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QUALITATIVE ASSAY OF ESSENTIAL OILS IN COMMERCIAL LAVENDER OIL BY GC-MS METHOD

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ABSTRACT: Essential oils are largely employed for their therapeutic properties, being marketed extensively in pharmaceutical and cosmetic industry. Lavender oil is known for its excellent aroma. Therefore, it is extensively used in the cosmetic, perfumery, and flavour industries. The lavender oil is known to possess sedative, carminative, antidepressive, and anti-inflammatory properties. The aim of our study was to assess the purity and quality of lavender oils, available on the market from various commercial producers. Therefore, essential oil compositions of lavender oil were analyzed using gas chromatography-mass spectrometry (GC-MS). Chromatographic analyses were carried out on HP-5 MS column. The injector volume was 1 µl in split mode (40:1) and the carrier gas was helium at a flow rate of 0.8 ml/min. 33 essential chemical constituents were identified based on GC-MS in lavender oil supplied from an herbalist. The major components of the lavender oil were found linalyl acetate (37.82 %), linalool (33.07 %), eucalyptol (4.88 %), camphor (4.07 %), lavandulol acetate (1.53 %) and caryophyllene (1.43 %).

INTRODUCTION: Nowadays, essential oils as alternative therapies have gained worldwide concern, owing to their various biological activities. Considerable attention has been devoted to peppermint oil, which is widely used for its important properties, including antimicrobial, anti-inflammatory, antispasmodic, cytoprotective, hepatoprotective with strong antioxidant actions. It is also used for its cooling effect to enhance the dermal penetration of pharmaceuticals. Then, it is a standout amongst the most vital seasoning added substances in the World [1, 2]. Lavender genus is a crucial member of the Lamiaceae family.

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Lavandula species are generally appropriated in the Mediterranean district and developed in France, Italy and Spain. Also, lavender oil **Fig. 1** is widely used for its medicinal actions, including antispastic, anti-inflammatory, sedative, antimicrobial and general tonic action. Externally, it can be used for wounds and superficial burns. It contains as major compounds linalool (20 - 45%), linalyl acetate (25 - 46%), monoterpenes, alcohols, and esters [3-5].

FIG. 1: LAVENDER OIL

Even if essential oils are marketed extensively in the pharmaceutical and cosmetic industry, not all products available to use are properly controlled in terms of the quality of their composition. The analytical methods applied for the analysis of essential oils are numerous and include methods exploiting volatility or their optical activity, along with the IR spectral methods,

Refractometry and Thin Layer Chromatography [6-8]: Several methods have been reported to determine the main constituents of essential oils by GC-MS method [9-15]. Other techniques, inexpensive, remain a fast alternative, although there are limitations in terms of specificity and sensitivity. But, GC-MS is the elected technique for analyzing. To date, no GC-MS method is accounted for till date for assurance of essential oils by GC-MS in commercial lavender oil in Turkey.

Therefore, in this study, 33 essential chemical constituents were identified based on GC-MS in lavender oil supplied from an herbalist. The components were identified by comparing linear kovats retention index, their retention times, and mass spectra with those obtained from the MS library.

MATERIALS AND METHODS:

Chemicals and Reagents: Linalyl acetate, linalool, eucalyptol, camphor, lavandulol acetate, caryophyllene, and different synthetic compounds were acquired from Sigma-Aldrich (St. Louis, MO, USA). Lavender oil was purchased by a local herbalist. It was labeled as a 100% natural product.

GC-MS System: GC-MS investigations were completed on an Agilent 7820A gas chromatography system equipped with 7673 series autosampler chemstation and 5977 series mass selective detector. HP-5 MS segment with 0.25 μm film thickness (30 m × 0.25 mm I.D., USA) was utilized for separation. The temperatures of the inlet and transfer lines were 250 and 300 °C, respectively.

GC-MS Conditions: Different temperature programs were researched for the technique. At the finish of this examination, the GC broiler temperature was at 60°C for 10 min and afterward was customized to 220°C at a rate of 4°C/min and kept in this temperature for 10 min. The stove temperature was at long last modified to 240°C at a rate of 1°C/min with the last hold time of 80 min. The split proportion was 40:1.

Identification of Components: The range of the obscure segment was contrasted, and the range of the part was put away in the National Institute of Standards and Technology Library Version (2005), Software, Turbomass 5.2. The parts were distinguished by contrasting direct Kovats maintenance list and mass spectra with those obtained from the MS library. Understanding on mass range GC-MS was directed utilizing the database on National Institute Standard and Technology having more than 62,000 examples. The relative rate measure of every part was determined by contrasting its normal pinnacle region with the complete areas. The name, atomic weight, and structure of the segments of the test materials were discovered.

RESULTS AND DISCUSSIONS:

Method Development and Optimization: The strategy advancement for the examination of phytocomponents depended on their synthetic properties. In this investigation, the fine segment covered with 5% phenyl and 95% dimethyl-polysiloxane is a decent decision to partition these analytes since they elute as symmetrical tops at a wide scope of focuses. Distinctive temperature programs were explored for GC broiler.

