

Effect of Peppermint Aromatherapy on the Level of Anxiety in Patients Undergoing Colonoscopy

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ABSTRACT

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Background: Anxiety is one of the main problems in patients waiting for diagnostic procedures for digestive disorders, which unfavourably affects their recovery process. Therefore, it is essential to modify or eliminate it by approved methods that are not associated with major adverse effects. This study aimed to determine the effect of peppermint aromatherapy on the level of anxiety in patients undergoing colonoscopy.

Methods: This clinical trial was conducted on 50 patients undergoing colonoscopy referred to one of the training Quaem Hospital affiliated to Mashhad University of Medical Sciences, Mashhad, Iran, in 2015. The samples were selected through convenience sampling method, and they were randomly assigned into two groups of intervention and control. The subjects in the intervention group inhaled three drops of pure peppermint essential oil and 5 cc distilled water with a nebulizer mask for 10 min, half an hour prior to the colonoscopy. However, the patients in the control group inhaled distilled water. The level of anxiety was estimated in the pre- and post-intervention phases using Spielberger State-Trait Anxiety Inventory. Data analysis was performed in SPSS software, version 19 using Fisher's exact and Chi-squared tests, as well as paired and independent samples t-tests.

Results: According to the results of this study, the mean scores of anxiety were changed from 52.1±6.9 and 52.4±7.2 at the pre-intervention phase to 45.5±4.0 and 50.1±5.9 at the post-intervention stage, respectively (P<0.009).

Conclusion: Regarding the results, peppermint aromatherapy can decrease the level of anxiety before undergoing a colonoscopy. Therefore, it is recommended to employ this non-pharmacological, low-risk, and pleasant method for patients before invasive procedures such as colonoscopy.

1. Introduction

Colonoscopy is one of the most used methods of assessment for disorders affecting the lower gastrointestinal (GI) tract. In addition, it is the most efficient technique for colorectal cancer screening.¹ This method is constantly used for the diagnosis or treatment of a wide range of problems. The observation of the GI tract by endoscopy and colonoscopy is a painful procedure, which is typically associated with transient disruption of oxygen supply and tachycardia.²⁻⁴

Although colonoscopy does not usually a long time, the associated fear and anxiety could negatively affect the physical and mental responses

of patients⁵, resulting in increased pain and incomplete procedure.⁶ Additionally, the increased use of sedatives in these patients leads to prolonged hospitalization and recovery.⁷ Generally, the level of anxiety of patients increases before and after colonoscopy and endoscopy, and women are more affected by this complication than men.⁸

Therefore, it is essential to prevent and reduce the anxiety during the mentioned procedures.⁹ Nowadays, various medications such as midazolam, meperidine, and propofol are used to reduce the level of anxiety and discomfort in patients during colonoscopy, which could be associated with hypotension, respiratory depression, and deep sedation.

These complications led to the limited use of these medications just for sedation during colonoscopy.^{10,13} Despite the use of sedatives to prevent anxiety, observing the GI tract via endoscopy and colonoscopy is still considered as an invasive procedure associated with embarrassment, discomfort, and hopelessness because of their unexpected findings. All of these concerns affect patients' tolerance and can result in the increased level of anxiety.¹⁴

As a result, it is recommended to use complementary medicine treatments that are not associated with major complications along with medical techniques to calm patients.¹⁵

Although the available complementary medicine treatments are beneficial, some of them are associated with several limitations. However, it seems that aromatherapy is less limited and more applicable, which can be used as a simple and cost-effective technique in healthcare centers. Aromatherapy is defined as the use of aromatic plants essential oils to improve the physical and mental health status of patients.¹⁶⁻¹⁸ In this regard, one of the commonly used essential oils is extracted from peppermint.

