

# The Effects of Hydro-Alcoholic Extract of Leaf and Flower of *Achillea wilhelmsii*

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**Achillea wilhelmsii** from *Helianthus annuus* family consists of about 115 species around the world. About 19 species of this genus that grows in Iran which has medicinal properties and is used in traditional medicine. An 18-year-old woman was admitted with abdominal pain complaints. Patient complaints began with vague abdominal pain and nausea about one year ago. The abdominal ultrasound showed multiple hypoechoic cysts in the peritoneal cavity. The CT scan confirmed the findings of the sonography and also showed several cysts in the kidney. Antibodies against *Echinococcus granulosus* (by hemagglutination) with high titre was found in the serum of patients. Purpose: the purpose of this study was to evaluate the components of the leaves and flowers Essential Oil of *Achillea wilhelmsii*, and essential oils effects on the liver cysts. Methods: In this study, the *Achillea wilhelmsii* species were collected. The leaves and flowers Essential Oil of this species was extracted by distillation with water and essential oil components were analyzed and identified using GC device. For the treatment, Use of *Achillea wilhelmsii* extract was prescribed one glass a day for one month to the patient. The patient's complaints were completely eliminated and the size of the patient's cysts was significantly reduced in the next examinations. Results: Essential oil efficiency for leaves and flowers of *Achillea wilhelmsii* are: 8.1-cineole (13%) geranyl isovalerate (4.11%).

**Keywords:** Liver Cyst, *Achillea wilhelmsii*, Essential Oil, *Helianthus annuus* family (Asteraceae), GC.

## *Achillea wilhelmsii*

The genus *Achillea* L. belongs to Asteraceae and Achilles family. *Achillea* contains around 19 perennial species

*Achillea* genus in Iran has 19 herbaceous perennial plant and often aromatic species.

Other species of this genus, in addition to Iran, are also in Iraq, Anatolia, Syria, the Caucasus, Lebanon, Palestine, Central Russia, the Transcaucasia, Turkmenistan, Afghanistan, Southwest Asia, and Central Asia (1).

The *Achillea wilhelmsii* stems are 20–90 cm tall or more. This species is in the plains and

mountainous slopes of Europe and Asia, including Iran, and these plants growing wild. Its leaves without petioles, cover with trichomes and Split into very narrow cutaways. Small and multiple capitols, has corymbose (inflorescences) (2).

From all parts of the plant, smell strong odors, so that the odor is felt solely by touching the plant parts. The parts used in this plant are Flowering branches and leaves that have a bitter taste and strong odor (3).

## Ingredients in the *Achillea* Genus

With phytochemical research on various species of the *Achillea* genus, it has been noted that

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the compounds in plants of this genus, bioactively have highly active compounds. The most important compounds in these plants are flavonoids (Fig. 1-2), terpenoids, lignans, Amino acids derivatives, fatty acids, alkalies (Saeidnia *et al.*, 2011).

#### **Yarrow (*Achillea wilhelmsii*) herbal properties**

Yarrow is a medicinal and valuable plant that has been used by people since the first century, so that, was used of this plants to grab blood and the treatment of the wound to stop the bleeding and they have believed that plant. In the middle Ages, the yarrow was used to stop bleeding nose, menstrual dysfunction, insomnia, visual impairment, blood in urine, Hemoptysis, epilepsy, and so on.

From this time its consumption for medical purposes has increased, In addition to the aforementioned, it has been used to treat diseases such as liver and kidney disease, hemorrhoids, and so on, while in the current century, its consumption gradually decreased, however, while confirming some of the therapeutic effects of the Yarrow, new studies kept it in the ranks of beneficial medicinal herbs. Brewing yarrow, has a beneficial effect on eliminating acute and chronic gastritis, and bloating. Meanwhile, it eliminates indigestion caused by bloating.

Yarrow has treating effect on dissemination of femininity, bind blood (Stop bleeding), bloody Hemorrhoid and simple diarrhea, and since it works decisively in such cases, the belief in people has always been high over the centuries. Studies have shown that with the use of yarrow, it prevents the rectal mucosa secretions, which causes hyperhidrosis and swelling of the painful area of the hemorrhoids. The emmenagogue effect of the yarrow has caused people to use it continuously over the centuries, and because repeated use of it does not produce a side effect in the patient, it is used to regulate menstruation when it occurs insufficiently. It is also used to prevent pain and discomfort during menstruation. Yarrow is also effective due to its diuretic effect on urinary volume and kidney stone excretion, and is also antifatulent and febrifuge (2 and 3).

