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Research Article

Essential Oil Ratios of the Lavender Plant used in the Treatment of Anxiety in Cancer

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Abstract

The genus Lavandula is native to the lands surrounding the Mediterranean Sea and southern Europe through northern and eastern Africa and Middle Eastern countries to southwest Asia and southeast India. It includes more than 30 species, dozens of subspecies, and hundreds of hybrids and selected cultivars.

The main constituents of lavender are linalool, linalyl acetate, 1, 8-cineole B-ocimene, terpinen-4-ol, and camphor. However, the relative level of each of these constituents varies in different species. Lavender oil, obtained from the flowers of Lavandula angustifolia (Family: Lamiaceae) by steam distillation, is chiefly composed of linalyl acetate (3, 7-dimethyl-1, 6-octadien-3yl acetate), linalool (3,7-dimethylocta-1,6-dien-3-ol), lavandulol, 1,8-cineole, lavandulyl acetate, and camphor. Whole lavender oil and its major components linalool and linalyl acetate are used in aromatherapy. The major components of lavender oil were identified as 51% linalyl acetate and 35% linalool measured by gas chromatography and gas chromatography-linked Fourier Transform Infrared analysis.

Most commonly lavender is recommended for oral administration. However, it is also being employed in aromatherapy (inhalation of lavender; aromatherapy massage, dripping oil, and bathing. Unlike many other essential oils used in aromatherapy, lavender oil is often applied undiluted to the skin. The study of Jager et al. Suggested that essential oils and their components are rapidly absorbed through the skin.

Several animal experiments suggest anxiolytic, sedative, analgesic, and anticonvulsive and neuroprotective properties for lavender. It was shown that lavender possesses an anticonflict effect in mice. Continuous exposures to lavender essential oils for 7 days significantly inhibited anxiety- and depression-like behaviors tested by elevated plus-maze and forced swimming tests in rats. Lavender oil produced significant antianxiety effects in the Geller conflict and the Vogel conflict tests in mice. Linalool, a major constituent of lavender oil, produced significant anticonflict effects in the Geller and Vogel tests; findings that were similar to those of lavender oil. Effects of lavender oil were compared with chlordiazepoxide, as a reference anxiolytic, on open-field behavior in rats. Lavender oil exhibited antianxiety properties similar to those of chlordiazepoxide. Anxiolytic effect of lavender was also compared with diazepam in elevated plus-maze test in the Mongolian gerbil. Exposure to lavender odor showed an anxiolytic profile similar to diazepam in female gerbils.

Key words: lavender; effect; anxiety; cancer

Lavender (Lavandula spp.) is a very valuable essential oil plant from the family Lamiaceae.1 There are about 39 types of lavender (Lavandula spp.), most of them of Mediterranean origin. There are three important types of lavender in the world with high commercial value. These include lavander (Lavandula angustifolia Mill. = L. officinalis L. = L. vera DC), lavandin (Lavandula intermedia Emeric ex Loisel. = L. hybrida L.) and spike lavander (Lavandula spica = L. latifolia Medik.). The variety used in our study is L. intermedia. The essential oil quality of lavander varieties called British lavender is L. stoechas L. (Spanish lavender), L. latifolia medik. (Broadleaved lavender), L. multifida (fern leaved lavender), L. canariensis (Canary Islands lavender), L. lanata (wool lavender), L. heterophylla and Lx allardii (L. dentata x L. latifolia Medik.) are also available. There are also many species grown as ornamental plants and cut flowers.3 Lavender is a perennial, semi-bushy Mediterranean plant. The roots can be as deep as 80-100 cm depending on soil and climate conditions. The four-pointed stalk is bare or feathery. The plant gives numerous lateral branches. Leaves are mutually located in the knuckles and are 2-6 cm long. At the end of the flower stem is 15-20 cm long flower spike-cluster axis. There are 4-6 flower clusters on the spike axis. Each flower cluster has a number of flora (6-14) depending on some factors.

The color of the fruit varies from dark brown to black. 1000 grain weight is less than 1g.4 the most important substance of lavender flower is colorless or light yellow colored essential oil. The quality of the essential oil is evaluated in particular according to the ratio of linalyl acetate and linalool in the oil. In addition, the flavonoids of the luteoline type in the content of the essential oil have bacteriostatic and spasmotic effect. It also carries compounds such as β-pinene, linalol, camphor, terpineol, borneol, and cineol.