The actual mechanism of peppermint essential oil for reducing anxiety is not clear. The probable mechanism of its action is that the inhaled molecules are transported up to the limbic system via the olfactory system and apply their anxiolytic and sedative effects by simulating the limbic system. In addition, the presence of effective substances including monoterpenes, sesquiterpenes, and flavonoids increases the impact of this extract on the central nervous system and benzodiazepine receptors, which improves its anxiolytic effect.¹⁹

Merat *et al.* in 2010 introduced peppermint essential oil as a sedative and anxiolytic agent, which can relieve tension headaches and the symptoms of irritable bowel syndrome.²⁰ Additionally, Khakshour *et al.* reported that peppermint essential oil inhibits the contractions caused by cellular depolarization and blocks the calcium channel. Moreover, it is used as an antispasmodic agent for smooth muscle relaxation.²¹

Ozgoli *et al.* in 2016 demonstrated that an effective substance in mint is menthol that affects the hypothalamus and suppresses the secretion of the corticotropin-releasing hormone and adrenocorticotropin, as well as cortisol from the pituitary and adrenal glands, respectively, and this process reduces the level of anxiety.²²

According to the evidence, there is an increasing need for diagnostic methods such as colonoscopy; therefore, making proper decisions about choosing non-invasive and non-pharmacological strategies to

calm patients with the lowest complications seems to be necessary.²³ To the best of our knowledge, there was no study carried out into the effect of peppermint on anxiety before and after invasive procedures such as colonoscopy. With this background in mind, this study aimed to determine the effect of aromatherapy with peppermint on the level of anxiety in patients undergoing colonoscopy.

2. Methods

2.1. Design

This clinical trial was conducted on patients waiting for colonoscopy referred to one of the training hospitals affiliated to Mashhad University of Medical Sciences, Mashhad, Iran, in 2015.

2.2. Participants and settings

The sample size was estimated to be 19 cases according to the study conducted by Park *et al.* in 2009 and sample size formula.¹⁹

$$n = \frac{(s_1^2 + s_2^2) \left(z_{1-\frac{\alpha}{2}} + z_{1-\beta} \right)^2}{(\bar{\mu}_1 - \bar{\mu}_2)^2}$$

$\mu_2 = 35/36$, $\mu_1 = 40/3$, $S_2 = 6.09$, $S_1 = 4.8$, $Z_{1-\alpha/2} = 1.96$, $Z_{1-\beta} = 0.84$, $\alpha = 0.05$

Ultimately, 50 individuals (25 cases per group) were selected considering 25% sample attrition. The subjects were selected through convenience sampling method and were randomly assigned into two groups of intervention and control using lottery method. In this regard, two series of cards (A and B) were provided for all the patients. The cards were placed in a closed box, and each eligible patient was asked to select a card. The patients who selected the A cards were assigned into the intervention group, whereas the remaining subjects were allocated to the control group.

The inclusion criteria entailed the age range of 18-60 years old, negative history of mental, cardiovascular, and respiratory diseases, lack of use of sedatives, no previous colonoscopy, alertness, lack of sensitivity to peppermint, and lack of impaired sense of smell. On the other hand, the exclusion criteria included severe pain and intolerance to aromatherapy during the determined period.

It is worth mentioning that data were obtained from direct observation, interview with subjects, and evaluation of their medical records. In order to ensure that the subjects had a normal sense of smell, two dark glass containers (one containing lemon extract and the other containing damask rose extract) were provided for the participants to detect any impairment in their sense of smell. Those

patients who were able to distinguish between the extracts were included in this study.

2.3. Instruments

Data were collected using demographic and clinical characteristics form (containing age, gender, marital status, the level of education, the reasons for colonoscopy, and the duration of colonoscopy) and Spielberger State-Trait Anxiety Inventory (STAI), which was developed by Spielberger *et al.* in 1970.²⁴ However, only the state anxiety was evaluated in the present study. The state anxiety scale contained 20 items in two positive (items: 1-2-5-8-10-11-15-16) and negative (items: 3-4-6-7-9-12-13-14-17-18) forms, which were scored from 1 to 4 (high, moderate, mild, no) and 1 to 4 (no, mild, moderate, high), respectively. The total score was ranged between 20 and 80, and the higher scores were indicative of higher levels of anxiety level. This tool has been standardized in Iran and its reliability has been frequently confirmed in Iran.²⁵ In the current

study, the reliability of the scale was estimated at the Cronbach's alpha of 0.82.

2.4. Data Collection

At first, the patients who referred to undergo colonoscopy and met the inclusion criteria were invited to participate in the study. All the participants entered the waiting room 30 minutes prior to the colonoscopy and completed the clinical and demographic characteristics form along and STAI as a self-report.

