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Effect of Acupressure with Cardamom Massage Oil on the Severity of Common Cold in Children Aged 3-5 Years

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ABSTRACT

Background: The common cold is one of the most common infectious diseases in toddlers and can reduce their comfort and activity. Non-pharmacological treatments, such as acupressure, are becoming increasingly popular because they are considered safe and can enhance the immune response. Cardamom massage oil contains bioactive compounds thought to help relieve symptoms and improve immune function. This study aimed to determine the effectiveness of acupressure with cardamom oil on the severity of the common cold in toddlers aged 3-5 years, based on temperature and Immunoglobulin A (IgA) levels.

Subjects and Method: This study used a true experimental design and a pretest-posttest with a control group. The study was conducted at the Purwokerto Timur I Community Health Center in November 2025. A total of 32 subjects were divided into two groups: (1) The intervention group was given acupressure intervention group with cardamom oil for 30 minutes/day for 5 days (n = 16), and (2) The control group was given control group given Dextromethorphan, Pseudoephedrine, CTM, Paracetamol, and Vitamin C (n = 16). The dependent variables were body temperature and IgA levels. The independent variables were acupressure with cardamom oil and Dextromethorphan, Pseudo-ephedrine, CTM, Paracetamol, and Vitamin C. Body temperature is measured using a thermometer. IgA levels were measured using an ELISA kit. Data were analyzed by Paired t-tests.

Results: The average body temperature in the intervention group after being given acupressure with cardamom oil was lower (Mean = 36.7; SD = 0.23) compared to before the intervention (Mean= 38.1; SD= 0.29) and was statistically significant ($p < 0.001$). The average IG-A level in the intervention group after being given acupressure with cardamom oil was higher (Mean= 52.91; SD= 19.94) compared to before the intervention (Mean = 31.64; SD = 16.49) and was statistically significant ($p < 0.001$).

Conclusion: Acupressure with cardamom oil has been shown to be effective for the common cold by lowering body temperature and increasing IgA levels in toddlers aged 3-5 years.

Keywords: acupressure, common cold, IgA levels, cardamom massage oil

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BACKGROUND

The common cold is an upper respiratory tract infection (URTI) that affects the nasopharynx and nose. It is often characterized by nasal discharge and can be accompanied by a fever in children that lasts for several days. Children are the most vulnerable group to this infection because their immune systems are still weak or immature. This will affect the severity of the common cold in children. The severity can vary from mild symptoms such as a stuffy or runny nose, a mild cough, and fever, to more severe ones. If not treated properly and correctly, it can progress to more serious lower respiratory tract infections, such as bronchiolitis and pneumonia. Furthermore, the respiratory viruses that cause colds can worsen chronic respiratory diseases such as asthma, bronchitis, and chronic obstructive pulmonary disease (COPD) (Eccles, 2023).

Air pollution, climate change, and weather are suspected to be among the triggers for viral infections of the upper respiratory tract (Masetla, 2023). Coughing is a vital defense mechanism of the respiratory system, functioning to expel irritants, mucus, and pathogens from the airways. Coughing is also a protective response to maintain airway integrity (Bakhtiar and Juwita, 2020).

The prevalence of coughs and colds in Indonesia is around 25.0%, with 13.8% of cases diagnosed by a doctor. Overall, there are 1,017,290 cases. Toddlers in Indonesia experience coughs and colds three to six times per year (Ministry of Health of the Republic of Indonesia, 2018). In 2021, the incidence of acute respiratory infections (ARI) reached more than 600,000 cases, with a prevalence of 9.3 per 1,000 population. Cases of pneumonia, which commonly affect children, also show a high prevalence. Data from the Ministry of Health in 2023 recorded an increase in acute respiratory infections (ARI) cases, with 296,416 cases in January, 277,455 cases in May, and 285,623 cases in July. The prevalence of pneumonia cases reached 3.5% per 100 children under five, with approximately 2 million children dying from pneumonia each year (Indonesian Ministry of Health, 2023).

