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# EFFECT OF LEMON AROMATHERAPY ON THE ANXIETY LEVEL OF DENTAL EXTRACTION PATIENTS IN RSND SEMARANG

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## ABSTRACT

**Background:** Dental treatment that is often done is the tooth extraction procedure. The treatment and the use of sharp instruments such as syringes, pliers, bein during extraction can cause anxiety. Anxiety will be responded by several changes in the body such as the increasing of MAP, pulse rate, and respiratory rate. Handling anxiety can be done with aromatherapy, one is lemon aromatherapy. **Aim:** To determine the effect of lemon aromatherapy on anxiety levels and the correlation of anxiety levels with the results of MAP, pulse rate, and respiratory rate in tooth extraction patients at RSND Semarang **Method:** Experimental study with pretest and posttest control group design with sampling simple random to get 40 respondens that indicated as extraction teeth patient. Respondens were divided into 2 groups: 20 control respondens and 20 intervention respondens. Anxiety level was measured by the Modified Dental Anxiety Scale (MDAS) questionnaire. Data that was not distributed normally were the difference in pulse rate and the difference in respiratory rate, while the results of the homogeneity test obtained data that were not homogeneous were the difference between the MDAS questionnaire and the difference in the MAP. The rest of the mentioned data above were all distributed normally and homogeneous. Analysis of differences in anxiety levels between before and after lemon aromatherapy was given using paired t-test, analysis of differences in anxiety levels between the control group and the intervention group using the independent t-test, and to analyzing the correlation of anxiety levels with the results of MAP, pulse rate, and respiratory rate using the Spearman test. **Results:** There was a significant difference in anxiety scale between before and after lemon aromatherapy was given p = 0,000135 (p <0.05) and between the control group and the intervention group p = 0.000002 (p <0.05). There was a positive correlation between anxiety levels with the results of MAP, pulse rate, and respiratory rate. **Conclusion:** Anxiety of tooth extraction patients shows a decreased after inhaling lemon aromatherapy. When someone is anxiety, there will be an increase in MAP, pulse rate, and respiratory rate.
***Keywords:*** *Anxiety, tooth extraction, lemon aromatherapy, MAP, pulse rate, respiratory rate.*

## BACKGROUND

According to the Riset Kesehatan Dasar (RISKESDAS) in 2013, 25.9 percent of the Indonesian population experienced dental and oral problems of which only 31.1 percent received treatment.[1] While in RISKESDAS 2018, 57.6 percent of the Indonesian population experienced dental and oral problems, with only 10.2 percent of them receiving treatment.[2] Dental extraction procedure is one of the most common dental and oral treatment.[3] Treatment procedures and the use of sharp tools such as needles, pliers, and beins may exaggerate feelings of anxiety. This results in patients avoiding regular visits to the dentist or being uncooperative during treatment, thereby reducing the effectiveness of dental health services.[4,5]

Anxiety is an emotional state with the emergence of a feeling of discomfort in a person.[6] Anxiety will be responded to by several changes in the body, especially in vital signs. Changes that may occur consists of an increase in Mean Arterial Pressure (MAP), pulse, and respiratory rate. If the increase in anxiety that occurs is too overwhelming, the work of the heart and the need for oxygen will also increase.[7] Management of anxiety can be done non-pharmacologically using aromatherapy.[8]

Aromatherapy is a fragrance treatment technique derived from essential oils obtained through extracts from flowers, leaves, stems, and roots.[5] Aromatherapy works through the sense of smell. Essential oils from aromatherapy when inhaled will activate the olfactory nerves in the nasal cavity and then transmit impulses to the limbic system in the brain which is the center for memory, mood, and intellect to respond to odors that stimulate blood circulation and the nervous system.[9,10]

One of the most favourite aromatherapy is lemon. Lemon aromatherapy can be used to reduce pain and anxiety and is more economical. Lemon aromatherapy contains linalool which functions to stabilize the nervous system that may cause a calming effect for the person inhaling it.[11] The

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linalool content is able to relax and flex the nervous system and tense muscles by reducing the work of the sympathetic nerves when someone experiences anxiety. Sympathetic nerves that carry vasoconstrictor nerve fibers will reduce its work when linalool enters the body through inhalation which then results in decreased production of epinephrine from vasoconstrictor nerve endings and thus an increased in pulse rate, respiration, and blood pressure can decrease.[12]

Several studies have been conducted to determine the effect of aromatherapy on the patient's anxiety level. These studies suggests that aromatherapy can reduce anxiety levels in patients.[5,11]

Based on this background, this research needs to be carried out to find whether lemon aromatherapy can affect the patient's anxiety level when undergoing tooth extraction. This study also aims to provide information about the effect of lemon aromatherapy on the anxiety level of tooth extraction patients.