Thereafter, the patients in the intervention group received a 10-minute aromatherapy with three drops of pure peppermint essential oil (Barij Essence Pharmaceutical Co., Tehran, Iran) and 5 cc distilled water using a nebulizer mask. On the other hand, the subjects in the control group received only 100 drops of distilled water in the same way. All of the participants recompleted the STAI immediately after the intervention.

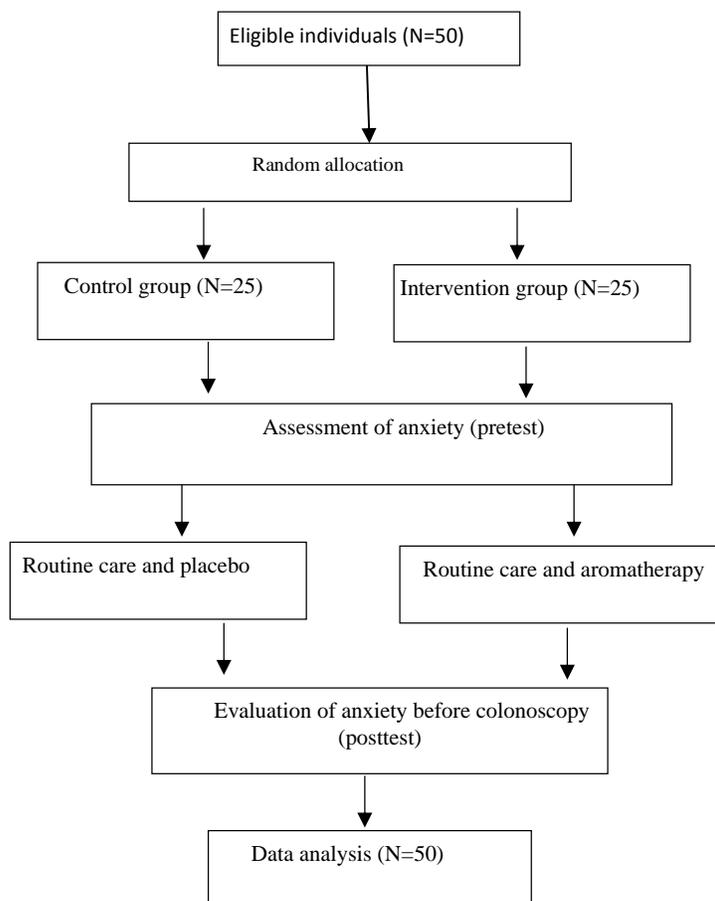


Diagram 1. Study steps

2.5. Ethical considerations

Prior to the study, the researcher explained the objectives of the study to the participants, and a written informed consent was obtained from all the subjects. In addition, the patients were ensured of the confidentiality terms regarding their personal information. Moreover, they were allowed to withdraw from the study at any time and it had no impact on their treatment. At the end of the study, the obtained results were given to the endoscopy ward of the selected hospital to use this technique.

2.6. Statistical analysis

Data analysis was performed using Chi-squared and Fisher's exact test (to evaluate the differences between the groups considering the demographic data), independent samples t-test (to compare the mean scores of the study groups in terms of duration of colonoscopy, age, and anxiety and their changes) and paired t-test (to compare the level of anxiety

between the groups at pre- and post-intervention phases) in the SPSS software, version 19.

3. Results

The demographic characteristics of the patients are presented in Table 1, according to which no significant difference was observed between the intervention and control groups in terms of the evaluated variables.

Regarding the results of paired t-test, the level of anxiety was significantly decreased in both group at the post-intervention phase ($P \leq 0.05$). However, there was a more significant reduction in the level of anxiety in the patients in the intervention group in comparison to the control group ($P = 0.001$). Furthermore, a significant difference was observed between the groups after aromatherapy in terms of the level of anxiety ($P = 0.009$; Table 2).

