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# ***In Vitro* Growth-Inhibitory Activity of Liquid and Vapour Phases of Essential Oils from Spice Mixtures against Food-borne Bacterial Pathogens <sup>†</sup>**

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Foodborne diseases are global public health concerns; therefore, food protection against bacterial spoilage and contamination is vital in the food sector [1]. Since spice essential oils (EOs) are necessary flavouring food ingredients possessing antimicrobial activity in the vapour phase, they have been suggested as active agents in antimicrobial atmosphere packaging, such as stickers, absorbent pads, and emission sachets. Although the antibacterial properties of vapours of EOs of individual spices are very well-known [2], the growth-inhibitory effects of their mixtures, traditionally used in cuisines worldwide, have not been fully explored yet.

The study aimed to determine minimum inhibitory concentrations (MICs) of EOs hydrodistilled from spice mixtures (Tunisia Bharat and Mulling spice) and their ingredients (*Cinnamomum cassia*, *Laurus nobilis*, *Myristica fragrans*, *Pimenta dioica*, *Piper nigrum*, *Rosa × damascena*, and *Syzygium aromaticum*) against foodborne bacterial pathogens (*Bacillus cereus*, *Enterococcus faecium*, *Listeria monocytogenes*, *Salmonella enterica* Typhimurium and *Streptococcus bovis*) in liquid and vapour phase using broth-microdilution volatilization method in vitro [3].

Tunisia Bharat and Mulling spice EOs produced the most potent antibacterial effect (MIC = 256 µg/mL) in liquid and vapour phases against *B. cereus* as well as against *S. bovis* and *L. monocytogenes*, respectively. In addition, EO of *C. cassia*, a primary ingredient of Tunisia Bharat and Mulling spice, showed an excellent inhibitory effect (128–256 µg/mL) against *Bacillus cereus* in both phases, which as per our previous findings (≥ 256 µg/mL) [4]. These findings suggest that EO from Tunisia Bharat is a promising source of volatile antibacterial agents that can be used for further research and development of new products in natural food preservatives.

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