## METHODS

This is an experimental research with pretest and posttest with control group design. This study used a *Modified Dental Anxiety Scale* (MDAS) questionnaire, and the measurement of blood pressure, pulse, also respiratory rate as data collection. The ingredients used are aromatherapy lemon essential oil with the ratio of 5 drops: 30ml of water which was burned using a furnace for 15 minutes. The number of samples used were 40 respondens who were divided into 2 groups, consists of 20 respondens as controls and 20 other respondens who were given lemon aromatherapy intervention. The inclusion criteria of this study were women aged 25-44 years, included as simple tooth extraction cases, could read and write. The exclusion criteria of this study were respondens who had systemic disease (hypertension, diabetes mellitus, heart disease), had an allergy to lemon scent, had psychiatric disorders.

Dental extraction patients were given an explanation and then asked to fill out and sign the informed consent, and then blood pressure, pulse, and respiratory rates were measured and finally the MDAS questionnaire was given to be filled out by the patient. Patients were given lemon aromatherapy that had been formulated with a ratio of 5 drops of aromatherapy: 30 ml of water in the room for 15 minutes for the treatment group. For the control group, they only waited 15 minutes before tooth extraction without intervention. After completion, the blood pressure, pulse, and respiratory rate were re-measured and filled out the MDAS questionnaire.

Before analyzing the data, a recheck was done (editing). The data was then coded (coding) and made into a table based on the variables (tabulating) then finally being entered into a computer program (entry) using a computer program.

This study uses the Saphiro Wilk normality test based on the sample size which is <50 respondens. The homogeneity test was carried out with the *lavene's* test to see the data variation. The results of the normality test obtained that data that was not distributed normally were the difference in pulse rate and the difference in respiratory rate, while the results of the homogeneity test obtained data that were not homogeneous were the difference between the MDAS questionnaire and the difference in the MAP. The rest of the mentioned data above were all distributed normally and homogeneous. Data analysis used to compare before and after being given lemon aromatherapy was paired t test. To compare the control group with the treatment group, an unpaired t-test was used. To see the relationship between anxiety levels and the results of MAP, pulse, and respiratory rate, we use the Spearman test.

## RESULT

The results of the paired t-test were $p$ = 0.000135 ($p$<0.05), which means that there was a significant difference between the pretest and posttest in the MDAS questionnaire intervention group. For the results of the unpaired t test, $p$ = 0.000002 ($p$ <0.05), which means that there was a significant difference in the MDAS questionnaire posttest results between the control group and the intervention group.

**Table 1.** Paired t test on differences in anxiety levels before and after lemon aromatherapy

| MDAS | Intervention | p |
|---|---|---|
| Pretest | 10,10 ± 2,25 | 0,000135* |
| Postest | 8,00 ± 2,36 | |

Note: * Meaning (p <0.05)

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**Table 2.** unpaired t test on differences in anxiety levels of the treatment and control groups

| MDAS | Group | | p |
|---|---|---|---|
| | Control | Intervention | |
| Posttest | 13,80 ± 3,97 | 8,00 ± 2,36 | 0,000002* |

Note: * Meaning (p <0.05)

**Table 3.** Spearman correlation test for MDAS differences

| Selisih | MDAS | | Annotation |
|---|---|---|---|
| | p | r | |
| MAP | 0,003 | 0,463 | Significant, moderately positive correlation |
| Pulse Rate | 0,000123 | 0,570 | Significant, strongly positive correlation |
| Respiratory Rate | 0,004 | 0,450 | Significant, moderately positive correlation |

The research data were not normally distributed and not homogeneous, and thus we use the Spearman correlation test.. The results showed that there was a positive relationship between anxiety levels and the results of MAP, pulse, and respiratory rate

