

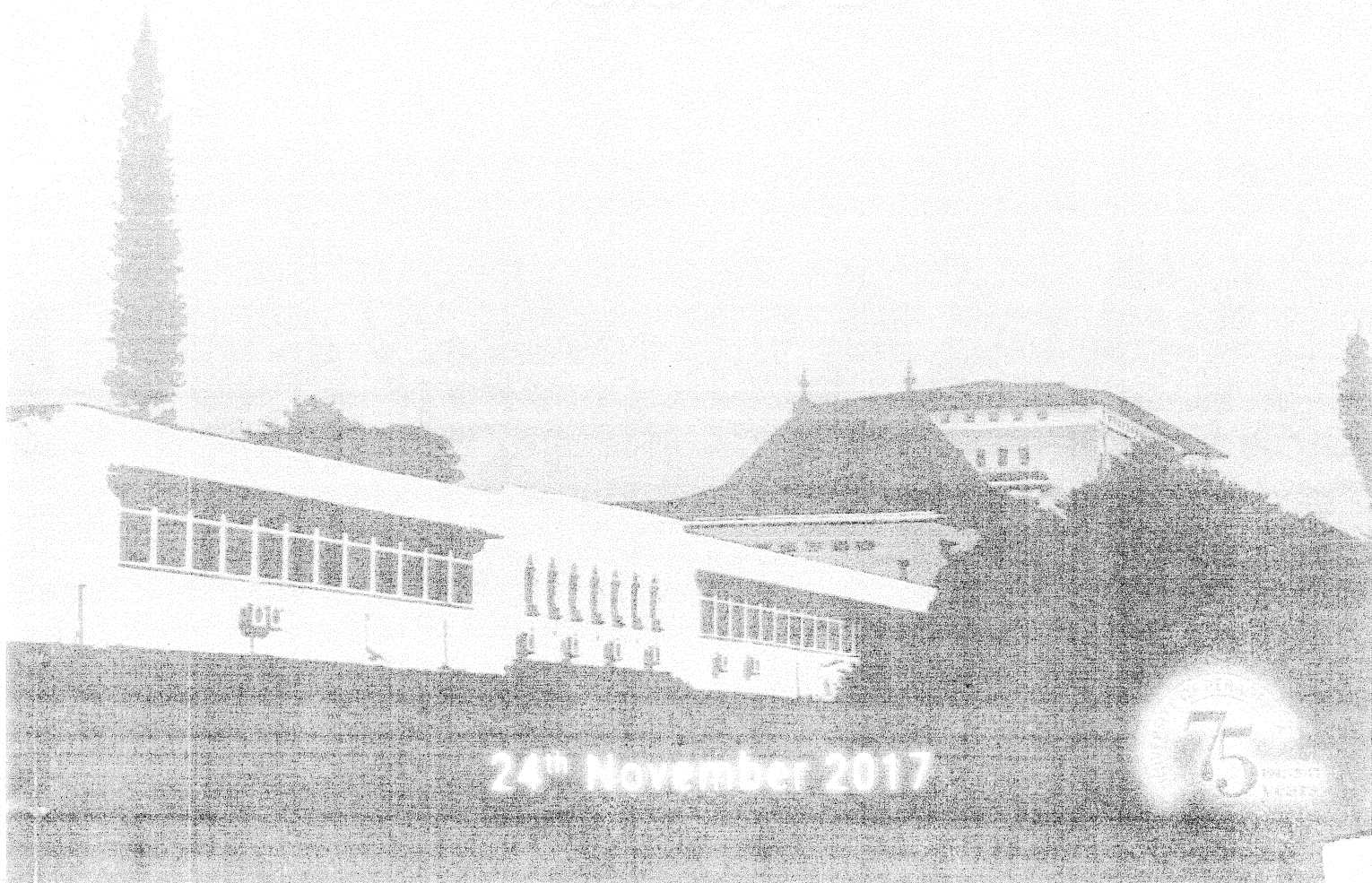
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## Potential Antibacterial and Antibiofilm Activity of Curcumin Encapsulated Layered Double Hydroxides against *S. aureus* and *E. faecalis*

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**Introduction:** Curcumin (1, 7-bis (4-hydroxy 3-methoxy phenyl)-1, 6-heptadiene-3, 5-Dione), a natural polyphenolic pigment from *Curcuma longa* (turmeric) rhizomes, is a well-known antimicrobial agent. Layered double hydroxide (LDH) nano composite is a class of inorganic material with its unique structure of an outer positively charged metal hydroxide sheets and inner interlayer anions hydrated with water molecules aiding in its uptake and cellular penetration. This study aimed to determine the effect of curcuminoid intercalated Mg/Al Layered Double Hydroxide (curcumin-LDH) Nano hybrid on planktonic and biofilm bacterial communities. Findings of the study will direct modern research towards the novel approaches in wound care and other superficial biofilm infection management.

**Materials and Methods:** The antibacterial effect of curcumin-LDH composite was investigated against two bacterial species, *S. aureus* and *E. faecalis* by agar well diffusion method. Minimum inhibitory concentrations (MIC) of planktonic bacteria in Brain Heart Infusion (BHI) broth medium were determined using broth microdilution method. The MBIC<sub>50</sub> and minimum killing time for 48 hours matured single and mixed species biofilms were determined by MTT (3-(4,5-Dimethylthiazol-2-Yl)-2,5-Diphenyltetrazolium Bromide) assay to

investigate the potential anti-biofilm effect of curcumin-LDH composite. Scanning Electron Microscopy (SEM) was used to determine the post-exposure architectural properties of biofilms.

**Results:** The zone of inhibition given by curcumin-LDH revealed the inhibitory effect for test bacterial species while *E. faecalis* expressed the maximum sensitivity. The MIC values were 0.01 g/ml for *S. aureus* and 0.025 g/ml for *E. faecalis*. The 48 hours matured biofilms and mixed species were killed by curcumin-LDH with 0.01 g/ml of 50% MIC. The minimum time to achieve 50% MIC was 3 hours. The SEM images showed a significant reduction of biofilm cell density and amount of extracellular polymeric substances for all biofilms in the presence of Curcumin-LDH.

**Discussion and Conclusion:** The curcumin intercalated LDHs has a potential antibacterial activity against *S. aureus* and *E. faecalis*. Further, there is a maximum antibiofilm activity against their matured single and mixed species biofilms within 3 hours of the treatment.