



## The Effect of Aromatherapy with *Rosa damascena* Essential Oil on Sleep Quality in Children

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### Abstract

**Background and objectives:** Sleep disorder is one of the main problems in children. Poor sleep quality can lead to adverse effects on their growth and development. Aromatherapy is a kind of method for improving sleep. In Iranian traditional medicine, inhaling *Rosa damascena* has been recommended for treating sleep disorder. Due to the side effects of chemical drugs and trend to alternative medicine due to less complication, the aim of this study was to investigate the effect of aromatherapy with *Rosa damascena* essential oil on sleep quality in children. **Methods:** This study was an experimental before and after study that conducted in 30 children with sleep disorder. Children inhaled 5 drops of *Rosa damascena* essential oil on a cotton ball before sleep for 20 min (2 weeks). Before and after intervention, BEARS questionnaire was asked. Wilcoxon signed-rank test was used for comparisons by SPSS software. **Results:** The results of this study showed that resistance to sleep, difficulty waking in the morning, nightmare and waking up during the night in children decreased ( $p < 0.05$ ) by inhaling *Rosa damascena* essential oil. There was no significant improvement in daytime sleeping and fatigue of children after aromatherapy. **Conclusion:** Aromatherapy with *Rosa damascena* was safe and could improve sleep quality in children with sleep disorders.

**Keywords:** aromatherapy; children; *Rosa damascene*; sleep; traditional medicine

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### Introduction

Sleep disorder is one of the most common problems in children [1]. The prevalence of sleep

disorder is different in international studies and has been reported between 1 and 43% in children

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(pre-school and school children) [2-7]. Sleep disorder has harmful impacts on all physical, cognitive and social aspects of children. Difficulty initiating or maintaining sleep, excessive daytime sleepiness, Snoring or other breathing problems, abnormal movements or behaviors during sleep are the most sleep complaints in children. Cultural factors, parental expectations and reactions, diseases and medications affect the quality of sleep. Many problems such as headache, anxiety, depression and decreased self-confidence are caused by sleep disorders [8,9]. Benzodiazepines are the most prescribed drugs to induce sleep with many side effects such as sleepiness, fatigue, headache, irritability, dizziness and amnesia [10]. Recently, with increasing trend to complementary medicine in treating children, aromatherapy has been considered due to considerable results and low side effects [11].

Aromatherapy is a holistic therapeutic method with a history of several thousand years. It helps maintaining health and improving physical and mental diseases with using essential oils. Essential oils are volatile liquid materials that are extracted from different parts of aromatic plants. Massage, anointment, bathing and inhaling are kinds of aromatherapy [12]. Many studies have shown considerable effects of aromatherapy on improving sleep quality [13,14]. Much evidence in Iranian traditional medicine (ITM) has shown considerable effects of aromatherapy on improving sleep quality [15-19]. *Rosa damascena* is one of the most common medicinal plants recommended to treat sleep disorders in ITM. It has antianxiety, tonic and hypnotic effects [20]. *Rosa damascena* is locally known as "Gol-e-mohammadi" in Iran. It is one of the most important species of Rosaceae family. Several studies have shown that it has antitussive, hypnotic, antidiabetic, relaxant, anti-HIV, antibacterial and antioxidant effects [21]. In a study, Rakhshandah et al. found that *Rosa damascena* essential oil (RO) increased the duration of sleep in mice [22]. Hajibagheri et al. showed that sleep quality of cardiac patients in

coronary care unit (CCU) was improved after inhaling RO [23]. Haze et al. revealed that inhaling RO had a suppressor effect on the sympathetic system and the adrenaline level [24]; while Maroufi et al. also reported that inhaling RO reduced the post-operative pain in children [25]. Two separate studies showed that aromatherapy had no significant effect on sleep quality in children with autism [26,27].

Although some studies have recommended RO to treat sleep disorders, no specified evaluation was found about its hypnotic effects on children. The aim of the present study was to determine the effect of aromatherapy with RO on sleep quality in children with sleep disorder.

## Material and Methods

### Preparation of the essential oil

The essential oil was purchased and evaluated using GC/MS in laboratory of School Phytochemistry, Shahid Beheshti University of Medical Science, Tehran, Iran. For finding the proper dose, similar studies were considered and preparations were made in oil base [28,30] and finally RO 10% products were packed in opaque glass droppers.