In Madiun Regency, Indonesia, according to data from the local Health Office, cases of coughs and colds among toddlers reached 2,905 cases as of July 2023, out of a total of 42,501 toddlers (Radar Madiun, 2023). In 2024, the number of visits for acute respiratory infections (ARI) at 26 community health centers and three hospitals in Madiun Regency reached 9,776, with 5,742 of these visits being among children. The main factors contributing to the increase in ARTI cases in this area include children's more vulnerable immune systems and the impact of extreme weather on the spread of viruses and bacteria.

In the post-COVID-19 pandemic context, the link between SARS-CoV-2 and ARTI becomes increasingly important to consider. Although COVID-19 cases in Indonesia have decreased significantly since their peak, they continued to experience a sporadic increase in cases in 2025. As of mid-June 2025, the Indonesian Ministry of Health recorded 179 cases of COVID-19 from 10,057 specimens examined, with the highest positivity rate recorded in weeks 18 and 23, reaching 3.62–3.67%. The dominant subvariants were KP.2.18 and MB.1.1, which cause symptoms similar to acute respiratory infections (ARI) such as cough, runny nose, and mild fever. The Indonesian Ministry of Health responded by issuing a Circular on Alertness regarding the emergence of new subvariant COVID-19 cases and activating the Surveillance and Response System (SKDR) for integrated monitoring of COVID-19, pneumonia, severe acute respiratory infections (ARI), and influenza-like

illness (ILI) (Indonesian Ministry of Health, 2025). Symptoms of COVID-19 similar to acute respiratory infections (ARI) have led to an increase in the burden of visits to health facilities, especially among vulnerable age groups such as children. This reinforces the urgency of strengthening promotive, preventive, and public education efforts in preventing acute respiratory infections (ARI) and other respiratory diseases.

Because the common cold is caused by a self-limiting rhinovirus, treatment depends heavily on the patient's immune system. A healthy immune system will cause milder symptoms and faster recovery. However, if the immune system is weak, symptoms will be more severe, and recovery may take longer or progress to a more serious illness. Currently, no specific antiviral drug has been found for rhinovirus, so treatment only aims to alleviate symptoms to reduce their severity and prevent them from developing into a more serious illness (Kemenkes, 2019).

Cough and cold treatment is divided into pharmacological and non-pharmacological approaches. Pharmacological therapy includes the use of decongestants, antihistamines, and analgesics, which have been proven effective in relieving symptoms. However, these methods carry the risk of side effects and the possibility of drug resistance if used irrationally. Antihistamines and decongestants can increase heart rate and the risk of seizures and even death (FDA, 2008). Based on research conducted (Shaikh and Wald, 2014) found evidence to support the use of antihistamines or decongestants for children with acute sinusitis providing significant side effects, such as drowsiness, irritability, insomnia, rhinitis medicamentosa, prolonged middle ear effusion, and death have been associated with the use of these medications (Indonesian Ministry of Health, 2024). Therefore, until further data from randomized controlled trials in children are available, the use of these medications is not recommended. Therefore, non-pharmacological therapies such as acupressure, aromatherapy, and herbal remedies are gaining increasing attention due to their fewer side effects (Hartono, 2017).

Acupressure is a form of complementary therapy that is widely used as an adjunct to conventional therapy in various health conditions (Wahidah, Ningtyas and Latifah, 2023), including respiratory tract disorders. This therapy involves applying pressure to specific points on the body to stimulate the nervous system and improve organ function naturally. As a complementary therapy, acupressure is not intended to replace primary medical treatment, but rather to accelerate the healing process and relieve symptoms more comfortably and minimize risks (Tsai et al., 2021).

Acupressure, as a single therapy, has been shown to boost immunity by stimulating specific points associated with the immune system. This stimulation can improve blood circulation, optimize lymphatic function, and stimulate the release of endorphins and other bioactive substances that play a role in strengthening the immune system, thereby reducing the severity of the common cold in children (Patriyani, 2022). Acupressure has been shown to affect changes in temperature, pulse rate, respiratory rate, and sleep quality in toddlers with acute respiratory infections (ARI) (Malikah, 2018). Research by Maftuchah et al. (2020) on the "effectiveness of acupressure therapy and common cold massage in treating coughs and colds in infants" showed that the therapy was effective in reducing cough and cold symptoms in infants. Another study by Isnina et al. (2023) examined the effect of massage on the LU 1, 2, and CV 17 acupressure points on reducing coughs in

toddlers. This study found that massage at these points significantly reduced the duration and severity of coughs in toddlers.