Table 1. Demographic and clinical characteristics of the participants

Variables	Groups	Intervention group	Control group	P-value
		N (%)	N (%)	
Gender	Male	13 (52)	9 (36)	0.19*
	female	12 (48)	16 (64)	
Marital status	Single	2 (8)	3 (12)	0.51*
	Married	23 (92)	22 (88)	
Level of education	Illiterate and elementary	11 (44)	5 (20)	0.18**
	Below diploma	3 (12)	5 (20)	
	Diploma and higher	11 (44)	15 (60)	
Reason for colonoscopy	Screening	8 (32)	10 (40)	0.55*
	Having symptoms of digestive disorders	17 (68)	15 (60)	
Duration of colonoscopy	M \pm SD****	9.4 \pm 1.7	10.1 \pm 1.6	0.62***
Age	M \pm SD	10.3 \pm 44.1	43.4 \pm 9.8	0.71***

* Fisher's exact test, ** Chi-squared test, ***Independent samples t-test, **** Mean and standard deviation

Table 2. Comparison of pre- and post-intervention mean score of anxiety between the intervention and control groups

Group	Time	Pre-test	Post-test	P-value*
		Mean \pm SD	Mean \pm SD	
Intervention group		52.1 \pm 6.9	45.5 \pm 4.0	0.001
Control group		52.4 \pm 7.2	50.1 \pm 5.9	
**P-value		0.905	0.009	0.019

*Paired t-test, **Independent samples t-test

4. Discussion

Considering the results of the present study, aromatherapy with peppermint decreased the level of anxiety in the patients before colonoscopy. Although the severity of anxiety of the subjects in the control group decreased at the post-intervention phase, the reduction was more significant in the intervention group.

Park *et al.* in 2009 demonstrated that the use of 10-minute combined aromatherapy 20 min prior to

the colonoscopy reduced the anxiety of participants at 10 min post-procedure.²⁶ However, in this study, the assessment of anxiety was carried out after the aromatherapy and before the colonoscopy. The consistency between the results might be due to an equal time interval between aromatherapy and colonoscopy.

Nevertheless, Lee *et al.* in 2010 conducted a study to evaluate the effect of combined aromatherapy (using of more than one extract) on

the level of anxiety in patients undergoing colonoscopy. They used combined aromatherapy with the essential oils of neroli, chamomile, lavender, and lemon immediately after entering the examination room and during the colonoscopy procedure. According to the results of the mentioned study, the level of anxiety decreased in patients. In addition, the Visual Analogue Scale was applied in the mentioned study.²⁷

Regarding the use of different study tools for assessing anxiety and diverse type of extracts, the consistency between the results might be due to the impact of aromatherapy during the procedure, which distracted the patients and led to the lack of focus on the diagnostic process. Considering the results of the current study, the level of anxiety of the subjects decreased immediately after aromatherapy, which might be due to the short-term impact of aromatherapy on anxiety.

Nevertheless, several studies have yielded contradictory results regarding the impact of aromatherapy on the patients undergoing colonoscopy. For instance, Muzzarelli *et al.* in 2006 pointed out that performing aromatherapy with lavender essential oil before several procedures including colonoscopy and endoscopy did not significantly decrease the level of anxiety among patients. Nonetheless, subjects expressed that they had a good feeling during aromatherapy. Moreover, Hu *et al.* in 2010 marked that aromatherapy with neroli essential oil had no significant impact on the anxiety and pain of patients undergoing colonoscopy. However, physiological parameters (e.g., systolic blood pressure) of the subjects in the intervention group were somehow significant compared to the control group.²⁸ Given the use of similar tools for assessing anxiety in both studies; this inconsistency might be due to the use of different essential oils in aromatherapy, which could be due to the sedative effects of peppermint.²⁹ In a study conducted by Teda *et al.* in 2011, performing 10-minute aromatherapy with peppermint had a positive effect on the level of cortisol hormones and chromogranin in patients.¹⁷

Furthermore, in congruence with the results of the present study, Vaezi *et al.* in 2017 demonstrated that aromatherapy with peppermint resulted in the reduced level of anxiety in patients with the history of heart failure hospitalized in intensive care unit.³⁰ On the other hand, Meshgin Abadi *et al.* in 2013 used combined aromatherapy with peppermint and lavender essential oils to reduce the level of anxiety

in patients who were candidate of percutaneous coronary intervention.³¹

The results obtained by Ezgoli *et al.* in 2013 revealed that the application of peppermint essential oil could decrease the severity of anxiety and pain caused by normal vaginal delivery.³² This result was in line with our findings, which might be due to the use of similar compounds.

