

The Holistic Evaluation of the Articles on Aromatherapy: A Bibliometric Analysis

Aromaterapi Makalelerinin Bütüncül Değerlendirilmesi: Bibliyometrik Bir Analiz

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Abstract

Objective: Aromatherapy is the use of oils obtained by distilling the roots, leaves, or flowers of plants to prevent diseases and treat diseases that have already occurred. In the literature review, no bibliometric study on aromatherapy could be found. Therefore, we purpose to examine scholarly articles holistically and show universal productivity and trend issues.

Material and Method: In this study, 1428 published articles (1985-2019) on aromatherapy from the Web of Science database were statistically analyzed. Bibliometric network scanning maps were formed to disclose trending topics, citation analysis, and cross-country cooperations.

Results: The United States ranked first in aromatherapy literature with 316 publications (22.1%). The USA was followed by the UK, Japan, Iran, and Australia (143, 136, 126, 74, respectively). Complementary Therapies in Medicine (50 articles), Journal Of Alternative And Complementary Medicine (47 articles), and Evidence-Based Complementary And Alternative Medicine (36 articles) are the best 3 most prolific journals. Hur Mh (18 articles) is the most working author and University Of London (32 articles) is the most productive establishment. The most cited article in aromatherapy literature is "Pharmaceutical and therapeutic potentials of essential oils and their individual volatile constituents: A review". It was shown that the most trendy plants used in aromatherapy studies were Lavender, used in 111 studies, followed by Linalol 16, Bergamot 16, and peppermint in 12 publications.

Conclusion: Aromatherapy has been shown to be used in many areas of medicine and is used for therapeutic purposes in many countries of the world thanks to important international collaborations globally.

Keywords: Aromatherapy; Bibliometric; Complementary medicine; Essential oils

Özet

Amaç: Aromaterapi bitkilerin kök, yaprak veya çiçeğini distile edilerek oluşan yağların hastalıkları önlemek ve oluşmuş olan hastalıkları da tedavi etmek amacı ile kullanılmasıdır. Literatür taramasında bu konuda bibliyometrik bir araştırmaya rastlanmamıştır. Bu nedenle, bilimsel makaleleri bütüncül olarak analiz etmeyi ve küresel verimlilik ve trend konularını belirlemeyi amaçladık.

Gereç ve Yöntemler: Bu çalışmada, Web of Science veri tabanından aromaterapi ile ilgili yayınlanmış 1428 makale (1985-2019) istatistiksel olarak analiz edilmiştir. Trend konularını, atıf analizlerini ve ülkeler arası işbirliklerini ortaya çıkarmak için bibliyometrik ağ görselleştirme haritaları oluşturulmuştur.

Bulgular: Amerika Birleşik Devletleri 316 yayın (%22,1) ile aromaterapi literatüründe birinci oldu. İngiltere, Japonya, İran ve Avustralya yayın sayıları ile ABD'yi takip etti (sırasıyla 143,136, 126, 74). Complementary Therapies in Medicine (50 makale), Journal Of Alternative And Complementary Medicine (47 makale) ve Evidence-Based Complementary And Alternative Medicine (36 makale) en üretken ilk 3 dergidir. Hur Mh (18 makale) en aktif yazar, University Of London (32 makale) en aktif kurumdur. Aromaterapi literatüründe en çok alıntı yapılan makale Edris tarafından yayımlanan "Pharmaceutical and therapeutic potentials of essential oils and their individual volatile constituents: A review" oldu. Aromaterapi çalışmalarında kullanılan en trend bitkilerin 111 çalışmada kullanılan Lavanta bitkisi, daha sonra sırayla, Linalol 16, Bergamot 16, ve 12 yayında da peppermint bitkisinin olduğu gösterilmiştir.

Sonuç: Aromaterapi tıbbın birçok alanında kullanım alanı olduğunu ve küresel olarak uluslararası önemli işbirlikler sayesinde bir çok dünya ülkesinde tedavi amaçlı kullanıldığı gösterilmiştir.