However, acupressure has limitations because its effectiveness is highly dependent on the skill of the therapist, and if performed incorrectly, its benefits can be reduced or even cause pain. Its therapeutic effects are also not immediate and require several sessions to experience improvement. Pressure is applied through stimulation of acupuncture points, the effects of which can be short-lived if not performed regularly. Furthermore, scientific evidence regarding the effectiveness of acupressure in treating the common cold is still mixed, so further research is needed. Acupressure is also contraindicated in certain conditions, such as high-risk pregnancies, blood clotting disorders, or the presence of open wounds in the pressure area (MCN, 2022).

Besides acupressure, the use of herbs in non-pharmacological therapy is also a promising option. One plant that can be used to treat coughs and colds is cardamom. Cardamom contains essential oils that can help treat coughs, colds, and other respiratory problems. Cardamom oil contains the active compounds eucalyptol cineol, terpinol, and borneol. Cardamom also contains antioxidants, alkaloids, flavonoids, saponins, sterols, and tannins (Umakant and Rabb, 2022). This oil can help reduce oxidative stress and increase immune cell activity, which are important factors in the body's defense against pathogens. Other benefits of cardamom include its antimicrobial, anti-inflammatory, and immunomodulatory properties (Dilshad, 2024).

Cardamom can also help thin mucus and remove it from the respiratory tract. As coughs and colds often cause mucus buildup in the respiratory tract, cardamom can help expel mucus accumulated in the lungs and relieve an itchy throat (Indonesian Ministry of Education, 2019). Cardamom oil, with its antioxidant and bioactive compounds, can enhance immune response and reduce inflammation, but its effectiveness can vary depending on the dose and method of application (Ashokkumar et al., 2020).

The study conducted by (Khan, 2024) revealed that cardamom extract has a bronchodilator effect through a calcium channel inhibition mechanism, which supports its use in the treatment of asthma. In addition, research by (Patra et al., 2020) Studies have shown that cardamom phytochemicals can inhibit enzymes involved in the life cycle of Streptococcus pneumoniae, the bacteria that causes bronchitis, and found that acetic acid from cardamom can inactivate enzymes from Mycoplasma pneumoniae, other bacteria associated with bronchitis. Furthermore, a meta-analysis by Asbaghi et al. (2023) showed that cardamom consumption can lower blood pressure and inflammation, relevant factors in respiratory diseases.

Despite the various benefits of cardamom, there are certainly some caveats to consider when using it therapeutically. Cardamom massage oil, a preparation that can be used therapeutically, has several drawbacks that require attention, such as the risk of skin irritation and allergic reactions, especially if used without proper dilution. Furthermore, the lack of standardized dosages makes its therapeutic effects variable, while its strong aroma requires caution when used in asthmatics. This oil has the potential to interact with certain medications, so its use should be considered, especially in individuals undergoing pharmacological therapy for certain conditions (Hamdy et al. 2024).

Acupressure and cardamom herbal therapy each have their own advantages and disadvantages. The effects of acupressure tend to be temporary and require repeated

treatments for optimal results. Furthermore, the body's response to acupressure can vary from person to person, depending on health conditions and frequency of therapy. When acupressure is combined with cardamom oil, it is hoped that the potential for increased immunity can be optimized and the severity of the common cold can be reduced. Furthermore, the relaxing effects of cardamom oil can support acupressure in reducing stress and improving balance of the autonomic nervous system, which plays a role in the immune response.

