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Design, Synthesis, and Antimicrobial Evaluation of Novel Schiff Bases Derived from Thymol

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Abstract: *Schiff bases, a significant class of organic compounds, are synthesized through the reaction of a primary amine with an aldehyde or ketone under specific conditions. In this study, we report the synthesis of novel Schiff bases derived from thymol (2-Isopropyl-5-methylphenol). The synthesis began with the esterification of thymol to produce (2-Isopropyl-5-methylphenoxy)-acetic acid ethyl ester (1), followed by hydrazination to yield (2-Isopropyl-5-methylphenoxy)-acetic acid hydrazide (2). The hydrazide (2) was then treated with various aromatic aldehydes to synthesize a series of Schiff bases (3A-J). The chemical structures of these compounds were elucidated using infrared (IR) spectroscopy, proton nuclear magnetic resonance (1H-NMR), and mass spectrometry. The synthesized Schiff bases were evaluated for their antibacterial and antifungal activities using standard screening methods. The results indicated that all synthesized compounds exhibited varying degrees of antimicrobial activity. Among the series, compound 3C showed the highest antibacterial and antifungal potency, suggesting it could be a promising candidate for further development. This study highlights the potential of Schiff bases as bioactive compounds with broad-spectrum antimicrobial properties. The structure-activity relationship (SAR) suggests that the presence of specific substituents on the aromatic aldehyde moiety could enhance biological activity. Further investigation into the mechanisms of action and optimization of these Schiff bases could contribute to the development of novel antimicrobial agents.*

Keywords: Schiff bases, thymol, synthesis, antibacterial activity, antifungal activity, aromatic aldehydes, IR spectroscopy, 1H-NMR