At the finish of this examination, the best temperature program was chosen for good detachment. The GC broiler's temperature projects were as follows: beginning temperature of 60 0C, held for 1. min, expanded to 220 0C at a rate of 4 0C/min held for 10 min. The broiler temperature was at long last modified to 240°C at a rate of 1°C/min with the last hold time of 80 min. Mass spectra were taken at 70 eV, and the mass range was from m/z 35 to 450.

GC-MS Analysis: GC-MS is a standout amongst the best procedures to distinguish the constituents of unstable issues, long-chain, stretched chain hydrocarbons, alcohols, amines, esters, ketones, heterocycles, and terpenes. GC-MS examination uncovered the nearness of 33 mixes in oil of lavender oil. Pinnacle number, maintenance time,

and compound name are expressed in **Table 1**. The substance 33 basic constituents were recognized dependent on GC-MS in lavender oil provided by the botanist. The significant parts of the lavender oil were linalyl acetic acid derivation (37.82 %), linalool (33.07 %), eucalyptol (4.88 %), camphor (4.07 %), lavandulol acetic acid derivation (1.53 %) and caryophyllene (1.43 %).

TABLE 1: CHEMICAL COMPOSITION OF THE ESSENTIAL CONSTITUENTS OF LAVENDER OIL

Number	Retention time (min.)	Retention index	Name	% Ratio
1	7.67	937	α-pinene	0.18
2	8.47	952	camphene	0.22
3	10.06	974	sabinen	0.34
4	10.22	986	β-pinen	0.27
5	11.34	992	β-myrcene	0.24
6	12.05	994	amylethylcarbinol	0.17
7	13.64	1032	eucalyptol	0.32
8	14.89	1049	trans-β-acimene	1.98
9	16.23	1074	linalool oxide	0.11
10	16.91	1088	terpinolene	0.17
11	18.22	1099	linalool	33.07
12	19.71	1142	(-) camphor	4.07
13	21.02	1167	Endo borneol	2.08
14	21.43	1177	4-terpineol	0.11
15	21.70	1183	crypton	0.09
16	22.20	1190	L-α-terpineol	0.99
17	23.28	1226	bornyl formate	0.12
18	24.63	1257	linalyl acetate	37.82
19	25.57	1285	bornyl acetate	0.08
20	25.81	1306	lavandulol acetate	1.53
21	28.48	1364	nerol acetate	0.36
22	29.16	1382	geranyl acetate	0.78
23	29.32	1391	17-epi-sesquit hujene	0.12
24	30,39	1419	caryophyllene	1.43
25	30.86	1435	α-bergamotene	0.04
26	31.14	1464	sesquisabinene	0.03
27	31.57	1477	t-β-farnesene	0.97
28	32.45	1481	D-germacrene	0.38
29	33.22	1508	α-farnesene	0.34
30	33.54	1577	γ-muurolene	0.04
31	35.75	1581	caryophyllene oxide	0.11
32	37.58	1640	α-epicadinol	0.05
33	38.77	1684	α-bisabolol	0.39

On examination of the present outcomes with those detailed from different parts of India, it is very clear that the groupings of 1,8 cineole, camphor, β-caryophyllene, and caryophyllene oxide were somewhat higher, though the centralizations of α-terpineol, linalyl acetic acid derivation, geranyl acetic acid derivation, neryl acetic acid derivation and lavandulyl acetic acid derivation were generally lower in the Kashmir oil than in the present oil [16]. However, the lavender oil announced from the Kashmir valley contained a lot of limonene (11.0 %), citronellol (10.0 %) and α-terpineol (7.6 %) and low substance of linalool (10.0 %). Moreover, the centralizations of (E)- β-ocimene, 1-octen-3-yl acetic acid derivation, α-terpineol, and β-caryophyllene were marginally higher in the oil delivered in Kodaikanal when contrasted with the present oil. These varieties could be because of contrasts in area, rise, hereditary makeup of the plant, or a versatile procedure to specific natural conditions. Lawrence additionally watched a wide variety in the quantitative organization of lavender oil contingent upon plant genotype and development zone, and the arrangement of the oil from lavenders were perceived to shift essentially as per height, microclimate, and area.

CONCLUSION: This investigation recommends that GC-MS is the viable technique for examining the fundamental oils. Applying the proposed system, a sum of 33 segments was distinguished for

the lavender fundamental oil. These parts represent 89.0% of the all-out relative substance of the basic lavender oil. This examination likewise exhibited that the basic lavender oil is rich in linalyl acetic acid derivation and linalool and could be a decent hotspot for this compound. The lavender fundamental oil may have immediate or roundabout mitigating or antinociceptive exercises. The effects of linalyl acetate and linalool in the future can be investigated.

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