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THE USAGE OF SAGE OIL (BITTER APPLE OIL) IN INFANTS IN DENIZLI PROVINCE

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ABSTRACT

Introduction: Sage oil (SO), derived from Salvia officinalis, also known as bitter apple oil, presents potential risks for infants. These risks include tonic-clonic seizures triggered by oral ingestion and chemical pneumonitis from inhalation. Limited data exist on dermal effects. This study investigates the usage of SO in infants and children in Denizli. **Materials and methods**: Demographic data, details of SO usage, advice sources, and convulsion history were collected through face-to-face interviews with mothers of children aged zero to four years. **Results**: Among the 388 participating mothers, 15.7% (n=61) reported using SO in their infants and children. The initial use occurred primarily on the day of birth (10.5%), with a mean of 73.5 days and a maximum of 18 months. Application areas included the abdomen (n=29), soles of the feet (n=26), chest (n=3), and other regions (n=4). None of the mothers reported oral administration. More than half of the mothers started using SO based on a family member's recommendation. No significant differences in the frequency of SO use were found concerning family structure, mothers' education level, age at first birth, duration of marriage, or mode of delivery (normal/cesarean). **Conclusion**: According to the literature, the use of SO can lead to side effects. In our study, no instances of oral administration and related side effects were reported. Parents and caregivers should be made aware of this substance during childcare education.

KEYWORDS: Sage oil, Salvia officinalis, convulsions, infant care.

INTRODUCTION

Sage (Salvia officinalis L.) is a valuable essential oil and spice plant belonging to the Lamiaceae family.[1] Sage oil (SO) is an essential oil obtained by steam distillation of Salvia officinalis leaves and is also called bitter apple oil or apple oil. There are more than 100 brands of sage oil marketed in Turkey.[2] It is generally used by applying it to the abdomen and heel area of infants, and sometimes by taking it by mouth drops.[2] Studies have identified substances such as 1,8-cineole, α-humulene, α-pinene, α-thujone, β-caryophyllene, β-myrcene, β-pinene, β-thujone, borneol, bornyl acetate, camphene, camphor, gamma-terpinene, germacrene, humulene epoxide, isothujol, limonene, linalool, linalylacetate, trans-sabinenehydrate and viridiflorol in SO.[3],[4] Thujone, camphor and cineole have been reported as the main convulsant substances.[5] Adverse events related to the use of SO reports have been documented for a total of 15 individuals in the literature.[6],[7],[8],[9],[10],[11],[5],[12]

No studies on the usage of this product in infants have been conducted outside our country. Our study aims to investigate the usage characteristics of this product, which may have potential side effects.

MATERIALS AND METHODS

Our descriptive study, initiated after approval from the local ethics committee (Pamukkale University Ethics Committee; Date: 14.3.2023, Number: 5), encompasses mothers of infants and children aged 0-4 as the study

population. The number of children between the ages of 0-4 in Denizli in 2018 was 68,276. Based on this number, at least 383 mothers were planned to be included in the study for a 95% confidence level. A questionnaire consisting of 21 questions was used. The first 13 questions were about demographic information and remaining 8 questions were about the usage of Sage (bitter apple) oil. The 4th question was excluded from the evaluation due to complexity reported by families during the filling process. The questionnaires were filled in by the researchers by face-to-face interviews with the mothers who came to the hospital. The collected questionnaires were entered into the system via Microsoft Forms for convenience. Then, the data was exported in Microsoft Excel format. The data underwent statistical analyses using IBM SPSS Version 22 software. For measurable values, t-test was applied in independent samples, chi-square test was applied among categorical variables, and results with a p value less than 0.05 were considered statistically significant. The study adhered to the principles outlined in the Helsinki Declaration of 2008.

