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Safe Hand Antiseptic Formulation Produce From Cymbopogon Citratus Essential oils
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Safe Hand Antiseptic Formulation Produce from Cymbopogon Citratus Essential Oils for Children with Special Needs to Anticipate The New Normal Protocols of The COVID-19 Pandemic

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ABSTRACT
The goverment has set on June until December as the recovery phase and must implement the new normal protocol. The policy applies to all levels of society including children with special needs who must start going to school gradually. This condition requires conscious effort to maintain personal health through paying attention to cleanliness of the hand to slow the spread of the COVID-19 pandemic. Handwashing with soap and use of hand antiseptics habit are the keys to success in preventing COVID-19 transmission. According Block (2001) repeated use of alcohol on hand antiseptic preparations can cause skin dryness and irritation. The aim of this research is (1) to develop a non-alcoholic hand antiseptic formulation that is safe for children with special needs made from lemongrass essential oils base carbomer-940 and CMC-Na gel. (2) examine of aorganoleptic test, pH, homogeneity, and consistency test of the product hand antiseptic formulation. The research method is an experiment by conducting laboratory tests on the preperation of carbomer-940 and CMC-Na gel. The research result of carbomer-940 gel base with a concentration lemongrass essential oil 15% is clear yellow, thin, lemon odor, pH 6,6, homogeneous no granules, until a five days spend there is no phase separation, consistent, and non-sticky. The result of CMC-Na gel base is clear yellow, thick, lemon odor, pH 7,0, homogeneous, consistent with no phase separation, sticky. The conclution shows that using a carbomer-940 ge is more comfortable on the skin and is not sticky so panelists are preferable than CMC-Na gel.

Keywords: *lemongrass; children with special needs; new normal; hand antiseptic; COVID-19*

1. INTRODUCTION

WHO officially renamed on February 11th "2019- nCoV" as "COVID-19", with "CO" meaning corona, "VI" for virus, "D" for disease, and referring to 2019 [1,2]. Virus Covid-19 was the new strain from betacoronavirus genetic of Severe Acute Respiratory Syndrome Coronavirus (SARS CoV) some CoV sourced from Bats [1,2]. Comparation with SARS-CoV and MERS-CoV, COVID-19 indicate human to human transmission and thus the risk of much wider spread of the disease, to address WHO declared as the "2019-nCoV infodemic" on February 2th [1]. In March 2th, 2020, clusters of "2109-nCoV" reported in Jakarta, Indonesia infecting 2 persons and in March 30th infecting at least 1.528 people. In April 18th, to increasing number of cases and widening geographycal spread of the disease "2019- nCoV" infecting at least 6.248 people. The Government campaigns to promote precautions for travellers, including frequent hand-washing, cough eiquette, and use masks when visiting public places. One of recommendations from government is frequent hand-washing and use a hand sanitizer, this mean that "2019-nCoV" spread through the palms of the hands and use to touch surrounding objects or materials that are exposed the virus and will bu used to rub the nose, eyes or to get

food throgh the mouth.This recommendation applies to all citizens of Indonesian society including children with special needs who have conditions that are more vulnerable to exposure to the virus. The use hand sanitizers made from synthetic compounds including 70% ethanol or formaldehyde is not recommended to be use for a long time, the most likely impact is irritation.This condition has inspired to antiseptic formulations with raw vegetal materials from tropical plants that are easy to cultivate and contains antimicrobial properties that are safe for children with special needs who are sensitive to synthetic compaounds. Cymbopogon citratus was chosen as raw material, in Indonesia it is largely cultivated in tropical and known as lemongrass. The lemongrass essential oil is present biological activities as antibacterial [3,4] antioxidant [5] antifungal [6], insecticide [7], larvasida [8], and mosquito repellent [9]. Antibacterial essential oil lemongrass depend on the presence of compounds geranial, neral, and myrcene [10]. Onawunmi et al.[10] had observed that gram positive organisms were more sensitive to the lemongrass oil than gram negative organisms. Similar result of lemongrass oil of Premathilake et al., [11] had observed is lemongrass oil to be effective against E. Coli, B. Cereus, dan S. Aureus with various concentrations and got inhibited at 0.03% concentration and at 0.06% concentration got inhibited B. Subtilis, E. Coli, and at 0,25% concentration got inhibited K. Pnemoniae. The antibacteria activity was found progressively increasing with the increase lemongrass essential oil cocentration because citral treated cell membranes. Terena lipofilik modify the accuracy and permeability of cell membranes, changes intracellular pH and ATP concentration so that cells wall damage [12]. The lemongrass oil also inhibited gram negative bacterial and strains which is resistant to some drug, as P. Aeruginosa, E. Coli, Enterobacter cloaceae, Morganella morganii, Proteus mirabilis [13,14]. The minimum levels for inhibiting bacteria are known as minimal inhibition levels and minimal damage levels [15]. The use of lemongrass essential oil as an antiseptic for children with special needs intended to inhibit harmful bacteria is a safe alternative to produce from natural ingredients.

