Analysis Results of Yarrow Medicinal Plant Used as Gastroprotective and Its Use in Health

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Received date: July 19, 2021; **Accepted date:** August 25, 2021; **Published date:** September 30, 2021

Citation: Hayriye Alp (2021) Analysis Results of Yarrow Medicinal Plant Used as Gastroprotective And Its Use In Health. *J. Gastroenterology Pancreatology and Hepatobiliary Disorders*. 5(6) DOI: [10.31579/2641-5194/040](https://doi.org/10.31579/2641-5194/040)

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Abstract

Introduction: Herbal treatments are a sub-branch of traditional and complementary medicine. People generally use it to strengthen health. It is mostly used with the advice of radio-television, internet and friends. Among the side effects, the most frequent allergic reactions can be seen. standardized products should be used. It is reported that 80% of the essential oils of mercury (*Achillea* herba L.) must be monoterpene. Sesquiterpene group is guaianolite, germacranolite, edesmanolite and has anti-inflammatory, anti-edematous, antimicrobial effect. As flavonoid routine, it contains apigenin. Quinine has effects that increase secretion and appetite. It is spasmolytic due to azulene and flavonoids. It is used in gastric mucosa irritations. It is defined as a gastroprotective drug. Azulene and camazulene give wound healing properties to essential oil. The symptoms of inflammation are relieving.

Method: Plants (*Achillea* herba L.) Grown in July Organic Farm in Konya region were used. Analyzes were conducted in the laboratory of the Western Mediterranean Antalya Regional Directorate of Agriculture and Forestry. Total volatile oil content flavonoid amount was determined in the analysis. The amount of essential oil of lavender plant grown in Konya region was measured by hydrodistillation method. Essential oil components were measured by GC-MS / FID method.

Result: In this study, we aimed to present phytochemical analysis of mercury (*Achillea* herba L.) Plant grown in Konya region. Total essential oil amount was found to be 0.62%. Piperitone takes the first place with 31.25% and p-mentha -1, 5-dien-8-ol with 14.49% and α -pinene with 10.61%. When the content analysis of European countries is examined in the literature studies, it is seen that the amount of Kamuzulen and monoterpene in the plants grown in Estonia region is higher than other European countries (Hungary, Greece, Moldova, Lithuania, and Germany). Millefolii herba is recommended as gastroprotective drug. It is also used after prostate adenectomy because of its antiinflammatory properties.

Keywords; *achillea* herba L.; konya region; volatile component

Introduction

Medicinal and aromatic plants have become very popular recently. It is widely used in health promotion [3, 26]. In the 2000s, it created an economy of \$ 158 million in the United States. In Brazil, it is seen that this amount reached 160 million dollars in 2007 [8]. These figures tend to increase steadily in the following years [23]. Many people access these products with the advice of social media, internet, and friends without consulting a doctor. Therefore, misuse, side effects, drug interactions, contamination and toxicity can be seen. It is very important that such widely used medicinal and aromatic plants are used in health with the advice of a doctor and that the right products are in the appropriate standardization. Soner et al. It was determined that the most used green tea in the study of. In the same study, 27.2% of the population stated that they preferred herbal treatments because they had health enhancement, 25.4% were less harmful, and 17% had less side effects [27].

Konya is located in the inner Anatolian region as the province with the largest surface area of our country. It has a population of 2,038,555 according to the records of 2011 (tuik, 2013). It brings. Turkey's Flora "Flora of Turkey and The East Aegean Islands", according to Turkey belonging to 174 families in 1251 genera and more than 12,000 species and taxa (sub-species and varieties) and has a very rich flora [13, 14, and 18].

Plants convert the nutrients they receive from soil, water and sun to primary and secondary metabolites in their bodies and convert many essential oils, tannins, alkaloids to health. When these substances are taken into the body, they strengthen the immune system, accelerate healing, and support tissue and organ functions [15, 21].

