



Original Research

The Effect of Turmeric Drink and Lavender Aromatherapy Combination on Neck Pain in Batik Craftsmen

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ABSTRACT

Introduction: neck pain in batik craftsmen causes discomfort to work so the efficiency and productivity decrease. Neck pain in batik craftsmen is caused by a bent position when sitting for a long time and done by sitting in a small chair which is usually called a dingklik. The process of canting takes 6-8 hours per day so that the batik craftsmen have a short rest time which causes fatigue and muscle tension. The research objective was to analyze the effect of the combination of turmeric water and lavender aromatherapy on neck pain in batik craftsmen.

Method: the research design used was pre-experimental using one-group pre-post test data collection method with a sample size of 74 respondents. Samples were taken using probability sampling techniques. The independent variable in this study is the combination of turmeric water and lavender aromatherapy. The dependent variable in this study was neck pain in batik craftsmen. The instrument in this study used a demographic data questionnaire, a numeric rating scale pain measurement sheet and standard operating procedures for making turmeric water and lavender aromatherapy.

Results: the research data obtained were analyzed by Wilcoxon Signed Rank Test $\alpha \leq 0.05$. There is an effect of a combination of turmeric water and lavender aromatherapy on neck pain in batik craftsmen in Tuban with a value of $\alpha \leq 0.05$, $p = 0.000$.

Conclusion: the combination of turmeric water and lavender aromatherapy can reduce the level of neck pain in batik craftsmen with neck pain complaints.

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1. INTRODUCTION

Batik crafters spend more than 95% of working time in a monotonous sitting posture for more than 2 hours a day. That condition increases the risk of neck pain caused by the canting process "traditional painting" because of fatigue and muscle tension (Wijayati, 2013). Prior study on batik craftsmen showed that neck pain occurs during the canting process because of bent position when sitting for a long duration in a small chair commonly called a "dingklik". The canting process usually takes 6-8 hours per day so that batik craftsmen have a short

rest time which causes fatigue and muscle tension (Savitri, Hardian and Sumekar, 2015). Neck pain causes work discomfort which leads to efficiency and productivity decrease on batik craftsmen (Mallapiang, 2019). Neck pain can be treated using NSAIDs. Turmeric containing curcumin and curcuminol compound which works as NSAIDs to alleviate neck pain, coupled with linalyl acetate and linalool compounds which can relieve muscle tension so that the neck pain process can be mechanically resolved. However, the combination of turmeric drink and lavender aromatherapy on neck pain in batik craftsmen still needs to be explained.

Prior study found that neck pain was the highest number of diseases (51.1%) complained by batik craftsmen in Yogyakarta (Seok and Kwon, 2019). The result was supported by Lindawati and Mulyono, 2017 who stated that all batik craftsmen experienced neck pain (100%). Pamungkas (2013) studied on 15 batik craftsmen found they complained neck pain (100%) due to fatigue and neck muscle tension. Based on a preliminary study in February 2020, at 5 batik houses in Tuban, 81 batik craftsmen stated that they experienced neck pain. The interviews result of 25 batik craftsmen showed 100% neck pain was experienced by batik craftsmen who had worked minimum 2 years and worked more than 2 hours per day. Neck pain was measured by numerical rating scale. Of the 25 batik craftsmen, 21 people experienced mild pain and 4 people experienced moderate pain. Batik craftsmen reported that their work was disrupted while the pain occurred. The batik craftsmen performing stretching during work to reduce pain.

Neck pain arises due to excessive work and repetitive activities of the neck muscles that cause tense, spasm, tightness and stiffness in neck muscles. Continuous tense muscles cause decreased microcirculation which lead to tissue ischemia. Ischemia starves the tissue of nutrients and oxygen and causes metabolic waste accumulation of inflammation, thus stimulating P substance in the form of prostaglandins, bradykinin and serotonin which cause pain (Yugi, 2018). Neck pain is caused by chemical and mechanical processes due to free nerve endings stimulation of muscles that work as mechano-nociceptive and chemo-nociceptive units. Chemical pain processes occur due to fatigue, trauma, and muscle ischemia. Muscle fatigue will trigger anaerobic metabolism which resulted in the metabolites accumulation in muscles that produce lactic acid which caused pH drops and stimulates prostaglandins and leukotrienes produced from eicosanoids metabolism. Then it will stimulate free nerve endings as chemo-nociceptive units. Trauma and ischemia release mediators such as prostaglandins and leukotrienes resulting from eicosanoid metabolism, which then stimulate chemo-nociceptive. Mechanical processes that trigger pain can result from stretching or pressure on the muscles so that they stimulate free nerve endings as mechano-nociceptive units (Rao, 2002).

