

# Bangladesh Journal of Pharmacology

Volume: 12; Number 3; Year 2017



Cite this article as: Gopikrishnan V, Radhakrishnan M, Pazhanimurugan R, Shanmugasundaram T, Balagurunathan R. Antimicrobial, antitubercular and antiproliferative activities of quercetin isolated from the marine *Streptomyces fradiae*. Bangladesh J Pharmacol. 2017; 12: 333-34.

## Letter to the Editor

### Antimicrobial, antitubercular and anti-proliferative activities of quercetin isolated from the marine *Streptomyces fradiae*

Sir,

During the course of actinobacterial bioprospecting programme, we isolated a quercetin molecule from marine *Streptomyces fradiae* PE7. The purified quercetin showed promising anti-biofouling activity at *in vitro* as well as in field level (Gopikrishnan et al., 2016). Here we described the anti-microbial, anti TB and anti-proliferative activity of quercetin at *in vitro* level.

Quercetin from the cultures of *S. fradiae* PE7 was produced by agar surface fermentation (Radhakrishnan et al., 2014) and isolated through TLC-based bioassay guided fractionation (Singh et al., 2014). The MIC of quercetin molecule was determined by microbroth dilution method against *Staphylococcus aureus* MTCC96, *Bacillus subtilis* MTCC441, methicillin resistant *S. aureus*, extended spectrum beta lactamase producing strains of *Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* at concentrations ranged between 100 and 1 µg/mL (Ignacimuthu et al., 2016). The MIC of quercetin

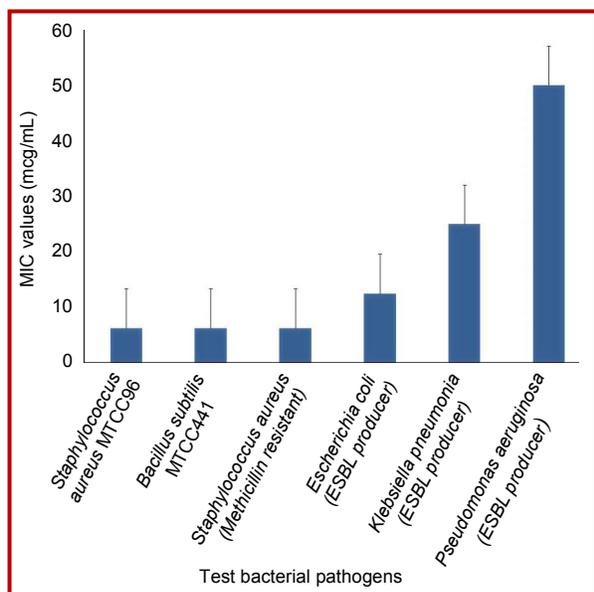


Figure 1: Anti-microbial activity of quercetin against standard and MDR microbial pathogens

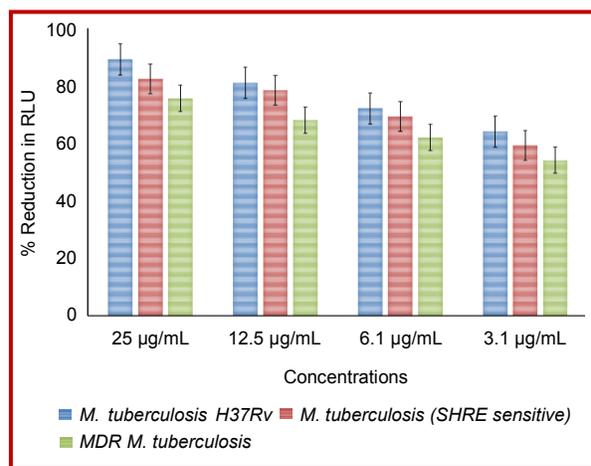


Figure 2: Anti-tuberculosis activity of quercetin standard and clinical *M. tuberculosis* strains

molecule against *M. tuberculosis* strains by adopting luciferase reporter phage (LRP) assay at 100 to <1 µg/mL. Test pathogens used in this study include standard strain *M. tuberculosis* H37Rv, clinical drug sensitive *M. tuberculosis* and multi drug resistant (MDR) *M. tuberculosis* strains (Sivakumar et al., 2007). Anti-proliferative activity of quercetin was tested on HeLa (cervical cancer) and A549 (lung cancer) cell lines by adopting MTT assay (Karupiah et al., 2013).

