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Original Article

Comprehensive Analysis of Biological and Metabolic Changes During a 10-Day Water-Only Fasting: A Case Study

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What is already known on this topic?

- *Prolonged water-only fasting has been recognized for its potential to enhance metabolic flexibility and promote cardiovascular health, particularly in reducing blood pressure in hypertensive individuals.*
- *Previous studies have demonstrated metabolic adaptations during fasting, including reduced resting metabolic rate, shifts toward fat oxidation, and increased ketogenesis, as well as transient changes in heart rate variability and sleep patterns.*
- *Structured refeeding protocols are critical for minimizing risks such as refeeding syndrome and restoring metabolic homeostasis following prolonged fasting.*

What this study adds on this topic?

- *This case study provides a detailed, longitudinal analysis of cardiovascular and metabolic changes in a healthy individual during a 10-day water-only fast, highlighting individualized responses in heart rate variability, respiratory quotient, and sleep quality.*
- *It demonstrates the stability of cardiovascular parameters, such as blood pressure and oxygen saturation, in a normotensive individual*

ABSTRACT

Objective: Prolonged water-only fasting has garnered significant interest for its potential health benefits, including enhanced metabolic flexibility and cardiovascular improvements. This case study explores the physiological and metabolic responses of a healthy 36-year-old male during a 10-day water-only fast, followed by a structured 5-day refeeding phase.

Methods: Key parameters such as heart rate variability (HRV), respiratory quotient (RQ), resting metabolic rate (RMR), oxygen consumption (VO_2), and sleep quality were monitored throughout the fasting and refeeding periods. Data collection was conducted at the Laboratory of Atatürk University Faculty of Medicine in February 2025.

Results: Findings revealed substantial metabolic adaptations, including a decline in RMR from 2040 kcal/day to 1342 kcal/day and a reduction in RQ from 0.89 to 0.74 by fasting day 7, indicating a shift from carbohydrate to fat oxidation. Cardiovascular parameters, including blood pressure and heart rate, remained stable, while sleep patterns exhibited notable variability, with a marked reduction in deep sleep after the third day of fasting. During the refeeding phase, metabolic and physiological parameters progressively returned to baseline levels, underscoring the importance of dietary reintroduction in restoring homeostasis.

Conclusion: This study highlights the dynamic interplay between metabolic rate, substrate utilization, and cardiovascular stability during prolonged fasting and refeeding. While the findings align with existing literature, the results emphasize the individuality of fasting responses and the necessity for medical supervision. These insights contribute to the growing body of evidence supporting water-only fasting as a potentially safe and effective intervention for metabolic health, warranting further investigation in diverse populations.

Keywords: Cardiovascular stability, prolonged fasting, refeeding, respiratory quotient, sleep patterns, water-only fasting

Introduction

Water-only fasting has been practiced for centuries across various cultures, primarily for religious, spiritual, and health-related purposes.[1-3] Historical records from traditions such as Ayurveda, ancient Greek medicine, and religious fasting rituals emphasize the restorative and purifying effects of prolonged fasting on the human body.[4,5] In recent decades, scientific interest in fasting has grown, particularly in understanding its effects on weight loss, metabolic health, inflammation, and cellular repair mechanisms such as autophagy.[3,6,7] Modern studies have highlighted the potential of fasting as a non-pharmacological intervention for managing metabolic disorders, reducing inflammation, and promoting longevity.[7-9] In this context, case studies provide unique insights into the physiological adaptations and clinical safety of prolonged fasting.[10,11]

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under medical supervision, reinforcing the safety of prolonged fasting in healthy populations.

- *The study underscores the reversibility of fasting-induced metabolic and sleep disturbances during a structured 5-day refeeding phase, offering insights into safe refeeding strategies and their impact on metabolic recovery.*

Despite the growing body of research on fasting, gaps remain in the literature regarding the comprehensive physiological and metabolic changes that occur during prolonged water-only fasting. Most existing studies focus on short-term fasting protocols or calorie restriction, often with an emphasis on general trends rather than individualized responses.[12,13] Furthermore, the impact of prolonged fasting on cardiovascular function, energy metabolism, and other physiological systems has rarely been studied in a single individual under controlled conditions. This case report aims to address these gaps by providing a detailed examination of the biological and metabolic adaptations observed during a 10-day water-only fasting period, contributing valuable data to the scientific discourse on the subject. By focusing on detailed and continuous measurements, the study seeks to elucidate the body's adaptive mechanisms during prolonged fasting. Rather than making generalized claims, this report provides a unique perspective on the individual responses to water-only fasting, offering insights into its potential benefits and challenges in clinical and non-clinical settings. Consequently, the following research question was addressed: "What biological and metabolic adaptations occur at the individual level during a ten-day water-only fasting protocol?"