2. RESEARCH METHODS

The formulation of non-alcoholic antiseptic products that are safe for children with special needs modified the results research Manus, YamLean, dan Kojong [16] use gelling agent Carbomer-940 and CMC-Na with glycerin and propilen glikol as humectan. The result was found at concentration 15% of lemongrass essential oil maximum effect to decrease the number of bacterial colonies, so this formulation is used as the basis for making hand antiseptics that are safe for children with special needs.

A. Materials

The formulation process for making non-alcoholic hand antiseptics uses digital weighing equipment, Erlenmeyer, beaker glass, measuring glass, stirring rod, petri dish, Universal pH meter, dropper pipette, gloves, electric stove, stopwatch.

The materials used are Sodium Carboxymethyl cellulose (CMC-Na), Carbomer-940, distilled water, glycerin, propylene glycol, Triethanolamine, methyl paraben, Cymbopogon citratus essential oil, 70% alcohol, filter paper. The methods research of non-alcoholic antiseptics was carried out using laboratory experiments with a concentration of 15% Cymbopogon citratus essential oil with CMC- Na gel as compared to Carbomer-940. The humectants used are glycerin and propylene glycol. Natural materials with added preservatives to prevent fungal using methyl paraben. Testing of non-alcoholic antiseptic products on organoleptics, pH, and adult users who are willing to volunteer.

B. Preparation of An Antiseptic Gel

Gel formulations with variations of CMC-Na and Carbomer-940 materials are presented in Table 1 below. The preparation procedure is carried out by weighing all the materials needed using a digital scale. Preparation of a gel formulation for the 15% Cymbopogon concentration was made by entering CMC-Na into a beaker glass with 10 mL water added and heat on the electric stove while continuing to stir until homogeneous. After cooling, the glycerin and propylene glycol as humectants are added while stirring continuously, add the methyl paraben and TEA. Add distilled water to 100 mL while continuing to stir until a CMC-Na gel base is formed. The formulation for the Carbomer-940 gel base is carried out in the same manner by replacing the gelling agent material.

TABLE I. FORMULATION CMC-Na GEL WITH GLYCERIN AND PROPYLEN GLYCOL HUMECTANTS

Component	Raw Materials of Gel	Concentration
C.citratus Essential oil		15 %
CMC-Na	2,5 g	
Carbomer-940	2,5 g	
Glycerin	10 ml	
Propylen Glykol	5 ml	
TEA	7 tetes	
Methyl paraben	0,2 g	
Aquadest	100 mL	

C. Cymbopogon Citratus Antiseptic Gel

Preparation

The basic materials of the gel that have been produced from CMC-Na and Carbomer-940 are each added 15 mL of Cymbopogon citratus by stirring until homogeneous. Let stand in a place that is protected from light for 24 hours. Testing of antiseptic non alkohol formulation product Organoleptic tests were carried out by physical observation using five sensory observations of the color, shape, and odor of the gel.

The pH test was carried out by diluting the resulting gel formulation using a universal digital pH stick. According to Tranggono (2007) the gel formulation must be in accordance with the pH for the skin, namely 4.5-6.5. The homogeneity test was carried out by applying the formulation to a glass petri dish and it was observed that there were no visible granules.

