Agarwood's Role in Inflammatory-related Conditions: A Systematic Review of Animal Models

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Abstract

Agarwood (Aquilaria spp.) is a resinous wood traditionally used in various medicinal systems across Asia for treating inflammation-related ailments. Despite its longstanding ethnopharmacological use, scientific validation of its anti-inflammatory effects remains fragmented. This scoping review aims to systematically evaluate and synthesize current evidence from animal studies investigating the anti-inflammatory potential of agarwood. A comprehensive literature search was conducted using PubMed, Scopus, and Web of Science. Inclusion criteria focused on original animal studies assessing the anti-inflammatory effects of agarwood extracts, essential oils, or derivatives. Data on study design, animal models, agarwood species, treatment dosage, duration, biomarkers, and outcomes were extracted and summarized narratively due to methodological heterogeneity. Eight studies met inclusion criteria, involving models of inflammation-related conditions such as pain,

neuroinflammation, gastrointestinal injury, cancer, and toxicity. Agarwood treatment consistently reduced pro-inflammatory cytokines (e.g., IL-1β, IL-6, TNF-α), modulated oxidative stress markers (e.g., NO, SOD, GSH), and regulated signalling pathways including NF-κB, p38 MAPK, and Nrf2–ARE. Notably, improvements were observed in behavioural and histological outcomes across models, with evidence of dose-dependent effects in several studies. In conclusion, preclinical evidence supports agarwood's broad-spectrum anti-inflammatory and antioxidant properties across multiple organ systems. These findings provide mechanistic insights and a scientific basis for its traditional use. However, variability in species, extraction methods, and study designs highlights the need for standardised protocols and clinical validation to advance agarwood as a potential therapeutic agent.

Author keywords

agarwood; animal model; anti-inflammation; Aquilaria; inflammatory; oxidative

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