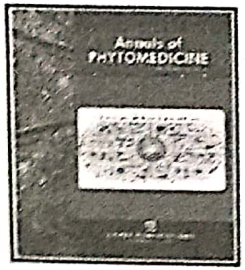
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Phytochemical profiles and pharmacological activities of mulberry (*Morus* species): Insights from experimental and clinical research

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Abstract

Mulberry (*Morus* species) is increasingly attracting scientific interest because of its rich phytochemical profile and a variety of pharmacological actions, which can help explain its historical use in treating metabolic and inflammatory diseases. This review critically and extensively summarises the phytochemical profiles, structure-activity relationships (SAR) and pharmacological actions of key *Morus* species, incorporating both experimental and clinical evidence. Among the important bioactive components, 1-deoxynojirimycin (DNJ), flavonoids, phenolic acids, prenylated compounds, and polysaccharides are discussed in terms of their chemical properties and mechanisms of action. Preclinical evidence indicates strong antidiabetic, antioxidant, anti-inflammatory, antimicrobial and anticancer effects. DNJ-mediated α-glucosidase inhibition and activation of the AMPK pathway are major processes in glycaemic regulation. There is also clinical evidence of reduced postprandial glucose levels (20-30%), but these results are limited by small sample sizes and unstandardized formulations. Notably, this review highlights synergistic effects among various phytochemicals and the drawbacks of reductionist research. Phytochemical variability, poor bioavailability and translational gaps are identified as key challenges and are addressed critically. The views of the future emphasise the importance of standardised extracts, sophisticated delivery systems and large-scale clinical trials. Overall, *Morus* species provide a potentially significant but underexplored source of phytotherapeutics and functional foods.

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