Anahtar Kelimeler: Aromaterapi; Bibliyometrik; Tamamlayıcı tıp; Esansiyel yağlar

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Introduction

Aromatherapy, one of the complementary medicines, is the use of plant extracts obtained from flowers, leaves, stems, stalks, fruits, seeds, and roots of plants (1). The plant extract is a hundred times more effective than the plant itself (2). The two most widespread forms of aromatherapy are inhalation and massage aromatherapy (3). Aromatherapy massage is one of the most favorite supplementary therapies that is non-invasive, cheap, and easy to perform (4). It involves several methods of manipulation of the body, such as rubbing, squeezing, deep and superficial massage, stroking, and vibrating actions (5). Aromatherapy massage is extensively utilized in complementary therapies. Aromatic herbal oils and herbal volatiles are slowly absorbed by the skin during aromatherapy massage within 10-30 minutes and show herbal therapeutic effects such as antipyretic, sedative, analgesic, and antispasmodic (6). There is literature on the use of aromatherapy in many pathologies such as cancer, immune system, sleep disorders, psychiatric disorders, oxidative stress, infectious diseases, and anymore (7-12).

Bibliometrics and scientometrics are recently trending statistical concept that provides a detailed analysis of the academic literature in a given field. Scientometric studies provide major scientific information such as the prolificacy of countries, authors, and institutions, the disintegration of publications, and publication trends and models (13). The academic literature is deprived of a scientometric search in the area of health and ancient complementary medicine like aromatherapy even though there has been a growing popularity of studies on alternative or complementary medicine area. This study targets to offer a holistic analysis of health literature on aromatherapy between 1985 and 2019. This is the first study in this area.

Material and Method

The data of this study were obtained by using the database of Thomson Reuters WoS (Thomson Reuters, New York, NY, USA). We used “aromatherapy”, “essential oils” keywords to search WoS database. We were able to access the database until 1985 and added all instruments made between 1985 and 2019. We excluded entire articles published in 2020. Statistical analyses were performed with SPSS (Version 22.0, SPSS Inc., Chicago, IL, USA; licensed for Hitit University, Corum, Türkiye). To create and visualize bibliometric networks, we used a free software tool called VOSviewer to create infographics showing bibliometric networks (14).

Results

Total Number of published items

A total of 1428 documents on aromatherapy were found to have been published between 1985 and 2019 as a result of the WoS database search. The majority of these publications consisted of original article (n=1005, 70.38%) followed by review (n=204, 14.29%), meeting abstract (n=92, 6.44%), proceedings paper (n=75, 5.25%), editorial material (n=30, 2.10%) and other publication types (n=22, 1.54%) (Table 1).

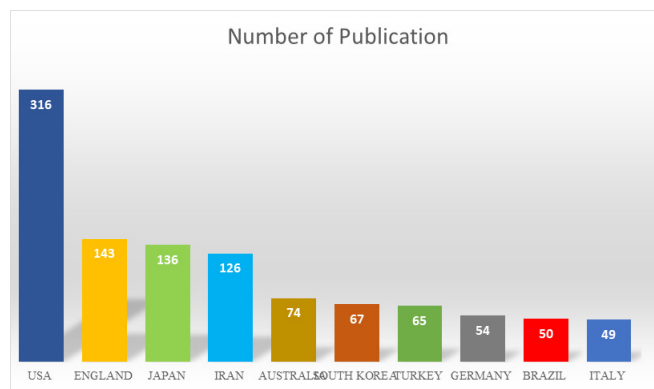
Productivity Of Countries

The United States dominated the literature on aromatherapy with 316 publications (22.1%) followed by England, Japan, Iran, and Australia (143,136,126,74, respectively) (Figure 1).

Table I. Types of publication on aromatherapy literature

Document Type	Number	%
Article	1005	70.38
Review	204	14.29
Meeting Abstract	92	6.44
Proceedings Paper	75	5.25
Editorial Material	30	2.10
Letter	20	1.40
News Item	2	0.14
Total	1428	100

Figure I. Top ten countries publishing aromatherapy publications by total number of items



We calculated the productivity points of countries publishing aromatherapy certificates using a simple formula (number of productions/population X 1,000,000).

