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Analysis of Essential Oils Utilization in Enhancing Immune Systems in the Pandemic Era

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ABSTRACT
In December 2019, a new virus strain of coronavirus-SARS-CoV-2 (COVID-19) has been reported. One prevention that can be done is to increase immune systems by using essential oils. This study aims to analyze the essential oils used during a pandemic. A Qualitative descriptive method with a random sampling technique was used in this study. The questionnaire was distributed through social media with a sample size of 261 people in the West Nusa Tenggara region. Data on the percentage of use of essential oils such as eucalyptus oil 82.6%; lemon oil 14.8%; lemongrass oil 13.9%; lavender oil 9.6%. 72.2% answered that the technique for using this oil is by rubbing and 5.76% by inhaling the oil. The expected benefits by users are to be healthy 58.9%; fresh 23.2%, and 11.6% answered to avoid COVID-19. Meanwhile, there were 96.85% respondents used the oils before the pandemic, and 5.3% used the oils since March to April. 50.4% respondents attained the information from social media and 49.6% from friends/family. The data shows the awareness to improve health and immunity through the use of essential oils and it is advisable to give more attention to social media aspects in using medicinal plants containing essential oils.

Keywords: *Essential oil, Healthy, Immune Systems, Pandemic*

1. INTRODUCTION

Coronavirus disease (COVID-19) is caused by SARS-CoV-2 and is a causative agent of disease and is of great concern to public health worldwide. The World Health Organization named the virus Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV) and the name of the disease is coronavirus disease 2019 (COVID-19). According to WHO data, as of September 8, 2020, the number of confirmed cases was 27,236,916 and 891,031 of them died. (WHO, 2020). In Indonesia alone 200,035 and 8230 confirmed deaths. (COVID-19.go.id).

COVID-19 transmitted through droplets from coughs and sneezes, then enters the respiratory system and replicates[1]–[3]). COVID-19 infects people who have low immune systems, and people who are elderly. When the immune system response is low, weak, or damaged, viral infection is very easy [4]–[7]). The virus will spread and damage to the affected tissue will occur, especially in organs that have ACE2 expression, and cell damage will occur which induces inflammation in the lungs. Inflammation of the lungs is a major cause of life-threatening respiratory disorders at a more severe stage[8]

Currently, there is no definite cure or vaccine to treat the corona virus, however, there are many such things as the use of medicinal plants, namely using herbal medicine as a treatment for viral infections, including those caused by SARS-CoV [9]–[11]. Using medicinal plants is currently believed to be around 75-80% of the mainstay of treatment for those caused by SARS-CoV[12]. It bases this on the public's belief that medicinal plants have advantages over synthetic drugs, such as herbal medicines that do not contain side effects, are relatively cheap and are available locally [13], [14]).

Many medicinal plants are easily get by the community and are believe from generation to generation to increase the body's immune system in dealing with SARS-CoV[15], [16] so it makes it a habit for the community to consume medicinal plants during the COVID-19 pandemic like now, besides that there are financial limitations for the community to buy vitamins. Very minimal and a high sense of anxiety about contracting COVID-19 [17], [18].

There is a public understanding that medicinal plants containing essential oils can prevent contracting COVID-19, the research instrument provides a choice of 6 types of essential oils that are commonly used by local people with the assumption that knowledge from generation to generation is still dominant in influencing people's behavior, especially the people of NTB.

Based on the results of literature analysis, it shows that the content that is often consumed by the public and found in

medicinal plants is the content of essential oils. Various medicinal plants that can be used such as turmeric, ginger and galangal, white wood, bergamot, lemongrass, moringa, and so on can be made as drinks that are very useful in maintaining the body's immune system. As well as drinks from *Arenga pinnata*[19]

Furthermore, several essential oils have been used and screened for their used to inhibit the development of viruses and have potential as a treatment for SARS-CoV, such as essential oils which include cinnamon (*Cinnamomum zeylanicum*), bergamot (*Citrus bergamia*), lemongrass (*Cymbopogon flexuosus*), thyme (Thymus). vulgaris), which was tested in the liquid phase showed 100% inhibition of the H1N1 virus[20] .

In addition, citrus essential oil has been widely used for bactericidal, virucidal, fungicidal, antiparasitical, insecticidal, medicinal and cosmetic purposes. Also currently, it has been applied in the pharmaceutical, cosmetic, agriculture and food industries [21]. The constituents of citrus essential oils include limonene, β-myrcene, α-pinene, p-cymene, β-pinene, and terpinolene are the main aromatic compounds [22].