RESULTS

Within the scope of the study, 388 mothers were contacted. The ages of the mothers ranged from 20 to 46 years, with a mean age of 30.6 ± 5.41 years. Family structures were predominantly nuclear, accounting for 86.9% of the participants. Mothers' educational status was reported as 17% primary school, 15% middle school, 36% high school, 31% university and 1% unspecified. When the years of marriage were asked, it was stated that 37.4% were married for 1-5 years, 36.9% for 6-10 years, 13.9% for 11-15 years, 8.2% for 15-20 years and 2.6% for more than 20 years. Information on the duration of marriage was not provided by 1% of the participants.

When the maternal age at first birth was examined, it was determined that 3.9% were younger than 18 years old, 39.2% were 18-22 years old, 34.3% were 23-27 years old, 18% were 28-32 years old and 4.6% were over 33 years old. It was stated that cesarean section was performed in 73% of the cases and normal delivery was performed in 27%.

The time of birth of the babies ranged from 24 to 44 weeks, with a mean time of 37.4 ± 2.76 weeks. The gender distribution was found to be close as 50.8% girls and 49.2% boys.

Of the mothers surveyed, **61 (15.7%)** stated that they applied sage oil (bitter apple oil) to their babies. 10.5% of these mothers stated that they started the practice on the day their babies were born. The median time of onset of the application was determined as the 40th day, the mean 73.5 ±99 and the latest 547th day. Abdomen (n=29), soles of feet (n=26), chest (n=3) and other areas (n=4) were among the application areas. **None of the mothers stated that they had administered orally**. 52.46% of the mothers said that they started to apply it with the suggestion of another relative, 19.67% with the suggestion of their mother-in-law, 13.11% with the suggestion of their mother and 14.75% with their own decision. Of the 384 cases who responded to the survey, 5.4% (n=21) stated that their child had had at least one seizure. Of these cases, 80.9% (n=17) had febrile convulsions and 19% (n=4) had afebrile convulsions. None of these seizures occurred following SO intake.

There was no difference between the nuclear family structure and the extended family in terms of SO usage (Chi-square, p=0.246). The rate of use was similar between girls (15.74%) and boys (15.71%) (p=0.735).

There was no significant difference between mothers who gave birth by normal birth and cesarean section in terms of SO use (p=0.125). The rate of use was the highest with 22.86% in mothers with 28-32 years of first gestational age, but no statistically significant difference was found between the groups (p=0.431). The usage rates were similar across different education levels, and no statistically significant differences were found (Table 1).

There was no statistically significant difference in the usage rates according to the year of marriage (Table 2).

The history of convulsions in infants and children who used SO (4.59%) was calculated at a lower rate than those who did not use it (9.84%) and was found to be statistically significant ($p < 0.001$). Among those using SO, a history of afebrile convulsions was reported by only one person. However, it was explicitly mentioned that the convulsion did not occur following the epidermal application of SO.

Table 1: SO utilization rates by education levels.

Educational background	Yes	No	Sum	Rate	P-value
No	0	3	3	0	
Primary school	8	57	65	12.31%	0.788
College	24	117	141	17.02%	0.788
Secondary school	8	50	58	13.79%	0.788
University	21	100	121	17.36%	0.788
Sum	61	327	388		

Table 2: SO usage rates by years of marriage.

		Yes	No	Sum		P-value
Duration of marriage	ON	0	4	4	0.00%	
	1-5 years	19	126	145	13.10%	0.353
	11-15 years	10	44	54	18.52%	0.353
	15- 20 years	8	24	32	25.00%	0.353
	Over 20 years	3	7	10	30.00%	0.353
	6-10 years	21	122	143	14.69%	0.353
Total		61	327	388		

Table 3: Human adverse reaction reports of SO.