Neck pain can be relieved using pharmacotherapy such as NSAIDs (Nonsteroid Anti-Inflammatory Drugs). NSAIDs functioned by inhibiting COX and prevent prostaglandins and thromboxanes to be formed (Hsieh, 2010). The curcumin and curcuminol compound in turmeric able to inhibit the cyclooxygenase (COX) pathway in eicosanoid metabolism that inhibit the chemical process of neck pain (LIPI, 2017). The previous study (Sari and Leonard's 2018) showed that lavender flowers contain linalyl acetate and linalool which can relieve muscle tension due to mechanical processes

that cause neck pain. Therefore, this study objective was to examine the effect of the combination of turmeric drink and lavender aromatherapy on neck pain in batik craftsmen in Tuban.

2. METHODS

2.1 Research Design

The study was a pre-experimental study with a pretest-posttest design. The data collection process was carried out in July 2020 at 5 batik houses in Tuban

2.2 Population, Sample, and Sampling

The population was batik craftsmen with neck pain complaints at the age of 20-60 years and working more than 1 year in 5 batik houses in Tuban with a total of 81 batik craftsmen in February 2020. Samples were obtained using proportionate random sampling with inclusion criteria: 1) Pain category in a mild to moderate scale 2) Batik craftsmen do not use painkillers. The number of samples in this study were 74 respondents.

2.3 Research Variables

The variables of this study was a combination of turmeric drink and lavender aromatherapy and neck pain in batik craftsmen.

2.4 Research Instrument

The data was collected using a Numeric Rating Scale questionnaire to measure neck pain. Data analysis was used SPSS 24.0 for Windows program and statistically tested Wilcoxon Sign Rank Test, namely p 0.05.

2.5 Procedure

The research procedure begins with asking permission at the research location, then conducting a research ethics test. At the time of data collection, the researcher will provide an explanation of the objectives of the research to be carried out to the respondents. The samples with inclusion criteria were enrolled who were allocated to intervention and control groups.

2.6 Data Analysis

This research has obtained the ethical review from the ethics committee health research at the Faculty of Nursing, Universitas Airlangga and received approval for the research protocol number 2068-KEPK.

3. RESULTS

This study found that of 74 batik craftsmen, most of whom are in the age of 41-60 years (77%). Based on gender characteristics, all of respondents are female (100%). Based on the weight category, most of the respondents have normal weight with a total of 37 respondents (50%). Based on the category of length of service, 19 (25.7%) respondents have worked for 6-10 years. Based on exercise habits, the majority of

Table 1 Respondents Demography Characteristics

| Characteristics | Criteria | f | % |
|--------------------------|---------------|------------|------------|
| Age (years) | 20-40 | 17 | 23 |
| | 41-60 | 57 | 77 |
| | Total | 74 | 100 |
| Sex | Female | 74 | 100 |
| | Male | 0 | 0 |
| | Total | 74 | 100 |
| Weight | Less Weight | 12 | 16.2 |
| | Normal Weight | 37 | 50 |
| | Risky Weight | 10 | 13.5 |
| | Obesity I | 14 | 18.9 |
| | Obesity II | 1 | 1.4 |
| Total | 74 | 100 | |
| Duration of work (Years) | 1-5 | 15 | 20.3 |
| | 6-10 | 19 | 25.7 |
| | 11-15 | 17 | 23 |
| | 16-20 | 9 | 12.2 |
| | 21-25 | 14 | 18.9 |
| | Total | 74 | 100 |
| Physical Exercise | No | 32 | 43.2 |
| | Yes | 42 | 56.8 |
| | Total | 74 | 100 |
| Painkillers medicine | No | 74 | 100 |
| | Yes | 0 | 0 |
| | Total | 74 | 100 |