Achillea millefolium (yarrow), also known as quince in the community, belongs to the family of chamomile and is a perennial herbaceous variety,

a very old medicinal plant group. The length of the plant is around 30-90 cm and it is often covered with hairy structures. It has a special smell. It has flowers forming a white cap and consists of tongue-like tongue flowers. The seeds are small and hard and round in shape. These seeds do not have hairs called papules. It is used among people with indigestion and cold. Dried flowers of the plant are preferred for medical use. In the composition of yarrow, which has an uncomfortable odor and taste with bitter taste, volatile oils, sesquiterpenes, flavonoids and tannins are present. The composition and analysis of the blue colored volatile oil can be affected by the variety of the plant and the harvest time, the region where it grows. In the herba part of the plant, approximately 0.2-0.4% volatile oil can be found. Volatile oil can contain azulene, limonene, cineol, borneol, pinenes, sesquiterpenes.

Achillea herba L. active ingredients, Achillein substance is homeostatic. It also contains salicylic acid and coumarin. The essential oil rate is 0.2-1%. There is about 0.2-0.4% volatile oil in herba part. It is reported that the rate of volatile oil in the European Pharmacopoeia should be at least 0.2% and contain Proazulen (Matrix). Although Kamazulen is not found as essential oil in the plant, it is formed during water vapor distillation of Proazulen precursor substance, a colorless compound. Kamazulen gives the essential oil of the plant a dark blue color. It is reported that 80% of the essential oil of *Achillea herba L.* must be monoterpene. Among the main components are 6 different chemotypes; there are components 1,8-cineol and constant, 1,8-cineol, camphor, and borneol, Sabinen, β -pinen, 1,8-cineol and artemisiaketone, Camphor and 1,8-cineol linalool, Askraridol [31]. Other components include karyophylline and α -bisabolol. Sesquiterpene group is guaianolite, germaranolite, odesmanolite and they show anti-inflammatory, antiedematous and antimicrobial effects.

Use of Yarrow (*Achillea herba L.*) plant has secretion and appetite increasing effects due to quinine. It is spasmolytic effective due to azulene and flavonoids. It is used in gastric mucosa irritations. It is described as a gastroprotective drug. Azulene and kamazulen give the essential oil a wound-healing property. Inflammation has relieving symptoms. Due to its sesquiterpene structure, it regulates bile flow with its choleric feature. It shows sympathomimetic effect due to painful substances, improves blood circulation. Because of this feature, it is also used in the treatment of hemorrhoids. *Artemisia vulgaris* (common wormwood), *Achillea millefolium* (yarrow perch) is also used in the regulation of menstrual blood [11, 21]. It is protective against hepatotoxic effects due to its glycosylated flavonoids. It can be used hepatoprotectively in chronic inflammatory liver diseases [31]. Plants used in phytotherapy; botanically appointed, microbiological and chemical controlled, amount of active substance certain, standardized packed and packaged in hygienic conditions must be presented to the patient. United States and various organizations in Europe, toxic medical that can have effects and is very popular they try to set certain standards for plants [4].

Dosage

Achillea herba L. average is 4.5g / day. It can be used as pharmaceutical infusion tea, capsule, liquid, sitting baths. It should be noted that in use it may affect the absorption of iron. Those allergic to the Astraceae family may experience allergic reactions like dermatitis.

Medicinal and Aromatic Plants in Turkey

Among the plants cultivated in our country, cumin, anise, thyme, mint, red pepper, fennel, poppy, fenugreek, nigella and mustard can be counted [15]. According to the five years of data covering the years 2003-2007 in Turkey, it is made in the field of organic production average 147 589 ha of production area of medicinal plants in this area 1.977 ha. The share of medicinal plants in the total area is 1.3 % [15].

Herbalists (herbalists) in the treatment, only the active substance is isolated and conventional therapy aimed at giving on the contrary, within the totality of the maximum effect appeared, all the components of the plant are positive. They argue that they have a share in the impact. According to them, the use of unpurified plant, neutralizing the substances that make up the plant reduces the possibility of side effects due to [24].

In this study, we tried to reveal the analysis of whether the yarrow (*Achillea herba L.*) plant grown in an organic farm in Konya Region contains enough correct compounds and its use in health.