One of the major drawbacks of this study was the lack of evaluation of duration of the anxiolytic effect of aromatherapy. It seems that it was more efficient to assess the level of pain, as well as changes in physiological parameters and comfort of the patients during colonoscopy for more extended generalization of the results. Therefore, further studies are recommended in this regard.

5. Conclusion

According to the results of the current study, aromatherapy with peppermint reduced the level of anxiety in patients before colonoscopy. In addition to the medicinal effect of aromatherapy, the process had a mental impact and distracted the attention of patients resulting in reduced level of anxiety in the subjects before an invasive procedure. Therefore, it is suggested to use this method as a non-pharmacological, low-risk, and pleasant technique in patients before invasive procedures such as colonoscopy.

Conflicts of interest

The authors declare no conflicts of interest.

Authors' contributions

Marzieh Mogharab : Research design and implementation, extract of results and writing of the article, Kazem Ayoubzadeh : Research design and final confirmation of the article, Gholam Reza Sharif-zadeh : statistics counselor and participation in writing of the article

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References

1. Gordon P. Screening for colorectal carcinoma. *Current Oncology* 2010; 17(2): 34-9.

2. Alcaín G, Guillén P, Escolar A, Moreno M, Martín L. Predictive factors of oxygen desaturation during upper

- gastrointestinal endoscopy in nonsedated patients. *Gastrointestinal Endoscopy* 1998; 48(2): 143-7.
3. Yilmaz M, Aydin A, Karasu Z, Gunsar F, Ozutemiz O. Risk factors associated with changes in oxygenation and pulse rate during colonoscopy. *Turkish Journal of Gastroenterology* 2002; 13(4): 203-8.
 4. Mahajan RJ, Johnson JC, Marshall JB. Predictors of patient cooperation during gastrointestinal endoscopy. *Journal of Clinical Gastroenterology* 1997; 24(4): 220-3.
 5. Maguire D, Walsh JC, Little CL. The effect of information and behavioural training on endoscopy patients' clinical outcomes. *Patient Education and Counseling* 2004; 54(1): 61-5.
 6. El-Hassan H, McKeown K, Muller AF. Clinical trial: music reduces anxiety levels in patients attending for endoscopy. *Alimentary Pharmacology and Therapeutics* 2009; 30(7): 718-24.
 7. Banihashem N, Alijanpour E, Basirat M, Shirvany JS, Kashifard M, Taheri H, et al. Sedation with etomidate-fentanyl versus propofol-fentanyl in colonoscopies: a prospective randomized study. *Caspian Journal of Internal Medicine* 2015; 6(1): 15.
 8. Arikian S. Assessment of anxiety levels in patients during elective upper gastrointestinal endoscopy and colonoscopy. *Turk J Gastroenterol* 2010; 21(1): 29-33.
 9. NikbakhtNasrabadi AR, Bakhshayeshi O, Parsayekta Z, Hoseyni M, Taghavi T, Rezvani H. The effectiveness of implementing nursing consultation on the anxiety of patients undergoing GI endoscopy. *Iran Journal of Nursing* 2012; 25(79): 54-62.
 10. Pascual MG, Zayas BM, Sáez BM, Abreu VM, Martínez LL. Propofol versus midazolam and pethidine in the colonoscopy realization. *Acta Gastroenterologica Latinoamericana* 2011; 41(3): 214-20.
 11. Repici A, Pagano N, Hassan C, Carlino A, Rando G, Strangio G, Romeo F, et al. Balanced propofol sedation administered by nonanesthesiologists: The first Italian experience. *World Journal of Gastroenterology* 2011; 17(33): 3818.
 12. Baudet JS, Aguirre-Jaime A. The sedation increases the acceptance of repeat colonoscopies. *European Journal of Gastroenterology and Hepatology* 2012; 24(7): 775-80.
 13. Horiuchi A, Nakayama Y, Kajiyama M, Kato N, Kamijima T, Ichise Y, et al. Safety and effectiveness of propofol sedation during and after outpatient colonoscopy. *World Journal of Gastroenterology* 2012; 18(26): 3420.