The user test results of the formulation were tested on volunteers who were willing to get a response to comfort and smell. Testing on children with disabilities cannot be carried out because until September, cases of positive exposure to Covid-19 in Surabaya were still high, so the policy of studying at home was still continuing. In addition, children are among those who are very vulnerable to infection, so a statement was issued by the Minister of Education through the mass media, if parents object to their children going to school because they are concerned about being exposed, they are allowed to learning from home.

3. RESEARCH RESULT

Organoleptic test results of non-alcoholic antiseptic gel formulations at 15% Cymbopogon citratus cocentration levels are presented in Table 2 below. The modified formulation of Kurniawan's findings [17] shows almost the same picture between CMC-Na and Carbomer-940 gel bases. The results of physical observations resulted from the non-alcoholic antiseptic gel formulation at 15% Cymbopogon citratus cocentration found that the color difference of the CMC-Na gel base material was more cloudy, while Carbomer-940 was clearer.

TABLE II. ORGANOLEPTIC TEST RESULTS NON-ALCOHOL ANTISEPTIC GEL FORMULA AT 15% COCENTRATION CYMBOPOGON CITRATUS

Kind of Gel	Shape	Color	Flavor
CMC-Na Gel Base	Semi solid	Clear	Odorless
Carbomer-940 Gel Base	Semi solid	Clear	Odorless
Antiseptic CMC-Na Gel Base - at 15% cocentration C. citratus	Slighty runny	Pale yellow slightly cloudy	Lemon grass
Antiseptic Carbomer- 940 Gel Base-at 15% concentration C. citratus	Slighty runny	Pale yellow clear	Lemon grass

The results of physical observations resulted from the non-alcoholic antiseptic gel formulation at 15% cocentration Cymbopogon citratus found that the color difference of the CMC-Na gel base material was more cloudy, while Carbomer-940 was clearer.

The results of the non-alcoholic antiseptic pH test of Cymbopogon citratus with a gel base of CMC-Na and Carbomer-940 are presented in Table 3. As follows

TABLE III. RESULTS OF PH TEST FOR NON-ALCOHOLIC ANTISEPTIC GEL FORMULA AT 15% COCENTRATION CYMBOPOGON CITRATUS

Kind of Gel	pH
CMC-Na Gel base	6,6
Carbomer-940 Gel base	6,4
Antiseptic CMC-Na – at 15% cocentration C. citratus	7
Antiseptic Carbomer-940 –at 15% cocentration C. citratus	6,6

The pH test results of the Carbomer-940 gel base were lower than that of CMC-Na with added TEA to increase the pH of the non- alcoholic antiseptic formulation Cymbopogon citrates 15% to match the health requirements for skin pH 4.5-6.5. The addition of TEA is done drop wise to get a pH that is not too alkaline but closer to a neutral ph.

Homogeneity and consistency tests after being left for 5 days show the results according to Table 4 below. The homogeneity test was carried out before storage and after storage by smearing it on the glass surface, then observing whether there were granules or not. The results showed that at the beginning and at the end after 5 days of storage, no granules were found, so it was stated that the resulting formulation was homogeneous.

TABLE IV. HOMOGENEITY TEST RESULTS NON-ALCOHOL ANTISEPETIC GEL FORMULA AT 15% COCENTRATION CYMBOPOGON CITRATUS

Kind of Gel	Homogeneity
CMC-Na Gel base	No granule
Carbomer-940 Gel base	No granule
Antiseptic CMC-Na –at cocentration 15% C. citratus	No granule
Antiseptic Carbomer-940 -at 15% Cocentration C. citratus	No granule

User test of PLB lecturer volunteers and BK3S volunteers responded to non-alcoholic antiseptic based CMC-Na and Carbomer-940 with Cymbopogon 15% of respondents liked fresh odor,

but it was a bit sticky in the hands so it was less pleasing. The test was carried out on adults who, on average, like citral odors like lemon. From users there are those who say the aroma is too strong.

