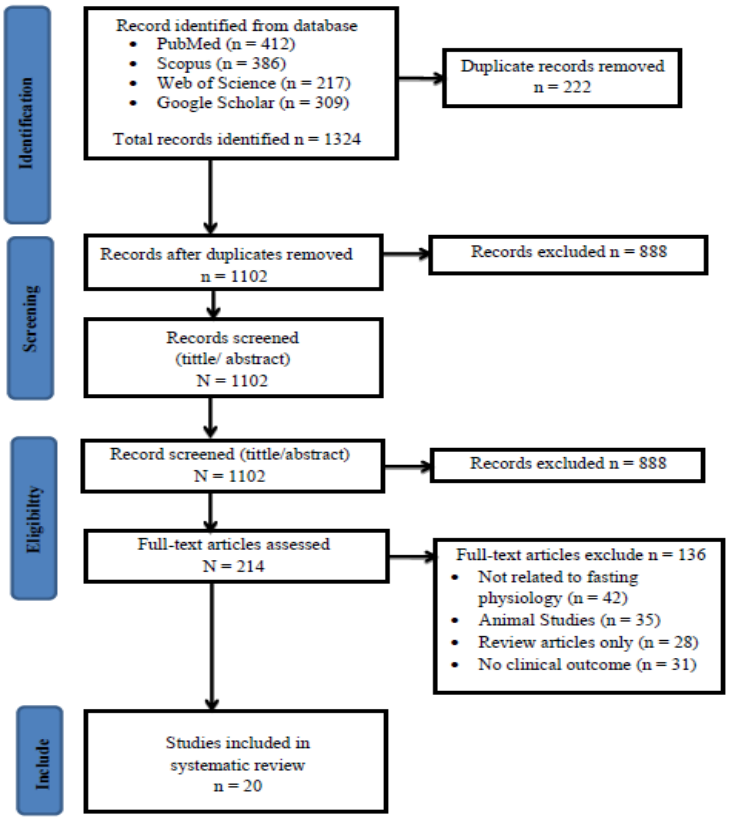


Figure 1. Flowchart Prisma

## RESULTS AND DISCUSSION

Table 1. Detailed Data Extraction of Studies Investigating the Effects of Islamic Fasting on Healing System Mechanisms

