

Electrochemical and Spectroscopic Studies on the Interaction Modes of Calf Thymus DNA with Antibacterial Schiff Bases obtained from Substituted Salicylaldehydes and Sulfamethizole

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In this study, two Schiff bases have been prepared from the condensation of sulfamethizole (SMTZ) with 3-methoxy and 5-nitro derivatives of salicylaldehyde. These compounds have been characterized by elemental analysis, FT-IR, UV-Vis, ¹H-NMR, melting point and X-ray measurements. The *in vitro* anti-bacterial properties of these Schiff bases against various microorganisms (*E. coli* ATCC 25922, *S. aureus* ATCC 25923 and trimethoprim sulfamethoxazole resistant clinical isolate *E. coli* (SXT-R *E. coli*)) have been also investigated. The Schiff base with -NO₂ (Schiff base B, MIC: 0.5 µg mL⁻¹) shows stronger antibacterial activity than SMTZ, other reactive compounds and the Schiff base with -OCH₃ (Schiff base A) against *S. aureus* ATCC 25923. The interaction of the Schiff bases with calf thymus DNA (CT-DNA) in the physiological pH (7.4) was studied by electrochemical and spectroscopic methods. The electrochemical and spectroscopic data revealed that Schiff bases bind to CT-DNA in 1:1 stoichiometry. The binding affinity followed the order Schiff base A > Schiff base B. It has been found that the binding affinity orders determined from different methods are in good agreement with each other. The obtained results indicate that Schiff base A binds to CT-DNA by means of electrostatic forces; however, Schiff base B could interact with CT-DNA molecule by intercalative mode.

Keywords: Antimicrobial activity, DNA interaction, Schiff bases, Substituted salicylaldehydes, Sulfamethizole.

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