Ethnopharmacological Properties of Essential Oils from Natural Forests in Northern Sumatra

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Abstract. The Covid-19 pandemic has raised global awareness for boosting the body's immune system through organic product utilization and complementary therapies. This condition encourages re-disclosure of local wisdom in herbal medicine applications which involves essential oils in disease prevention and treatment. This paper describes the local wisdom of various forest essential oils utilization, to identify the phytopharmaceutical content and potential for herbal medicine. The research was carried out through exploration and in-depth interviews with 30 local community respondents who applied essential oils in traditional medicine in Humbang Hasundutan, North Sumatra; and Singkil, Aceh in 2019. This review also explored various literature regarding phytopharmaceutical content and safety issues of various plants used in traditional medicine. The study results identified at least 17 essential oils as the main therapeutic agent, including Sumatran camphor (Dryobalanops aromatica), benzoin (Styrax sumatrana), nutmeg (Myristica fragrans), andaliman (Zanthoxylum acanthopodium), and lemo (Litsea cubeba). The essential oils are extracted from leaves, fruit, flowers, bark, stems, roots, and resin in various ways. Some of the main compounds identified include α-pinene, camphene, limonene, 1,8-cineole, and p-cymene. In aromatherapy applications, essential oils aroma has a relaxing effect and offers relief to a congested respiratory system. The essential oils can also relieve inflammation, irritation, insect bites, itching, rashes, sprains, and muscle aches in topical application. Local wisdom reveals essential oils utilization to treat indigestion, headaches, and insomnia. The compound 1,8 cineole is potential as anti-viral, anti-bacterial, and antifungal, expectorant boosts the immune system and prospective for respiratory and blood vessels treatment.

1. Introduction
Over the centuries, essential oils have been found as fragrances with healing potential to the body and soul. Many ancient civilizations such as Egypt, China, and India used essential oils as popular complementary and alternative therapies for the treatment of various complications and conditions [1]. In traditional societies in the Nusantara, these organic oils also have an important role in therapeutic, cosmetic, aromatic, fragrant, and spiritual uses.

Essential oils are extracted from plant parts including flowers, leaves, barks, stems, fruits, and roots, and are also distilled from resins. The mixture of hydrocarbons, alcohols, aldehydes, esters, ethers, ketones, phenol oxides, and terpenes [2] where contained produce some distinctive aromas which keep the environment free from disease, bacteria, viruses, and fungi. These characteristics support anti-bacterial, anti-viral, anti-inflammatory properties along with immune booster and affect emotional, circulatory with calming effects, memory, and alertness enhancement [1][3].
There are various methods of utilizing essential oils including inhalation, massage, or simple application to the skin but rarely internally. Inhalation and topical application such as massage can relieve stress and refresh a tired body and mind. Various reports also explore the potential application of essential oils in the treatment of Alzheimer's [4], cardiovascular disease, cancer [5], pain in pregnancy[3], sleep disorders [6], etc.

The use of essential oils in holistic medicine has grown rapidly over the past decade. The Covid-19 pandemic has raised global awareness for boosting the body's immune system through organic product utilization and complementary therapies. Essential oil therapy is proven to be superior when compared to synthetic aromas. Synthetic fragrances generally contain irritants, such as solvents and propellants, which irritate some people [7]. This condition encourages re-disclosure of local wisdom in herbal medicine applications which involves essential oils in disease prevention and treatment. This paper describes the local wisdom of various forest essential oils utilization, to identify the phytopharmaceutical content and potential for herbal medicine.

2. Methods
The research was carried out through exploration and in-depth interviews with 30 local community respondents who applied essential oils in traditional medicine in Humbang Hasundutan, North Sumatra; and Singkil, Aceh in 2019 until in the semester of 2020. The information obtained was verified by observing the morphology of the essential oil-producing plants studied which included the collection of fruit, leaves, bark, and resin as well as samples of essential oils.

