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SYNERGISTIC AND ADDITIVE ANTIMICROBIAL ACTIVITIES OF CURCUMIN, MANUKA HONEY AND WHEY PROTEINS

PRABHU BALAN[1,2,5], GORAKH MAL[3,4*], SHANTANU DAS[1] and HARJINDER SINGH[1]

[1]Riddet Institute, Massey University, Palmerston North, New Zealand
[2]Food Assurance and Meat Quality, AgResearch Ltd, Ruakura Research Centre, Hamilton, New Zealand
[3]Biochemistry Laboratory, Indian Veterinary Research Institute, Regional Station, Palampur, HP 176061, India
[4]Biochemistry Section, National Research Centre on Camel (ICAR), PB. No.07, Bikaner, Rajasthan 334001, India

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[5]Corresponding author.
TEL:+64 7 838 5319;
FAX:+64 7 838 5625;
EMAIL: Prabhu.Balan@agresearch.co.nz

*This author contributed equally to this work.

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ABSTRACT

Antimicrobial activity of curcumin, Manuka honey (MH, *Leptospermum scoparium*) and Whey protein isolate (WPI) and their synergistic and/or additive effects were tested against various Gram positive and negative bacterial strains for development of functional foods. Curcumin and MH each displayed 100% inhibition against all the tested strains of bacteria. The minimum inhibitory concentration values of curcumin and honey against different strains ranged from 100 to 250 μg/mL and 5–20% respectively. Except *Bacillus subtilis*, all other tested pathogens were completely inhibited by the mixture of subinhibitory concentrations of curcumin and MH. At these levels, the mixture of MH and WPI was more effective against *Streptococcus pyogenes*, *Shigella soneii* and *Proteus vulgaris*. Mixture of curcumin and WPI completely inhibited the growth of *Listeria monocytogenes* and *Staphylococcus aureus*. Combinations of curcumin, MH and WPI had additive and/or synergistic antimicrobial activities and various combinations could be used in food formulations and pharmacological applications.

PRACTICAL APPLICATIONS

Turmeric, honey and whey proteins are widely consumed all over the world, and have been associated with multiple health benefits. Synergistic and/or additive antimicrobial effects of curcumin, Manuka honey (MH) and whey protein isolate (WPI) were tested against various Gram positive and negative bacterial strains for development of functional foods. Curcumin and MH each showed complete inhibition against all the tested bacterial strains. These *in vitro* investigations demonstrate that combinations of curcumin, MH and WPI have potent antibacterial activities. To our knowledge, this is the first of such outcomes to be reported. The implication of the results of this study is that Curcumin, MH and WPI in various combinations could be used as a food supplement and also in pharmacological applications.

INTRODUCTION

Curcumin (diferuloyl methane), a yellow lipid-soluble polyphenolic dietary compound, found in the rhizome of turmeric is widely used as a coloring agent in foods (Aggarwal and Harikumar 2009). Because of its numerous health benefits, researchers have shown great interest in curcumin (Gupta *et al.* 2012). A wide range of pharmacological attributes of curcumin, such as antioxidative, anti-inflammatory, anticancer, antimicrobial, wound-healing and hepatoprotective properties, have been well documented (Nagabhushan and Bhide 1992; Aggarwal and Harikumar 2009; Frenkel *et al.* 2013). Biological activities of curcumin depend on its bioavailability and metabolism. Preclinical studies of