In this combination, the drawbacks of acupressure, which requires repeated stimulation, can be offset by the longer-lasting pharmacological effects of cardamom oil in supporting immunity, thereby reducing the severity of the common cold. Similarly, cardamom oil, which requires optimal application and distribution, can be more effective when applied in conjunction with acupressure, as oil penetration through the skin can be enhanced by stimulating acupressure points. The combined therapeutic approach of acupressure and cardamom oil in treating toddlers is expected to offer a more holistic solution than previously studied conventional methods. Therefore, the combination of these two therapies is expected to create a synergistic effect that is better in boosting immunity, thereby reducing the severity of the common cold in toddlers compared to using either therapy alone. To date, no research has been conducted on the combination of acupressure and cardamom oil. Therefore, further research is needed to explore the potential synergy of this combination in treating respiratory disorders in toddlers.

Therefore, this study aims to evaluate the effectiveness of the combination of acupressure and cardamom oil massage therapy in reducing the severity and accelerating the healing of the common cold in toddlers. Although each method has its drawbacks, integrating the two can provide a more effective therapeutic solution with minimal side effects and can be integrated with conventional medical therapies. Therefore, this research is expected to contribute to the development of safe and effective alternative therapy methods for children.

SUBJECTS AND METHOD

1. Study Design

This was a quasi-experimental study with control group. The study was carried out at the Kare Community Health Center, Madiun Regency, East Java, Indonesia. Data collection was conducted from October to November 2025.

2. Population and Sample

The target population was toddlers aged 3-5 years at the Kare Community Health Center in Madiun Regency. The total sample size was 32 respondents.

3. Study Variables

The dependent variables were body temperature and IgA levels. The independent variables were acupressure with cardamom oil and Dextromethorphan, Pseudoephedrine, CTM, Paracetamol and Vitamin C.

4. Operational Definition of Variable

Acupressure with cardamom oil is a massage therapy throughout the toddler's body using cardamom and acupressure points LI20, Lu7, SI7, UB12, GB20 and LI4 to cure coughs and colds which is done for 30 minutes/day for 5 days. Dextromethorphan, Pseudoephedrine, CTM, Paracetamol and Vitamin C are to help relieve common cold and fever in toddlers.

The level of common cold is the intensity and number of symptoms experienced by individuals during an uncomplicated upper respiratory tract infection.

The severity was measured based on the symptom score observed for 5 consecutive

days, the symptoms observed include dry/ phlegmy cough, intermittent or frequent runny nose (clear, or yellowish and thick mucus, child's body temperature 37.5-38.5, breathing through the nose or mouth with a frequency of 20-40x/minute, whether appetite decreases or not and how long it takes to recover until there are no symptoms

5. Study Instrument

Body temperature is measured using a thermometer. IgA levels are measured using an ELISA kit.

6. Data Analysis

Data analysis used Excel and the SPSS program. The average differences between paired groups were tested using the t-test.

7. Research Ethics

Research ethics issues, including informed consent, anonymity, and confidentiality, were carefully addressed throughout the research process. A research ethics approval letter was obtained from the Research Ethics Committee of the Ministry of Health Polytechnic of Semarang, Indonesia, No. 1231/EA/F.XXIII.38/2025, on October 30, 2025.

RESULTS

Table 1 shows the characteristics of the respondents. In terms of age, almost all of the intervention group (87.5%) exclusively breastfed the infants and the control group (81.25%). In terms of immunization status, all of the intervention group had complete immunizations and almost all of the control group (93.75%). In terms of birth history, all of the intervention group (100%) had a history of full-term birth. In terms of nutritional status, almost all of the toddlers had normal nutritional status (93.75%) in each intervention-control group.

Based on Table 2, the average body temperature in the intervention group after being given acupressure with cardamom oil was lower (Mean= 36.7; SD= 0.23) compared to before the intervention (Mean= 38.1; SD= 0.29), and the difference was statistically significant (p <0.001). In the control group, the average body temperature after treatment was also lower (Mean= 36.8; SD= 0.36) compared to before treatment (Mean= 38.0; SD= 0.24), and this difference was statistically significant (p <0.001). However, the mean reduction in body temperature in the intervention group (Mean difference= 1.38; SD= 1.89) was greater than in the control group (Mean difference= 1.23; SD= 0.28).