### Study population

Children were screened in 3 schools and 3 kindergartens by BEARS questionnaire in Tehran, Iran. Inclusion criteria were having of 5 to 12 age being diagnosed with sleep disorder by a physician, not using any hypnotic drugs, any history of asthma, allergy and disorders of nose. Exclusion criteria were the tendency to leave the study and report of side effect after intervention.

### Study design

This study was an experimental pretest-posttest evaluation that was conducted on 30 children with sleep disorders. Children inhaled RO after going to bed for two weeks and were followed up at the end of the first and the second week. The study was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences (Approval No. 171) and was registered in the

Iranian Registry of Clinical Trials (IRCT) under the number: IRCT2015062222865N1. After explaining the study to the parents and accepting its conditions, a written informed consent was signed by the parents.

### Intervention

For two weeks children inhaled 5 drops of RO 10% on a cotton ball (with a diameter 3 cm) for 20 minutes every night after going to bed. The parents were asked to have direct supervision of the procedure during the intervention. At the end of the first week, the parents were contacted and the method, child's feeling and possible side effect were controlled. Final evaluation was done at the end of the second week.

### Measurements

Evaluation of medical history and physical examination were performed and two questionnaires were filled by a physician. The first questionnaire included demographic information (age, gender, education, etc.) and the second questionnaire was BEARS. This questionnaire evaluates the children's sleep disorders in five domains, including bedtime issues, excessive daytime sleepiness, night awakenings, regularity and sleep disordered breathing. It is composed of some questions and filled with yes or no answer. It has been translated into Persian language and validity and reliability have been confirmed in Mohammadi's study in Iran [31]. For further evaluation of the related complaint, more detailed questions were asked regarding biographies of children and sleep status. A pediatrician was consulted for final confirmation.

### Statistical analysis

SPSS version 21.0 was used for analysis. The mean, standard deviation, and frequency of variables were calculated. Wilcoxon signed-rank test was used for comparisons.

### Results and Discussion

After screening, 35 children with eligibility

criteria were enrolled in the study but five children leaved the intervention. Three boys did not like the smell of RO and two of them (the youngest children) did not cooperate. Fifteen girls and 15 boys with sleep disorder continued the study. Their age was in the range of 5-12 years old (mean age  $7.4 \pm 2.4$  years). Demographic data of participants have been shown in table 1.

For evaluation of efficacy, the mean of BEARS items was evaluated at the beginning of the intervention and 2 weeks later (table 2). The statistical Wilcoxon signed-rank test before and after aromatherapy showed that mean of some items decreased significantly during the intervention ( $p < 0.05$ )

Adverse side effects were not reported by the parents. In two children transient burning sensation in the nose were reported by their parents in the beginning days of intervention. Most parents reported that children usually fell asleep between 5 to 15 min after inhaling RO. They also mentioned that their children liked the smell and had better sleep and relaxed face during sleep. Onset of changes in symptoms was usually reported from the first night.

**Table 1.** Demographic characteristics of children with sleep disorders (n=30)

Variable	value
age	$7.4 \pm 2.4$ (year)
male	7.5 (15) %
female	7.5 (15) %
weight	$26.3 \pm 8.2$ (kg)
height	$123 \pm 18.07$ (m)
Preschool children	7 (14) %
schoolchildren	8 (16) %

**Table 2.** Sleep quality in children before and after aromatherapy

Sleep disorders	Before (mean)	After (mean)	p value*
Resistance to sleep	83.3%	13.3%	0.001
Difficulty waking in the morning	56.7%	10%	0.001
Nightmare	53.3%	13.7%	0.003
Waking up during the night	33.3%	3.4%	0.007
Daytime sleeping	40%	30%	0.059
Fatigue during the day	30%	20%	0.36

\*Wilcoxon Signed Ranks Test

The present study examined the effect of inhaled RO on children with sleep disorder and showed that it was effective on the resistance to sleep, difficulty waking in the morning, nightmare and waking up during the night in children ( $p < 0.05$ ). The result of aromatherapy on daytime sleeping was not significant ( $p: 0.059$ ) but it seemed that it was noticeable. There was no significant change in the fatigue of children after aromatherapy ( $p < 0.36$ ). Our result was generally consistent with previous studies, which showed that aromatherapy was effective in sleep quality [13,14].