Method

Plants *Achillea herba L.* Dried 20 grams of the plant grown by expert pharmacist in July Organic Farm in Konya region were used. The study was carried out in the spring season in 2017. The analysis of the plants was carried out in the laboratory of the Western Mediterranean Agricultural Research Institute. For analysis of the plant, gas-mass chromatography (GC-FID, GCMS) scanning, hydrodistillation and essential oil quantity were determined.

Plant source

The mature *Achillea herba L.* fruits were harvested from Temmuz Organic Farm at 2017, Konya, Turkey. The fresh peels were separated from the fruits (Muammer Sen, phytotherapist- expert pharmacist Konya, Akyokus-organic farm-Turkey) collected the fruits.

Isolation of the volatile compounds

Microdistillation

The volatiles were obtained by microdistillation of fresh peels (600mg) using an Eppendorf Microdistiller with 10ml distilled water per sample vial. The sample vial was heated to 108°C /min and kept at this temperature for 90min, the heated the 112°C at a rate of 20°C /min and kept at this temperature for 30min. The sample was subjected to a final post-run for 2 min under the same conditions. The collecting vial, containing a solution of sodium chloride (2.5g) and water (500 μ l) plus and hexane (300 μ l) to trap volatile components, was cooled to -5°C during distillation. After the distillation was completed, the organic layer in the collection vial was separated and analysed by gas chromatography (GC) and chromatography mass spectrometry (GC-MS) systems, simultaneously. The distillation was duplicate.

Essential oil amount

The amount of essential oil is defined as the amount of substance defined in milliliters per 100 g of anhydrous plant obtained by distillation under the conditions specified in this standard.

The principle of this method is to distill the aqueous suspension of the sample, collect it in a graduated tube containing a certain volume of xylene used to hold the essential oil in the distilled part, wait for the organic and aqueous phases to separate, read the total volume of the organic phase and calculate the essential oil after extracting the xylene volume [28].

Preparation of sample sample:

Approximately 20 g of dried plant material prepared for analysis. Weigh the sample. The weighed sample is placed in the glass cleverger flask. Approximately 10 times (200 ml) of pure water is added to the sample. It is subjected to hydrodistillation for approximately 2 hours. Then, the essential oil that accumulates in the graduated section and creates a phase difference with water is read and the result is recorded in ml. Later, starting from the weighing amount, the amount of essential oil is calculated as a percentage.

Essential Oil Component Determination

Gas Chromatography Mass Spectrometry Analysis

Samples are diluted 1: 100 with hexane for study. Volatile oil compound quantity research of the samples was done by capillary column (HP InnowaxCapillary; 60.0 m x 0.25 mm x 0.25 µm) with GC / GC-MS (Gas chromatography (Agilent 7890A) -mass detector (Agilent 5975C)). In the study, 0.8 ml / min flow amount was treated with helium as the entraining gas, the samples were injected into the machine with a split amount of 40: 1 in 1 µl. Injector temperature was kept at 250 ° C, column temperature program was arranged as 60 ° C (10 minutes), from 60 ° C to 220 ° C, 4 ° C / minute and 220 ° C (10 minutes). Within the framework of the determined temperature plan, the total working time was 60 minutes. Scanning range (m / z) 35-450 atomic mass unit and electron bombardment ionization 70 eV were used for mass detector, WILEY and OIL ADAMS broadcast outputs were used for the determination of volatile substances. The percentages of the resulting substances were determined with the FID detector, and the substance determination was determined with the MS detector [24].