Table 2 Neck Pain Measurement Frequency Before Intervention

| Characteristic | Neck Pain Measure | | | | | | | | | | | |
|----------------------|-------------------|----------|-----------|-------------|---------------|-------------|-------------------|------------|-----------|-------------|---------------|-------------|
| | Pre intervention | | | | | | Post intervention | | | | | |
| | No pain | | Mild Pain | | Moderate pain | | No pain | | Mild Pain | | Moderate pain | |
| | f | % | F | % | f | % | f | % | f | % | f | % |
| Age (year) | | | | | | | | | | | | |
| 20-40 | 0 | 0 | 16 | 21.6 | 1 | 1.4 | 3 | 4.1 | 12 | 16.2 | 2 | 2.7 |
| 41-60 | 0 | 0 | 19 | 25.7 | 38 | 51.4 | 0 | 0 | 35 | 47.3 | 22 | 29.7 |
| Total | 0 | 0 | 35 | 47.3 | 39 | 52.7 | 3 | 4.1 | 47 | 63.5 | 24 | 32.4 |
| Body Weight | | | | | | | | | | | | |
| Less | 0 | 0 | 5 | 6.8 | 7 | 9.5 | 0 | 0.1 | 8 | 10.8 | 4 | 5.3 |
| normal | 0 | 0 | 12 | 16.2 | 25 | 33.8 | 3 | 4 | 25 | 33.8 | 9 | 12.2 |
| Risky | 0 | 0 | 6 | 8.1 | 4 | 5.4 | 0 | 0 | 6 | 8.1 | 4 | 0 |
| Obesity I | 0 | 0 | 11 | 14.9 | 3 | 4 | 0 | 0 | 8 | 10.8 | 6 | 18.9 |
| Obesity II | 0 | 0 | 1 | 1.3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4.1 |
| Total | 0 | 0 | 35 | 47.3 | 39 | 52.7 | 3 | 4.1 | 47 | 63.5 | 24 | 32.4 |
| Work Duration (year) | | | | | | | | | | | | |
| 1-5 | 0 | 0 | 14 | 18.9 | 1 | 1.4 | 0 | 0 | 11 | 14.9 | 4 | 5.4 |
| 6-10 | 0 | 0 | 4 | 5.4 | 15 | 20.3 | 0 | 0 | 13 | 17.6 | 6 | 8.1 |
| 11-15 | 0 | 0 | 0 | 0 | 17 | 23 | 0 | 0 | 11 | 14.9 | 6 | 8.1 |
| 16-20 | 0 | 0 | 7 | 9.5 | 2 | 2.7 | 3 | 4 | 5 | 6.8 | 1 | 1.4 |
| 21-25 | 0 | 0 | 10 | 13.5 | 4 | 5.4 | 0 | 0 | 7 | 9.5 | 7 | 9.4 |
| Total | 0 | 0 | 35 | 47.3 | 39 | 52.7 | 3 | 4.1 | 47 | 63.5 | 24 | 32.4 |
| Physical Activity | | | | | | | | | | | | |
| No | 0 | 0 | 21 | 28.4 | 11 | 14.9 | 1 | 1.3 | 16 | 21.6 | 15 | 20.3 |
| Yes | 0 | 0 | 14 | 18.9 | 28 | 37.8 | 2 | 2.7 | 31 | 41.9 | 9 | 12.2 |
| Total | 0 | 0 | 35 | 47.3 | 39 | 52.7 | 3 | 4.1 | 47 | 63.5 | 24 | 32.4 |

respondents exercise regularly, namely 42 respondents (56.8%). Based on the characteristics of the use of anti-pain drugs, all respondents did not use anti-pain drugs, namely 74 respondents (100%) (Table 1).

