International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Intermittent Fasting as a Primary Neurocognitive and Longevity Intervention: The Supportive Nootropic and Antioxidant Role of Coffee

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ABSTRACT
Intermittent fasting (IF) is increasingly recognized as a foundational metabolic intervention with significant effects on insulin sensitivity, mitochondrial efficiency, neurocognitive function, and longevity. A central mechanism underlying fasting-induced cognitive enhancement involves pathways associated with Brain-Derived Neurotrophic Factor (BDNF), a neurotrophin essential for synaptic plasticity, learning, memory, and neuronal survival.

This paper positions intermittent fasting as the primary driver of cognitive and longevity benefits, while coffee is examined as a fasting-compatible nootropic and antioxidant adjunct rather than an independent intervention. Fasting-induced metabolic switching and ketone body production are associated with neuroadaptive pathways known to influence neuronal efficiency and resilience. Coffee, when consumed without caloric additives, does not disrupt fasting physiology and may support alertness, cognitive endurance, and antioxidant defense.

Observational poll findings indicate improvements in focus, attention, mood stability, and reduced mental fatigue when fasting is combined with moderate coffee intake. These observations align with established BDNF-associated effects on cognition and mood regulation. Together, intermittent fasting and moderate coffee consumption may represent a synergistic, sustainable strategy for supporting brain health, cognitive resilience, and healthy aging.

INTRODUCTION

Intermittent fasting represents a metabolic state characterized by reduced insulin signaling, enhanced lipolysis, ketone body production, and activation of cellular stress-response pathways. These adaptations have been associated with improvements in metabolic health, reduced inflammation, enhanced stress resilience, and increased lifespan.

Beyond metabolic effects, intermittent fasting has emerged as a potent neurocognitive intervention. One of the most significant neurobiological mechanisms linked to fasting is the modulation of Brain-Derived Neurotrophic Factor (BDNF). BDNF plays a critical role in synaptic plasticity, neurogenesis, learning, memory consolidation, and mood regulation. Declining BDNF levels are associated with cognitive aging, depression, and neurodegenerative disorders.

Coffee consumption is commonly practiced during fasting windows. When consumed in a non-caloric form, coffee does not interrupt fasting physiology and may act as a mild nootropic agent, enhancing attention, alertness, and cognitive endurance. Additionally, coffee is a major dietary source of antioxidants that may reduce oxidative stress and support neuronal integrity.

NEUROCOGNITIVE MECHANISMS OF INTERMITTENT FASTING

Intermittent fasting induces a metabolic shift from glucose dependence toward fatty acid oxidation and ketone utilization. The ketone body beta-hydroxybutyrate functions not only as an energy substrate but also as a signaling molecule involved in neuronal adaptation. Experimental evidence suggests that beta-hydroxybutyrate influences transcriptional pathways linked to neuroplasticity and neuronal resilience.
Fasting also activates key signaling pathways such as AMPK, SIRT1, and CREB, which are involved in mitochondrial biogenesis, stress resistance, and synaptic function. Collectively, these adaptations support neuronal efficiency, cognitive flexibility, and resilience to age-related cognitive decline.

COFFEE AS A FASTING-COMPATIBLE NOOTROPIC AND ANTIOXIDANT

Coffee contains caffeine and several bioactive polyphenols, including chlorogenic acids, melanoidins, and trigonelline. During fasting, coffee may contribute to cognitive performance through enhanced alertness, antioxidant support, and improved fasting adherence.

OBSERVATIONAL FINDINGS

Coffee Intake Distribution:
1 cup/day ~13%
2 cups/day ~27%
3 cups/day ~53%
4–6 cups/day ~13%
Perceived Benefits:
Increased focus and mental clarity ~33–35%
Improved attention and cognitive endurance ~30%
Improved mood stability ~23–25%
Reduced mental fatigue ~20%
Reduced brain fog ~17–18%
These observations align with established BDNF-associated effects on attention, mood regulation, and cognitive efficiency.

DISCUSSION

The cognitive and mood-related benefits observed appear to be primarily driven by the fasting state. Coffee functions as a supportive nootropic adjunct, enhancing alertness and reducing perceived fatigue without interfering with fasting physiology.

CONCLUSION

Intermittent fasting is a primary neurocognitive and longevity intervention. Coffee, when consumed in moderation and without caloric additives, acts as a supportive nootropic and antioxidant adjunct. Together, they represent a sustainable approach to brain health and healthy aging.

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