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Black Coffee during Fasting: Physiological Mechanisms of Hunger Suppression and Enhanced Fasting Adherence

Dr. Kavitha P.S[1], Dr. Ramana V. Krishnan[2]

[1]Cofounder of The fasting studio, The fasting studio
[2]Founder of the fasting studio, The fasting studio

Abstract

Intermittent and prolonged fasting have become increasingly recognized as effective nutritional interventions for improving metabolic health, insulin sensitivity, body composition, and overall well-being. Despite these benefits, hunger remains one of the principal barriers limiting adherence to fasting protocols. Among individuals practicing fasting, unsweetened black coffee is one of the most frequently consumed beverages because it is widely perceived to reduce hunger while improving alertness and mental performance.

Coffee is a complex functional beverage containing more than one thousand biologically active compounds, including caffeine, chlorogenic acids, trigonelline, melanoidins, diterpenes, and polyphenols. These compounds influence neurological, endocrine, gastrointestinal, and metabolic pathways involved in appetite regulation. Current evidence suggests that black coffee may reduce the perception of hunger primarily through caffeine-mediated antagonism of adenosine receptors, increased catecholamine release, enhanced fat utilization, and modest modulation of appetite-regulating pathways. Non-caffeine compounds contribute additional metabolic benefits through improved glucose homeostasis, antioxidant activity, and gut microbial health.

To complement current scientific evidence, community-based observational surveys were conducted among individuals practicing intermittent and prolonged fasting. Most respondents reported meaningful hunger suppression while maintaining prolonged fasting schedules with only moderate black coffee consumption. This review summarizes the physiological basis through which black coffee may improve fasting adherence and integrates current scientific evidence with real-world community observations.

Keywords: Black coffee, intermittent fasting, prolonged fasting, appetite suppression, caffeine, chlorogenic acids, fasting adherence, metabolism.

Introduction

Intermittent fasting has evolved from a traditional dietary practice into an evidence-based therapeutic strategy for improving metabolic health. Numerous clinical studies have demonstrated improvements in insulin sensitivity, body weight, blood glucose regulation, lipid metabolism, and inflammatory markers following structured fasting interventions. During prolonged fasting, the body gradually shifts from carbohydrate metabolism to fatty acid oxidation and ketone production, allowing endogenous energy reserves to sustain physiological function.

Despite these metabolic benefits, hunger remains one of the greatest challenges limiting successful fasting. Hunger is not simply a consequence of an empty stomach but results from the interaction of multiple physiological systems, including the central nervous system, gastrointestinal tract, endocrine signaling, and behavioural conditioning. Hormones such as ghrelin, peptide YY (PYY), glucagon-like peptide-1 (GLP-1), cholecystokinin (CCK), insulin, and leptin continuously communicate with appetite-regulating centres in the hypothalamus. Simultaneously, reward pathways, emotions, circadian rhythms, and habitual eating behaviours influence the desire to eat.

Among the strategies commonly adopted by fasting practitioners, black coffee has become one of the most widely used because it contains negligible calories while frequently reducing hunger and improving mental alertness. Unlike caloric beverages, plain black coffee generally does not produce a meaningful insulin response when consumed without sugar, milk, or cream, making it compatible with most fasting protocols.

Black Coffee: More Than a Source of Caffeine

Coffee is often regarded simply as a stimulant because of its caffeine content. However, roasted coffee is one of the richest dietary sources of biologically active phytochemicals. More than one thousand compounds have been identified, many of which contribute to coffee's metabolic and physiological effects.

Table 1. Major Bioactive Components of Coffee

Compound	Physiological Function	Potential Contribution During Fasting
Caffeine	Adenosine receptor antagonist; CNS stimulant	Primary appetite suppression
Chlorogenic acids	Improve glucose metabolism and insulin sensitivity	Reduces hunger associated with glucose fluctuations
Trigonelline	Neuroprotective and glucose-regulating properties	Supports metabolic adaptation
Melanoidins	Antioxidant and prebiotic compounds	Supports gut health and satiety
Polyphenols	Anti-inflammatory and antioxidant activity	Supports long-term metabolic health

Among these compounds, caffeine is responsible for the immediate reduction in hunger perception, while chlorogenic acids, trigonelline, melanoidins, and polyphenols complement caffeine by improving metabolic stability and supporting the body's adaptation to fasting.

Physiological Mechanisms Through Which Black Coffee May Suppress Hunger

The appetite-suppressing effect of black coffee does not result from a single biological mechanism. Instead, coffee influences multiple neurological, endocrine, and metabolic pathways that collectively reduce the perception of hunger while improving the body's ability to utilize stored energy.