Materıal and Methods

L.intermedia was harvested from Konya -Turkey Organic Temmuz farm. The analyzes were carried out in the laboratory of Antalya West Mediterranean Agriculture and Forestry Directorate. Determination of Essential Oil: The amount of essential oil is all substances expressed in milliliters per 100 g of dry matter, which are steamed 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 fractionated tube containing a certain volume of xylene used to hold the volatile oil in the distilled portion, wait for the separation of the organic and aqueous phases, read the total volume of the organic phase and calculate the volatile oil after removal of the xylene volume. Preparation of sample: Approximately 20 g of dried plant material is prepared for analysis. The weighed sample is placed in a glass clevenger flask and added about 10 times (200 ml) of purified water to the sample. Hydrodistillation was done for approximately 2 hours. The volatile oil sample, which accumulates in the graduated part and forms a phase difference with water, is read and the result is recorded in ml. Then, based on the weighing amount, the amount of essential oil is calculated as a percentage. Determination of volumetric humidity: About 10 gr of sample is placed it in the flask. Xylene which is saturated with water is added to cover the plant material. The appliance is switched on for about 1 hour after boiling. The xylene and water are then separated in the graduated phase. The amount of water is read and recorded in ml. The result is calculated as a percentage by using the agricultural quantity of dry plant material.6 Determination of Essential Oil Component with Gas Chromatography Mass Spectrometry Analysis: Samples were diluted 1: 100 with hexane for analysis. Essential oil component analysis of the samples was performed by GC / GC-MS (Gas chromatography (Agilent 7890A) -mass detector (Agilent 5975C)) using a capillary column (HP InnowaxCapillary; 60.0 m x 0.25 mm x 0.25 μm). In the analysis, helium was used as a carrier gas at a flow rate of 0.8 ml / min. The injector temperature was maintained at 250°C, and the column temperature program was set to 60°C (10 minutes), 60°C to 220°C, 4°C / minute, and 220 ° C (10 minutes). The total analysis time for this temperature program was 60 minutes. The scanning range (m / z) 35-450 atomic mass units and electron bombardment ionization 70 eV were used for the mass detector, and the identification of the components of the essential oil was based on data from the WILEY and OIL ADAMS libraries. Component percentages of the results were made using FID detector and components were identified using MS detector.

Discussion

In this study, we investigated the organic oil components of L.intermedia plant grown in region. (1971) and Wagner (1980) reported lavender essential oil ratio of 1.5%, [10] at least 1%10, Baytop (1999) reported that it should be between 0.5- 1.0%.8,9,11 [10] reported that L. officinalis's essential oil content varies between 1.26-3.14%, [13] reported that lavender contains 7.1-9.9% of dry flower buds and 2.8- 5.0% of essential oil of lavander varieties.12,13 [14] stated that the ratio of essential oil of Super lavandin cultivars grown in Isparta varies between 1.0-1.5% in fresh stalked flowers and 5-6% in dry stalkless flowers, and lavender (Lx intermedia).14 [15] reported that L. angustifolia's essential oil content is 2.1-2.6% in the same lavender species15. [16] Reported that fat ratio is between 1.54-2.34%, [17] reported that it varies between 2.1-9.62%. Compounds found in leaves and immature flowers (Group 1 monoterpenes: 3 - carene, limonene, myrsen, bornyl acetate, borneol, camphor, 1.8-cineol and trans-oximene) are protective against insecticides.16 Group 2 contains monoterpene acetates and sesquiterpenes: linalyl acetate, lavandulyl acetate, germacren D, - β caryophyllene, Trans - β nes farnes. These compounds are formed during flowering and are attractive for pollination. Group 3 monoterpenes, linalool and terpinene - 4 - are insecticidal properties.18, 19 Aromatic plants affect the sense of smell. Odor has been suggested to have an effect that activates odor receptors or neurons in the vomeronasal organ and activates limbic areas such as amygdala.20-23 In a study conducted in anosmic mice, even intraperitoneal or oral administration of aromatic compounds has been shown to reach the central nervous system.24, 25 L. intermedia (lavandin) (Lamiaceae) is mainly planted for essential oils (EO), which contain a rich mixture of mono and sesquiterpenes. L. intermedia is used in perfumery, cosmetics and therapeutics. The relative concentration of organic compounds of these essential oils is of great importance for the biological activity of lavender essential oils. The composition and content of the essential oil have been shown to be exposed to changes pending the ontogenic improving of some of the whole herb or some of its members.26,27.The range of mono- and sesquiterpene carbon frames linked to the catalytic bustle of members of the terpene synthase (TPS) enzyme relations.28 The expression profile of several TPS members was characterized and demonstrated to follow complex spatial and temporal patterns during plant growth and in response to biotic and abiotic stresses.29 In lavender species, volatile organic compounds are produced and accumulated in special trichomes scattered on the surface of all green tissues such as leaves, calyxes, stems and supports. Lavender flowers are abundant in the amount of essential oil is a plant suitable for research because of the high rate.30 Since flowering time may affect terpene synthesis, suitable conditions for organic compounds at harvest time should be provided.