Table 2 shows the level of neck pain before intervention was delivered the highest moderate pain was in the 41-60 age category. After performing the

intervention, respondents with no pain category increased by 3 respondents, mild pain category to 12 respondents and moderate pain to 2 respondents. In the weight category, before intervention the highest of neck pain was in the normal weight category in the normal body weight, and the highest level of moderate neck pain in the normal weight category. In the category of duration of work, the level of mild

Table 3 Neck pain Level Distribution in Intervention of Turmeric Drink and lavender Aromatherapy Combination to Neck Pain in Batik Craftsmen in Tuban

| Neck Pain Level | Pre Intervention | | Post Intervention | |
|------------------|--|------|-------------------|------|
| | f | % | f | % |
| No Pain | 0 | 0 | 3 | 4 |
| Mild Pain | 35 | 47.2 | 47 | 63.6 |
| Moderate Pain | 39 | 52.8 | 24 | 32.4 |
| Statistical test | <i>Wilcoxon signed rank test</i> ($\alpha \leq 0,05$) (p) = 0,000 | | | |

neck pain before intervention was highest in the category 1-5 years work and the highest level of moderate neck pain was in the category 11-15 years work. In the physical activity category, it can be seen that the level of mild neck pain before the intervention was highest in the Not doing physical exercises category, and the highest level of moderate neck pain was in the doing physical exercises category.

Table 3 shows that before being given the intervention of turmeric drink and lavender aromatherapy combination, 52.8% of respondents experienced moderate neck pain. Meanwhile, after being given the intervention of a combination of turmeric drink and lavender aromatherapy, 63.6% of respondents experienced mild neck pain. Statistical tests using the Wilcoxon Signed Rank Test were carried out to examine the difference in the average neck pain scale in the initial measurement (pre-test) with the final measurement (post-test). From the test results, the value of $p = 0.000$ ($\alpha \leq 0.05$) which means that there was an effect of a combination of turmeric drink and lavender aromatherapy on neck pain in batik craftsmen.

4. DISCUSSION

The results of this study are in line with prior research by Jogdand (2017) on rats that showed the ethanolic extract of turmeric has analgesic activity comparable to aspirin. Astuti (2018) research on rabbits showed that there was an anti-inflammatory effect on rabbit incisions compared to the control group. Fitria, Hasballah, and Mutiawati (2016) research on fracture pain patients showed a significant decrease in 48 respondents who were given an intervention with a mixture of turmeric and ginger for 3 days. Based on Kakuhese and Rambis research (2019) on post-operative sectio-caesarea mothers who were given lavender aromatherapy for 2 days of treatment showed a decrease in pain scale in all respondents. The previous study by Widayani (2017) in postpartum vaginal women who experienced second degree rupture who were given lavender aromatherapy 3 times a day showed a significant decrease from moderate pain (35.7%), after which the most pain was mild (39.3%). Widyastuti's research (2017) on preoperative fracture patients with complaints of pain who was given lavender aromatherapy for 3 days before

surgery showed a significant difference in the mean level of pain between the intervention and control groups

Neck pain is caused by multiple factors, including poor posture. Neck pain has two processes, namely chemical and mechanical due to stimulation of free nerve endings in muscles that work as mechano-nociceptive and chemo-nociceptive units. Chemical pain processes occur due to fatigue, trauma, and muscle ischemia. Muscle fatigue will trigger anaerobic metabolism resulted in the metabolites accumulation in muscles that produce lactic acid which drops pH and stimulates prostaglandins and leukotrienes produced from eicosanoids metabolism. Trauma and ischemia will release mediators such as prostaglandins and leukotrienes resulting from eicosanoid metabolism, which will then stimulate chemo-nociceptive. Mechanical processes that trigger pain result from stretching or pressure on the muscles so as to stimulate free nerve endings as mechano-nociceptive units (Raj Rao, 2002). Turmeric drinks contain compounds namely curcuminoids, essential oils, flavonoids, and saponins. The curcumin compound in turmeric can inhibit the cyclooxygenase (COX) pathway in eicosanoid metabolism which reduce inflammation. Turmeric contains curcumenol which functions as an analgesic to inhibit the release of prostaglandin and leukotrienes synthesis to inhibit the chemical process of neck pain (Aswani, 2015)

This study results proved that the active substance curcumin has many therapeutic effects such as anti-inflammatory, anti-arthritis, anti-microbial, antioxidant, immunomodulatory, anti-cancer, anti-ulcer, anti-diabetic, anti-fungal, anti-viral, anti-malarial and hepatoprotective. Essential oils are terpenoid compounds that have anti-inflammatory, anti-bacterial, and anti-tumor activities. The sesquiterpene compounds in turmeric essential oil are derivatives of terpene compounds such as alcohol which are bactericidal by destroying the tertiary structure of bacterial proteins or protein denaturation (Tarwiyah, 2001). Flavonoids are lipophilic and have antioxidant and anti-inflammatory activities. In addition, there are saponins which also have anti-inflammatory and anti-oedematic effects (Lawand & Gandhi, 2013).