Identification of the volatile compounds

No	RRI	NAME	Quantity (%)
1	1022	α-PINENE	10,61
2	1126	VERBENENE	1,54
3	1130	SABINENE	1,46
4	1290	CYMENE	1,32
5	1528	CIS-P-MENTH-2-EN-1-OL	0,71
6	1572	PINOCARYONE	2,07
7	1576	CIS-ABINENE HYDRATE	0,53
8	1586	CIS-CHYRYSANTHENYL	3,01
9	1680	TRANS-PINOCARVEOL	1,92
10	1693	TRANS-VERBENOL	9,94
11	1704	P-MENTHA-1,5-DIEN-8-OL	14,49
12	1758	PIPERITONE	31,25
13	1774	CIS-CHYRYSANTHENOL	6,38
14	1814	MYRTENOL	1,07
15	2163	NEO-INTERMEDEOL	10,91
18		Undetermined	2,78

Table.1 essential oil quantity analysis of *Achillea herba L.*)

Discussion

Previously, studies have been published on the volatile compounds of the Turkish *Achillea*. Water distilled essential oils from the herbal parts of *Achillea phrygia*, an endemic species in Turkey, was analyzed by GC/MS. Ninety-two and eighty-eight components were characterized representing 99.2% and 93.5% of the total components detected in two oil samples respectively. *Cis-Piperitol* (11.2%, 31.2%), *trans-p-menth-2-en-1-ol* (11.0%, 14.7%), *cis-p-menth-2-en-1-ol* (7.2%, 9.9%) and 1, 8-cineole (9.1%, 9.9%) were the major constituents of the oils obtained in 0.7% yield, respectively, from two plant samples. In addition, in one oil sample, camphor (14.5%) and linalool (9.9%) were also major constituents [5].

Aerial parts of *Achillea millefolium* subsp. *Millefolium* yielded a new sesquiterpene lactone, achillifolin, together with known sesquiterpene lactones, dihydroparthenolide and dihydroreynosin. Known flavonoids, terpenoids and vanilic acid were also isolated [30].

The present work examined the in vitro antimicrobial and antioxidant activities of the essential oil and methanol extract from *Achillea biebersteinii* Afan. (Asteraceae). The essential oil exhibited antimicrobial activity against 8 bacteria, 14 fungi and the yeast *C. albicans*, whereas

The components of the sample were identified by comparison of their mass spectra with those in the in-house Baser Library of Essential Oil Constituents' Adams Library, [2], MassFinder Library (Hochmuth 2008), WileyGC/MS Library (Mc Lafferty & Stauffer 1989) and confirmed by comparison of their retention indices. These indications were accomplished by comparison of retention times with authentic samples or by comparison of their relative retention index (RRI) to series of n-alkanes. N-alkanes (C₈₋₂₁) were used as reference points in the calculation of relative indices (RRI) (Curver et al 1985). Relative percentage amounts (%) of separated compounds were calculated from FID chromatograms.

Results

The total amount of essential oil was 0.62%. This value is seen in accordance with the European Pharmacopoeia. The table below shows the content analysis of *Achillea herba L.* Plant. In the microdistilled *Achillea herba L.* sample piperitone (31,25%), p-mentha-1,5dien-8-ol (14,49%), neo-intermedeol (10,91%) were the main compounds. α-pinene (10.61%), trans-verbenol (9,94%), cis-chrysanthenol (6,38%), cis-chrysanthenyl (3,01%), pinocaryone (2,07%), trans-pinocarveol (1,92) were the other characteristic compounds of the sample.

methanolic extract remained inactive. The antioxidative capacity of the samples was evaluated by using DPPH (2,2-diphenyl-1-picrylhydrazyl) and b-carotene/linoleic acid assays. In both assays, the extract showed better antioxidative capacity than the oil. The extract reduced the stable free radical DPPH with lower IC₅₀ value (89.90 µg/ml) than the oil (8900 µg/ml). In the b-carotene/linoleic acid assay, the samples were not effectively able to inhibit the linoleic acid oxidation, exhibiting only 22.7% (the extract) and 16% (the essential oil) inhibitions at 2 mg/ml, far below than that of BHT (97.0%). Total phenolic constituent of the extract was 51 µg/mg (5.1%, w/w) as gallic acid equivalent. GC-MS analysis of the essential oil resulted in the identification of 64 components representing 92.24% of the oil. Piperitone, camphor and 1, 8-cineole (eucalyptol) were the main constituents [4].

