A Comparative Study on the Inhibitory Effects of Aroma Essential Oils on Nitric Oxide

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This study measured the anti-inflammatory and basic physiological activities of its immune mechanism of Palmarosa essential oil, Myrrh essential oil, and Sandalwood essential oil which can be used for functional materials in the beauty care industry. The experimental results showed that Palmarosa essential oil, Myrrh essential oil, and Sandalwood essential oil had no toxicity in RAW264.7 cell. Then, NO inhibition of Palmarosa essential oil, Myrrh essential oil, and Sandalwood essential oil was assessed by LPS-inducement. The result showed that the LPS-treated group had a remarkable increase in NO concentration and the Palmarosa essential oil, Myrrh essential oil, and Sandalwood essential oil-treated group (500 ug/mL) had excellent NO inhibition. In particular, the Sandalwood essential oil-treated group had significant NO inhibition. Based on the results, Palmarosa essential oil, Myrrh essential oil, and Sandalwood essential oil had excellent NO inhibition induced by LPS in RAW264.7 cell. In particular, the most excellent NO inhibition was found in Sandalwood essential oil, followed by Myrrh essential oil and Palmarosa essential oil.

Key words: Palmarosa essential oil, myrrh essential oil, sandalwood essential oil, RAW264.7 cell, NO

I. Introduction

The essential oils have long been used in the traditional medicines including Ayurvedic Medicine, as important agents to have a variety of physiological activities such as anti-bacterial, anti-inflammatory and pain relief effects (Lee and Kim, 2007). According to the oldest Indian book "The Vedas", ginger, cinnamon, sandalwood and myrrh were used for medical treatments and religious rituals, and a Chinese record said that those agents were used as medical herbs (Kim et al, 2003). Europe has already been using the aroma oils as medicines, as well as the advanced medical countries including UK, Germany and Switzerland have made endeavors to seek for the measures to produce and use quality aroma oils with high treatment effects and actively conducted relevant researches. Recently, South Korea has also taken a lot of interest in the aroma essential oils to fundamentally cure, manage and prevent problem skins caused by stress.

There have been many researches on the anti-inflammatory (Sousa et al, 2008; Hajhashemi et al, 2003; De Sousa, 2004) and immunosuppressive effects (Won et al, 2003) of many aroma essential oils used for aromatherapy.

The Palmarosa oil used in this study is made of Palmarosa, which is a light yellow or olive species in the Gramineae family, originated from India and Pakistan and scientifically named as Cymbopogon martini(Schneault and Kurt, 1999).

As for the researches on Palmarosa oil, there have been a research on the herbicidal activities of Palmarosa essential oil (Lee, 2010) and a research on anti-bacterial effects of Geranium and Palmarosa (Huang, 1993).

The Myrrh oil is made of Myrrh (Commiphora Molmol Engler), which is a bitter and fragrant yellowish auburn oleoresin extracted from Commiphora Molmol Engler or other congeneric plant species (Im, 1997). The myrrh oleoresin has

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anti-bacterial and anti-inflammatory effects to use for external application of inflammatory diseases such as eczema, and includes the essential oils of myrcene, α-camphorene, z-gulsterol, guggulsterol I, mukulol, cembrene A(Kimura et al, 2001). There have been a report on anti-inflammatory actions of Terpenoid compounds in mice(Tipton et al, 2003) and a report that the Myrrh essential oil has anti-inflammatory effects on fibroblasts and epithelial cells of human gums(Chana, 1994).

The Sandalwood essential oil(Santalam album) is made of Sandalwood, which is a 12-15m evergreen tree in the Santalaceae family and wildly grown or cultivated in India, Malaysia, Australia and Indonesia. The light yellow or yellow viscous fluid of Sandalwood has a very soft and sweet wood fragrance with a little bit of Balsam fragrance that can last in consistency for a relatively long time due to the durability of fragrance(Yang and Choi, 2005).

The researches on Sandalwood essential oil reported the effects of the essential oil to relieve the main symptoms of atopic dermatitis, pruritus and skin inflammation(Scartezzini and Speroni, 2000), the anti-bacterial effects(Jagetia and Baliga, 2000), the effects to serve as an antioxidant inhibitory protein(Bang et al, 2009), the antioxidant and anti-inflammatory effects(Yoon et al, 2009), and the effects of Sandalwood essential mixed oil on treating skin lesion, inflammation and atopic dermatitis(Shin and Kim, 2009). The essential oil has been used as a medicine for dry skin, with an effect to reduce skin infections and atopic dermatitis(Yang and Choi, 2005).

The inflammatory reaction is a defense mechanism of biological tissues by external stimulations such as bacterial infection or internal stimulations such as metabolites in the body(Kang et al, 1996). In particular, stimulations such as cytokines, tumor necrosis factor(TNF-α), lipopolysaccharide(LPS) in macrophages revitalize the transcription factors of inflammatory reaction, whereby they reveal inducible nitric oxide synthase(iNOS), cyclooxygenase-2(COX-2), produce nitric oxide(NO) and Prostaglandin E2(PGE2) and cause inflammation(Shew et al, 1993). In addition, excessive production of NO has harmful actions against the human body by accelerating inflammatory reaction, causing septic shock due to excessive vasodilation, inhibiting wound healing and damaging nerve tissues(Weller, 1997).

The researcher visited a skin care salon in person and put Palmarosa essential oil, Myrrh essential oil and Sandalwood essential oil among the aroma oils on acne with erythema and fever based on clinical aromatherapy. It was aimed to objectively prove the effects of the essential oils by reviewing their anti-inflammatory effects after having various clinical benefits on dry skin, inflammatory acne and sensitive skin with fever.

This research aimed to come up with the grounds and guidelines for comprehensive clinical use of essential oils, which have been used as functional materials in the beauty care industry including cosmetics after studying their effects and utility, since there have little research on the basic physiological activities on the anti-inflammatory effects and immune mechanism of the essential oils.