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# Effectiveness of aromatherapy in decreasing maternal anxiety for a sick child undergoing infusion in a paediatric clinic

Shingo Ueki<sup>a,\*</sup>, Kazuteru Niinomi<sup>a</sup>, Yuko Takashima<sup>a</sup>,  
Ryoko Kimura<sup>a</sup>, Kazuyo Komai<sup>b</sup>, Kiyotaka Murakami<sup>b</sup>,  
Chieko Fujiwara<sup>a</sup>

<sup>a</sup> Osaka University Graduate School of Medicine, 1-7 Yamadaoka, Suita, Osaka 565-0871, Japan

<sup>b</sup> Nakano Children's Hospital, 4-13-17 Shinmori, Asahi-ku, Osaka 535-0022, Japan

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## KEYWORDS

Aromatherapy;  
Anxiety;  
Mother;  
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## Summary

**Objectives:** We examined whether aromatherapy involving inhalation of yuzu (*Citrus ichangensis* × *Citrus reticulata*) oil was effective in decreasing mothers' anxiety for her sick child receiving an infusion at a paediatric clinic.

**Design:** Controlled clinical trial.

**Setting:** Mothers of sick children who arrived at the hospital were asked to complete an anonymous questionnaire. After a doctor examined the child and confirmed the necessity for infusion, the mothers who agreed to participate in our study were allocated to an aromatherapy or a control group.

**Interventions:** A diffuser was filled with yuzu oil before the subjects entered the aromatherapy room. The mother was shown how to use the aromatherapy diffuser while the child was receiving an infusion in the same room. Fifteen minutes after entering the room, the mothers were asked to complete another questionnaire.

**Main outcome measures:** We measured the mother's anxiety with the state anxiety score from the State-Trait Anxiety Inventory.

**Results:** There were 60 subjects in the aromatherapy group and 61 in the control group. Both groups were well balanced in terms of demographic characteristics. Using analysis of variance, we demonstrated a significant difference in two-factor interactions between the control and aromatherapy groups. Maternal state anxiety was significantly lower in the aromatherapy than in the control group.

\* Corresponding author. Tel.: +81 6 6879 2539; fax: +81 6 6879 2539.

E-mail addresses: [uekin0327@hotmail.com](mailto:uekin0327@hotmail.com), [ueki-s@sahs.med.osaka-u.ac.jp](mailto:ueki-s@sahs.med.osaka-u.ac.jp) (S. Ueki).

**Conclusions:** Inhalation of yuzu oil was shown to decrease maternal anxiety for a sick child. A multicentre randomized controlled trial or double-blind study is necessary to obtain objective evidence of this benefit of aromatherapy.

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## Introduction

The child-rearing environment has changed because of falling birth rates and the trend towards nuclear families in developed countries. In Japan, approximately 75% of mothers in 2012 reported having experienced child-rearing anxiety.<sup>1</sup> A mother's anxiety is likely to intensify if her child falls ill.<sup>2</sup> That anxiety increases if she becomes aware of the severity of her child's condition—either following a doctor's examination or because of the need for such a procedure as an infusion. This anxiety could lead to dissatisfaction on the mother's part, which is potentially detrimental to the physician–patient relationship.<sup>3</sup> Therefore, it is important that as well as treating the child, health-care professionals deal with the primary caregiver's concerns, particularly in the case of mothers. Complementary therapies are often used to manage anxiety in parents and children.<sup>4</sup>

Aromatherapy, the therapeutic use of essential oils from plants towards improving physical, emotional, and spiritual well-being,<sup>5</sup> is an inexpensive, non-invasive complementary practice. It is currently recognized as a tool for holistic nursing care in several countries, and it is reportedly effective in decreasing psychological distress, including anxiety.<sup>6</sup>

Lavender is the most commonly used anxiolytic oil in clinical trials for evaluating the effects of aromatherapy on anxiety symptoms.<sup>7</sup> Pharmacologically, lavender contains linalool and pinene. Linalool inhibits glutamate binding, and pinene potentiates sedative responses in the presence of gamma-aminobutyric acid.<sup>8</sup> Kim<sup>9</sup> found that mice that received intraperitoneal injections of lavender oil displayed increased expression of the dopamine D3 receptor subtype in the olfactory bulb. In another study, inhalation of lavender oil paralleled the effect of chlor-diazepoxide in up-regulating synthesis of serotonin in the rat pre-frontal cortex.<sup>10</sup> Despite these results, the effectiveness of aromatherapy in humans has been found to vary according to culture, individual aroma experience, gender, and personality.<sup>11</sup> If an oil's aroma is poorly tolerated by the person receiving therapy, its effect may be weak or adverse.<sup>12</sup>

Lavender may not be effective in aromatherapy among Japanese since it is not a commonly used product in Japan. We hypothesized that using a familiar pleasant scent could be effective for Japanese. Thus, we chose the oil from yuzu (*C. ichangensis* × *C. reticulata*, Japan), which is the most familiar sour citrus plant in Japan.<sup>13</sup> Yuzu contains linalool and pinene. Additionally, yuzu has a high concentration of limonene, which is not contained in lavender; one study has reported that limonene dramatically inhibited monoamine-induced elevation of psychological stress.<sup>7</sup>

The purpose of this study was to examine the effectiveness of aromatherapy inhalation therapy using yuzu oil to reduce maternal anxiety for sick children receiving an infusion at a paediatric clinic. To our knowledge, this is the first

study to report the effects of yuzu oil in reducing human anxiety.

## Methods

### Participants

This study was conducted at Nakano Children's Hospital, Japan, which has been designated by the Ministry of Health, Labour and Welfare as a secondary emergency hospital for paediatric patients. Annually, around 50,000 outpatients visit this hospital, and 3000 patients are admitted. Hospital consultation hours are limited to 5 h per weekday, but the hospital provides emergency care outside these times as required. We recruited mothers who presented at the hospital seeking care for their sick child, whose child was to undergo an intravenous infusion after the physician's evaluation, and who remained in the infusion room while the child received the infusion. All mothers who presented outside the usual walk-in triage process, such as those with critically ill children arriving by ambulance, were excluded. The investigation was conducted from December 2012 to March 2013. Each infusion was performed using a 200-mL SOLITA<sup>®</sup>-T No.1 (ST1) bottle (Ajinomoto Pharmaceuticals, Tokyo, Japan); this is widely used in Japanese paediatric clinics to treat dehydration resulting from fever or vomiting. The mothers of children who received an infusion other than with ST1 were excluded from this study. Furthermore, considering the small size of the bed in the infusion room, mothers of children aged over 7 years were excluded.

### Intervention

The intervention was conducted in two square infusion rooms, approximately 4 m,<sup>2</sup> each containing a 133-cm-long bed. Both rooms were ventilated and fitted with an air conditioner, which maintained the temperature at 26–28 °C. These two private rooms were adjacent to each other. One of these was the aromatherapy room; when its door was opened, the scent from within could have escaped to some extent. To reduce any resultant effect, the researcher closed the door immediately after the participants entered or left the room. The researcher also ventilated the air in the aromatherapy room for at least 15 min after one participant had left so that the following participant in the aromatherapy group could undergo treatment under equivalent conditions. Participants in the control group were allocated to the non-aromatherapy room. Aromatherapy was administered using a diffuser: this instrument produces a 1.7-MHz ultrasound vibration to the water with the essential oil; it spreads 3–5 μm of atomized particles by decreasing the surface tension of the water with the oil. The diffuser can be used safely because of its non-heating operation and

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