Caffeine and Adenosine Receptor Blockade

Caffeine is rapidly absorbed from the gastrointestinal tract and readily crosses the blood-brain barrier. It competitively blocks adenosine A_1 and A_2A receptors, preventing the fatigue and reduced neuronal activity normally associated with adenosine accumulation. As a result, alertness improves, fatigue decreases, and the conscious perception of hunger is reduced, making fasting easier to tolerate.

Dopamine and Norepinephrine

By blocking adenosine receptors, caffeine indirectly enhances dopamine and norepinephrine activity within the brain. These neurotransmitters improve attention, motivation, mood, and mental performance while reducing food cravings and the desire to snack. Increased sympathetic nervous system activity also encourages the body to utilize stored energy rather than seeking external fuel.

Appetite-Regulating Hormones

Coffee may modestly influence appetite-regulating hormones such as ghrelin, GLP-1, peptide YY (PYY), and cholecystokinin (CCK). Although findings vary across studies, the combined influence of these hormonal pathways may contribute to prolonged satiety. Importantly, many individuals report reduced hunger even when measurable hormonal changes are small, suggesting that central nervous system mechanisms play the dominant role.

Lipolysis and Fat Utilization

Caffeine stimulates the release of epinephrine and norepinephrine, activating hormone-sensitive lipase within adipose tissue. This promotes the breakdown of stored triglycerides into free fatty acids that are subsequently utilized by skeletal muscle and the liver. Improved access to endogenous fat stores reduces dependence on glucose and supports prolonged fasting.

Chlorogenic Acids

Chlorogenic acids are the principal polyphenols present in coffee. They improve insulin sensitivity, reduce hepatic glucose production, and slow intestinal glucose absorption. By minimizing fluctuations in blood glucose and insulin concentrations, chlorogenic acids may reduce reactive hunger and facilitate the body's transition into fasting metabolism.

Trigonelline

Trigonelline is a naturally occurring alkaloid with antioxidant, neuroprotective, and glucose-regulating properties. Although it is not a direct appetite suppressant, it supports neuronal function and metabolic stability, complementing the actions of caffeine during fasting.

Melanoidins and Polyphenols

Melanoidins are formed during coffee roasting and possess antioxidant and prebiotic properties. Together with other coffee polyphenols, they support a healthy gut microbiome and may indirectly influence appetite regulation through gut–brain communication. While their contribution to acute hunger suppression is modest, they enhance the long-term metabolic benefits associated with regular coffee consumption.

Integrated Physiological Effect

Collectively, these mechanisms demonstrate that black coffee may reduce hunger through coordinated neurological, hormonal, and metabolic actions rather than through a single appetite-regulating pathway. Caffeine provides the immediate reduction in hunger perception, while chlorogenic acids, trigonelline, melanoidins, and polyphenols support metabolic flexibility, glucose regulation, and gastrointestinal health. Together, these complementary actions help explain why many individuals find fasting more comfortable after consuming black coffee.

Community-Based Observations

While randomized controlled trials provide the highest level of scientific evidence, real-world observations offer valuable insights into how an intervention performs in routine practice. To complement the published literature, two anonymous community-based observational surveys were conducted among individuals who regularly practice intermittent and prolonged fasting.

The surveys explored three practical questions:

- Does black coffee help suppress hunger during fasting?
- How long do individuals fast each day?
- How much black coffee is typically consumed while fasting?

Together, these observations provide practical insight into the role of black coffee as an adjunct to prolonged fasting.

Survey 1: Perceived Hunger Suppression

Participants were asked:

"Does black coffee help suppress hunger while fasting?"

Table 2. Perceived Hunger Suppression During Fasting (n = 18)

Response	Number	Percentage
Yes, always	12	66.7%
Yes, for a few hours	1	5.6%
Mainly psychological satisfaction	5	27.8%
No effect	0	0%

Among the 18 respondents, 72.3% (13/18) reported that black coffee noticeably reduced hunger during fasting. Most participants described the effect as consistent, while a smaller proportion experienced hunger suppression lasting several hours.

Approximately 27.8% believed that the primary benefit was psychological, describing coffee as providing comfort or satisfaction rather than directly suppressing physiological hunger. Importantly, no participant reported that black coffee was completely ineffective.

Survey 2: Fasting Duration and Coffee Consumption

To better understand fasting practices, participants were also asked about their average daily fasting dura-

tion and black coffee intake.