Productivity scores revealed that Scotland was by far the most productive country with a score of 3,615 followed by Austria, Australia, England, and Taiwan (s=3,126, 2,936, 2,117, 1,598, respectively) (Figure 2,3).

Figure II. Top ten countries in productivity of aromatherapy literature

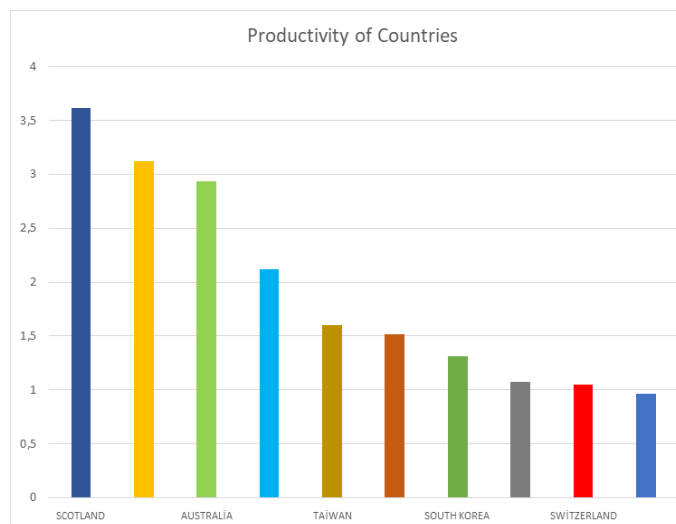
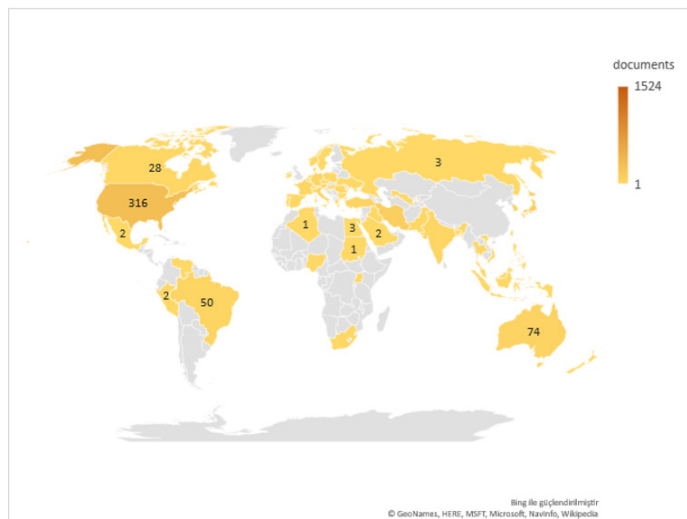


Figure III. Aromatherapy literature total publication density of world countries



Journals, publications, organizations, and authors integrative complementary medicine, nursing, pharmacology, pharmacy, medicine general internal, chemistry, medicinal were found to be the most published study subjects (274,189,129,101,79 respectively) (Table 2). Hur, Myung-Haeng was found to be the author with the most publications in aromatherapy with 18 records (Table 3). “Pharmaceutical and therapeutic potentials of essential oils and their individual volatile constituents: A review” published in the journal *Phytotherapy Research* in 2007. A review published by Edris in 2007 was the most-cited article in the aromatherapy literature, with 612 citations in the WoS database (average citation: 31.1 per year) (Table 4) (15). According to the number of documents published, the top 10 journals contained only 18.83% of the literature with 282 documents (Table 5). In the UK, the University of London published the highest number of aromatherapy publications with 32 documents, accounting for 2.24% of the total literature. Among the first 10 organizations include 4 UK, 3 Italy, and 2 Iranian universities (Table 6).

