

Original article

Two-week aroma inhalation effects on blood pressure in young men with essential hypertension

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Received 31 August 2012; received in revised form 12 December 2012; accepted 17 December 2012

Abstract

Aim: The purpose of this study is to assess the effects of two-week aroma inhalation on lowering the blood pressure of young patients with hypertension compared with a saline-treated control group.

Participants and methods: Forty newly enlisted soldiers undergoing training before placement diagnosed with hypertension were allocated non-randomly either a 2 week-essential oil aroma inhalation ($n = 20$) or saline solution control ($n = 20$). Outcome measures were blood pressure, 24-h ambulatory blood pressures and pulse rate on before, days 2, 5, 9, 12, 14 and 15.

Results: There were significant differences between the two groups, before treatment and 15 days after treatment, in the systolic blood pressure (SBP) ($p < 0.001$), diastolic blood pressure (DBP) ($p = 0.001$) and pulse rate ($p = 0.02$). In addition, the 24-h ambulatory full-time SBP ($F = 6.16$, $p = 0.02$), DBP ($F = 7.48$, $p = 0.01$) and PR ($F = 4.59$, $p = 0.04$) were all significantly different between the two groups (values measured before and after the two-week treatment). When the daytime and nighttime blood pressures were analysed separately, the daytime SBP ($F = 4.82$, $p = 0.03$) and DBP ($F = 5.68$, $p = 0.02$) demonstrated significant differences, but daytime PR, nighttime BP and PR did not.

Conclusion: A 2 week-aroma oil inhalation lowered the clinic blood pressures and pulse rates measured in the short-term use study. Lower SBP and 24-h ambulatory blood pressures were observed in the long-term use study.

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Keywords: Aromatherapy; Hypertension; Blood pressure; Ambulatory blood pressure

Introduction

With a general decrease in physical activity and increase in high calorie diets [1], 700 million people worldwide are suffering from hypertension [2], and at least 7 million deaths occur annually. Additionally, 64 million people live with disabilities from hypertension [3]. A three-year study from the Fourth Korean National Health and Nutrition Examination Survey reported that the prevalence rate of hypertension in the Korean population >30 years of age increased from 28.9% in 1998 to 31.9% in 2009, and in the population >65 years of age, the rate increased from 56.1% in 1998 to 64.9% in 2009 [4]. Because the number of

patients suffering from hypertension increases with age, it is extremely important to diagnose, control and treat elder hypertension patients that contribute to the high prevalence rate. However, because longer durations of the disease lead to a relative increase of complications, including cardiovascular and neurovascular diseases [5–7], identifying young patients with essential hypertension and controlling their blood pressure from an early stage [8] is also important, although they only constitute a small percentage of hypertension patients. According to the 2009 National Health Statistics, the awareness rate of hypertension in the population >30 years of age was 63.3%, and the treatment rate was 57.1%, and the control rate was 37.5% among the hypertension patients. For the people in their 30s, the awareness, treatment and control rates were 21.3%, 12.4% and 7.6%, respectively, showing overall lower rates. These rates are much lower than the hypertension awareness, treatment and controls rates of 58.8%, 42% and 30%, respectively, for people in their 20s and 30s according to the U.S. National Health and Nutrition

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Examination Survey (NHANES) [9]. For this reason, we targeted recently diagnosed young hypertension patients, rather than older patients undergoing drug treatment.

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) recommends a guideline of lifestyle changes [10]. Lifestyle changes, in addition to drug treatment with blood pressure lowering medication, can be effective in the prevention and control of hypertension. However, Lee et al. [11], who studied lifestyle change compliance rates in Korea, reported that 51% of hypertension patients failed to comply with lifestyle changes after 2 months; of the remaining subjects, only 41% complied with at least one lifestyle change. The authors brought attention to the necessity of structured programmes such as the changing the life style. Lee and Bae [12] showed through their study that newly diagnosed patients had higher expectations, confidence, behavioural intentions and compliance towards drug treatments than towards lifestyle changes, such as exercise and diet.