Based on Table 3, the average IG-A score in the intervention group after being given acupressure with cardamom oil was higher (Mean= 52.91; SD = 19.94) compared to before the intervention (Mean= 31.64; SD= 16.49), and the difference was statistically significant (p < 0.001). In the control group, the average IG-A score after treatment was also higher (Mean= 34.50; SD= 10.90) compared to before treatment (Mean= 27.08; SD= 9.60), and this difference was statistically significant (p <0.001). However, the mean increase in IG-A score in the intervention group (Mean difference= 21.27; SD= 11.59) was greater than in the control group (Mean difference= 7.42; SD= 9.31).

Table 1. Respondence Characteristics

Characteristics	Intervention		Control		p
	N	%	N	%	
History of Exclusive Breastfeeding					
Exclusive Breastfeeding	14	87.5	13	81.25	0.626
Not Exclusive Breastfeeding	2	12.5	3	18.75	

Characteristics	Intervention		Control		p
	N	%	N	%	
Immunization Status					
Complete	16	100	15	93.75	0.310
Incomplete	0	0	1	6.25	
Birth History					-
Quite a month	16	100	16	100	
Less than a month	0	0	0	0	
Toddler Nutritional Status					
Thin	0	0	1	6.25	
Normal	15	93.75	15	93.75	0.553
Obese	1	6.25	0	0	

Based on Table 2, the average body temperature in the intervention group after being given acupressure with cardamom oil was lower (Mean= 36.7; SD= 0.23) compared to before the intervention (Mean= 38.1; SD = 0.29), and the difference was statistically significant (p < 0.001). In the control group, the average body temperature after treatment was also lower (Mean= 36.8; SD= 0.36) compared to before treatment (Mean= 38.0; SD= 0.24), and this difference was statistically significant (p <0.001). However, the mean reduction in body temperature in the intervention group (Mean difference= 1.38; SD= 1.89) was greater than in the control group (Mean difference= 1.23; SD= 0.28).

Table 2. Effect of acupressure with cardamom oil on the common cold in the body temperature category of toddlers aged 3-5 years

Body Temperature	Mean	SD	p	Difference	
				Mean	SD
Intervention					
Pre	38.1	0.29	<0.001	1.38	1.89
Post	36.7	0.23			
Control					
Pre	38.0	0.24	<0.001	1.23	0.28
Post	36.8	0.36			

Based on Table 3, the average IG-A score in the intervention group after being given acupressure with cardamom oil was higher (Mean= 52.91; SD= 19.94) compared to before the intervention (Mean= 31.64; SD= 16.49), and the difference was statistically significant (p < 0.001). In the control group, the average IG-A score after treatment was also higher (Mean= 34.50; SD= 10.90) compared to before treatment (Mean= 27.08; SD= 9.60), and this difference was statistically significant (p< 0.001). However, the mean increase in IG-A score in the intervention group (Mean difference= 21.27; SD= 11.59) was greater than in the control group (Mean difference = 7.42; SD = 9.31).

Table 3. Effect of Acupressure with Cardamom Oil on the Common Cold in the IG-A Level Category of Toddlers Aged 3-5 Years

IG-A Level	Mean	SD	p	Difference	
				Mean	SD
Intervention					
Pre	31.64	16.49	<0.001	21.27	11.59

IG-A Level	Mean	SD	p	Difference	
				Mean	SD
Post	52.91	19.94			
Control					
Pre	27.08	9.60	<0.001	7.42	9.31
Post	34.50	10.90			

DISCUSSION

1. Effect of acupressure with cardamom oil on body temperature

The results showed no significant difference in body temperature between the control and intervention groups after treatment. Post-intervention body temperature in the control group was 36.8°C, while in the intervention group it was 36.7°C.

The comparable results in temperature reduction occurred because both pharmacological therapy in the control group and the combination of acupressure and cardamom oil in the intervention group were equally effective in lowering body temperature to within the normal physiological range, between 36–37°C. Once body temperature returned to the normal range, the minuscule difference of 0.1°C was no longer clinically or statistically significant. Furthermore, the common cold is a self-limiting illness that naturally improves within a few days, so body temperature tends to decrease in all children as part of the natural healing process.