## DISCUSSION

The results obtained from paired t test was *p* = 0.000135 (p <0.05), which means that there is a significant difference in anxiety levels between before and after being given lemon aromatherapy at tooth extraction procedure. This is in accordance with the research hypothesis which states that there are differences in anxiety levels between before and after being given lemon aromatherapy. The results of the same study were obtained by Merinchiana, et al with a sample of 30 respondens who will carry out a dental extraction procedure with 55% of patients experienced a decrease in anxiety levels after inhaling lavender aromatherapy.[5] According to Ary, et al, the anxiety level of all respondens was decreased after giving inhalation aromatherapy.[13]

Aromatherapy is a therapeutic method that uses essential oils and aromatic compounds from flowers, leaves, stems, and roots that aim to affect mood.[5,13]Aromatherapy has a direct effect on the human brain related to mood, emotion, memory and learning. Hence, after inhaling lemon aromatherapy alpha waves in the brain will increase, in can help the person who inhaled it to relax.[10] Aromatherapy works via the sense of smell. Essential oils from aromatherapy when inhaled will activate the olfactory nerves in the nasal cavity and then transmit impulses to the limbic system in the brain which is the center for memory, mood to respond to smells that stimulate blood circulation and the nervous system.[9,10]

The results of the unpaired t test obtained was *p* = 0.000002 (*p* <0.05). This shows that there was a significant difference in the level of anxiety between the control group and the intervention group. This is in accordance with the research hypothesis which says that there is a difference between the control group and the intervention group. The same research results were obtained by Rahmawati, et al with a sample of 56 respondens, consists of 28 respondens was give lavender aromatherapy and 28 other, this study showed that lemon aromatherapy was more effective in overcoming post-section caesarean pain with an average value of 4 which was greater than the average lavender aromatherapy of 2.15.[11] This is also in accordance with research conducted by Nurfitriani, et al, that showed there was an effect of giving lemon aromatherapy by inhalation on the severity of primary dysmenorrhea with a *p* value of 0.000 (p <0.005).[14]

Lemon aromatherapy contains linalool which functions to stabilize the nervous system which can cause a calming effect for the inhaler.[11] Linalool is considered as being able to relax and flex the nervous system and tense muscles by reducing the work of the sympathetic nerves when someone experiences anxiety. When linalool enters the body, the sympathetic nerves that carry vasoconstrictor nerve fibers will reduces their work. This condition also results in decreased production of epinephrine released by vasoconstrictor nerve endings which causes anxiety symptoms such as increased blood pressure, pulse, and respiratory rate decreases.[12]

The results of the Spearman correlation test showed that there was a positive significant relationship between the level of anxiety and the results of MAP, pulse, and respiratory rate. The same research results obtained by Rizky, et al showed a significance value of 0.005 (*p* <0.05) with a correlation coefficient (r) of 0.334, that shows that the relationship is unidirectional which means the higher the level of dental anxiety, the higher the blood pressure will be.[15] According to Jeffrey et al. in his research stated that from 60 research subjects there was an increase in body temperature as many as

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36 subjects, an increase in respiration rates in 46 subjects and an increase in pulse in 34 subjects.[16]

According to Hawari, the signs and symptoms of anxiety are different for each individual. Complaints that are often reported are the presence of somatic symptoms such as pain in muscles and bones, palpitations, shortness of breath, and indigestion.[17] When a person experiences or feels danger, the brain will send signals to the sympathetic nervous system which will cause physiological changes such as increased blood pressure, pulse, increased respiration, sweating and others.[18] Anxiety can affect the work of the heart so that adrenaline is secreted and increases blood flow to the body. This has the effect of increasing the vibration of the blood vessels in the form of a pulse. In addition, it can cause an increase in cardiac activity by increasing heart rate and cardiac output. When a person experiences anxiety, there will be an increase in $CO_2$ levels in the blood, and the body will respond immediately by sending a signal to the respiratory center, resulting in hyperventilation.[7,19]

## CONCLUSION

Based on research on the influence of lemon aromatherapy on the level of anxiety of dental extraction patients in RSND Semarang, the following conclusions are obtained:

1. There is an effect of giving lemon aromatherapy on the level of anxiety in dental extraction patients at RSND Semarang.
2. There is a difference in the level of anxiety between before and after being given lemon aromatherapy in the intervention group
3. There is a differences in the level of anxiety between the control group and the intervention group
4. There is a positive significant correlation between the level of anxiety with the results of MAP, pulse rate, and respiratory rate.

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