Although most patients rely more on drug treatments than on lifestyle changes to control hypertension, young patients in their 20s and 30s have low medication adherence rates [13] for prescribed drugs, leading to treatment difficulties. With its approachability and lower aversion, complementary therapy can be an alternative treatment for these young patients. Some types of aroma essential oils, used in aromatherapy, are known to exhibit lowering or raising effects on blood pressure. Lavender, marjoram, ylang ylang and May Chang oil aid in lowering blood pressure, while rosemary and thyme help to raise blood pressure [14]. Although complementary therapies, including aromatherapy, have often been used, their efficacy and safety have not been completely proven, and their use as treatments remains controversial. Aromatherapy can be used safely, but whether aromatherapy aids in lowering blood pressure remains to be determined.

Therefore, in this study, we evaluated the two-week aroma inhalation effects of lavender, marjoram, ylang ylang and a neroli blend on blood pressure in young hypertension patients.

Participants and methods

Study design

This study was a quasi-experiment that targeted young male essential hypertension patients to test the effects of aroma inhalation on clinic and 24-h ambulatory blood pressure measurements.

Study subjects

To maintain a constant experimental environment, the subjects were selected from newly enlisted soldiers undergoing training before placement, who were diagnosed with hypertension or met the criteria of hypertension according to the JNC 7 guidelines, as evaluated by an internist during their physical. The criteria of selection were subjects that had a systolic blood pressure (SBP) of >140 mmHg or a diastolic blood pressure (DBP) of

>90 mmHg. The exclusion criteria were patients who were taking antihypertensive medications, patients with chronic rhinitis or patients with a history of asthma or allergies.

The sample size was determined on G*Power 3.1.3. Using an effect size of (d) 0.97 as determined by a pilot study, a significance level (α) of 0.05 and statistical power ($1 - \beta$) of 0.80, 18 subjects were required to be in each group. Because the possibility of contamination existed if the study participants were located in the same space, each group was composed of the same team members. The soldiers were placed in their respective unit after 4 weeks of training. The study subjects were recruited in each training period, and the next round of subjects were recruited after the previous round had left to prevent the overlap of groups. Based on the order of recruitment, the odd-numbered participant groups were assigned to the treatment group, and the even-numbered participant groups were assigned to the control group. The subjects were not aware of which group they were assigned to. The initial number of subjects was 56; however, six patients were taking antihypertensive medication, two patients had chronic rhinitis and eight patients had a history of asthma or allergy. These patients were excluded, and the data were collected from the remaining 40 subjects.

Experimental treatment

The experimental treatment consisted of aroma essential oil inhalation. We chose essential oils for hypertension after we reviewed textbook about aromatherapy and systemically reviewed aromatherapy for treatment of hypertension [15]. So we selected lavender, ylang ylang, marjoram as antihypertensive oils to lower the blood pressure and selected ylang ylang, marjoram, neroli as parasympathetic effects to control the stress [16]. The oil used for inhalation comprised a 20:15:10:2 blend of lavender (*Lavandula angustifolia*), ylang ylang (*Cananga odorata*), marjoram (*Origanum majorana*) and neroli (*Citrus aurantium*), which were stored in a tinted glass bottle and refrigerated. The main components of lavender are linalyl acetate (46.7–53.8%) and linalool (29.4–41.6%), which relax the central nervous system and suppress the sympathetic nervous system, therefore lowering blood pressure and pulse rates. The main components of marjoram are terpinen-4-ol (31.6%), α -terpineol (8.3%) and linalyl acetate (7.4%), which stimulate the parasympathetic nervous system and lower blood pressure. The primary components of neroli are limonene (22.4%), β -pinene (8.7%) and nerol (7.0%), and the primary components of ylang ylang are benzyl acetate (25.1%), methyl ether (16.5%) and linalool (13.6%), which relax and calm the nervous system to suppress hyper-respiration and lower pulse rates. These essential oils are popular because they have exhibited low toxicity in humans. We used this blend to achieve a synergistic effect among the oils, lowering blood pressure in the cardiovascular system [14,17].

To apply the aroma essential oil, we used the aroma stone and aroma necklace. The aroma stone, made by Germany, was the plane, round aroma Ceramics, that they are made from natural clay, which is cleaned, formed and burnt at about 1.000 °C, and the aroma necklace was a crystal chamber like a small bottle

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