Research Eccles (2023) states that fever reduction in the common cold often occurs spontaneously as viral inflammation subsides. This finding aligns with research in the 2021 WHO guidelines, which showed that antipyretics are effective in normalizing fever. Research by Chen et al. (2020) confirms that acupressure is also effective in regulating thermal regulation through autonomic nervous system modulation.

This reduction in body temperature can be explained by the mechanism of action of antipyretic drugs, which work by inhibiting prostaglandin synthesis in the hypothalamus, thereby resetting the body's temperature-regulating center to normal levels. Pharmacological therapy plays an important role in relieving fever symptoms accompanying upper respiratory tract infections, especially in the acute phase of the disease (Balli et al., 2025). The WHO guidelines recommend that antipyretics be used for fevers ≥39°C in children with upper respiratory tract infections, as they inhibit prostaglandin E2 synthesis in the hypothalamus, which raises the body's temperature set point. This recommendation applies to mild to moderate fevers (38-39.5°C) in upper respiratory tract infections (URTIs) such as the common cold, where antipyretics are aimed more at relieving distress than suppressing the fever itself, with doses adjusted for body weight (10-15 mg/kg every 4-6 hours).

Effectiveness is proven by RCT studies showing a temperature reduction of 1-2°C within 1-2 hours, although GRADE evidence is low due to variations in thresholds across global guidelines (Greenhalgh, 2021). Consistent with this, research by Santos et al. (2019) showed that administering antipyretics to children can reduce temperatures by 1-1.5°C within the first few hours. The decrease in body temperature in the intervention group indicates that acupressure with cardamom massage oil acts as an effective complementary therapy in helping to treat fever in children with the common cold.

This effect can be explained by the physiological mechanisms of acupressure,

which increase peripheral blood flow, activate the parasympathetic nervous system, and reduce inflammatory mediators (Kwon et al., 2018). Stimulation of acupressure points triggers the release of neuropeptides and endorphins that reduce local inflammation by reducing pro-inflammatory cytokines such as IL-6 and TNF-α, while increasing blood flow through peripheral vasodilation due to smooth muscle relaxation. Activation of the parasympathetic system decreases sympathetic tone, reduces catecholamines that reduce inflammation and vasoconstriction, thus supporting more effective thermoregulation in cold fever. These effects are cumulative, with onset 10-30 minutes post-stimulation and a duration of up to 4-6 hours (Karamian et al., 2022).

Stimulation of specific acupressure points has been shown to reduce the inflammatory response by modulating the hypothalamic-pituitary-adrenal (HPA) axis, which ultimately influences body temperature regulation (Chen et al., 2023).

In addition to its acupressure effects, cardamom oil also plays a crucial role in triggering temperature reduction. This oil contains active compounds such as 1,8-cineole, limonene, and α-terpinyl acetate, which have anti-inflammatory and antipyretic properties. These compounds work by inhibiting the release of pro-inflammatory cytokines such as IL-6 and TNF-α, which are the primary triggers of fever in viral infections. Thus, the combination of acupressure and cardamom oil provides a synergistic effect in lowering body temperature, thereby accelerating the recovery process from common cold symptoms (Heydarian et al., 2023).

Researchers assumed that overall, both the control and intervention groups showed significant reductions in body temperature. However, the intervention group achieved this reduction through a mechanism involving a combination of nervous system stimulation, improved circulation, and the phytochemical effects of cardamom oil. These findings suggest that complementary therapies such as acupressure may be a useful complementary intervention alongside pharmacological therapy in the management of the common cold in toddlers.

2. Effect of Acupressure with Cardamom Oil on IG-A Levels

The results showed a significant difference in IgA levels between groups. Post-test IgA levels in the control group were 34.50 ng/mL, while in the intervention group, they increased significantly to 52.91 ng/mL. A statistical test showed a p-value of 0.13 ($p<0.05$), indicating a significant difference in IgA levels between the intervention and control groups.