Eucalyptus essential oil has several activities including antimicrobial activity, anti-virus, fungicides, insecticidal components that are found in much eucalyptus essential oils are monoterpenes (1,8-cineole, p-cymene, citronellal, citronellol, limonene, α-phellandrene, β- phellandrene, α-pinene, β-pinene, trans-pinocarveol, terpinolene, α-terpineol, α- thujene[23] .

The genus Cymbopogon from the Poaceae family has been investigated for its pharmacological potential. Cymbopogon nardus (L.) Nardus is commonly used in perfume, cosmetic production, as an insect repellent and has antiviral activity. The main chemical constituents are geraniol, citral, citronellal, and citronellol [24]. Medicinal plants used by the community are generally based on information from generation to generation. Therefore, in increasing people's knowledge required accurate information through community elements such as students, so that basic knowledge is needed in order to transfer knowledge. So improving student's critical thinking skill in conveying that knowledge become important part in this pandemic situations[25] .

This study aims to analyze the essential oils commonly used by the people of NTB in enhancing the immune system during a pandemic. In this study, it focuses on identifying the essential oils from various local Indonesian plants as medicinal plants used in the NTB community which are believed to prevent the spread of COVID-19, both of which have the ability as an immunomodulator, antiviral and correlate with ACE2 or components of the SARS virus. CoV-2.

2. METHOD

This study uses an experimental method using a google form which is distributed via social media, with 216 respondents.

2.1 Design

The qualitative descriptive inductive approach was used in this survey research using a questionnaire. The focus of research in this study is to avoid plant types, plant forms and herbal plant processing techniques consumed during a pandemic to increase the immune system as a prevention of contracting Covid-19. The questions posed are divided into three important questions: 1) types of essential oil used to boost the immune system during the Covid-19 pandemic, 2) the utilization technique of essential oil to boost the immune system during the Covid-19 pandemic and 3) the dosage of essential oil used to increase the immune system during the Covid-19 pandemic.

2.2 Participant

In this study, purposive sampling was used. Participate in filling out the questionnaire. 216 respondents from 10 urban districts in West Nusa Tenggara, consisting of 62.3% women and 37.7% men with age intervals of 18 - 60 years.

2.3 Data Collection

Data collection was carried out by observation and questionnaire survey.

2.4 Data Analysis

Data were analyzed using descriptive analysis and a percentage of the total sample (216 respondents).

3. RESULT AND DISCUSION

The research was conducted in March 2020 - April 2020 in West Nusa Tenggara (NTB) with 216 respondents who were representatives of family members. Research data got through, filling out questionnaires. The following are the characteristics of the respondents got based on the research results as follows.

Table 1. Characteristics of Respondents

Characteristics	N	%
Age		
18-40 years	114	53
41-60 years	102	47
Gender		
Men	82	37,7
Women	134	62,3

Based on table 1. The results show that most respondents aged 18-40 years (32%) with most respondents were female 64 people (62.3%). Based on age characteristics, it shows that most respondents are at the productive age, namely 18-40 years, and most respondents are female. This is because more female respondents know and use herbal plants and essential oils than men. Has considerable experience in medicine. This can be the reason many respondents are dominated by this age[26], [27] . Based on gender, most respondents are women. This is because women care more about health than men and tend to have better knowledge about treatment [28], [29] . Based on the survey results, it can be seen that plants containing essential oils that are often used to increase the immune system, especially family medicinal plants, are as follows (Figure 1).

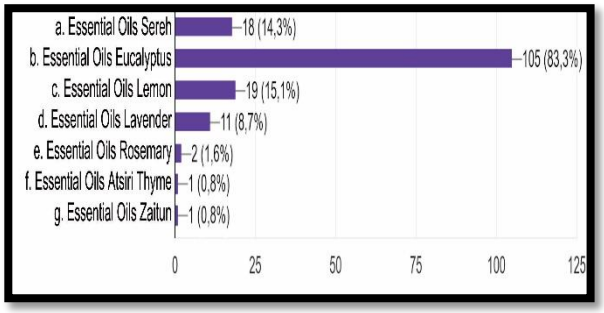

Fig. 1 Diagram of the Community's Essential Oil Usage

Based on the data above, medicinal plants that contain essential oils that consumed by the people of West Nusa Tenggara (NTB) to increase the immune system are essential oils from eucalyptus (83.3%), essential oils from lemongrass (14.3%) and essential oils from Lemon (15.1%). It produces eucalyptus oil from the leaves of the Melaleuca leucadendron plant, with the largest content being eucalyptol (cineole). The results of research on the efficacy of cineole explain that cineole provides mucolytic effects (thinens sputum), bronchodilating (relieves breathing), anti-inflammatory and reduces the average exacerbation of chronic obstructive pulmonary cases well as in the case of patients with asthma and rhinosinusitis [30]. In addition, the effects of using eucalyptus for the treatment of acute bronchitis are well measured after four days of therapy use. There is evidence to show that the essential oil vapour from Eucalyptus globulus is effective as an antibacterial and it is worth considering its use in the treatment or prevention of patients with respiratory tract infections in hospitals[31] . As for the use of essential oils that are often done by the community as below (Figure 2)