The in vitro antimicrobial and antioxidant activities of the essential oil and methanol extracts of *Achillea millefolium* subsp. *millefolium* Afan. (Asteraceae) were investigated. GC-MS analysis of the essential oil resulted in the identification of 36 compounds constituting 90.8% of the total oil. Eucalyptol, camphor, α-terpineol, β-pinene, and borneol were the principal components comprising 60.7% of the oil. The oil strongly reduced the diphenylpicrylhydrazyl radical (IC₅₀=1.56 µg/ml) and

exhibited hydroxyl radical scavenging effect in the Fe^{3+} -EDTA- H_2O_2 deoxyribose system ($\text{IC}_{50}=2.7 \mu\text{g/ml}$). It also inhibited the nonenzymatic lipid peroxidation of rat liver homogenate ($\text{IC}_{50}=13.5 \mu\text{g/ml}$). The polar phase of the extract showed antioxidant activity. The oil showed antimicrobial activity against *Streptococcus pneumoniae*, *Clostridium perfringens*, *Candida albicans*, *Mycobacterium smegmatis*, *Acinetobacter lwoffii* and *Candida krusei* while water-insoluble parts of the methanolic extracts exhibited slight or no activity. This study confirms that the essential oil of *Achillea millefolium* possesses antioxidant and antimicrobial properties in vitro [9].

A. *millefolium* plant, the highest total antioxidant activity was observed in seed water extract and the lowest total antioxidant activity was observed in flower ethanol extract.

To determined the DPPH radical removal capacity and total phenolic compound amount of the water extracts of the leaves and flowers of *Achillea collina* plant, which they collected from two different regions. They found that DPPH radical removal capacity was higher in flower extracts than leaves [17].

The extracted *Achillea millefolium* leaves in water / acetonitrile (70/30) mixture by two different methods and determined the total amount of phenolic compound with DPPH radical removal capacity [2]. DPPH radical cleaning capacity of the extracts obtained from the first type of extraction is 17.82%, the total amount of phenolic compound is 64.5 mg / 100 grams over quercetin; The DPPH radical removal capacity of the extracts obtained from the second type of extraction was 18.31% and the total amount of phenolic compound was 58 mg / 100 grams over quercetin [2].

Yarrow (*Achillea herba L.*) plant uses include gastric hyperacidity, duodenal ulcer. It can be used with both infusion teas and herbal mixtures. Among the most commonly used plant mixes are *Lini semen*, *Psylli semen*, *Foenugraeci semen*, *Althaeae radix / folium*, *Sinapis albae semen* [16].

It is also among the plants used in bladder irrigation after prostate adenectomy. It was observed in 22 patients that it prevents hemorrhagic and purulent inflammation after adenectomy, reduces postoperative blood loss and bacteriuria and has no side effects [12].

In the toxicity studies, 20mg / kg dose of a mixture including yarrow was used on experimental animals. Both biochemical and histopathologically, it has been shown that it does not cause any toxicity in experimental animals in acute, subacute and chronic periods [25].

Result

Yarrow herb can be used in diseases where inflammation is the first, due to its antioxidant capacity and anti-inflammatory effects, due to its more effective effect instead of synthetic supplements. There are many methods in medicinal and aromatic plant standardization. Correct botanical name, source country or region, harvest time, sensory tests (organoleptic tests of color and odor), macroscopic (can be done with naked eye or authentic sample, such as shape, size, surface character, texture, refraction), microscopic (parenchyma, colenchima, There are fungi, leaf epidermis, calcium oxalate, starch, protein, fat or authentic substances can be compared with samples), chemical (investigation of the presence of secondary metabolites such as alkaloid, cardiac glycosides) and chromatographic (especially Thin Layer Chromatography, TTC) tests [6].

Many medicinal plants (such as chamomile, sage, peppermint, and lemongrass) are used as medicines in the treatment of mild ailments in almost every home without the need for a doctor's advice. It is important to use medicinal plants under doctor's control in order to avoid important side effects (Ozer, 2001).

Acknowledgement

Thanks to Temmuz Organic Farm and BATAM.

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