Lavender aromatherapy contains lavender essential oil which is used to treat anxiety, nervousness, mental stress, insomnia, fatigue, and can relax muscles. Lavender flower oil has other

benefits as antibacterial, antifungal, carminative, sedative, antidepressant, effective for burns, and insect bites. The main ingredient in lavender aromatherapy is linalyl acetate which functions to relax the nervous system and tensed muscles. The content of linalool acts as a relaxation and sedative (Cavanagh and Wilkinson, 2002).

According to Bryan S Dennison & Michael H Leal (2011), the neck is divided into 3 parts, namely sub-occipital, upper cervical, and lower cervical. The muscle in the upper cervical play a central role in stabilizing head posture. This postural muscle tissue can become tense when contracted for a long duration of time, resulting in compression which lead to muscle fatigue, spasm, trauma and vasoconstriction in the capillaries (Achim and Wenig, 2019). This condition causes the emergence of chemical and mechanical processes of neck pain which can be relieved using chemicals from turmeric and lavender by inhibiting the COX pathway so that it inhibits the inflammatory process and relaxes the upper and lower cervical neck muscles. Changes in the location of pain can be caused by several factors, namely posture, sleeping position and activities that involve muscles in the upper and lower cervical (Jehaman, 2020).

During the study, all respondents were given a drink of turmeric and lavender aromatherapy in the afternoon after finishing work. Ten grams of turmeric is boiled with 300 ml of water until the water is reduced by one third which will release substances in the form of curcumin and curcuminol to inhibit the cyclooxygenase pathway and inhibit the release of prostaglandin and leukotrienes synthesis so that it can inhibit the chemical process of neck pain. Then, respondents were asked to enter the intervention room and were given lavender aromatherapy. Lavender aromatherapy has the main ingredients, namely linalyl acetate and linalool which are inhaled into the nose and enter the limbic (a part of the brain shaped like the letter C as a center for memory, mood, and intellect). The scent of lavender stimulates the release of enkephalins or endorphins in the hypothalamus, PAG, and ventromedial rostral medulla. Enkephalin stimulates an area in the brain called the raphe nucleus to secrete serotonin, causing a relaxing, calming, and anxiety-reducing effect and as a neuromodulator to inhibit nociceptive information in the spinal cord. This neuromodulator closes the defense mechanism by occupying receptors in the dorsal horn so that it inhibits the release of substance P. Inhibition of P substance will make pain impulses unable to pass through projection neurons, so they cannot be transmitted to higher processes in the cortex somatosensory and transitional so that it can relieve muscle tension due to the mechanical process of neck pain (Hutasorit, 2002).

According to the theory above, the researcher analyzed that the pain level decrease in batik craftsmen was caused by several factors such as age, weight, and length of work. Respondents experienced a significant reduction in pain level due to consuming

turmeric drinks and lavender aromatherapy combination which contain active substances in the form of curcumin, curcumenol, linalyl acetate and linalool which play a role in reducing the scale of neck pain.

5. CONCLUSION

This study concluded that batik craftsmen who work in 5 batik houses experience mild to moderate neck pain in the back of the neck before and after giving a combination of turmeric drink and lavender aromatherapy. The turmeric drink and lavender aromatherapy combination reduce the neck pain level in batik craftsmen, namely before the intervention was given by 52.8% moderate pain and after giving the intervention 63.6% mild pain.

It is hoped that batik craftsmen will pay more attention to body posture while working, rest periods, healthy lifestyle, and use a turmeric drink and lavender aromatherapy combination to treat neck pain that appears. Further research is hoped to control the confounding variables in the study, the sample is not homogeneous, and it is recommended to be able to conduct further research with other interventions and use a comparison group so as to achieve more accurate research results.

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