Hajibagheri et al. showed quickly falling asleep in the experimental group after RO aromatherapy on sleep quality of adult patients ( $p < 0.05$ ) [23]. In our study, we did aromatherapy on children and we also found that resistance to sleep decreased. ITM physicians believed that RO with anti-anxiety effect was suitable for children [16,20]. Haze et al. showed that RO had suppressor property on the sympathetic system and adrenaline level [24]. Emotional problems and anxiety is one of the main reasons for resistance to sleep in children [32] while ITM believes that sleep quality in children is affected by anxiety and inherent weakness and it is thought to be improved by using antianxiety and tonic herbal medicine such as *Rosa damascena* [16,20]. According to the studies, aroma molecular compounds enter the neurochemical pathway via the limbic system and affect the central nervous system through the olfactory way and trigger the release of some neurotransmitters such as dopamine and serotonin [33]. Other reports have shown that intranasal drug delivery into central nervous system give better result in treatment of sleep disorders [34]. It seems that due to inhalation of RO and stimulating the limbic system and suppression of the sympathetic system, calmness was induced in children and falling asleep happened earlier while nightmares decreased. Since sleep disorder can be the result of brain weakness in ITM, it seems RO with its inclusive effect on brain and anti-anxiety component could act specifically. Now, there are

different mechanisms for improving sleep quality. ITM believes in a wide mechanism for improving sleep, which requires more extensive research to be assessed. There was no significant change in the fatigue of children after aromatherapy ( $p < 0.36$ ). It was concluded that some issues such as anemia, high school assignments and spending too much time watching TV could have affected these items.

It could be said that there were some limitations in our study. We had faced a variety of personal sleep habits in children that affected the sleep quality which were out of our control. Different conditions between pre-school children and school children that influenced the sleep quality were another problem. So, it is suggested that future studies be focused on one kind of sleep disorder on children with similar conditions and follow up the results of aromatherapy for at least two week after the end of intervention.

The present study showed that only inhaling *Rosa damascena* essential oil (without any intervention such as massage, bath or hospitalization) showed significant effects in improving sleep quality in children with sleep disorders. Considering the positive results, this method can be considered as safe, suitable and acceptable in improving the quality of sleep in children.

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### **Declaration of interest**

The authors declare that there is no conflict of interest. The authors alone are responsible for the content of the paper.

## References

- [1] Hintze JP, Paruthi S. Sleep in the pediatric population. *Sleep Med Clin*. 2016; 11(1): 91-103.
- [2] Ipsiroglu OS, Fatemi A, Werner I. Prevalence of sleep disorders in school children between 11 and 15 years of age. *Wien Klin Wochenschr*. 2001; 113(7-8): 235-244.
- [3] Meltzer LJ, Mindell JA. Sleep and sleep disorders in children and adolescents. *Psychiatr Clin North Am*. 2006; 29(4): 1059-1076.
- [4] Boyle J, Cropley M. Children's sleep: problems and solutions. *J Fam Health Care*. 2004; 14(3): 61-63.
- [5] Owens J. Classification and epidemiology of childhood sleep disorders. *Prim Care*. 2008; 35(3): 533-546.
- [6] Abuduhaer A, Xu PR, Muzhapaer D. Sleep disorders and their influencing factors in primary school children from Urumqi. *Zhongguo Dang Dai Er Ke Za Zhi*. 2007; 9(6): 543-545.
- [7] Badin E, Haddad C, Shatkin JP. Insomnia, the sleeping giant of pediatric public health. *Curr Psychiatry Rep*. 2016; Article ID 26993792.
- [8] Wise M, Glaze D. *Assessment of sleep disorders in children*. [Accessed 2015]. Available from: [http://www.uptodate.com/contents/index\\_accord.htm](http://www.uptodate.com/contents/index_accord.htm).
- [9] Hannan K, Hiscock H. Sleep problems in children. *Aust Fam Physician*. 2015; 44(12): 880-883.
- [10] Arbanas G, Arbanas D, Dujam K. Adverse effects of benzodiazepines in psychiatric outpatients. *Psychiatr Danub*. 2009; 21(1): 103-107.
- [11] Adams D, Dagenais S, Clifford T, Baydala L, King WJ, Hervas-Malo M, Moher D, Vohra S. Complementary and alternative medicine use by pediatric specialty outpatients. *Pediatrics*. 2013; 131(2): 225-232.
- [12] Fradelos E, Komini E. The use of essential oils as a complementary treatment for anxiety. *Am J Nurs Sie*. 2015; 4(1): 1-5.
- [13] Hwang E, Shin S. The effects of aromatherapy on sleep improvement: a systematic literature review and meta-analysis. *J Altern Complement Med*. 2015; 21(2): 61-68.
- [14] Lillehei AS, Halcon LL. A systematic review of the effect of inhaled essential oils on sleep. *J Altern Complement Med*. 2014; 20(6): 441-451.
- [15] Keyhanmehr AS, Movahhed M, Sahranavard S, Hamdieh M, Afsharpaiman S, Gachkar L, Nikfarjad H. Which aroma in Iranian traditional medicine is effective on sleep disorders? *Galen Med J*. 2017; 6(1): 3-11.
- [16] Nazemjahan M. *Exir-e-azam*. Tehran: Tehran university of Medical Science, Institute for Islamic and Complementary Medicine, 2007.
- [17] Ibne Sina H. *AlQanoun fi al teb*. Beirut: Alalamy, 2005.
- [18] Azam Khan Cheshti H. *Qarabadin-azam*. Tehran: Nezami, 2011.
- [19] Arzani MA. *Tebbe akbari*. Qom: Jalaeddin, 2008.
- [20] Aghili-Khorasani MH. *Makhzan-al-adviyeh*. Tehran: Sabz, 2011.
- [21] Boskabady MH, Naser Shafei M, Saberi Z, Amini S. Pharmacological effects of *Rosa damascena*. *Iran J Basic Med Sci*. 2011; 14(4): 295-307.
- [22] Rakhshandeh H, Sadeghnia HR, Ghorbani A. Sleep-prolonging effect of *Coriandrum sativum* hydro-alcoholic extract in mice. *Nat Prod Res*. 2012; 26(22): 2095-2098.
- [23] Hajibagheri A, Babaii A, Adib-Hajbaghery M. Effect of *Rosa damascena* aromatherapy on sleep quality in cardiac patients: a randomized controlled trial. *Complement Ther Clin Pract*. 2014; 20(3): 159-163.
- [24] Haze S, Sakai K, Gozu Y. Effects of fragrance inhalation on sympathetic activity in normal adults. *Jpn J Pharmacol*. 2002; 90(3): 247-253.
- [25] Marofi M, Sirousfard M, Moeini M,