Materials and Methods

Participant Characteristics

The participant in this case study was a 36-year-old healthy male with no known chronic medical conditions or history of regular medication use. Data collection was conducted at the Laboratory of Atatürk University Faculty of Medicine in February 2025. Standing 180 cm tall and weighing 96.5 kg at the start of the fasting period, he had a body mass index of 29.8 kg/m², placing him in the overweight category. Pre-study assessments were conducted to confirm the participant's eligibility for prolonged water-only fasting. These included comprehensive evaluations of mental and physical health. Psychological evaluations using the Beck Depression Inventory (BDI)[14] and Beck Anxiety Inventory (BAI)[15] indicated no psychological distress or mental health issues. Blood tests, including a complete blood count (hemogram) and detailed biochemical analyses such as glucose, lipid profile, and liver and kidney function tests, showed all values within normal reference ranges. A routine urinalysis showed no abnormalities, with parameters such as pH, protein, and glucose levels within normal limits. Physical examinations conducted by 2 independent physicians confirmed normal cardiovascular function, including blood pressure and resting heart rate, and found no contraindications for water-only fasting. The participant maintained a sedentary lifestyle with no structured exercise routine and followed a mixed diet without specific dietary restrictions before the study. Based on these assessments, the participant was deemed physically and psychologically fit to undergo the fasting protocol under medical supervision.

Study Design

This case study was designed to monitor the cardiovascular and metabolic changes during a 10-day water-only fasting period, with a specific focus on key parameters related to heart rate variability (HRV), oxygen saturation (SpO_2), body temperature, blood pressure, heart rate (minimum, maximum, and average), and sleep quality (total sleep time, Rapid Eye Movement [REM], and deep sleep). Additional metabolic measurements included resting metabolic rate (RMR), respiratory quotient (RQ), oxygen consumption (VO_2), and substrate utilization percentages (FAT% and CHO%).

The study consisted of 3 distinct phases:

Pre-Fasting Baseline Phase

Baseline measurements of all aforementioned parameters were recorded prior to the fasting period. These data served as a reference point for comparison during and after the fasting protocol. A bowel-cleansing procedure was performed using a mild laxative (magnesium hydroxide) to ensure that the gastrointestinal system was prepared for the fasting phase.

Fasting Phase

During the 10-day water-only fasting period, the participant consumed only water and abstained from all forms of caloric intake. To prevent discomfort and ensure gastrointestinal health, bowel movements were facilitated every 3 days using magnesium hydroxide. Measurements were taken on days 1, 2, 3, 5, 7, and 10 to evaluate changes in HRV, SpO_2, body temperature, blood pressure, and heart rate. Sleep quality metrics, including total sleep time, REM, and deep sleep, were monitored daily using a wearable device. Metabolic parameters such as RMR, RQ, VO_2, Ventilation (VE), Rf, and substrate utilization (FAT% and CHO%) were assessed on the same days to track metabolic adaptations.

Refeeding Phase

Following the fasting period, a structured refeeding protocol was implemented over 5 days to minimize the risks associated with refeeding syndrome and support the participant's metabolic recovery. Measurements of all parameters continued on days 1, 3, and 5 of the refeeding phase to assess recovery and normalization of metabolic and cardiovascular function.

On the first day, no solid foods were consumed. Instead, the participant was provided with liquid-based drinks, including electrolyte-enriched water and diluted fruit juices. This approach ensured hydration and supported initial glucose and glycogen replenishment while maintaining electrolyte balance. Additionally, a mild laxative effect was induced using magnesium hydroxide to facilitate gentle bowel movements and prevent gastrointestinal discomfort following the prolonged fasting period.

During the second and third days, the participant consumed easily digestible foods, such as small portions of fruits, boiled vegetables, yogurt, and soup. These foods provided essential nutrients while remaining gentle on the gastrointestinal system. Additionally, small amounts of low-fat protein sources, such as boiled eggs or low-sodium white cheese, were introduced to begin supporting muscle recovery. Bowel movements were monitored, and no abnormalities were observed during this phase.