The analysis results obtained are shown in the table below

Gıda Tıbbi ve Aromatik Bitkiler Araştırma Laboratuvarı

Numune (Örnek) No	41			
Makbuz / Fatura	**Tarih**	25/03/2021	**Seri / No**	0020176

Numune Adı	**Lavanta Bitkisi**	**Rapor Tarihi ve Numarası**
Geliş Tarihi	**23/03/2021**	
Geldiği Yer	**Temmuz Organik Çiftlik Ürünleri Tıbbi ve Aromatik Bitkiler İlaç ve Tur. San. Tic. Ltd. Şti.**	**25/03/2021-37**
Yapılan Analiz		**Analiz Metodu**
Uçucu Yağ Bileşenleri Tayini		**GC-MS/FID**

Analiz Sonuçları (%)

No	Bileşen adı	Bileşen miktarı (%)	No	Bileşen adı	Bileşen miktarı (%)
1	*beta*-Myrcene	0,49	11	Linalyl acetate	27,51
2	*1,8*-Cineole	2,58	12	Lavandulyl acetate	1,37
3	*cis*-Ocimene	0,68	13	*alpha*-Terpineol	6,08
4	*trans*-Ocimene	0,89	14	Neryl acetate	0,96
5	3-Octanone	0,43	15	Geranyl acetate	1,58
6	1-Octenyl-acetate	0,30	16	Nerol	0,60
7	*trans*-Linalool oxide	0,36	17	Geraniol	1,95
8	*cis*-Linalool oxide	0,27	18	*alpha*-Bisabolol	0,73
9	Camphor	5,76			
10	Linalool	47,47	***Uçucu Yağ miktarı: %5,50***		

MAKALENİN YAZIMI	Çalışmanın tamamının ya da önemli bölümlerinin yazılmasında sorumluluk almak	Hayriye ALP
ELEŞTİREL İNCELEME	Çalışmanın teslim edilmesinden önce, dil ve yazınsal düzeltmelerden bağımsız olarak bilimsel anlamda çalışmayı yeniden değerlendirmek	Hayriye ALP
KAYNAKLAR VE FON SAĞLAMA	Çalışma için gerekli personel, mekân, finansal kaynak ve araç-gereçleri sağlamak	Hayriye ALP
MALZEMELER	Biyolojik materyaller, sevk edilen hastalarla ilgili sorumluluk almak	Hayriye ALP
DİĞER		

Adı, Soyadı	Tarih	İmza
1. Hayriye ALP	15.7.2020.....	

X

MAKALENİN YAZIMI	Çalışmanın tamamının ya da önemli bölümlerinin yazılmasında sorumluluk almak	Hayriye ALP
ELEŞTİREL İNCELEME	Çalışmanın teslim edilmesinden önce, dil ve yazınsal düzeltmelerden bağımsız olarak bilimsel anlamda çalışmayı yeniden değerlendirmek	Hayriye ALP
KAYNAKLAR VE FON SAĞLAMA	Çalışma için gerekli personel, mekân, finansal kaynak ve araç-gereçleri sağlamak	Hayriye ALP
MALZEMELER	Biyolojik materyaller, sevk edilen hastalarla ilgili sorumluluk almak	Hayriye ALP
DİĞER		

Adı, Soyadı	Tarih	İmza
1. Hayriye ALP	15.7.2020.....	