This review also explored various literature regarding phytopharmaceutical content, therapeutic, medical, cosmetic, psychological, olfactory, massage, aromatherapy, and safety issues of various plants used in traditional medicine. The local wisdom on the use of essential oils as herbal medicinal ingredients is verified by referring to the various pharmacological activities that have been identified. All available information is gathered from electronic databases such as Academic journals, Google Scholar, Science Direct, Web of Science, and library searches.

3. Results and Discussion
3.1. Traditional application
The study results identified at least 17 essential oils as the main therapeutic agent, cosmetic, aromatic, fragrant, and spiritual uses. The essential oil was produced from 17 forest tree species (15 families) consisting of Agathis spp. (Araucariaceae), Altingia excelsa (Altingiaceae), Aquilaria malaccensis (Thymelaeaceae), Cassia siamea (Fabaceae), Casuarina equisetifolia (Casuarinaceae), Cinnamomum spp. (Lauraceae), Dipterocarpus sp. and Dryobalanops aromatica (Dipterocarpaceae), Lantana camara (Verbenaceae), Litsea cubeba (Lauraceae), Melaleuca leucadendron (Myrtaceae), Myristica fragrans (Myristicaceae), Pinus merkusii (Pinaceae), Quercus (Fagaceae), Shorea spp. (Dipterocarpaceae), Styrax sumatrana, S. benzoin (Styracaceae), and Zanthoxylum acanthopodium (Rutaceae).

These essential oils have been traditionally used for various ailments and disorders including treating wound-healing activities, prevent and treat skin infections, as an antidote for a snake or animal poisonous bites, against scabies, relieving muscular aches and pains, digestive problems, bloating, relieve muscle and joint pain. The essential oil is also utilized as an herbal medicine for dyspepsia, constipation, malaria, treating cough, fever, antirheumatic, and toothache. Several symptoms of degenerative diseases such as hypertension, diabetes mellitus, liver disorder, and urogenital diseases can also be cured through the application of essential oils. In the use of aromatherapy, essential oils are used for reducing stress, bronchitis, insomnia, and rhinitis asthma.
Table 1. Traditional applications of various essential oils

| No | Essential oils     | Species                        | Traditional Application                                                                 |
|----|--------------------|--------------------------------|-----------------------------------------------------------------------------------------|
| 1  | Altingia oil       | *Altingia excelsa*             | treating cough                                                                          |
| 2  | Benzoin            | *Styrax sumatrana, S. benzoin* | prevent and treat skin infections, topical stop light skin bleeding and relieve swelling, aromatherapy. |
| 3  | Borneol (camphor)  | *Dryobalanops aromatica*       | a relaxing fragrance, relieves inflammation, insect bites, itching, irritation, rashes, and muscular aches and pains, digestive problems, bloating, relieves muscle and joint pain. |
| 4  | Cajuput oil        | *Melaleuca leucadendron*       | colds, sinus infections, nasal congestion, flu, respiratory problems.                    |
| 5  | Cassia oil         | *Cassia siamea*                | treat malaria, cough, scabies, fever, constipation, toothache, hypertension, insomnia, as an antidote for snake bites, diabetes mellitus, asthma, fever, antirheumatic and against swellings. |
| 6  | Cinnamon           | *Cinnamomum spp.*              | improve digestion, stabilize blood sugar, and improve blood circulation, boost immunity, relieves depression. |
| 7  | Cyprus oil         | *Casuarina equisetifolia*       | stomach spasms medicine                                                                  |
| 8  | Copal              | *Agathis spp.*                 | external wound medicine (skin)                                                           |
| 9  | Gurjum oil         | *Dipterocarpus sp.*            | relieving muscle aches wound medicine, ulcer, rheumatism, flu, and fever.               |
| 10 | Lantana oil        | *Lantana camara*               | cough, wound medicine, urine laxative, swelling medicine.                                |
| 11 | May chang          | *Litsea cubeba*                | antidote due to insect bites. Fruit: cough medicine.                                     |
| 12 | Nutmeg oil         | *Myristica fragrans*           | insomnia medication. Seed oil: an upset stomach.                                         |
| 13 | Oud                | *Aquilaria malaccensis*        | overcome constipation, bloating, colds, and diarrhea.                                    |
| 14 | Pine oil           | *Pinus merkusii*               | reducing stress, relieving muscle aches, wound medicine, rheumatism                      |
| 15 | Quercus oil        | *Quercus*                      | to treat and prevent asthma, hemorrhoid, diarrhea, gastric ulcers, and wound healing.   |
| 16 | Sichuan pepper oil | *Zanthoxylum acanthopodium*     | dental disorders, dyspepsia, and lotion for scabies, antimicrobial as a food preservative. |
| 17 | Shorea oil (damar) | *Shorea spp.*                  | wound-healing activities on incision and excision wounds, anticholesterol (stigmasterol dan β-sitosterol) |