From the fourth day onward, the diet gradually included more complex and calorically dense foods. Whole grains, legumes (e.g., lentils, chickpeas), and lean protein sources, such as fish or poultry, were incorporated to further restore metabolic function. Foods rich in dietary fiber were also introduced to regulate bowel movements and support gut health. The participant's calorie intake was progressively increased to approximately 120% of the RMR by the fifth day, aligning with established guidelines for safe refeeding.

Throughout the refeeding phase, fat intake was kept minimal during the initial days to avoid gastrointestinal distress, and the participant's progress was closely monitored for signs of electrolyte imbalance or other complications. This systematic approach ensured a safe and effective transition from fasting to normal metabolic function.

Measurements and Data Collection

Data collection in this study was conducted using validated tools and standardized protocols to ensure accuracy and reliability. Measurements were taken during the pre-fasting baseline phase, on days 1, 2, 3, 5, 7, and 10 of the fasting phase, and on days 1, 3, and 5 of the refeeding phase. The following parameters and devices were used:

Cardiovascular and Respiratory Parameters

Heart rate variability: Recorded using the Apple Watch Series 8, which provides accurate HRV measurements through photoplethysmography (PPG) technology.

Oxygen saturation (SpO_2): Measured using the Masimo MightySat™, a reliable pulse oximeter widely used in clinical settings.

Body temperature: Monitored with the Braun ThermoScan® PRO 6000 tympanic thermometer.

Blood pressure: Measured using the Omron Platinum BP5450, a clinically validated upper-arm blood pressure monitor.

Heart rate (minimum, maximum, and average): Continuously monitored using the Apple Watch Series 8.

Sleep Quality

Total sleep time, REM sleep, and deep sleep: Tracked using the Apple Watch Series 8, which employs advanced algorithms and sensors to analyze sleep patterns.

Metabolic Measurements

Resting metabolic rate, RQ, oxygen consumption (VO_2), minute ventilation (VE), and respiratory frequency (Rf): Assessed using the COSMED K5 portable gas analyzer. This device provides precise measurements of metabolic and respiratory parameters during rest and physical activity.

Substrate utilization (FAT% and CHO%): Derived from respiratory gas exchange data obtained through the COSMED K5.

All devices were calibrated according to manufacturer guidelines before each measurement session. Data collection was performed under the supervision of trained medical staff to ensure the participants' safety and the integrity of the study.

Ethical Considerations

This study was conducted in full compliance with ethical standards and was approved by the Non-Interventional Clinical Research Ethics Committee of Atatürk University (Date: 27.12.2024; Approval no.: 35, Meeting no.: 9, Approval). The research adhered to the principles outlined in the Declaration of Helsinki for medical research involving human participants. The participant provided written informed consent prior to participation, acknowledging the nature, purpose, and potential risks of the study. Confidentiality of all personal and medical data was strictly maintained throughout the study, ensuring adherence to data protection and privacy regulations. The study procedures, including the 10-day water-only fasting protocol and subsequent refeeding phase, were carefully designed to minimize risks and ensure participant safety. Continuous medical supervision was provided, with

Table 1. Changes in Cardiovascular, Metabolic, and Sleep Parameters During a 10-Day Water-Only Fast and Refeeding Phase