Quercetin showed broad-spectrum antibacterial activity against bacterial pathogens. Quercetin inhibited the gram positive bacteria at the lowest of 6.3 µg/mL, whereas the MIC value for gram negative bacteria was ranged between 12.5 and 50.0 µg/mL (Figure 1). In LRP assay quercetin showed more than 65% reduction against all the three *M. tuberculosis* strains at 3.1 µg/mL concentrations (Figure 2). Quercetin exhibited very high and potent inhibition in both the tested cell lines. Quercetin showed the LC<sub>50</sub> range 250 µg/mL and 1.5 µg/mL concentration in the HeLa and A549 cell lines, respectively (Figure 3).

In the literature, there are no notable reports on the isolation of quercetin from actinobacteria particularly from marine origin. Findings of the present study revealed that the quercetin isolated from marine *S. fradiae* will be a promising candidate for anti-microbial, anti-tubercular and anti-cancer drug development, in addition to its anti-biofouling activity.





Figure 3: Anti-proliferative activity of quercetin against HeLa and A549 cell lines

The authors are thankful to the Vice-Chancellor and the Registrar of the Periyar University and the management of Sathyabama University for the research facilities provided. The authors are thankful to DST SERB ECR File No. ECR/2016/000438 for financial assistance through the major research project.

**Venugopal Gopikrishnan<sup>1</sup>, Manikkam Radhakrishnan<sup>1</sup>, Raasaiyah Pazhanimurugan<sup>2</sup>, Thangavel Shanmugasundaram<sup>3</sup> and Ramasamy Balagurunathan<sup>2</sup>**

<sup>1</sup>Centre for Drug Discovery and Development, Sathyabama University, Jeppiar Nagar, Chennai 600 119, Tamil Nadu, India; <sup>2</sup>Actinobacterial Research Laboratory, Department of Microbiology, Periyar University, Periyar Palkalai Nagar, Salem 636 011, Tamil Nadu, India; <sup>3</sup>DRDO-BU Centre for Life Sciences, Bharathiar University Campus, Coimbatore 641 046, Tamil Nadu, India.

Corresponding author:  
email: actinobalaguru@gmail.com

## References

Devadass BJ, Paulraj MG, Ignacimuthu S, Theoder PAS, Dhahi NAA. Anti-microbial activity of soil actinomycetes isolated from Western Ghats in Tamil Nadu, India. *J Bacteriol Mycol Open Access*. 2016; 3: 1-11.

Gopikrishnan V, Radhakrishnan M, Pazhanimurugan R, Shanmugasundaram T, Balagurunathan R. Quercetin from marine derived *Streptomyces fradiae* PE7: Taxonomy, fermentation, anti-fouling activity and characterization. *J Environ Sci Pollut Res*. 2016; 23: 13832-42.

Karuppiyah V, Aarthi C, Sivakumar K, Kannan L. Statistical optimization and anti-cancer activity of a red pigment isolated from *Streptomyces* sp. PM4. *Asian Pac J Trop Biomed*. 2013; 3: 650-56.

Radhakrishnan M, Anuradha Raman V, Bharathi S, Balagurunathan R, Kumar V. Anti-MRSA and anti-tubercular activity of phenoxazinone containing molecule from Borra Caves *Streptomyces* Sp. BCA1. *Int J Pharm Sci Res*. 2014; 5: 5342-48.

Singh LS, Sharma H, Talukdar NC. Production of potent antimicrobial agent by actinomycete, *Streptomyces sannanensis* strain SU118 isolated from phoomdi in Loktak Lake of Manipur, India. *BMC Microbiol*. 2014; 14: 278.

Sivakumar PM, Seenivasan SP, Kumar V, Doble M. Synthesis, antimycobacterial activity evaluation and QSAR studies of chalcone derivatives. *Bioorg Med Chem Lett*. 2007; 17: 1695-700.