 14. Williams GL, Clarke P, Vellacott KD. Anxieties should not be forgotten when screening relatives of colorectal cancer patients by colonoscopy. *Colorectal Disease* 2006; 8(9): 781-4.
 15. Shahinfar J, Zera'ati H, Masroomnia M, Vafayi S, Hashemi F. Comparison of the effects of lavender and diazepam on the anxiety level of patients before orthopedic surgery. *Medical-Surgical Nursing Journal* 2016; 5(3):1-5.
 16. Buckle J. Aromatherapy: What is it? *Herbal Gram* 2003; 57(1): 50-60.
 17. Toda M, Morimoto K. Evaluation of effects of lavender and peppermint aromatherapy using sensitive salivary endocrinological stress markers. *Stress and Health* 2011; 27(5): 430-5.
 18. Babashahi M, Babashahi F, Fayazi S. Comparing the effect of massage Aromatherapy and massage on anxiety level of the patients in the preoperative period: a clinical trial. *Evidence Based Care* 2012; 2(2): 19-28.
 19. Nikfarjam M, Parvin N, Asaradegan N. The effect of *Lavandula angustifolia* in the treatment of mild to moderate depression. *Journal of Shahrekord University of Medical Sciences* 2010; 11(4): 66-73.
 20. Merat S, Khalili S, Mostajabi P, Ghorbani A, Ansari R, Malekzadeh R. The effect of enteric-coated, delayed-release peppermint oil on irritable bowel syndrome. *Digestive Diseases and Sciences* 2010; 55(5): 1385-90.
 21. Kiani MA, Sabbagh M, Najafi M, Khodadad A, Khakshour A, Kianifar HR, Jafari SA, Ghayour Mobarhan M, Saeidi M. Effect Supermint oil (peppermint oil) on Patient Satisfaction and the Colonoscopy team during Colonoscopy. *International Journal of Pediatrics* 2014; 2(2.1): 25.
 22. Ozgoli G, Torkashvand S, Salehi Moghaddam F, Borumandnia N, Mojab F, Minooe S. Comparison of peppermint and clove essential oil aroma on pain intensity and anxiety at first stage of labor. *The Iranian Journal of Obstetrics, Gynecology and Infertility* 2016; 19(21): 1-10.
 23. Tazakorri Z, Amani F, Karimollahi M. Effects of music on blood pressure of patients in endoscopy unit. *Iranian Journal of Nursing and Midwifery Research* 2010; 10(2):1-10.
 24. Spielberger CD. STAI manual for the state-trait anxiety inventory. *Self-Evaluation Questionnaire* 1970; 1(1):1-24.
 25. Dehghan-nayeri N, Adib-Hajbaghery M. Effects of progressive relaxation on anxiety and quality of life in female students: a non-randomized controlled trial. *Complementary Therapies in Medicine* 2011; 19(4): 194-200.
 26. Park JS, Kim JH. Effect of aroma oil inhalation on the anxiety of colonoscopy patients. *Journal of Korean Biological Nursing Science* 2009; 11(1): 85-91.
 27. Lee YM, Ahn HY. Effects of aromatherapy on anxiety and discomfort in patients having colonoscopy. *Journal of Korean Academy of Fundamentals of Nursing* 2010; 17(4): 539-47.
 28. Hu PH, Peng YC, Lin YT, Chang CS, Ou MC. Aromatherapy for reducing colonoscopy related procedural anxiety and physiological parameters: a randomized controlled study. *Hepato-Gastroenterology* 2010; 57(102): 1082.
 29. Muzzarelli L, Force M, Sebold M. Aromatherapy and reducing preprocedural anxiety: a controlled prospective study. *Gastroenterology Nursing* 2006; 29(6): 466-71.
 30. Vaezi AA, Parizi S, Vahidi AR, Tavangar H. Study the effect of inhalation of peppermint oil on depression and anxiety in patients with myocardial infarction who are hospitalized in intensive care units of Sirjan. *Journal of Medicinal Plants* 2017; 2(62): 55-62.
 31. Meshkin Abadi N, Ramezani B, Mahmoodi K. The effect of aromatherapy massage on anxiety in patients following percutaneous coronary intervention(PCI). *Preventive Care in Nursing and Midwifery* 2013; 2(1): 14-22.
 32. Ozgoli G, Aryamanesh Z, Mojab F, Alavi Majd H. A study of inhalation of peppermint aroma on the pain and anxiety of the first stage of labor in nulliparous women: a randomized clinical trial. *Qom University of Medical Sciences Journal* 2013; 7(3): 21-7.

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