



Qualitative and quantitative biological studies of three chemotypes of basil essential oils grown in Malaysia against *E.coli*, *S.aureus* and *P. aeruginosa*

Zuriah Ismail*, Azhari Hamid Nour and Salah Elhoussein

Faculty of Industrial Sciences and Technology, Universiti Malaysia Pahang, 26300 Lebuhraya Tun Razak, Gambang, Pahang, Malaysia

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ABSTRACT

Different accessions of basil introduced to Malaysia as seeds and cultivated at University Malaysia Pahang (UMP) farm and their essential oils extracted by steam distillation. Three chemotypes of these essential oils with estragole, linalool and methyl cinnamate as dominant compounds were evaluated against three facultative anaerobic bacteria obtained from the National Pharmaceutical Control Bureau, Ministry of Health Malaysia: namely, *Escherichia coli*, *Pseudomonas aeruginosa* (Gram-negative) and *Staphylococcus aureus* (Gram-positive) by qualitative and quantitative method. Different concentration ranged from 10 µL/mL to 1000 µL/mL of basil essential oil solutions prepared and tested against bacterial strain using agar well diffusion and quantitative methods. Minimum inhibitory concentration (MIC) was performed using broth microdilution plate. Eight different concentrations of serial two-fold dilutions ranged between 250 µL/mL and 1.95 µL/mL performed using Magellan software of Tecan Infinite Series M200 Pro microplate reader. In the result of agar well diffusion test, the zone of inhibition increased as the concentration of essential oil increased. The MIC was 7.81 µL/mL for all chemotype of the oils against *E.coli* and *S.aureus* while 15.63 µL/mL for *P.aeruginosa* of linalool-rich chemotype and 31.25 µL/mL for estragole and methyl cinnamate-rich chemotypes. The results obtained in this study were considered encouraging the potential of basil essential oil for medicinal uses as antibiotics and hygienic purposes as antibacterial products.

| Essential oil | Basil (*Ocimum basilicum* L.) | minimum inhibitory concentration | *Escherichia coli* | *Staphylococcus aureus* | *Pseudomonas aeruginosa* |

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1. INTRODUCTION

A natural product has been used since time immemorial not only as food flavors but also to treat diseases in ancient time. In recent years, there is a global attentions towards the medicinal plants and a lot of evidence has shows the promising potential of these plants which can be used in various traditional, complementary and alternate systems of treatment of human diseases [1]. Volatile oil of several plants has showed an increment in global market as antibacterial [2;3;4;5], antivirals [6], antifungals [7] and insecticides [8]. Essential oils or some of their components are used commercially in pharmaceutical, agronomic, food, sanitary, cosmetic and perfume industries [9].

An example of aromatic plant has shown an interesting properties as antimicrobial is basil. Basil (*O. basilicum* L.) is recognized as genus of *Ocimum* and includes about 50 to 150 species from different parts in the world and widely used as culinary herbs [10]. Basil oil has strong ability as insect repellent [11], antifungal [12] and nematocidal. Essential oil of basil was also known for their biological properties as antibacterial. Authors in 2009 reported on antibacterial properties of six Sudanese basil chemotypes, and all showed strong antibacterial activity against *Escherichia coli*, *Staphylococcus aureus* and

Salmonella typhimurium and LD₅₀ calculated was varied between 40 and 325 µL [13]. Research in 2009 on antibacterial activity of essential oils obtained from different seasons showed significant results on certain types of microorganisms (*S.aureus*, *E.coli*, *B.subtilis*, *P.multocida*, *A.niger*, *M.mucedo*, *F.solani*, *B.theobromae* and *R.solani*) [14]. An antimicrobial activity of the essential oils of four *Ocimum* species growing in Tanzania indicates that the oil of *O.suave* (B) has strongest antibacterial activity, followed by *O.suave* (A), *O.kilimandscharicum* and *O.lamiifolium* were moderately active while *O.basilicum* was weakly active which tested to eight bacterial strains and three fungi [15]. Different basil essential oils chemotypes from Togo revealed that only the methyleugenol and methyleugenol/t-anethole chemotypes were active against tested fungi and bacteria where their MIC of tested bacteria varied from 200-400 µL/L and from 250-500 µL/L respectively [16]. Based on report in 2010, *E.coli* 0157:H7 was inhibited by *O.basilicum* ‘Genovese’ essential oil, while *Ocimum americanum* and *Ocimum x citriodorum* essential oils were the most effective against *Enterococcus faecalis*, *Enterococcus faecium*, *P. vulgaris*, *S.aureus* and *S.epidermis* [17]. This study was carried out to reveal the antibacterial activity of three chemotypes of basil growing in Malaysia against *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*.

Corresponding author at:

E-mail addresses: zuriahismail@gmail.com (Zuriah Ismail)