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ÇIKAR ÇATIŞMASI BEYANI

1. Bu çalışma sırasında, yapılan araştırma konusu ile ilgili doğrudan bağlantısı bulunan herhangi bir ilaç firmasından, tıbbi alet, gereç ve malzeme sağlayan ve/veya üreten bir firma veya herhangi bir ticari firmadan, çalışmanın değerlendirme sürecinde, çalışma ile ilgili verilecek kararı olumsuz etkileyebilecek maddi ve/veya manevi herhangi bir destek alınıp/alınmadığı.
2. Bu çalışma ile ilgili olarak yazarların ve/veya aile bireylerinin çıkar çatışması potansiyeli olabilecek bilimsel ve tıbbi komite üyeliği veya üyeleri ile ilişkisi, danışmanlık, bilirkişilik, herhangi bir firmada çalışma durumu, hissedarlık ve benzer durumlarının olup/olmadığı.
3. Çalışma hazırlanırken; veri toplanması, sonuçların yorumlanması ve makalenin yazılması aşamalarında herhangi bir çıkar çatışması alanının bulunup/bulunmadığı açık bir şekilde belirtilip, formun bütün yazarlar tarafından imzalanması gereklidir.

ÇALIŞMANIN BAŞLIĞI:
Nekrotizan vaskülit yarasında ozon terapinin etkinliği

Bu formu imzalamakla yazarlar,

☑ Çalışma ile ilgili hiçbir şekilde (mali vs.) çıkar elde etmediklerini onaylamış olurlar.

☐ Bu çalışmada yazılan ve/veya tartışılan konularla ilgili olarak aşağıda belirtilen çıkar ilişkilerinin söz konusu olduğunu onaylamış olurlar (Elde edilen çıkarlar, ilgili yazarın adı verilerek yazılmalıdır).

Adı, Soyadı	Tarih	İmza
1. ...Hayriye Alp.....	15.7.2020.....	
2.	.....	.....
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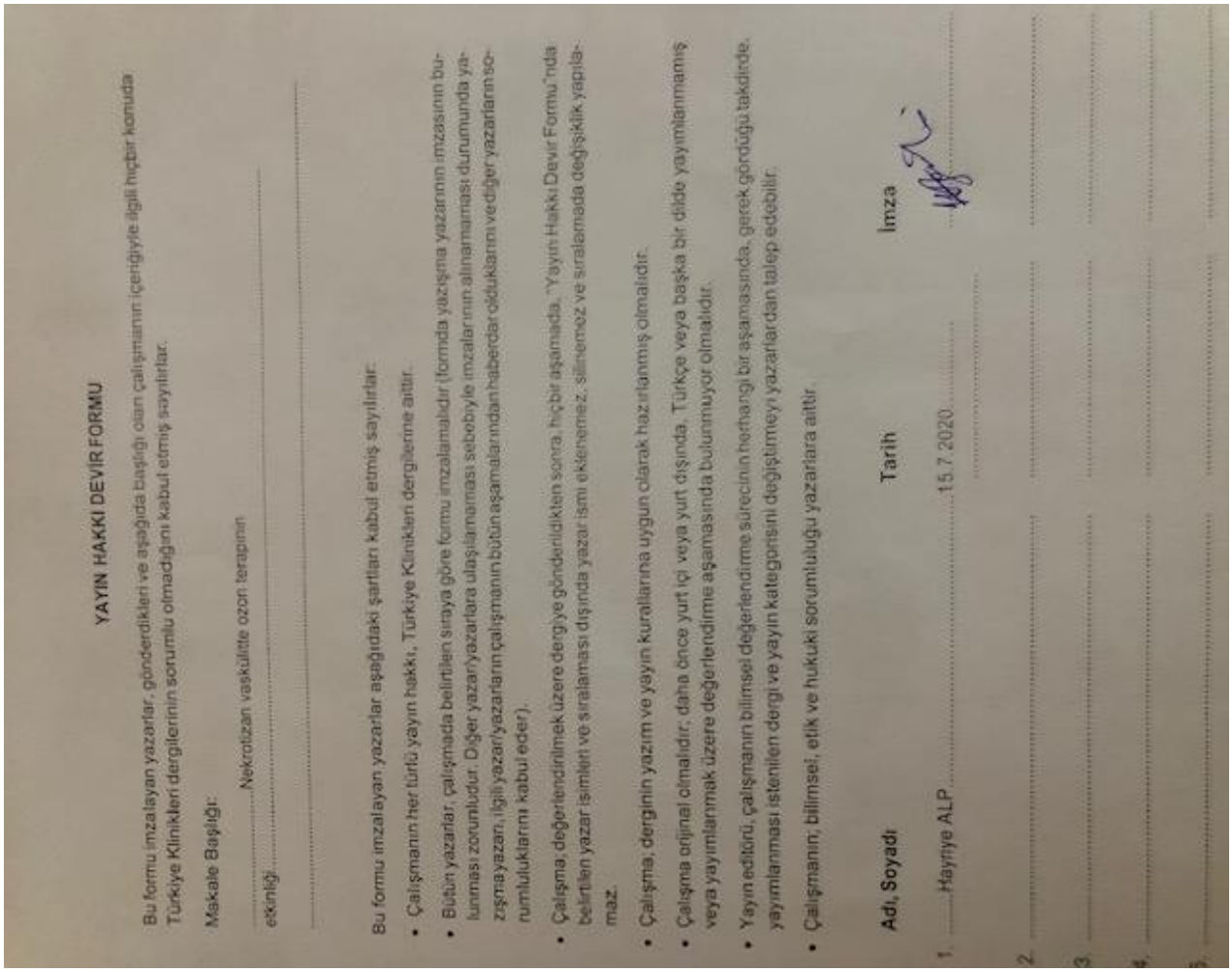