Parameter	Baseline	Fasting Day 1	Fasting Day 2	Fasting Day 3	Fasting Day 5	Fasting Day 7	Fasting Day 10	Refeeding Day 1	Refeeding Day 3	Refeeding Day 5
Body temperature (°C)	36.6	36.7	36.5	36.6	37.2	37.2	37.1	36.7	36.5	36.7
Systolic blood pressure (mmHg)	115	100	122	124	124	112	118	100	102	111
Diastolic blood pressure (mmHg)	75	59	59	77	77	76	76	76	81	73
Heart rate (Min) (bpm)	54	58	59	59	59	62	61	63	60	55
Heart rate (Max) (bpm)	108	105	106	102	102	101	102	116	113	115
Resting heart rate (Avg) (bpm)	69	66	66	69	69	67	67	72	74	73
Heart rate variability (HRV) (ms)	82	21	49	45	28	22	23	87	49	31
Oxygen saturation (SpO_2) (%)	98	97	97	99	96	97	97	96	96	97
Total sleep time (h:mm)	07:15	07:18	06:36	07:18	08:35	07:11	04:55	09:43	07:11	08:41
REM sleep (h:mm)	01:33	01:35	00:58	00:54	01:37	01:45	00:23	02:31	01:09	01:30
Deep sleep (h:mm)	00:51	00:47	00:51	00:57	00:32	00:24	00:29	00:34	00:24	00:28
Resting metabolic rate (RMR) (kcal/day)	2040	2058	2008	2050	1805	1664	1342	1483	1606	1801
Respiratory quotient (RQ)	0.89	0.87	0.76	0.78	0.80	0.74	0.74	0.89	0.96	0.94
Oxygen consumption (VO_2) (mL/min)	298	305	295	300	262	245	197	211	226	261
FAT utilization (FAT%)	37.40	43.80	83.60	77.00	69.40	87.50	87.50	37.40	12.2	21.30
Carbohydrate utilization (CHO%)	62.60	56.20	16.40	23.00	30.60	12.50	12.50	62.60	87.8	78.70

regular monitoring of physiological and metabolic parameters to promptly address any adverse events or complications.

Results

This case study documented significant cardiovascular and metabolic changes during a 10-day water-only fasting period and the subsequent refeeding phase (Table 1). The data collected included HRV, oxygen saturation (SpO_2), body temperature, blood pressure, heart rate (minimum, maximum, and average), sleep quality (total sleep time, REM, and deep sleep), RMR, RQ, oxygen consumption (VO_2), and substrate utilization percentages (FAT% and CHO%).

Cardiovascular Parameters

Heart Rate Variability: HRV decreased significantly during fasting, from a baseline value of 82 ms to 21 ms on day 1, remaining low throughout the fasting period. By refeeding day 1, HRV returned to 87 ms but decreased again on subsequent refeeding days.

Oxygen Saturation (SpO_2): SpO_2 values remained stable, fluctuating between 96% and 99% throughout fasting and refeeding, indicating no significant respiratory impairment.

Blood Pressure: Blood pressure exhibited fluctuations during fasting, with an initial drop from 115/75 mmHg to 100/59 mmHg on day 1. By day 10, it stabilized at 118/76 mmHg. Refeeding showed slight variations but returned to near-baseline levels by day 5.

Heart rate: Minimum, maximum, and average heart rates increased slightly during fasting, with a notable rise in the maximum heart rate (116 bpm) during refeeding.

Sleep Quality

Total sleep time: Sleep duration showed variability, decreasing to 4:55 hours by fasting day 10 and increasing to 9:43 hours by refeeding day 1. This was accompanied by a partial restoration of sleep quality during refeeding.

REM sleep and deep sleep: REM sleep was reduced during fasting, with a minimum of 23 minutes recorded on fasting day 10. Deep sleep followed a similar trend, decreasing significantly during fasting and showing partial recovery during refeeding.

Metabolic Parameters

Resting metabolic rate: RMR decreased from 2040 kcal/day at baseline to 1342 kcal/day by fasting day 10, reflecting metabolic adaptation. Refeeding increased RMR to 1801 kcal/day by day 5.

Respiratory quotient: RQ declined from 0.89 at baseline to 0.74 during fasting, indicating a shift toward fat oxidation. Refeeding elevated RQ to 0.94.

Oxygen consumption (VO_2) and substrate utilization: VO_2 dropped from 298 mL/min to 197 mL/min during fasting, aligning with reduced metabolic demands. FAT% increased significantly (37.4% to 86.5%) while CHO% decreased (62.6% to 13.5%) during fasting. Refeeding reversed these trends, with carbohydrate utilization increasing substantially.

Body Temperature

Body temperature showed minor fluctuations, ranging from 36.5°C to 37.2°C during fasting. Refeeding normalized these values to the baseline range.

Discussion

Prolonged water-only fasting has gained increasing attention for its potential health benefits, including metabolic flexibility and cardiovascular improvements. This case study investigates the effects of a 10-day water-only fast on key physiological parameters such as HRV, RMR, VO_2, and sleep quality, providing unique insights into the fasting process and its outcomes. The findings align with prior research, which demonstrates metabolic shifts during fasting, including reduced RQ values and increased reliance on fat oxidation. These physiological changes, coupled with structured refeeding, highlight the importance of medical supervision in ensuring a safe transition and recovery.

