Short communication

Major Constituents of the Volatile Oils of Genus Achillea from Iran, Concise Review of Researches

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ABSTRACT

The genus Achillea has nineteen species in Iran which seven species are endemic. Medicinal effects of these species are antimicrobial, antiallergic, antiinflammatory and antioxidant activities. This review focuses on main components of essential oils of some species of Achillea grown in Iran such as Achillea millefolium, A. filipendula, A. wilhelmsii, A. eriophora, A. nobilis, A. biebersteinii, A. tenuifolia, A. conferta. The major constituents of the essential oils could be markedly influenced by the genotype, environmental conditions and laboratory isolation methods.

Introduction

Medicinal and aromatic plants are used by 70% to 80% of global population for their medicinal effects (WHO, 2008). Between 50,000 to 80,000 flowering plants can be used for medicinal purposes (Naguib, 2011). There are more than 120 species in the genus Achillea from family Compositae (Asteraceae). These plants are medicinal perennial herbs that are native to Europe and Western Asia, (Amjad et al., 2011).

The genus Achillea has nineteen species in Iran which seven of them are endemic (Mozaffarian, 2007). Some species of Achillea has shown anti-hypertensive and anti-hyperlipidemic activity in human (Asgary et al., 2000) and have flavonoids and sesquiterpene lactones, which are effective in lowering blood lipids and hypertension (Amjad et al., 2011). Species of the genus Achillea are widely used for numerous pharmacological properties, such as antimicrobial, antiinflammatory, antiallergic and antioxidant activities (Kiyampour et al. 2011).

This review focuses on main components of essential oils of some species of Achillea from Iran.

Major Oil Components

Essential oils of aerial parts of Achillea millefolium from Darrehshar, Ilam province were investigated by Yousefzadeh and Zeinivand (2013). The major constituents were dihydrocarveol (34.97%), umbelulone (16.65%), 1,8-cineole (14.94%), bornyl acetate (6.08%), chrysanthenyle acetate cis (5.24%), camphene (4.21%), p-cymene (3.29%) and α-pinene (3.24%).

Another experiment by Ebrahimi et al. (2012) revealed the compositions of the essential oils of five A. millefolium subsp. elbursensis accessions. The results showed that the major compounds among accessions were camphor (16%-40%), 1,8-Cineole (10%-20%) and borneol (4%-21%).

Essential oils of Achillea filipendula were isolated by Kiyampour et al. (2011) via hydrodistillation. Major components of the leaves and flowers were: 1,8-cineole (17.2–19.0%) and chrysanthenyl acetate (18.5-19.3%), respectively.

Essential oils of A. millefolium ssp. elbursensis flowers isolated by hydrodistillation indicated chamazulene (54%), camphor (8%) and isoborneol (7.6%), while the leaf oil contained chamazulene (35%), isoborneol (18.2%) and p-cymene (14.8%). (Jaimand et al, 2006).

The floral leaves of A. wilhelmsii were collected from Charvsay region in the state of kohgiloyeh by Armand (2012). Sixty-two compounds were identified in the oil. Main constituents were sabinyl acetate (24.4%), cis-Sabinol (21.5%), Chrysanthenyl acetate (15.2%), linalool (8.2%) and 1,8-cineole (3.3%).

Hooshyari et al. (2012) investigated the oil components of Achillea wilhelmsii C. Koch from two region and identified forty components in the oil of the Sardasht and thirty-five components in the oil of the Changol from Mamassani in Iran. The major oil components reported by them in the Sardasht region were linalool (24.25%), 1,8-cineole (15.46%), α-pinene (8.59%), spathulenol (5.45%), viridiflorol (5.26%) camphor (5.17%) and (3E)-cemberene A (4.83%).
The major oil components of the Chamogl region were (3Z)-cembrene A (22.62%), linalool (14.78%), spathulenol (8.67%), α-cadinol (6.13%), viridiflorol (5.33%), (Z)-lanceol acetate (4.71%), davanone (4.69%) and cubenol (4.39%).

Khani and Asghari (2012) identified the oil components of the flowers of A. wilhelmsii, collected from Sade, Ghænat (33° 19’ N, 59° 14’ E), located in South Khorasan province, Iran. 1,8-cineole was the main compound (13.03%). Caranol (8.26%), α-pinene (6%), farnesyl acetate (6%), p-cymene (6%), camphor (4.2%), carvacrol (3.7%) and terpineol (3.1%) were other constituents.

The volatile oil of A. wilhelmsii growing wild in Iran was characterized by higher amounts of camphor (19.66%), 1,8-cineole (9.06%) and α-pinene (10.00%). The main components of the oil of Achillea eriophora DC. were camphor (30.40%), 1,8 cineol (25.24%) and camphene (6.21%). These major components for A. nobilis L. subsp neilreichii (Kerner) Formanek were α-thujone (34.06%), 1,8-cineole (14.14%) and β-cedren epoxide (9.63%), while in A. biebersteinii Afan. were 1,8-cineole (32.82%), carvacrol (10.85%) and piperitone (7.34%) (Ghani et al., 2008).

An experiment by Shafaghat (2009) with three parts of Achillea tenuifolia shoots (flower, leaf and stem) collected in Khalhchal, Ardabil road area in Northwest of Iran indicated that the main constituents of the oil of flowers were limonene (23.2%), α-cadinol (18.2%), in the leaves were limonene (25.2%), α-pinene (14.4%), caryophyllene oxide (6.5%), α-gurjunene (6.3%), bornyl acetate (5.5%) and δ-cadinene (4.4%) and in the stem were limonene (23.6%), α-pinene (13.4%) and spathulenol (6.4%).

Volatil oil composition of A. wilhelmsii from Kazeroon in the Fars province, Iran has been investigated by Javidnia et al. (2004). Fifty-seven components were identified at which carvacrol (25.1%), linalool (11.0%), 1,8-cineole (10.3%), Enerolidol (9.0%) and borneol (6.4%) were the main components.

In another study the main components of the oil of the A. wilhelmsii collected from Mazandaran province were camphor, borneol and 1,8-cineole of which borneol and 1,8-cineole were two major compounds of the oil of this study (Azadbakht et al., 2003).

Essential oil components of A. wilhelmsii from Kerman (Iran) were reported by Afsharypour et al. (1996). Caryophyllene oxide (12.5%), camphor (9.0%), borneol (6.1%), linalool (5.5%), chrysanthenyl acetate (2.8%) and carvacrol (2.0%) were the main components.

Saedian et al. (2005) isolated volatile oils of aerial parts of Achillea conferta DC. from Taleghan area. Forty-eight components were identified. The major constituents were camphor (22.1%) and 1,8-cineole (10.0%).

The constituents of the essential oils could be markedly influenced by the genotype, geographical environment, physical and chemical characteristics of the soil, plant age, drying method, oil isolation method, etc.

References
Khani A, Asghari J. 2012. Insecticide activity of essential oils of Mentha longifolia, Pulpicaria graphphalodes and Achillea wilhelmsii against two stored product pests, the flour beetle, Tribolium castaneum, and the cowpea weevil, Callosobruchus maculatus. Journal of Insect Science 12:73 available online: insectscience.org/12.73