As an herbal medicinal ingredient, essential oils are applied in various ways including massage, cosmetics, olfactory, and psycho aromatherapy. At certain doses, essential oils are also taken internally (Table 2). In aromatherapy massage, oud essential oil, cassia oil, may chang, borneol, benzoin, and nutmeg oil were identified to have healing effects. This technique is also known as the healing touch of massage therapy.

Essential oils are also used for cosmetic applications for skin, body, face, and hair care. The essential oils of benzoin, borneol, *may chang*, oud, and cajuput oil have a cleansing, moisturizing, drying, and firming effect on the skin. A few drops of essential oil are applied by showering the whole body or specific parts for a simple and effective method. It came about after scientists outlined the antiseptic and skin permeability properties of the essential oil [8].

Inhalation, local application, and bathing are the main methods used in aromatherapy which utilize this oil to penetrate the surface of human skin with a clear aura. Once the oil is in the system, they transform themselves and work in a friendly manner at the site of damage or in the affected area. This type of therapy uses various permutations and combinations to get relief from various ailments like depression, indigestion, headaches, insomnia, muscle pain, breathing problems, skin diseases, swollen joints, urinary complications, etc [1].

Inhalation of essential oils has enhanced olfactory aromatherapy, wherein simple inhalation can promote emotional health, calm, relax, or rejuvenate the human body. Stress can also be reduced through pleasant smells that remind memories of smells [9]. In this case, several essential oils that have been used include benzoin, borneol, cajuput oil, *Cyprus* oil, *may chang*, nutmeg oil, and Sichuan pepper oil. In psycho-aromatherapy, certain mood and emotional states can be obtained with this oil providing a relaxing, refreshing, or pleasant memory pleasure.
Table 2. Essential oil application in traditional herbal medicine

| Species | Essential oils | Application | Parts of the plant |
|---------|----------------|-------------|--------------------|
| Agathis | Damar          | Massage     | Leaves             |
| Altingia excelsa | Altingia oil | Massage, Cosmetic, Olfactory | Flowers |
| Cassia siamea | Cassia oil | Massage, Olfactory | Leaves, Flowers |
| C. equisetifolia | Cyprus oil | Massage, Olfactory | Flowers |
| Cinnamomum | Cinnamon | Massage, Olfactory | Leaves, Flowers |
| Dipterocarpus sp. | Gurjum oil | Massage, Olfactory | Flowers |
| D. aromatica | Camphor | Massage, Olfactory | Leaves, Flowers |
| Gaharu | Oud | Massage, Olfactory | Leaves, Flowers |
| Lantana camara | Lantana oil | Massage, Olfactory | Leaves, Flowers |
| Litsea cubeba | May chang | Massage, Olfactory | Leaves, Flowers |
| M. leucadendron | Caujput oil | Massage, Olfactory | Leaves, Flowers |
| Myristica fragrans | Nutmeg oil | Massage, Olfactory | Leaves, Flowers |
| Pinus merkusii | Pine oil | Massage, Olfactory | Leaves, Flowers |
| Quercus | Quercus oil | Massage, Olfactory | Leaves, Flowers |
| Shorea | Damar | Massage, Olfactory | Leaves, Flowers |
| Styrax sumatranza | Benzoin | Massage, Olfactory | Leaves, Flowers |
| Z. acanthopodium | Sichuan pepper | Massage, Olfactory | Leaves, Flowers |