Previous research has demonstrated the potential of water-only fasting to significantly lower blood pressure in hypertensive individuals.[8,16-18] For instance, medically supervised fasting protocols have reported average reductions in systolic and diastolic pressures of 37/13 mmHg, with reductions of up to 60/17 mmHg observed in participants with severely elevated baseline values.[17] Similarly, studies on prolonged fasting followed by a whole-plant-food diet highlight its long-term efficacy in managing hypertension.[16] In this case study, the participant's normal baseline blood pressure limited the magnitude of reduction, emphasizing the role of individual health status in determining cardiovascular outcomes. Despite the minimal changes, the maintenance of blood pressure stability during fasting underscores the safety of this intervention in healthy individuals under medical supervision.

Metabolic adaptations during the fasting phase were marked by significant shifts in the RQ and substrate utilization patterns. The observed decline in RQ from 0.89 at baseline to 0.74 by fasting day 7 reflects a transition from carbohydrate metabolism to predominant fat oxidation. This metabolic shift aligns with findings from Scharf et al[19] (2022), where fasting-induced ketogenesis was identified as a critical adaptive mechanism for energy homeostasis. Increased fat oxidation, as indicated by FAT% rising to 87.5% on fasting day 7, highlights the body's reliance on lipid stores for energy during caloric deprivation. Similar trends were reported in studies exploring prolonged fasting's effects on skeletal muscle metabolism, where enhanced fatty acid utilization supported energy demands while sparing lean mass.[6,20,21] Interestingly, the refeeding phase reversed these trends, with RQ values rapidly rising to 0.89 on refeeding day 1 and further increasing to 0.96 by day 3. This rebound reflects the reintroduction of carbohydrates and a shift back toward glucose metabolism as the primary energy source.

While RQ is a valuable metric for assessing substrate utilization, it has limitations when ketones become a significant energy source during prolonged fasting. RQ calculations traditionally account for carbohydrate and fat oxidation but do not directly consider ketone metabolism.[6,20,21] For instance, the RQ of beta-hydroxybutyrate ($C_4H_8O_3$) is approximately 0.89, while acetoacetate ($C_4H_6O_3$) yields an RQ of approximately 0.94. These values reflect the distinct oxidation pathways of ketones compared to carbohydrates and fats. As ketogenesis becomes dominant, the standard interpretation of RQ as a measure of substrate preference may underestimate the contribution of ketones to overall energy metabolism. This limitation underscores the need for complementary measures, such as direct ketone quantification, to fully capture metabolic adaptations during fasting. In this study, therefore, RQ data were further supported by ketone measurements and body composition analyses, providing a holistic view of metabolic changes during fasting.

Reductions in RMR and oxygen consumption (VO_2) observed during fasting further illustrate the body's adaptive energy conservation mechanisms. RMR declined progressively from 2040 kcal/day at baseline to 1342 kcal/day by fasting day 10, reflecting a marked decrease in energy expenditure. This reduction aligns with findings from previous studies, which identified RMR decline as a critical adaptive response to conserve energy during prolonged caloric deprivation.[6,21,22] Similarly, VO_2 decreased from 298 mL/min at baseline to 197 mL/min by fasting day 10, consistent with a lower metabolic demand. These changes underscore the shift toward an energy-efficient state, driven by reduced cellular activity and increased reliance on lipid oxidation. During the refeeding phase, RMR and VO_2 began to recover, demonstrating the reversibility of these adaptations with nutrient reintroduction. These findings highlight the dynamic interplay between metabolic rate, substrate utilization, and energy conservation during fasting and refeeding.

Heart rate data revealed expected patterns during the fasting and refeeding phases, consistent with physiological adaptations to these states. While the participant's minimum and average heart rates remained relatively stable, maximum heart rate (HRmax) exhibited fluctuations, particularly during fasting days. Notably, these peaks in HRmax were associated with short-duration performance tests, such as vertical jumps and 6-second Wingate sprints, conducted to assess anaerobic capacity. The physiological stress imposed by these high-intensity activities likely contributed to transient increases in HRmax, rather than reflecting the resting cardiovascular response to fasting. This interpretation is supported by the observation that resting heart rate remained within a narrow range across all phases of the study, further underscoring the cardiovascular stability maintained throughout the fasting and refeeding periods. Such findings align with previous research emphasizing the importance of differentiating resting and exercise-induced cardiovascular responses when evaluating the effects of fasting.