Asgari *et al.* (2000) examined the effects of *Achillea wilhelmsii* on blood pressure and anti-cholesterol. In this study, 120 males and females aged between 40-60 years old were randomly selected and they were given twice a day and

each time 15-20 drops of *Achillea wilhelmsii* hydroalcoholic essential oil and the treatment was performed for more than Six months. Blood pressure and serum lipids (cholesterol, triglyceride, LDL, HDL) were measured in three stages in two months. The results showed a significant reduction in triglycerides after two months, while a significant reduction in triglycerides, total cholesterol and LDL cholesterol levels was observed after four months. HDL-cholesterol levels increased significantly after six months of treatment. Significantly decreased in diastolic pressure and systolic pressure, respectively, after two and six months. *Achillea millefolium* can effectively protect the mucous membranes of the stomach and prevent gastric acid secretion. In the study of effect of aquatic extracts of *Achillea* leave, protecting the mucosal layer of the stomach against direct Ethanol necrosis action, which can damage the mucous membrane of the stomach by destroying the gelatinous layer consisting of mucus and Bicarbonate levels of the stomach, and this gelatinous layer prevents stomach ulcers.

Stimulation of M2 muscarinic receptors (M2Rs) in parietal cells, increasing the levels of gastric peptides and their regulation, stimulating histamine and decreasing the blood flow to the stomach mucosal layer, increase gastric secretion and reduce the protective factors of the stomach. The extract of this species from the yarrow has reduced the volume and acidity of the gastric juice, which is probably an important protective role by blocking the receptors in the intestinal cells M3, (histamine H2 receptor and cckb receptor gastrin) (Baggio *et al.*, 2002 )

*Achillea wilhelmsii* stimulates the immune system. In a study that was done on the mouse, aqueous extract of this species *Achillea* stimulated cellular immunity and humoral immunity that by stimulating macrophages and B lymphocytes, increase the production of antibodies and thus strengthen the immune system. (Shariffar *et al.*, 2009).

In traditional medicine, the *Achillea* genus is used for the wound healing process. In a study to confirm this, extracts of an indigenous species of *Achillea* in Turkey called *Achillea biebersteinii* were used on two superficial and deep wounds in rats. Different extracts of this plant accelerated the wound healing process and extracts - N hexane of

this plant has similar effects to Madecassol, which is used to treat wounds.

When a scar is caused and exposed to the external environment, it is likely that it will be attacked by germs that delays the wound healing process. In addition, the presence of Microbe at the site of the ulcer causes the accumulation of macrophages and neutrophils in that area, which causes the production of ROS, which, if the amount of ROS produced is high, can cause severe tissue damage, which is also a barrier to the process of healing. Extract of this plant has antioxidant potential and antimicrobial activity, which can be used as a useful drug for accelerating the wound healing process (Akkol *et al.*, 2009).

Yarrow has antimicrobial activity. In a study in vitro situation, the ethanolic extract and *Achillea eriophora* essential oil prevented the growth of pathogen microorganisms. In this study, has been found that *Staphylococcus aureus* relative to essential oil *Achillea eriophora* is sensitive.

The essential oil of this plant in various concentrations prevented the growth of other microbes such as *Aspergillus niger*, *Bacillus subtilis*, *Candida albicans*, *Pseudomonas aeruginosa*, *Escherchia coli*. Therefore, this plant can be used against opportunistic antimicrobials that cause respiratory diseases like colds. Also, the *Achillea eriophora* essential oil can be used as a natural Antimicrobial, preserving and protecting foods with a low risk (Ghasemi *et al.*, 2008).

*Achillea* genus species also prevent inflammation caused by infection and damage. In a study of lipopolysaccharide (LPS) isolated from the cell wall of the gram-negative bacteria, to activate the mouse RAW264.7 macrophages in the culture substrate was used. By activating macrophages, a large number of inflammatory agents such as NO, COX-2, TNF- $\alpha$  and IL -6 was produced when the extracted oil of *Achillea millefolium* L. prevented the development of inflammatory response in these macrophages by reducing these inflammatory factors (Chou *et al.*, 2013).

The genus *Achillea* reduce nerve inflammation, which has an important role in the progression of diseases such as Parkinson's and Alzheimer's and also has a major role in stimulating microglial cells. By producing primary inflammatory mediators such as cytokines, MMP (matrix metallo Proteins (ROS and NO) cause nerve

cell death. In a study, the *Achillea fragrantissima* extract, was prevented from excessive production of inflammatory mediators by mouse microglial cells in the culture substrate. Therefore it can be considered for the control of neurodegenerative diseases. (Elmann *et al.*, 2011)

*Achillea millefolium* has a protective effect on the kidney. In a study of D-GalN D-galactosamine and lipopolysaccharide (LPS), was used to induce liver injury in mice and this damage was confirmed by measuring the levels of alanine aminotransferase (ALT) and aspartate aminotransferase (AST) plasma. The aqueous-methanolic extracts of this species of Yarrow have significantly reduced the levels of ALT and AST in treated mice with this plant, and this protective effect of yarrow on the liver was confirmed by histological observation. (Sheikh Yaesh *et al.*, 2006)

## MATERIALS AND METHODS

### Herbal materials and essential oils extraction Extraction method

At first, Yarrow Plant was collected from the Abedan section of Bushehr province in May and immediately the weeds and unused parts of the plant were isolated, then the collected clean plant was dried in shade and without moisture. After drying, extraction was carried out using percolator method.