YAYIN HAKKI DEVİR FORMU

Bu formu imzalayan yazarlar, gönderdikleri ve aşağıda başlığı olan çalışmanın içeriğiyle ilgili hiçbir konuda Türkiye Klinikleri dergilerinin sorumlu olmadığını kabul etmiş sayılırlar.

Makale Başlığı:

Nekrotizan vaskülite ozon tedavisi

etkinliği

Bu formu imzalayan yazarlar aşağıdaki şartları kabul etmiş sayılırlar:

- Çalışmanın her türlü yayın hakkı, Türkiye Klinikleri dergilerine aittir.
- Bütün yazarlar, çalışmada belirtilen sıraya göre formu imzalamalıdır (formda yazışma yazarının imzasının bulunması zorunludur. Diğer yazar/yazarlara ulaşılamaması sebebiyle imzaların alınamaması durumunda yazışmayazarı, ilgili yazar/yazarların çalışmanın bütün aşamalarından haberdar olduklarını ve diğer yazarların sorumluluklarını kabul eder).
- Çalışma; değerlendirilmek üzere dergiye gönderildikten sonra, hiçbir aşamada, "Yayın Hakkı Devir Formu"nda belirtilen yazar isimleri ve sıralaması dışında yazar ismi eklenemez, silinemez ve sıralamada değişiklik yapılamaz.
- Çalışma, derginin yazım ve yayın kurallarına uygun olarak hazırlanmış olmalıdır.
- Çalışma orijinal olmalıdır; daha önce yurt içi veya yurt dışında, Türkçe veya başka bir dilde yayımlanmamış veya yayımlanmak üzere değerlendirme aşamasında bulunmuyor olmalıdır.
- Yayın editörü, çalışmanın bilimsel değerlendirme sürecinin herhangi bir aşamasında, gerek gördüğü takdirde, yayımlanması istenilen dergi ve yayın kategorisini değiştirmeyi yazarlardan talep edebilir.
- Çalışmanın; bilimsel, etik ve hukuki sorumluluğu yazarlara aittir.

	Adı, Soyadı	Tarih	İmza
1	Hayriye ALP	15.7.2020	
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Suggestıons

Lavender intermedia is an aromatic plant that needs to be worked on with plenty of flowers and highly essential oil components. It can be used both in the treatment of anxiety and insecticide control as a plant with high added value that can obtain abundant organic compounds with suitable harvest conditions.

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