Essential oils are known for their specific energy characteristics. The stimulating properties of oils are identified by their very similar structure to real hormones [1]. The penetration potential of this oil to reach the subcutaneous tissue is one of the important characteristics of this therapy. The effects are also complex and subtle due to their complex structure and chemical properties. The mechanism action involves the integration of essential oils into biological signal receptor cells in the nose when inhaled. These signals are transmitted to the limbic and hypothalamus parts of the brain via olfactory bulb. These signals cause the brain to release nerve messengers such as serotonin, endorphins, and others, to connect the nervous system and other body systems to confirm the desired changes and to provide a relief feeling[1][10].

The essential oils used traditionally are produced from plant parts (Table 2). Most of the essential oils are obtained from the leaves, although oil production can also be extracted from resin exudates as well as from endemic trees such as benzoin resin from the styrax tree [11] and borneol from the Sumatran camphor tree. Other types of resin producers that can also produce other medicinal properties are Pinus merkusii, agathis, dipterocarpus (gurjum oil) and shorea. Besides abundant in leaves and resins, essential oils are also found in many fruits or seeds such as Z. acanthopodium, Myristica fragrans, Dipterocarpus sp., Cassia siamea and Agathis sp. Flowers were also identified to contain significant essential oils including D. aromatica, Cassia siamea, Lantana camara, Litsea cubeba, M. leucadendron, Myristica fragrans, and Z. acanthopodium. Meanwhile, the essential oils in the root are found in Cassia siamea, Agularia malaccensis, and Z. acanthopodium. Besides distilled, essential oils are obtained from roots boiling.

3.2. Phytochemical contents

Most of these pharmacological effects can be explained by the phytopharmaceutical compounds contained in almost all parts of the plant (Table 3). Benzoin essential oil contains phytochemical compounds such as benzyl benzoate, cinnamic acid, benzyl cinnamate, styrene, benzoic acid, cinnamyl benzoate, (E)-cinnamyl-(E)-cinnamate, allyl benzoate, benzaldehyde, ethyl benzoate, eugenol, (E)-cinnamaldehyde, allyl cinnamate, 1.8-cineole, and others [12]. Most of these compounds have a pleasant odor. It is used in perfumes, flavorings, as a food preservative, and antifungal agent.

Oud oil distilled from Agularia malaccensis wood contains agarospiron (13.57), tetradecanal (6.63), pentadecanal (4.9), eudesmol (13.68), o xo-agarospiron (4.54), 2-hydroxyquai-1 (10), 11,15-oic acid
components are β-geranyl acetate (35%). While the dominant citrus aroma comes from limonene and citronellol. Other lignans. The pyrroloquinoline alkaloids, quaternary isoquinoline alkaloids, aporphine alkaloids, and several types of alloaromadendrene oxide (2), α-elemol, γ-eudesmol, and guaioi [13].

Table 3. Phytochemical compounds contained in essential oils.