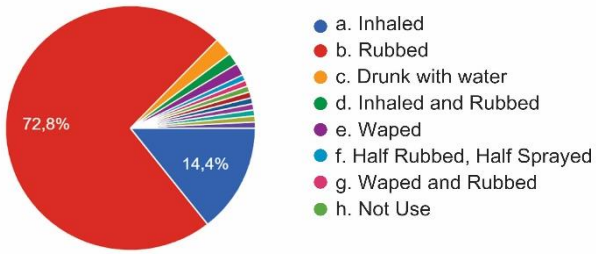

Figure 2. NTB community

From Figure 2 above, it shows that people mostly use essential oil ingredients that have medicinal properties by inhaling (14.4%) and rubbing (72.8%). Inhalation/inhalation therapy is carried out by administering the drug directly into the airway through inhalation . Simple inhalation means giving a drug by inhaling [32] it in the form of steam into the respiratory tract, which is carried out in a simple way and can be done in the community. Steam Inhalation (Steam Inhalation) is inhaling warm steam from boiling water[33] . The evaporation uses boiling water with a temperature of 42`C-44`C [34]. Efforts to inhibit the spread of tuberculosis (TB) germs by inhalation therapy methods in patients using Eucalyptus citriodora oil extract [35], [36]. The results got are Eucalyptus citriodora proven to inhibit the spread of pulmonary tuberculosis by over 90%. Rubbing on the chest, treating the sinuses by inhaling warm water vapour that has been dripped with eucalyptus oil and relieving nasal congestion by inhaling the aroma of eucalyptus oil.

The frequency of use of essential oils in NTB people is as follows (Figure 3)

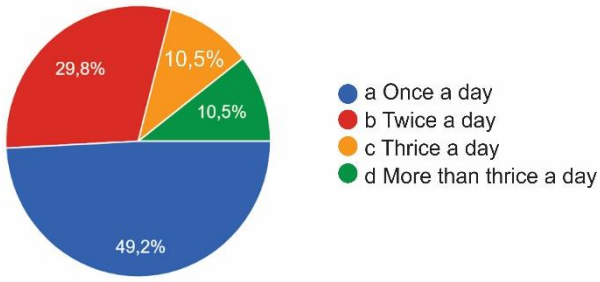

Fig. 3 The NTB Community Essential Oil Frequency Diagram

Based on the picture above, it shows that the frequency of using essential oils is once per day (49.2%), twice a day (29.8%), three times a day (10.5%), over three times a day (10.5%). This is because people do not know the frequency that is effective as a respiratory tract medicine. The results of a clinical trial using a randomized, double-blind, placebo-controlled method of spray using five essential oils (*Eucalyptus citriodora, Eucalyptus globulus, Mentha piperita, Origanum syriacum, and Rosmarinus officinalis*) were performed on patients with respiratory tract infections. Top in six clinics in Israel. Aromatic spray or placebo is used five times a day for three days with a dose of four sprays each time directed at the back of the throat. Symptom evaluation shows that aromatic sprays are more effective at reducing symptoms compared to placebo[37] . Based on the survey results, the people of West Nusa Tenggara have long known essential oils as shown in the data below (Figure 4)

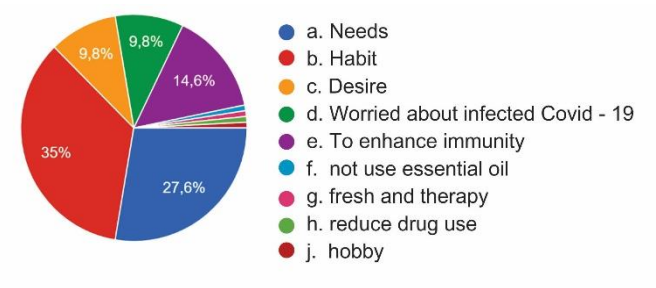

Fig. 4 The Diagram of the Use of Essential Oils for the NTB Community

The picture above shows that the habit of people using essential oils is 35%. The essential oil used is eucalyptus essential oil which a topical medicine. For a long time parents on various islands in Indonesia have used eucalyptus essential oil, especially for handling respiratory tract infections (ISPA), namely by rubbing eucalyptus oil on the child's body, giving lime juice mixed with soy sauce. , or giving mixed oil of nutmeg, they can trust cloves that have been blended to drink because they to relieve pain. Further, the use of essential oils and their derivatives worldwide has increased by around 8-10%, including in Indonesia [38]. The increase was because of the public realizing the importance of essential oils for health. In addition, people's mindsets have changed from consuming synthetic compounds to natural ingredients. This is not much different from the condition of the people of West Nusa Tenggara (NTB) as seen in the picture below (Figure 5)