This significant difference indicates that the combination of acupressure and cardamom oil has a stronger ability to enhance the mucosal immune response compared to pharmacological therapy alone. Acupressure is known to stimulate plasma cell activity in mucosal tissue through parasympathetic nervous system regulation, which plays a role in increasing IgA secretion as part of the airway mucosal defense. Furthermore, cardamom oil has immunomodulatory properties derived from bioactive compounds such as cineole and limonene, which can increase macrophage activity, suppress inflammation, and improve epithelial integrity, enabling optimal IgA production.

This mechanism is supported by Li et al. (2023) which showed that vagus nerve stimulation and HPA axis modulation significantly increased IgA secretion. (Brandtzaeg, 2013) also explained that IgA is an important component of mucosal immunity that increases when mucosal conditions

improve. In addition, research (Heydarian *et al.*, 2023) Studies have shown that certain essential oils can increase secretory IgA by enhancing local immune activity. Therefore, the high IgA levels in the intervention group reflect a synergistic immunological effect between acupressure and cardamom oil, which not only aids recovery but also strengthens the mucosal defensive system more effectively than pharmacological therapy. This improvement reflects the direct effect of the combination of acupressure and cardamom oil on the mucosal immune system.

Mechanistically, stimulation of acupressure points associated with the respiratory and immune systems, such as LU 7 and LI 4, can increase parasympathetic nervous system activation via the vagus nerve pathway, which plays a role in regulating the mucosal immune response and increasing IgA secretion. This research aligns with research conducted by (Karamian et al., 2022) The role of massage in strengthening mucosal immunity against respiratory and gastrointestinal infections. This improvement is associated with relaxation and immune stimulation, which prevent infection. This finding is relevant for ARI because sIgA plays a key role in the upper respiratory tract. Research by Efendi et al. (2020) showed that acupressure and therapeutic massage significantly increased serum and salivary IgA levels in children with upper respiratory tract infections. This effect is further enhanced by the role of cardamom oil used during acupressure.

Cardamom contains bioactive components such as 1,8-cineole, α-terpinyl acetate, and limonene, which have anti-inflammatory, immunostimulant, and respiratory function-enhancing properties. These compounds work to increase macrophage activity, suppress mucosal inflammation, improve airway epithelial integrity, and stimulate local antibody production, including IgA. The study (Heydarian et al., 2023) showed that 1,8-cineole can enhance the mucosal immune response in respiratory tract infections. Cardamom extract has a significant immunostimulatory effect on immune cells. The combination of acupressure and cardamom oil produces a synergistic effect, where autonomic nerve stimulation, reduced inflammation, and increased immune activity work together to produce a significantly greater increase in IgA than either natural physiological recovery or pharmacological therapy alone. Therefore, the increase in IgA in the intervention group was not only statistically significant but also physiologically significant, demonstrating that acupressure with cardamom oil can significantly strengthen mucosal immunity.

IgA is a key component of mucosal immune system, playing a crucial role in protecting the upper respiratory tract from pathogen invasion. During infection, IgA production increases as an adaptive immune response to neutralize viruses and prevent the adhesion of microorganisms to mucosal surfaces. However, the increase in IgA levels in the control group was relatively lower compared to the intervention group. This indicates that pharmacological therapy does not have a direct immunomodulatory effect but rather supports the healing process by controlling symptoms.

Researchers speculate that the control group's omission of massage or acupressure therapy also affected the speed of the immune response and the reduction of symptoms. Acupressure is known to stimulate the parasympathetic nervous system, promote relaxation, and improve blood and lymph circulation, ultimately supporting the immune system. Therefore, although the control group showed a decrease in temperature and an increase in IgA levels,

the response was slower and less optimal than the group receiving a combination of pharmacological therapy and acupressure with cardamom oil.

AUTHOR CONTRIBUTION

In compiling this journal, Hera Lusi Ayuandita, Arwani dan Sri Wahyuni collaborated on the development of the manuscript. Hera Lusi Ayuandita prepared all research administrative documents (research permits) and data collection. Hera Lusi Ayuandita, Arwani dan Sri Wahyuni analyzed, interpreted, and published the data.

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CONFLICT OF INTEREST

There is no conflict of interest in this study

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