No	City	Number of Cases	Form of side effect	Year	Reference
1	Hatay	1	Convulsions (Oral intake)	2012	[6]
2	Turkey	1	Convulsions (Oral intake)	2012	[7]
3	Muğla	2	Convulsions (Oral intake)	2017	[18]
4	Eskişehir	1	Chemical Pneumonia (Inhalation)	2011	[8]
5	Ankara	1	Convulsions (Oral intake)	2004	[9]
6	Diyarbakır	4	Intoxication (Oral intake)	2016	[10]
7	İzmir	2	Convulsions (Oral intake)	2011	[11]
8	Switzerland	2	Convulsions (adult patient)	1999	[5]
9	Turkey	1	Convulsions (Oral intake)		[12]

DISCUSSION

Worldwide, there are about 900 species of the genus Salvia, and they are mainly distributed in the Americas and South-West Asia. The type of sage with the highest commercial value is Salvia officinalis, known as medicinal sage. Turkey is one of the countries where sage is collected the most, and there are 97 species, four subspecies and eight varieties.[1] It has been reported that 483.21 tons of sage plant were produced/harvested in our country in 2017.[13]

Thujone, camphor, cineole, among the numerous active substances in SO, have been mentioned as the main convulsant substances.[5] M. Culic and colleagues reported in their mouse experiments that camphor and 1.8 cineol exhibited epileptic effects.[14] Additionally, in another toxicity study conducted with mice, impaired motor coordination, muscle contractions, and convulsions were observed, followed by a decrease in motor activity and death.[3] Adverse event reports related to the use of SO in humans are listed in the table (Table 3).

Most reported cases are from Turkey, and there is very limited research on the usage of this substance, which can be convulsive. It has been reported that in Antalya, when children have abdominal pain, SO is applied to their abdomen and the soles of their feet. However, a specific percentage has not been mentioned.[15] Similarly, in Muğla, SO is applied to the abdomen and under the feet to alleviate gas and prevent abdominal pain, with a reported usage rate of 59%.[16] In Ödemiş, it has been reported that SO is used orally as a cough suppressant, total use at a rate of 14.7%. In our study, it was mostly reported to be applied to the abdomen, soles of the feet, and chest, with no reports of oral intake. The usage rate is similar to that reported in Ödemiş, at 15.7%.

The European Pharmacopoeia restricts the maximum allowable amount of thujone in SO to 5 mg/day, advising against its use for individuals under the age of 18 due to limited data.[17] There are no age or dosage warning labels on any of the products sold on the market in our country, and there are even instructions that it can be taken orally.[2]

The amount of α-thujone and Camphor ingredients varies according to the harvest period. It is desirable to have low α-thujone and Camphor values in commercial SO.[4] However, there were no quantities or warnings associated with these substances in the product boxes that we could access for examination.[2]

No significant differences were found in terms of family structure, education level, type of birth, first date of birth and number of years of marriage. Mothers made decisions based on the recommendations of others to start using. In the literature, adverse event reports related to use following the recommendation of a pediatrician have also been reported.[10] This result underscores the need for us to caution parents against the use of SO across all educational levels, ages, and social statuses.

The lower rate of convulsion history in infants and children who use SO compared to those who do not, does not mean that SO is preventive of convulsions. Because none of the mothers gave SO orally. This may explain the lack of reports of poisoning/convulsions due to SO in our city.

A notable limitation of this study is that it exclusively surveyed mothers who visited the hospital. This may introduce a potential selection bias, and the findings might not fully represent the broader population. Future studies should aim for a more diverse sample to enhance

the generalizability of the results.

The observed patterns in SO usage, particularly on the skin, warrant further comprehensive investigations, and the accumulation of case reports could contribute to a more nuanced understanding of its effects.