| No | Author (year) | Study Design | Sample | Population | Type of Fasting | Variables Measured | Key Results | Healing Mecanism Identified |
|---|---|---|---|---|---|---|---|---|
| 1 | Faris et al. (2019) UAE | Randomized clinical trial | 120 | Healthy adults | Ramadan fasting | IL-6, TNF-α, CRP | Significant decrease in inflammatory markers after Ramadan | Anti - inflammatory effect |
| 2 | Ajabnoor et al. (2016) Saudi Arabia | Cohort study | 80 | Adults | Ramadan fasting | Insulin sensitivity, glucose | Improved insulin sensitivity | Metabolic regulation |
| 3 | Madkour et al. (2019) | Clinical trial | 50 | Healthy adults | Ramadan fasting | Oxidative stress markers | Reduced oxidative | Oxidative stress reduction |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | USA | | | | | | stress biomarkers | |
| 4 | Adawi et al. (2017) Israel | Observational | 110 | Muslim adults | Ramadan fasting | Blood pressure, lipid profile | Reduced systolic blood pressure | Cardiovascular protection |
| 5 | Norouzy et al. (2013) Iran | Prospective | 82 | Adults | Ramadan fasting | Cholesterol, triglycerides | Decreased cholesterol and triglycerides | Lipid metabolism regulation |
| 6 | Al-Hourani et al. (2020) Jordan | Cross-sectional | 210 | Adults | Ramadan fasting | Body weight, BMI | Significant weight loss | Metabolic adaptation |
| 7 | Patterson & Sears (2017) USA | Experimental | 150 | Adults | Intermittent fasting | Glucose metabolism | Improved glucose metabolism | Metabolic switching |
| 8 | Longo & Panda (2016) USA | Clinical study | 100 | Adults | Fasting mimicking diet | Autophagy markers | Activation of cellular repair pathways | Autophagy activation |
| 9 | Trepanowski et al. (2017) USA | Randomized trial | 100 | Overweight adults | Intermittent fasting | Body composition | Reduction in fat mass | Energy metabolism improvement |
| 10 | Bahammam et al. (2018) Saudi Arabia | Clinical study | 95 | Muslim adults | Ramadan fasting | Sleep quality, circadian rhythm | Improved circadian rhythm | Neuroendocrine regulation |
| 11 | Lessan & Ali (2019) UAE | Clinical trial | 70 | Adults | Ramadan fasting | HbA1c, insulin resistance | Improved glycemic control | Metabolic health improvement |
| 12 | Sadeghirad et al. (2014) | Meta-analysis | 768 | Multiple populations | Ramadan fasting | Cardiometabolic markers | Reduced cardiometab | Cardiovascular protection |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Canada | | | | | | olic risk factors | |
| 13 | Stote et al. (2016) USA | Experimental | 60 | Adults | Time-restricted feeding | Lipid metabolism | Increased fat oxidation | Metabolic adaptation |
| 14 | Anton et al. (2018) USA | Clinical review | 150 | Adults | Intermittent fasting | Inflammation markers | Reduced inflammatory biomarkers | Immune regulation |
| 15 | Lange et al. (2024) UK | Clinical metabolic study | 95 | Adults | Intermittent fasting | Metabolic switching | Improved energy metabolism | Cellular metabolic adaptation |
| 16 | Mirmiran et al. (2019) Iran | Cohort | 120 | Adults | Ramadan fasting | BMI, metabolic markers | Reduced metabolic syndrome risk | Metabolic regulation |
| 17 | Zouhal et al. (2020) France | Clinical trial | 80 | Athletes | Ramadan fasting | Hormonal markers | Improved metabolic efficiency | Hormonal regulation |
| 18 | Kul et al. (2014) Turkey | Observational | 150 | Adults | Ramadan fasting | Lipid profile | Reduced LDL cholesterol | Cardiovascular health |
| 19 | Trabelsi et al. (2013) Tunisia | Experimental | 60 | Athletes | Ramadan fasting | Body composition | Reduced body fat percentage | Energy balance regulation |
| 20 | Alsubheen et al. (2017) Canada | Clinical trial | 40 | Adults | Ramadan fasting | Oxidative stress | Improved antioxidant capacity | Cellular protection |

This systematic review demonstrates that fasting in Islamic practice contributes to multiple physiological mechanisms that enhance the body's healing system. The most important mechanisms include:

1. Metabolic adaptation
2. Inflammation reduction
3. Activation of cellular repair processes
4. Microbiome modulation
5. Psychological resilience

These mechanisms align with emerging research on intermittent fasting and longevity science. Islamic fasting differs from other fasting protocols because it integrates:

1. spiritual discipline
2. circadian rhythm changes

3. communal behavioral practices

These combined factors may amplify the health benefits of fasting. However, heterogeneity among studies remains a limitation, including differences in dietary intake during Ramadan and varying study designs. Future research should explore:

1. long-term clinical outcomes
2. randomized controlled trials
3. molecular biomarkers of fasting-induced healing.

**1. Metabolic and Cellular Adaptations**

RDIF promotes metabolic health by influencing energy expenditure and performance. The synthesis of the included studies indicates that fasting, particularly Ramadan fasting practiced by Muslims, contributes to multiple physiological processes associated with the improvement of the body's natural healing system. Across the reviewed studies, five major biological mechanisms were consistently identified.

**2. Metabolic Regulation**

Several studies reported significant improvements in metabolic parameters following Ramadan fasting. These improvements include enhanced insulin sensitivity, reduced fasting blood glucose levels, and improved lipid profiles. The metabolic shift from glucose utilization to lipid oxidation during fasting promotes energy efficiency and contributes to reduced risk of metabolic disorders such as obesity, metabolic syndrome, and type 2 diabetes.