Table II. Types of publication on aromatherapy literature

Integrative Complementary Medicine	274
Nursing	189
Pharmacology Pharmacy	129
Medicine General Internal	101
ChemistryMedicinal	79
Food Science Technology	75
Psychiatry	68
Plant Sciences	65
Neurosciences	59
Oncology	58

Table III. Top ten authors by record count in aromatherapy

Authors	Record Count	%
Hur Mh	18	1.44
Lee Ms	16	1.28
Bagetta G	12	0.96
Corasaniti Mt	11	0.88
Morrone La	10	0.80
Lis-Balchin M	9	0.72
Rombola L	9	0.72
Sakurada S	9	0.72
Sakurada T	9	0.72
Adams J	8	0.64
Ozdemir L	8	0.64

Table IV. The 10 most cited manuscripts in the aromatherapy literature

Article	Authors	Journal name	Total citation	Average citations per year
Pharmaceutical and therapeutic potentials of essential oils and their individual volatile constituents: A review	Edris, Amr E.	<i>Phytotherapy Research</i>	614	51.16
Use and expenditure on complementary medicine in England: a population based survey	Thomas, KJ; Nicholl, JP; Coleman, P	<i>Complementary Therapies In Medicine</i>	437	24.2
Evidence for improving palliative care at the end of life: A systematic review	Lorenz, Karl A.; Lynn, Joanne; Dy, Sydney M.; et al.	<i>Annals Of Internal Medicine</i>	359	32.63
Biological activities of lavender essential oil	Cavanagh, HMA; Wilkinson, JN	<i>Phytotherapy Research</i>	348	21.75
Complementary and alternative medicine for menopausal symptoms: A review of randomized, controlled trials	Kronenberg, F; Fugh-Berman, A	<i>Annals Of Internal Medicine</i>	347	21.68
The escalating cost and prevalence of alternative medicine	MacLennan, AH; Wilson, DH; Taylor, AW	<i>Preventive Medicine</i>	307	18.05
The BBC survey of complementary medicine use in the UK	Ernst, E; White, A	<i>Complementary Therapies In Medicine</i>	289	15.21
Management of agitation and aggression associated with Alzheimer disease	Ballard, Clive G.; Gauthier, Serge; Cummings, Jeffrey L.; et al.	<i>Nature Reviews Neurology</i>	194	19.40
Pain management for women in labour: an overview of systematic reviews	Jones, Leanne; Othman, Mohammad; Dowswell, Therese; et al.	<i>Cochrane Database Of Systematic Reviews</i>	187	11
Aromatherapy as a safe and effective treatment for the management of agitation in severe dementia: The results of a double-blind, placebo-controlled trial with Melissa	Ballard, CG; O'Brien, JT; Reichelt, K; et al.	<i>Journal Of Clinical Psychiatry</i>	182	10.70

Table V. The first 10 journals source according to the number of published documents

Journal Name	Number of publications	%
Complementary Therapies in Medicine	50	3.5
Journal Of Alternative And Complementary Medicine	47	3.29
Evidence-Based Complementary And Alternative Medicine	36	2.52
Complementary Therapies in Clinical Practice	35	2.45
Journal of Perianesthesia Nursing	25	1.75
Natural Product Communications	17	1.19
Flavour and Fragrance Journal	16	1.12
Cochrane Database Of Systematic Reviews	15	1.05
Contact Dermatitis	14	0.98
Phytotherapy Research	14	0.98
BMC Complementary and Alternative Medicine	13	18.83

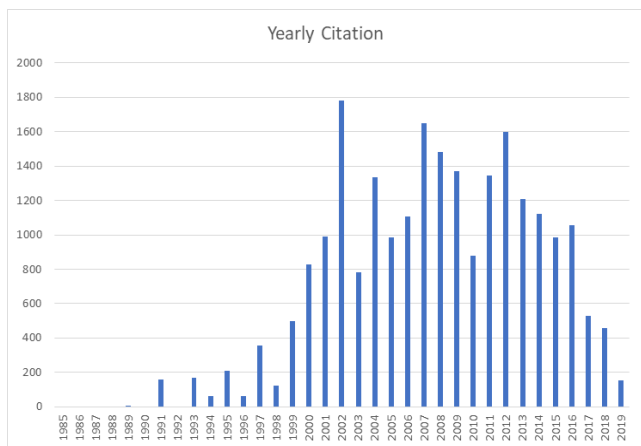
Table VI. The top ten institutions by number of publications in aromatherapy literature