Heart rate variability exhibited notable reductions during the fasting phase, decreasing from 82 ms at baseline to as low as 21 ms on fasting day 1 and remaining suppressed throughout the fasting period. This decline suggests a shift toward sympathetic dominance, which is a common physiological response to caloric deprivation and stress. However, HRV showed significant improvement during the refeeding phase, reaching 87 ms on refeeding day 1, indicating a return to parasympathetic balance and recovery of autonomic function. These findings are consistent with prior studies highlighting the transient autonomic changes associated with fasting and the reversibility of these effects with nutrient reintroduction. Oxygen saturation (SpO_2) remained stable throughout the study, with values fluctuating minimally around 96%-99%. This stability suggests that prolonged fasting did not compromise pulmonary function or oxygen delivery, even during metabolic shifts to fat oxidation and ketogenesis. The consistent SpO_2 values reinforce the safety of water-only fasting under medical supervision in a healthy individual, further emphasizing its minimal impact on basic respiratory parameters.

Sleep patterns during the fasting and refeeding phases displayed notable variability, with total sleep time and REM sleep showing fluctuations. Interestingly, deep sleep duration showed a marked reduction after the third day of fasting, suggesting potential disruptions in sleep architecture during prolonged fasting. However, these results should be interpreted with caution, as they are highly dependent on individual factors unique to the participant. While the case study highlights these personalized responses, existing literature has documented the potential for fasting to cause sleep disturbances, including reduced sleep efficiency and altered REM cycles. Previous studies have noted that prolonged fasting can disrupt circadian rhythms and lead to fragmented sleep patterns.[3,19,20]

Limitations and Strengths

This case study offers valuable insights into the physiological and metabolic effects of a 10-day water-only fast; yet, it is subject to several limitations. Firstly, the findings are based on a single participant, which limits the generalizability of the results to broader populations. Individual variability in fasting responses, including metabolic adaptations, cardiovascular changes, and sleep patterns, underscores the need for caution when extrapolating these outcomes. Additionally, while the study employed robust monitoring tools, the absence of a control group prevents direct comparisons and limits the ability to distinguish fasting-induced changes from natural physiological variations. The participant's healthy baseline status may also reduce the magnitude of changes observed compared to individuals with underlying health conditions, such as hypertension or metabolic syndrome, where fasting might have more pronounced effects. Lastly, sleep pattern analysis relied on a wearable device, which, while convenient, may lack the precision of polysomnography for detailed sleep architecture evaluation. This limitation is particularly relevant given the observed disruptions in deep sleep and REM patterns during fasting, which warrant further investigation with more advanced methodologies. Future studies involving larger sample sizes, control groups, and continuous monitoring of key parameters would be instrumental in validating and expanding upon these findings.

Conclusion

This case study provides a detailed exploration of the physiological and metabolic changes associated with a 10-day water-only fast in a healthy individual. The findings reveal significant metabolic adaptations, including reduced RMR and RQ values, increased reliance on fat oxidation, and fluctuations in sleep patterns, particularly deep sleep. Cardiovascular parameters, including blood pressure and heart rate, remained stable, underscoring the safety of medically supervised fasting in healthy individuals. The refeeding phase demonstrated the reversibility of fasting-induced changes and emphasized the importance of structured dietary reintroduction in restoring metabolic balance. While the results align with existing research, this study highlights the individuality of fasting responses and underscores the need for personalized approaches in fasting interventions. These findings contribute to the growing body of evidence supporting water-only fasting as a potentially safe and effective approach for metabolic health under appropriate medical supervision. Future research with larger and more diverse populations is essential to validate these results and explore the broader applicability of fasting interventions.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Ethics Committee Approval: This study was conducted in full compliance with ethical standards and was approved by the Non-Interventional Clinical Research Ethics Committee of Atatürk University (Date: 27.12.2024; Approval no: 35, Meeting no: 9).

Informed Consent: Written informed consent was obtained from the participant who participated in this case study.

Peer-review: Externally peer-reviewed.

