

Anti-Inflammatory Potential of Ginger and Turmeric: A Comprehensive Review

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Abstract: Chronic inflammation is a key contributor to the pathogenesis of various diseases, including arthritis, metabolic disorders, neurodegenerative conditions, and cancer. Ginger (*Zingiber officinale*) and turmeric (*Curcuma longa*) have been widely studied for their potent anti-inflammatory properties, attributed to their bioactive compounds such as gingerols, shogaols, curcuminoids, and turmerones. These phytochemicals exert anti-inflammatory effects by modulating cytokine production, inhibiting NF- κ B signaling, and reducing oxidative stress. Preclinical and clinical studies support their efficacy in inflammatory conditions, but their poor bioavailability remains a challenge. Recent advancements in nanotechnology-based delivery systems and synergistic combinations (e.g., with piperine or lipids) have shown promise in enhancing their therapeutic potential. This review provides a comprehensive analysis of the mechanisms of action, pharmacological evidence, clinical applications, and future research directions for ginger and turmeric in inflammation management. While promising, further large-scale clinical trials and formulation optimizations are necessary to establish their role as effective anti-inflammatory agents in modern medicine.

Keywords: Ginger (*Zingiber officinale*), Turmeric (*Curcuma longa*), Anti-inflammatory, Curcumin, Gingerol, NF- κ B pathway, Cytokine modulation, Oxidative stress, Bioavailability, Chronic inflammation