Table 3. Daily Fasting Duration (n = 13)

Daily fasting duration	Number	Percentage
20–23 hours	9	69.2%
23 hours	1	7.7%
16–18 hours	3	23.1%

The findings demonstrate that nearly 70% of respondents routinely practiced prolonged fasting between 20 and 23 hours each day, indicating that most participants were experienced fasting practitioners.

Table 4. Daily Black Coffee Consumption (n = 11)

Cups of black coffee/day	Number	Percentage
1 cup	3	27.3%
2 cups	3	27.3%
3 cups	5	45.4%
≥4 cups	0	0%

The most common intake was three cups of black coffee per day (45.4%), followed by one and two cups daily (27.3% each). None of the respondents reported consuming more than three cups per day, suggesting that the perceived appetite-suppressing effects were achieved with moderate rather than excessive caffeine intake.

Discussion

The findings presented in this review suggest that black coffee may serve as a practical adjunct to fasting through coordinated neurological, hormonal, and metabolic mechanisms. Caffeine appears to be the principal mediator of acute appetite suppression by antagonizing adenosine receptors, enhancing dopamine and norepinephrine activity, and reducing fatigue. These responses improve alertness and decrease the perception of hunger, making fasting more comfortable.

In addition to caffeine, coffee contains several biologically active compounds that complement these effects. Chlorogenic acids improve insulin sensitivity and glucose regulation, helping to minimize fluctuations in blood glucose that can trigger hunger. Trigonelline supports neuronal and metabolic function, while melanoidins and polyphenols contribute antioxidant and prebiotic properties that promote gut health and may indirectly influence appetite regulation through the gut–brain axis.

The community-based observations align closely with these physiological findings. More than 70% of respondents experienced meaningful hunger suppression while practicing prolonged fasting, and most maintained fasting periods of 20–23 hours while consuming only one to three cups of black coffee daily.

Although observational, these findings suggest that moderate black coffee consumption may improve fasting adherence in many individuals.

Interestingly, nearly one-third of respondents perceived the benefits to be primarily psychological. This does not contradict the physiological evidence. Hunger is influenced by both homeostatic mechanisms, which regulate energy balance, and hedonic mechanisms, which regulate food reward, habits, and emotions. The aroma, warmth, bitterness, and ritual of drinking coffee likely work alongside caffeine's neurological effects to reduce the overall desire to eat.

Clinical Implications

Based on current evidence, unsweetened black coffee appears to be a useful adjunct for individuals practicing intermittent or prolonged fasting.

The following practical recommendations may be considered:

- Consume plain black coffee without sugar, milk, cream, or caloric sweeteners.
- Moderate intake of 1–3 cups daily appears sufficient for most healthy adults.
- Coffee may be most beneficial during periods of peak hunger, particularly in the morning or early afternoon.
- Adequate hydration should always accompany fasting.

Key Take-Home Messages

- Hunger is one of the principal barriers to successful fasting.
- Black coffee may reduce hunger primarily through caffeine-mediated antagonism of adenosine receptors.
- Dopamine and norepinephrine improve mental alertness and reduce food cravings.
- Chlorogenic acids contribute to improved glucose regulation and metabolic stability.
- Trigonelline, melanoidins, and polyphenols provide complementary metabolic, antioxidant, and gut health benefits.
- 72.3% of survey participants reported meaningful hunger suppression while fasting.
- Nearly 70% successfully maintained fasting periods of 20–23 hours, with 45.4% consuming only three cups of black coffee daily, suggesting that moderate coffee intake may support prolonged fasting.

Conclusion

Hunger remains one of the greatest challenges limiting adherence to intermittent and prolonged fasting. Current evidence suggests that black coffee may reduce the perception of hunger through coordinated neurological, metabolic, and endocrine mechanisms rather than through a single appetite-suppressing pathway. Caffeine appears to be the principal mediator of acute hunger suppression, while chlorogenic acids, trigonelline, melanoidins, and other coffee phytochemicals provide complementary support by improving glucose regulation, metabolic flexibility, and gastrointestinal health.

The community-based observations presented in this review complement the published scientific literature. Most participants practicing prolonged fasting reported meaningful hunger suppression while consuming only moderate amounts of black coffee, suggesting that coffee may improve fasting adherence without requiring excessive caffeine intake.

Although larger randomized clinical trials are needed to establish optimal dose, timing, and individual variability, the available evidence supports unsweetened black coffee as a practical, inexpensive, and

metabolically compatible adjunct to intermittent and prolonged fasting. When combined with an appropriately designed fasting protocol, moderate black coffee consumption may help many individuals sustain fasting more comfortably while preserving its metabolic benefits.

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