- Ghanadi A. Evaluation of the effect of aromatherapy with *Rosa damascena* Mill on postoperative pain intensity in hospitalized children in selected hospitals affiliated to Isfahan University of Medical Sciences in 2013: A randomized clinical trial. *Iran J Nurs Midwifery Res.* 2015; 20(2): 247-254.
- [26] Williams TI. Evaluating effects of aromatherapy massage on sleep in children with autism: a pilot study. *Evid Based Complement Altern Med.* 2006; 3(3): 373-377.
- [27] McLay LK, France K. Empirical research evaluating non-traditional approaches to managing sleep problems in children with autism. *Dev Neurorehabil.* 2016; 19(2): 123-134.
- [28] Lytle J, Mwatha C, Davis KK. Effect of lavender aromatherapy on vital signs and perceived quality of sleep in the intermediate care unit: a pilot study. *Am J Crit Care.* 2014; 23(1): 24-29.
- [29] Aligani Renani H, Noruzi Zamengani M, Asnafi A, Latifi M. The effect of aromatherapy with orange essential oils on sleep quality in the school-age children whit ALL. *Complement Med J.* 2015; 5(1): 1113-1121.
- [30] Soltani R, Soheilipour S, Hajhashemi V, Asghari G, Bagheri M, Molavi M. Evaluation of the effect of aromatherapy with lavender essential oil on post-tonsillectomy pain in pediatric patients: a randomized controlled trial. *Int J Pediatr Otorhinolaryngol.* 2013; 77(9): 1579-1581.
- [31] Mohammadi M, Ghaleboghi B, Ghaleh Bandi MF, Amintehrani E, Khodaie Sh, Shoaee Sh, Ashra MR. Sleep patterns and sleep problems among preschool and school-aged group children in a primary care setting. *Iran J Pediatr.* 2007; 17(3): 213-221.
- [32] Fricke-Oerkermann L, Pluck J, Schredl M, Heinz K, Mitschke A, Wiater A, Lehmkuhl G. Prevalence and course of sleep problems in childhood. *Sleep.* 2007; 30(10): 1371-1377.
- [33] Lv XN, Liu ZJ, Zhang HJ, Tzeng CM. Aromatherapy and the central nerve system (CNS): therapeutic mechanism and its associated genes. *Curr Drug Targets.* 2013; 14(8): 872-879.
- [34] Pires A, Fortuna A, Alves G, Falcao A. Intranasal drug delivery: how, why and what for? *J Pharm Pharm Sci.* 2009; 12(3): 288-311.