Organizations	Document Number	%
University Of London (England)	32	2.24
Eulji University (South Korea)	22	1.54
Tehran University Of Medical Sciences (Iran)	19	1.33
Shahid Beheshti University Medical Sciences (Iran)	18	1.26
Kings College London (England)	17	1.19
University Of Calabria (Italy)	17	1.19
University Of Exeter (England)	17	1.19
University College London (England)	15	1.05
University Of Vienna (Austria)	15	1.05
Magna Graecia University Of Catanzaro (Italy)	14	0.98

Progression of aromatherapy literature

Total number of aromatherapy documents was highest in 2017 and a total of 167 documents were published. The number of citations varied for each year (Figure 4). The highest number of citations is seen in 2002 with 1779 citations. In the last 3 years, the number of citations has decreased (Figure 5).

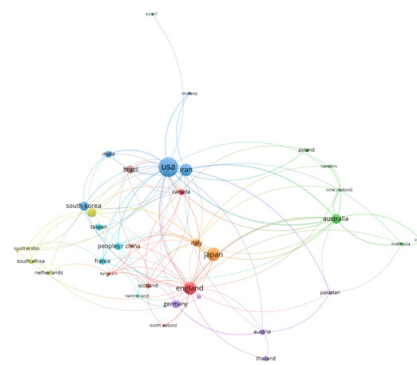
Figure V. Citation of yearly



Co-Authorship network for countries

We formed a co-authorship network for countries by utilizing the WoS database. We developed a co-authorship network for countries utilizing the WoS database. This network revealed both the productivity performance of countries by point size and the linkages between countries, including the authors who co-published. The United States, for example, has the largest number of full-color publications and has connected with countries of the same color, such as Iran, South Korea, and India. Authors from countries of similar color were published together and became co-authors of publications (Figure 6).

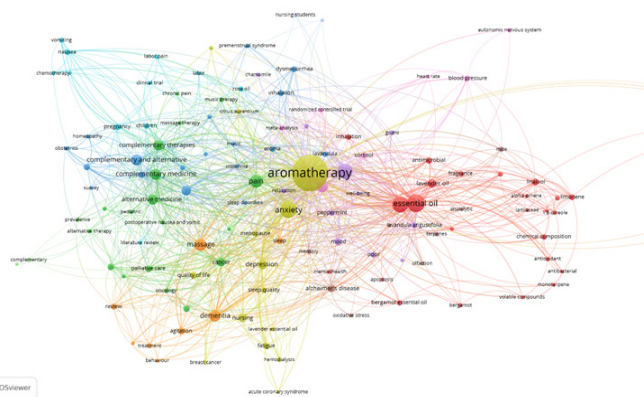
Figure VI. Co-authorship network in aromatherapy literature



Keyword analysis

Aromatherapy was the most used keyword followed by essential oil, anxiety, essential oils, lavender, pain and massage. We formed a network and link map utilizing the most frequently used keywords according to keyword density (Figure 7). Keywords close to each other are in the same color. For example, aromatherapy, anxiety, depression, sleep quality, lavender essential oil, fatigue, and hemodialysis were related keywords and aromatherapy was used the most (Figure 7).

Figure VII. Keyword network in aromatherapy literature



Discussion

Bibliometrics is a new scientific field used in scientific studies to analyze scientific big data on a specific topic. In 1986, Campbell published the first bibliometric statistical analysis (15). Bibliometrics makes it easier for researchers to make a more meaningful data analysis by looking at the forest, not the tree, of many data such as the interaction of countries, authors, institutions working on the subject, and the scientific content produced. Here, we aimed to contribute

to the creation of plans for further studies by trying to provide a holistic evaluation of scientific data on aromatherapy literature.

Essential oils extracted from aromatherapy plants are the main products used in aromatherapy. Essential oils are compounds extracted from plants. Essential oils are obtained through distillation or mechanical methods. Essential oils have been used since ancient times, from the attribution of Hippocrates to the Egyptians utilizing their antibacterial properties. Essential oils are widely used to treat and protect humans as well as animals from disease.

