ABSTRACT PRESENTATION:

Piperazine is a widely used heterocyclic compound in the development of biologically active molecules, valued for its favorable physicochemical properties, structural versatility, and ease of synthesis. Piperazine-containing molecules exhibit a broad spectrum of biological activities, including antibacterial, antifungal, antiviral, and anticancer effects. This study aimed to design, synthesize, and evaluate a novel series of piperazine derivatives to identify potential antiviral and anticancer agents.

We retained the piperazine ring as the core structure, modifying the N-1 position with urea and sulphonamide groups and the N-4 position with acyl groups. Antiviral efficacy was assessed against Zika virus, Dengue virus, and SARS-CoV-2, targeting the structural similarities in their viral proteases. Additionally, the compounds were tested against human breast cancer cell lines (MDA-MB468 and MCF7). Three compounds demonstrated a promising balance of efficacy and selectivity, showing antiproliferative effects on cancer cells without significantly affecting normal cells.

These results underscore the potential of piperazine derivatives in developing new antiviral and anticancer therapies.