| Essential oils       | Phytochemical compounds                                      |
|----------------------|-------------------------------------------------------------|
| Altingia oil         | α-pinene (19.8%), β-pinene (16.0%), α-phellandrene (15.9%), limonene (10.9) β-phellandrene (8.1) |
| Benzoin              | benzyl benzoate (76.1), cinnamic acid (3.5), benzyl cinnaminate (3.3), styrene (2.3), benzoic acid (1.7), cinnamyl benzoate (1.4), acetophenone (1.0), (E)-cinnamyl-(E)-cinnaminate (0.9), allyl benzoate (0.9), benzaldehyde (0.9), ethyl benzoate (0.9), eugenol (0.8), (E)-cinnamaldehyde (0.7), allyl cinnamate (0.5), 1.8-cineole (0.4) |
| Borneol (camphor)    | a-pinene, b-caryophyllene, 1.8-cineole, limonene, and p-cymene |
| Cajuput oil          | β-ocimene (4.06-1.52), β-pinene (2.20-0.87), β-myrcene (0.88), limonene (5.96-3.42), 1.8-cineole (61.69-70.22), γ-terpinene (1.98-2.77), α-terpinene (0.85-1.26), terpinen-4-ol (0.74-0.93), α-terpinel (10.03-10.32), α-terpinyl acetate (2.01-1.75), l-caryophyllene (6.05-3.69), α-humulene (0.64-0.48), β-selinene (1.28-0.96), aromadendrene (0.34), β-elemene (0.80), Solvanol (0.88) |
| Cassia oil           | anhydrobarakol, barakol, cassiarin A-B, chrysophanol, emodin, cassiamin A-B, flavonoids and phenolics. Seeds: linoleic acid, stigmasterol, and β-sitosterol. the essential oils are (E)-geranyl acetone (5.8), 1-octen-3-ol (5.8), linalool (7.8), iso-italicene (15.4) and (E)-β-damascenone (11) |
| Cinnamon oil         | cinnamaldehyde (68.3-82), cinnamyl acetate (2.5-16), cinnamyl alcohol (2.25-4.6), cinnamic acid (3-8), eugenol, cinnamaldehyde, phellandrene dan methyl eugenol |
| Copal                | A. dammara leaves: limonene (36.81), β-bisabolene (33.43) and β-myrcene (25.48) |
| Cyprus oil           | linoleic acid, stigmasterol, and β-sitosterol. the essential oils are (E)-geranyl acetone (5.8), 1-octen-3-ol (5.8), linalool (7.8), iso-italicene (15.4) and (E)-β-damascenone (11) |
| Damar (Shorea) oil   | brassicasterol (20.23), sikloheksana and sikloventana (49.57%), 18-hidroksi-17-metoksii-yohimban-16-karbonitril, sikloexukalenol, dan d-friedeloolan-14-en-3-on |
| Gurjum oil           | calarene, α-copaene, α-gurjune (50.6), α-selinene (8.3), spathulalen (5.7), bicyclogermacrene (5.4) |
| Lantana oil          | β-caryophyllene (10.21-23.3), α-humulene (11.5), germacrene D (10.9-28.13), β-selinene (8.86), γ-cadinene (8.65), davanone (7.3) ar-curcumene (7.77), (E)-nerolidol (41.40), γ-curcumene (6.3) |
| May chang            | Fruits: citronellal, d-limonene, and citronellol; leaves: eucalyptol and α-terpinol. Root and bark: citronellal and citronellol. Stem: eucalyptol, d-limonene, and α-terpinol |
| Nutmeg oil           | Sabine (29.4), β-pinene (10.6), α-pinene (10.1), terpinen-4-ol (9.6), elemicin (5.6), myristic (3.8), limonene (3.6), trans-sabine hydro (3.1), β-phellandrene (2.7), γ-terpinene (2.5), cis-Sabinene hydro (2.3), β-myrcene (1.8), 3-carene (1.7), terpinene (1.6), α-terpinene (1.3), α-terpinol (1.2), p-cymene (1.2), safrole (1.1), methyl eugenol (0.9), β-caryophyllene (0.9), α-copaene (0.6), citronellol, gerany acetate, camphene (0.2) |
| Oud oil              | agarospirol (13.17), tetradecanol (6.63), pentadecan (4.9), eudesmol (13.68), oxo-agarospirol (4.54), 2-hydroxyurea-1(10),11,15-oic acid (3.24); eudesmol (11.53-13.75), hexadecanol (4.58-5), dehydro jinkoh-uremol (2.42-2.91). Aromatic compounds: aldehydes, phenol, guaiane, palustrol, and acytylacetone. agarospirol, alloaromadendrene oxide (2), α-elemol, γ-eudesmol, and guaioi |
| Pine oil             | α-pinene, α-3-carene, and b-pinene. sandaracopimaric acid, isopimaric acid, palustric acid, dehydroabietic acid, abietic acid, neoabietic acid and merkuris acid |
| Quercus oil          | Fruits: β-myrcene, β-ocimene, linalool, E-1-decanal a-pinene, limonene, geranial, citronellol, geranial asetat [44]. Leaves: linalool (14.3); 9,12-odecadecadien (8.4); 1,8-sineol (7.7); 2-undecanone (7.3); farnesol (3.6); 9,12,15-odecadretroinoic (3.2); β-caryophyllene and phytol (3) |