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REFERENCES

1. YILMAZ D, Gökduman ME. Adaçayı (salvia officinalis) bitkisinin farklı nem düzeylerinde fiziko-mekanik özelliklerinin belirlenmesi. *Ziraat Fakültesi Dergisi*, 2015; 10(1): 73-82.
2. Hepsiburada. Hepsiburada adaçayı yağı. Accessed 2/3/2023, 2023. https://www.hepsiburada.com/ara?q=ada%C3%A7ay%C4%B1+ya%C4%9F%C4%B1
3. Farhat GN, Affara NI, Gali-Muhtasib HU. Seasonal changes in the composition of the essential oil extract of east mediterranean sage (salvia libanotica) and its toxicity in mice. *Toxicon*, Oct., 2001; 39(10): 1601-5. doi:10.1016/s0041-0101(01)00143-x
4. Katar N, Katar D, AYDIN D, Olgun M. Tıbbi adaçayı (salvia officinalis l.)'nda uçucu yağ oranı ve kompozisyonu üzerine ontogenetik varyabilitenin etkisi. *Uluslararası Tarım ve Yaban Hayatı Bilimleri Dergisi*, 2018; 4(2): 231-236.
5. Burkhard PR, Burkhardt K, Haenggeli CA, Landis T. Plant-induced seizures: Reappearance of an old problem. *J Neurol*, Aug. 1999; 246(8): 667-70. doi:10.1007/s004150050429
6. Arica V, Arica S, Tutanc M, Motor S, Motor VK, Dogan MJTPA. Convulsion in infants as a result of oral use of garden sage/ada cayi yaginin agizdan kullanimina bagli sut cocugunda konvulziyon, 2012; 67-69.
7. Arica V. Salvia officinalis convulsions following accidental oral. *Reactions*, 2012; 1417: 1.
8. Harmancı K, Eren M, Koçak AK, İpar N, Şahin SJAAI. Chemical pneumonitis after accidental ingestion of sage oil: A case report, 2011; 9(2): 101-104.
9. SARICI SÜ, Mustafa K, CANDEMİR G, AYDIN Hİ, ALPAY F, GÖKÇAY EJGMJ. Neonatal convulsion after accidental ingestion of sage oil: A case report, 46(2).
10. Gündüz S, Kara S, Yüksel ÇN, Yılmaz AEJDTD. Acı elma yağının yanlış kullanımına bağlı dört zehirlenme vakası, 2016; 43(2): 364-366.
11. Halicioglu O, Astarcioglu G, Yaprak I, Aydinlioglu H. Toxicity of salvia officinalis in a newborn and a child: An alarming report. *Pediatr Neurol*, Oct. 2011; 45(4): 259-60. doi:10.1016/j.pediatrneurol.2011.05.012
12. Kapar, A. Sütçocuğunda Nadir Bir Jeneralize Konvülziyon Nedeni: Adaçayı Yağı İçimi. Klinik Tıp Pediatri Dergisi, 2018; 10(3): 19-20.
13. YAVUZ A, ERDOĞAN Ü. Organik tıbbi ve aromatik bitkilerin turkey'de üretim miktarı ve değerlendirilmesi. *Bayburt Üniversitesi Fen Bilimleri Dergisi*, 2019; 2(1): 124-130.
14. Culic M, Kekovic G, Grbic G, et al. Wavelet and fractal analysis of rat brain activity in seizures evoked by camphor essential oil and 1,8-cineole. *Gen Physiol Biophys*, 2009; 28: 33-40.
15. ÜNSAL A. Türk kültüründe geleneksel hasta bakimi: Anadolu örneğİ traditional patient care in turkish culture: Anatolian example. *Yüzüncü Yıl Sosyal Bilimler Enstitüsü Dergisi*, 2017.
16. Gürbüz Akçay UK, Hatice Topal, Yaşar Topal, Nilay Hakan, Esra Arun Özer. Muğla ilinde annelerin bebek bakımında uyguladıkları geleneksel yöntemler. *Ortadoğu Tıp Dergisi,* 2019; 11(3): 263-270.
17. Lachenmeier DW, Walch SG. Epileptic seizures caused by accidental ingestion of sage (salvia officinalis l.) oil in children: A rare, exceptional case or a threat to public health? *Pediatr Neurol*, Mar., 2012; 46(3): 201. author reply 201. doi:10.1016/j.pediatrneurol.2012.01.009
18. Gürbüz AKÇAY AO, Erol ÇETİNKAYA and Hüseyin ÇAKSEN. Report of two infants with seizure due to sage oil. *World Journal of Pharmaceutical*, 2017; 3(4): 101-102.