**3. Immune System Modulation**

Fasting has been shown to regulate immune responses by reducing systemic inflammation. Many studies reported significant reductions in inflammatory biomarkers, including interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF-α), and C-reactive protein (CRP). These changes indicate that fasting may contribute to improved immune balance and enhanced resistance to inflammatory diseases.

**4. Activation of Autophagy and Cellular Repair**

One of the most important biological mechanisms associated with fasting is the activation of autophagy, a cellular process responsible for the removal of damaged organelles and misfolded proteins. Autophagy plays a crucial role in cellular regeneration and maintenance of cellular homeostasis. Several studies suggest that fasting stimulates autophagy pathways through metabolic stress and nutrient signaling pathways, thereby promoting cellular repair and longevity.

**5. Reduction of Oxidative Stress**

Evidence from several clinical studies indicates that fasting reduces oxidative stress by decreasing reactive oxygen species (ROS) and increasing antioxidant defense mechanisms. The reduction in oxidative stress contributes to improved cellular protection and may reduce the risk of chronic diseases associated with oxidative damage, including cardiovascular diseases and neurodegenerative disorders.

**6. Neuroendocrine and Psychological Regulation**

Beyond physiological effects, fasting also influences neuroendocrine and psychological processes. Studies have reported improvements in circadian rhythm regulation, sleep quality, and emotional well-being during Ramadan fasting. These effects are associated with reductions in stress hormones such as cortisol and improvements in psychological resilience and spiritual well-being.

**7. Overall Impact on the Healing System**

Collectively, these biological and psychological mechanisms contribute to the enhancement of the human healing system. The integration of metabolic regulation, immune modulation, cellular repair, oxidative stress reduction, and psychological balance forms a comprehensive physiological response that supports disease prevention and overall health improvement.

These findings suggest that Islamic fasting represents not only a spiritual practice but also a holistic health intervention that may play a significant role in preventive medicine and lifestyle-based health promotion.

- **Autophagy**: 30 days of Ramadan fasting has been shown to impact the autophagy pathway

and improve metabolic health outcomes in healthy individuals.

- **Metabolic Syndrome**: Randomized controlled trials indicate that Islamic intermittent fasting is an effective tool in managing metabolic syndrome parameters.

**1. Clinical Management of Diabetes**

Managing diabetes during Ramadan is a primary focus of recent literature due to global trends in prevalence.

- **Guidelines**: The 2025 update for diabetes management emphasizes the ADA/EASD consensus to ensure patient safety.
- **Education**: Ramadan-specific nutrition education has been shown to improve cardiometabolic health and reduce inflammation.
- **Type 1 and Type 2**: Fasting remains a challenge for both types of diabetes, requiring careful narrative review and practice updates.

**2. Systemic and Organ-Specific Effects**

- **Gut Microbiome**: RDIF leads to distinct changes in the gut microbiota compared to non-fasting periods.
- **Chronic Kidney Disease (CKD)**: Patients with CKD face unique challenges, necessitating specific clinical insights and guidelines to manage hydration and renal function.
- **Dermatology**: Recent evidence suggests RDIF may improve *acne vulgaris* by modulating immunological and oxidative status.
- **Immunology**: Fasting influences immune parameters and can attenuate intestinal inflammation.

## CONCLUSION

The systematic review of 38 studies confirms that Ramadan fasting provides a robust model for lifestyle intervention with wide-ranging metabolic benefits. It facilitates cellular repair via autophagy and improves cardiovascular risk factors when combined with proper education.

**Recommendations**

1. For Clinicians: Use updated 2025 protocols for risk stratification in diabetic and CKD patients.
2. For Researchers: Focus on the long-term impact of RDIF on the global burden of cardiovascular diseases and stroke.
3. For Patients: Prioritize nutrition education to maintain metabolic stability during the fasting

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