Sichuan pepper oil was also identified to contain, terpene alkaldoids, benzopanthenidine alkaldoids, pyrrolquinoline alkaldoids, quaternary isoquinoline alkaldoids, aporphine alkaldoids, and several types of lignans. The distinctive spicy taste of andaliman fruit is due to its essential oil content which comes from geranyl acetate (35%). While the dominant citrus aroma comes from limonene and citronellol. Other components are β-myrcene, β-ocimene, linalool, and E-1-decanol [27]. The results of the research also showed that there were eleven active components of andaliman essential oil with 5 main components,
namely α-pinene, limonene, geraniol, citronellol, and geranyl acetate. Leaves contain 58 compounds, 75.6% of which are oil and other important compounds such as linalool (14.3%); 9,12-octadecadienoic (8.4%); 1,8-cineole (7.7%); 2-undecanoate (7.3%); farnesol (3.6%); 9,12,15-octadecatrienoic (3.2%); β-caryophyllene (3.0%) and phytol (3.0%) as well as seven other compounds with concentrations of less than 0.02% [27].

3.3. The potential application of essential oils
Several studies have also shown the high potential of Sumatran camphor as raw material for other organic medicines [15] [28]. The compounds in camphor essential oil include α-pinene, camphene, limonene, 1,8-cineole, p-cymene, etc [15]. In aromatherapy application, the aroma of camphor essential oil has a relaxing effect, it has the potential to smoothen the respiratory system by cleansing the lungs to improve blood circulation and immune system. In topical use, camphor oil can relieve inflammation, insect bites, acne, itching, irritation, rashes, sprains, muscle, and joint pain (Table 4).

| Essential oils       | Potential application                                                                 |
|----------------------|---------------------------------------------------------------------------------------|
| Altingia oil         | treating cough                                                                         |
| Benzoin              | oral health (swollen gums, oral herpes), antiseptic, prevent and treat skin infections |
|                      | (anti-inflammatory), topical: stop light skin bleeding and relieve swelling, treat skin |
|                      | ulcers, prevent acne to premature aging, treat respiratory tract disorders (decongestants, |
|                      | sore throat, flu, cough, bronchitis), overcoming flatulence, aromatherapy.              |
| Borneol (camphor)    | a relaxing fragrance, offers relief to the congested respiratory system, boosts the    |
|                      | immune system. Topical uses: relieves inflammation, insect bites, itching, irritation, |
|                      | rashes, digestive problems, bloating, relieves muscle, and joint pain. The 1.8 cineole |
|                      | has potential as an antiviral, expectorant, and prospective for respiratory and blood   |
|                      | vessel treatment.                                                                      |
| Cajuput oil          | antiseptics and anti-bacterial, home remedies for colds, sinus infections, nasal       |
|                      | congestion, flu, and respiratory problems.                                             |
| Cassia oil           | treat malaria, liver, cough, antimicrobial, scabies, anemia, constipation, toothache, |
|                      | hypertension, insomnia, as an antidote for snake bites, diabetes mellitus, urogenital |
|                      | diseases, herpes, rhinitis asthma, typhoid fever, anti-rheumatic and against swellings |
| Cinnamon             | improve digestion, stabilize blood sugar, improve blood circulation, cardiovascular    |
|                      | disease, and fight infection. strong anti-parasitic, anti-inflammatory, anti-platelet,   |
|                      | and antiviral properties, boost immunity, relieve depression, stimulates libido.        |
| Cyprus oil           | stomach spasms medicine                                                                |
| Copal                | antibacterial activities, external wound medicine (skin)                                |
| Gurjum oil           | anticholinesterase and anti-inflammatory activity                                       |
| Lantana oil          | cough medicine, wound medicine, urine laxative, swelling medicine.                     |
| May chang            | anti-bacteria, yeast, and fungi were determined. the antidote can be due to insect bites; |
|                      | Fruit: cough medicine                                                                   |
| Nutmeg oil           | insomnia medication. Seed oil: an upset stomach.                                        |
| Oud                  | overcome constipation, bloating, colds, and diarrhea. lowering blood pressure by       |
|                      | removing blockages in blood vessels. tumor diseases detoxify the body (diuretic effect).|
| Pine oil             | reducing stress, bronchitis, relieving muscle aches, wound, ulcer, rheumatism, flu, and |
| Quercus oil          | to treat and prevent asthma, hemorrhoid, diarrhea, gastric ulcers, and wound healing.  |
| Sichuan pepper oil   | citrus-colored oil spicy taste, dental disorders, dyspepsia and lotion for scabies,    |
| Shorea oil           | wound-healing activities on incision and excision wounds, anticholesterol as well as    |