4. DISCUSSION

Cymbopogon citratus at 15% cocentration in a non-alcoholic antiseptic formulation according to the findings Shi, et al.[14] that Citral (C10H16O) compounds effect antimicrobial against C. sakazakii and there is increasing evidence that citral acts as a fungicidal and bactericidal agent. Base on Naik, et al. [3] found antibacterial activity increasing with the increase in concentration oil, the maximum effect was found at 30% concentration and minimum effect was observed at 5% cocentration of oil. The data from Naik et al. [3] show that Lemongrass oil at 15% concentraton found effective against staphylococcus aurens (24.66 and 29.66 at 30%), Bacillus cereus (15.66 and 28.00 at 30%), Bacillus subtilis (16.00 and 24.66 at 30%), Escherichia coli (16.33 and 22.33 at 30%0, and Klebsiella pneumoniae (12.66 and 17.00 at 30%). Selection of Sodium Carboxymethyl Cellulose gel base because it is raw vegetal material according to the findings of Safitri [17] to process durian skin and kapok fruit skin [18] which is safe when used for long-term and repeated use. According Rowe [19] Higher concentrations, usually 3–6%, of the medium- viscosity grade are used to produce gels that can be used as the base for applications and pastes; glycols are often included in such gels to prevent them drying out. Ramli, dkk. [20] said that Cellulose is a biopolymer which is abundant in nature and insoluble in water, so it must be treated to allow it to be applied as a thickener, gel agent or stabilizing agent. The use of Carbomer-940 at pH 7.7 is stable and in long storage, the viscosity can be guaranteed [23]. Humectants to maintain moisture by maintaining water content in the antiseptic formulations used glycerin and propylene glycol are also safe for the user's skin. According to Tan [21] glycerin as a humectant can have a gentle effect on the skin. In topical pharmaceutical formulations and cosmetics, glycerin is used primarily for its humectant and emollient properties. Glycerin is used as a solvent or cosolvent in creams and emulsions [19]. Triethanolamine is a clear, colorless to pale yellow-colored viscous liquid having a slight ammoniacal odor. It is a mixture of bases, mainly 2,20,200-nitrilotriethanol, although it also contains 2,20-iminobisethanol (diethanolamine) and smaller amounts of 2-aminoethanol. The addition of Triethanolamine (TEA) to increase the pH of non-alcoholic antiseptic formulations is in accordance with the opinion of Rowe, et al., [23] that TEA has a pH of 10.5 and Very hygroscopic 5% v/v of triethanolamine will be needed, with an appropriate increase in the amount of fatty acid used and primarily in the formation of emulsions.

Methyl paraben occurs as colorless crystals or a white crystalline powder. It is odorless or almost odorless and has a slight burning taste. It is a preservative, with chemical formula C8H8O3 and name Methyl-4-hydroxybenzoate use at 0,02%-0,3% cocentration [24]. Methyl paraben exhibits antimicrobial activity of pH 4–8. Preservative efficacy decreases with increasing pH owing to the formation of the phenolate anion. Parabens are more active against yeasts and molds than against bacteria. They are also more active against Grampositive bacteria than against Gram-negative bacteria.

Preservative efficacy is also improved by the addition of propylene glycol (2–5%), or by using parabens in combination with other antimicrobial agents such as imidurea. Non- alcoholic antiseptic products are required to have a pH between 4.5-6.5 in accordance with the pH of the skin so that there is no irritation [25,26].

5. CONCLUSION

Non-alcoholic antiseptic that is safe for children with special needs using 15% concentration of Cymbopogon citrates essential oil with a gel base of CMC-Na compared to Carbomer-940 illustrates the following

1. Base on review journal Cymbopogon citratus essential oil at 15% concentraton found effective against staphylococcus aurens (24.66 and 29.66 at 30%), Bacillus cereus (15.66 and 28.00 at 30%), Bacillus subtilis (16.00 and 24.66 at 30%), Escherichia coli (16.33 and 22.33 at 30%0, and Klebsiella pneumoniae (12.66 and 17.00 at 30%).
2. The organoleptic test results were both semisolid and lemongrass aroma, the color of CMC-Na was more cloudy
3. pH with CMC-Na bel base is 7, and pH with Carbomer-940 gel base is 6,6
4. Homogeneity is both homogeneous
5. User test for CMC-Na gel base feels more sticky

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