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References

1. Westermarck E. The principles of fasting. *Folklore*. 1907;18(4):391-422. [CrossRef]
2. Cherel Y, Robin JP, Heitz A, Calgari C, Le Maho Y. Relationships between lipid availability and protein utilization during prolonged fasting. *J Comp Physiol B*. 1992;162(4):305-313. [CrossRef]
3. Ogłodek E, Pilis Prof W. Is water-only fasting safe? *Glob Adv Health Med*. 2021;10:21649561211031178. [CrossRef]
4. Gaikwad ST, Gaikwad P, Saxena V. Principles of fasting in Ayurveda. *Int J Sci Environ Technol*. 2017;6(1):787-792.
5. Islam MT. Fasting in Hinduism, Buddhism and Islam: a comparative study. *MAQOLAT J Islamic Stud*. 2024;2(3):156-168.
6. Kolnes KJ, Nilsen ET, Brufladt S, et al. Effects of seven days' fasting on physical performance and metabolic adaptation during exercise in humans. *Nat Commun*. 2025;16(1):122. [CrossRef]
7. Gabriel S, Ncube M, Zeiler E, et al. A six-week follow-up study on the sustained effects of prolonged water-only fasting and refeeding on markers of cardiometabolic risk. *Nutrients*. 2022;14(20):4313. [CrossRef]
8. Zeiler, E., Gabriel, S., Ncube, M., Thompson, N., Newmire, D., Scharf, E. L., ... & Myers, T. R. (2024). Prolonged Water-Only Fasting Followed by a Whole-Plant-Food Diet Is a Potential Long-Term Management Strategy for Hypertension and Obesity. *Nutrients*, 16(22), 3959.
9. Solianik R, Židonienė K, Eimantas N, Brazaitis M. Prolonged fasting outperforms short-term fasting in terms of glucose tolerance and insulin release: a randomised controlled trial. *Br J Nutr*. 2023;130(9):1500-1509. [CrossRef]
10. Rathi SK, Lakhani JD, Shah A, et al. Health impact due to prolonged water only fast by Jain Monk: a case report. *Curr Res Nutr Food Sci J*. 2024;12(2):572-578. [CrossRef]
11. Zhou W, Luo L. Preoperative prolonged fasting causes severe metabolic acidosis: a case report. *Medicine*. 2019;98(41):e17434. [CrossRef]
12. Özbay S, Ulupınar S, Gençoğlu C, et al. Effects of Ramadan intermittent fasting on performance, physiological responses, and bioenergetic pathway contributions during repeated sprint exercise. *Front Nutr*. 2024;11:1322128. [CrossRef]
13. de Groot S, Pijl H, van der Hoeven JJ, Kroep JR. Effects of short-term fasting on cancer treatment. *J Exp Clin Cancer Res*. 2019;38(1):209. [CrossRef]
14. Beck AT, Steer RA, Brown GK. *Beck Depression Inventory*. 1996.
15. Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: psychometric properties. *Journal of consulting and clinical psychology*, 56(6), 893.
16. Zeiler E, Gabriel S, Ncube M, et al. Prolonged water-only fasting followed by a whole-plant-food diet is a potential long-term management strategy for hypertension and obesity. *Nutrients*. 2024;16(22):3959. [CrossRef]
17. Goldhamer A, Lisle D, Parpia B, Anderson SV, Campbell TC. Medically supervised water-only fasting in the treatment of hypertension. *J Manipulative Physiol Ther*. 2001;24(5):335-339. [CrossRef]
18. Scharf, E., Zeiler, E., Ncube, M., Kolbe, P., Hwang, S. Y., Goldhamer, A., & Myers, T. R. (2022). The effects of prolonged water-only fasting and refeeding on markers of cardiometabolic risk. *Nutrients*, 14(6), 1183.
19. Scharf E, Zeiler E, Ncube M, et al. The effects of prolonged water-only fasting and refeeding on markers of cardiometabolic risk. *Nutrients*. 2022;14(6):1183. [CrossRef]
20. Bak AM, Vendelbo MH, Christensen B, et al. Prolonged fasting-induced metabolic signatures in human skeletal muscle of lean and obese men. *PLoS One*. 2018;13(9):e0200817. [CrossRef]
21. Pedroso JA, Wasinski F, Donato Jr J. Prolonged fasting induces long-lasting metabolic consequences in mice. *J Nutr Biochem*. 2020;84:108457. [CrossRef]
22. Smith M, Edwards A, Gateless K, et al. The impact of intermittent fasting and exercise on resting metabolic rate and respiratory quotient. *J Exerc Physiol Online*. 2019;22(7):22-29.