It is known that cultures in different geographies from ancient China, India, and Tibet to the Middle East, from Mesopotamia to the American Indians, and from Africa to Ancient Rome have been applying their own endemic plants with different rituals within their own historical development. With aromatherapy dating back so many years and shifting from traditional methods to the scientific field, it is accepted as a complementary health method rather than an alternative in many fields. The fact that there are publications from 62 different countries on aromatherapy, which is considered to be a branch of phytotherapy, shows that this field also has a traditional side.

In our screening, its use in many fields of medicine such as cancer, cardiovascular diseases, atherosclerosis, thrombosis, neuroscience, antibacterial, antiviral, antioxidant, psychiatry, food science, dermatology, obstetrics, and gynecology is being investigated. In neuroscience, Ballard, GG et al. Management of agitation and aggression associated with Alzheimer's disease study received 195 citations (16). In another important study, the antibacterial and antifungal properties of the active ingredient Thymol were investigated, and we found that it was cited in 106 scientific studies (17). In another study, we observed aromatherapy massage applications in palliative therapies of cancer patients. We have seen that the most important plants used in aromatherapy or essential oil studies are lavender, used in 111 studies, followed by lanalol 16, bergamot 16, and peppermint in 12 publications.

USA was seen as the country with the highest number of publications. We have seen that aromatherapy publications have continued to increase in recent years. We have seen that some countries such as USA and England stand out in aromatherapy publications. In the productivity ranking of countries, we saw that Scotland had the highest productivity. We determined that the institution that contributed the most to the aromatherapy literature was the University of London. We determined that the journal *Complementary Therapies In Medicine* was the journal with the highest number of publications with 50 publications.

With the publication made by Edris Amr E, we saw that he received the most citation with 614 citations. We have seen that it has the highest citation rate with an average of 51.16 citations per year (18). We saw that the author who contributed the most publications to the aromatherapy literature was Hur MH with 18 publications.

We found that complementary medicine is the most published research area in the aromatherapy literature. In a study by Metin et al. (19), they examined the effects of aromatherapy massage on neuropathic pain severity and quality of life in patients with painful diabetic neuropathy. As

a result of the study, they found that neuropathic pain scores decreased significantly in the patient group compared to the control group in the fourth week of the study and there was a significant improvement in quality of life scores in the patient group. In a randomized, placebo-controlled clinical trial (20) evaluating the effects of aromatherapy on fatigue among women with hypothyroidism, they showed that regular inhalation of an essential oil aromatherapy mixture can relieve fatigue among women with hypothyroidism, particularly in the areas of general, emotional and overall fatigue. A 3-arm, parallel-group, randomized clinical trial (21) by Çiçek et al. examined the effect of aromatherapy via lavender oil inhalation and foot massage on stress response and blood pressure in patients with arterial hypertension. They found that lavender oil and foot massage decreased pulse rate, blood pressure, serum cortisol, and anxiety in hypertensive patients.

Through keyword analysis, a network visualization cluster analysis map was performed to exhibit how aromatherapy topics tend to be grouped. The diverse clusters are shown in diverse colors. Similar colored keywords are grouped in identical clusters. The number of keyword occurrences is denoted by the dimension of the circle. Aromatherapy was the most used keyword, followed by essence, anxiety, essential oils, lavender, pain and, massage. We set up a network and links map using the most used keywords based on keyword prevalence.

No comprehensive bibliometric study on aromatherapy was found in our literature review. Hur MH was the author who contributed the most publications to the aromatherapy literature. Our study addressed all aspects of aromatherapy.

The limitations of our study is the limited database including only the WoS database. Since citation analysis cannot be done in Pubmed database, bibliometric analyses are not prominent. We prefer the WoS database because it indexes articles published in journals with a higher impact factor than other databases (journals indexed in science citation index-expanded and emerging sources citation index). Another limitation is that the most recent publications in 2020-2022 were not included as they did not have enough time to accumulate significant citations, which may partly influence our results due to the rapid updating of the hotspots and frontiers of the research.

Conclusion

Scientific publications on aromatherapy have increased chronologically over the years. The USA has the highest number of publications on Aromatherapy and has established links with countries such as Iran, South Korea, and India. This shows us that there is significant international cooperation globally. We have shown that aromatherapy has applications in many fields of medicine and is used for therapeutic purposes in many countries around the world.

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