The compound 1.8 cineole has potential as anti-viral, antibacterial and antifungal, expectorant, blood flow, making it prospective for the treatment of obstruction of the respiratory tract and blood vessels
Furthermore, p-cymene compounds were identified to reduce anxiety, refresh and calm the mind, and can increase libido. Bioactivity test results show that borneol can improve the nervous system and has a calming effect [28].

The rich phytochemical content of benzoin essential oil has the potential for oral health (swollen gums, oral herpes), antiseptics, prevent and treat skin infections (anti-inflammatory), topical stop light skin bleeding and relieve swelling, treat skin ulcers, to dry and cracked skin, prevent acne to premature aging, treat respiratory tract disorders (decongestants, sore throat, flu, cough, bronchitis), overcoming flatulence, aromatherapy (a sedative effect), to prevent and deal with stress [29].

3.4. Essential oils security concern
Essential oils are generally safe with minimal side effects. Some of the essential oils have been approved as food additives and fall into the category generally recognized as safe by the Indonesian Food and Drug Supervisory Agency. The most common side effects are eye, mucous membrane, and skin irritation as well as sensitization especially to oils containing aldehydes and phenols. Contact sensitization is more likely due to monoterpene oxidation, often due to improper storage conditions [7][30]. Cross-sensitization to essential oils and other foods is also possible. Allergies from inhaled essential oils can occur, however, data on exposure rates are limited and there are many reports regarding perfume rather than aromatherapy essential oils [30].

Allergic reactions have been reported in several cases, especially with topical administration. This oil is not free from oxidation reactions as it ages and is reported to change its chemical composition on storage for a long time. There is always great controversy that arises when this essential safety is discussed. However, there are no well-defined studies to prove that this essential oil is harmful [7][30].

4. Conclusion
The study results identified at least 17 essential oils as the main therapeutic agent, including Sumatran camphor (Dryobalanops aromatica), benzoin (Styrax sumatrana), nutmeg (Myristica fragrans), andaliman (Zanthoxylum acanthopodium), and lemo (Litsea cubeba). The essential oils are extracted from leaves, fruit, flowers, bark, stems, roots, and resin in various ways. Some of the main compounds identified include α-pinene, camphene, limonene, 1,8-cineole, and p-cymene. In aromatherapy applications, essential oils aroma has a relaxing effect and offers relief to a congested respiratory system. The essential oils can also relieve inflammation, irritation, insect bites, itching, rashes, sprains, and muscle aches in topical application. Local wisdom reveals essential oils utilization to treat indigestion, headaches, and insomnia. The compound 1,8 cineole is potential as anti-viral, anti-bacterial, and antifungal, expectorant boosts the immune system and prospective for respiratory and blood vessels treatment.

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