At first, the flowers and leaves were separated from the stem and turned into powder by milling machine and the powder weight was recorded. In the bottom of the percolator hole, was put the amount of cotton so that its hole is completely blocked. Then, the powder was poured on the plant and put on a powder a piece of filter paper and put the weight on the filter paper. Then was added enough ethanol 70% (73 ml of 96% ethanol and 27 ml distilled water) to the powder to fill the space between the powdered yarrow and completely placed solvent on the powder. As soon as the solvent is penetrated into the powder, again, some 70% ethanol was used. Around the percolator funnel and also on the funnel was also covered with aluminum foil and a dark container was placed underneath the funnel, which darkened the container to prevent the harmful effect of light on the extract. On the container, a funnel was

placed to remove the extract from the funnel into the container. It took about 67 hours to extract the yarrow with a percolator method. During this time, with reducing the solvent level, was added enough ethanol 70 and the amount was recorded. After that, the dilute extract was concentrated as much as possible by rotary device.

#### Identification of essential oil composition

After preparation, the essential oil was injected into the GC device to determine the percentage of its constituents, and the essential oil was analyzed using a GC / MS device to determine the type of its constituents. Identification of essential oil composition by their inhibitory index and comparison with the inhibitory indexes

reported in the sources; comparison of the mass spectrum of each essential component with the mass spectrum found in the GC / MS device libraries; and the simultaneous injection of standard samples from the combinations of known essential oils ingredients. For the treatment of Hydatid cyst disease, was prescribed to the patient, daily one glass of Yarrow distilled water. Which continued for one month.

## RESULTS AND DISCUSSION

Achillea's medicinal effect on the kidney cysts in the patient with the use of Yarrow extract was eliminated and the abdominal pains of the

**Table 1.** Flower and leaves essential oils Ingredients

Row	Compound name	Flowers percentage	Leaf percentage
1	a- Pinene	1/3	2/5
2	Camphene	1/0	0/8
3	Sabinene	2/0	2/5
4	B-Pinene	0/8	1/6
5	Yomogi alcohol	1/4	2/8
6	1,8-cineole	10/3	17/0
7	y-Terpinene	0/6	1/0
8	Artemisia keton	—	2/8
9	Artemisiaalcohol	1/3	2/5
10	Linalool	1/2	3/4
11	Cis-a- Thujene	3/3	3/5
12	a-Cyclocytral	3/1	3/0
13	Camphor	6/4	3/5
14	trans- Verbenol	3/3	14/1
15	Lavandolul	2/6	—
16	4-Terpineol	1/5	—
17	Terpinene-4-ol	—	2/1
18	Borneol	2/4	—
19	p-Menth-1-en-8-Ol	1/8	—
20	a-Terpineol	—	4/0
21	cis-Crystanteny l acetate	1/3	4/0
22	Bornyl acetate	2/0	—
23	B-Caryophyllene	1/3	—
24	Geranyl isovalerate	8/4	—
25	Lavanduly l acetate	1/9	—
26	Gerany l propionate	—	1/4
27	gerany l isobutyrate	1/3	—
28	Spathulenol	1/8	—
29	Caryophyllene oxide	3/0	1/0
31	3B-Cadin-4-en-10-ol	7/5	7/8
32	Arimadenderen epoxide	1/9	—
33	Eudesm-7(11)-en-4-ol	3/0	2/3

patient improved and ultrasound (sonography) confirms the elimination of cysts.

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In various studies, the effects of reducing the resistance of peripheral arteries are attributed to the presence of compounds such as flavonoids in plant extracts. Desouza *et al.* (2011) have argued in their research that flavonoid Artemetin in *Achillea millefolium* L. has a low blood pressure effect, and has a relaxing effect on the blood vessels (De souza *et al.* 2011).

Therefore, in the scope of this study, it can be concluded that prescribing the leaves and flowers extract of Yarrow-e- Shirazi, injectable to reduce blood pressure and is consistent with the results of previous studies.

In the present study, was used of the extract of yarrow in vivo.

In a study by Ajay *et al.*, 2006, in association with the role of quercetine flavonoids on the mechanical activity of isolated aorta in diabetic rats, has been stated that quercetin to reduce phenylephrine-induced contraction responses, which part of this effect is due to the increase in nitric oxide in the vessel endothelial (Ajay *et al.*, 2006).

The existence of this flavonoid has been reported in various species of *Achilles* (Saeidnia *et al.*, 2011).

Herrero *et al.* (1996) investigated the

effects of several flavonoids on the mechanical activity of aorta isolation mice. The researchers found that these flavonoids led to vasodilatation after the use of compounds such as noreadrenaline and KCl. In this study, flavonoids had no effect on the adrenergic system (Herrero *et al.*, 1996).

The presence of Galangineng Flavonoids has also been reported in various species of *Achillea* (Saeidnia *et al.*, 2011). In a study by Morello *et al.* (2006) was performed survey in connection with vascular fluctuating effects of this flavonoid, they suggested that this flavonoid would reduce phenylephrine contraction effects, which, according to the results of this study, this flavonoid has produced such effects both from the Endothelium-dependent pathway (nitric oxide release) and from the endothelium independent pathway (preventing the passage of calcium ions from the Cell membranes) (Morello *et al.*, 2006).

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