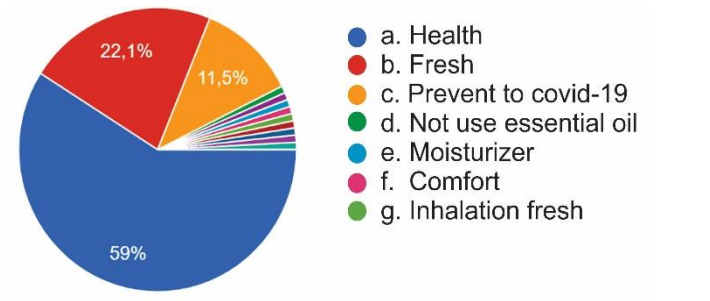

Fig. 5 The Purpose Diagram for the Use of Essential Oils for the NTB Community

This figure shows that health is the major factor (35%) of people using essential oils in treatment. One type of essential oil that is most consumed domestically and has high economic value is eucalyptus oil. Eucalyptus oil has many benefits, including as a medicine for itching, dizziness, nausea, and as a body warmer [39]. In addition, a percentage of 11.5% of people want to be protected from Covid-19, a disease caused by the Coronavirus. In the state of the Covid-19 pandemic, eucalyptus oil has been widely researched as a potential drug as a corona antiviral. Eucalyptus oil containing 1,8-cineol based on the in silico test, in vitro and in vivo tests, has the potential to be a corona antiviral. Eucalyptus oil (1,8-cineol molecule) can interact with the COVID -19 virus target through various mechanisms, including protease, endoribonuclease, ADP Ribose Phosphatase, RNA-Dependent RNA Polymerase, Spike Protein Binding Domain Angiotensin-Converting Enzyme[40] .

In silico research, eucalyptol or 1,8-cineol has the potential to inhibit Covid-19 infection by binding to the Covid-19 proteinase. The Mpro-eucalyptol complex forms strong hydrophobic, hydrogen bonding and ionic interactions. 1,8-Cineol in silico can inhibit viral replication by binding to the spike protein or protein from the coronavirus [41]. In the in silico test between 1,8-cineol and bronchitis virus protein, it turned out to be 1,8 -cineol kills viruses at the time before and after the virus enters cells.

The 1,8-cineol site reacts is at the N terminal of the phosphorylated nucleocapsid protein. Based on these studies, it was concluded that 1,8-cineol disrupted the bond between RNA and the bronchitis virus protein [42] . The public gets more information about the use of eucalyptus oil through the mass media because the delivery of information got is faster and easier, as is the custom of the people of West Nusa Tenggara (NTB) as seen in the picture below (Figure 6)

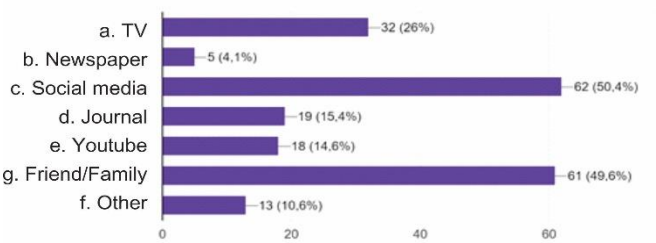

Fig. 6 The Source Of Information On The Use Of Essential Oils For The NTB Community

The tradition that occurs in society, especially in West Nusa Tenggara, is the influence of parents or family from generation to generation to decisions taken by a person, including the use of medicinal plants, which is very strong, but in this study the influence of social media is more dominant in influencing people's behavior. In this era, they widely use social media in the community. Starting from students, business people, university students, office employees, parents, upper middle class, even lower middle class also have social media accounts. Nowadays various types of social media exist and are easily available. From year to year there are more and more social media, more sophisticated and provide many additional great features. Therefore, the more sophisticated social media will allow people to be thirsty and curious about the information on social media [43]. From this condition, it is suggested to the next researchers to pay more attention to the aspects of social media in using medicinal plants containing essential oils.

4. CONCLUSION

The various essential oils used to enhance the immune system during a pandemic in the community of West Nusa Tenggara (NTB) region is eucalyptus oil.

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