

The Quality of Polymia Hand Sanitizer Towards Effectivity of Food Handlers

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Abstract: The personal hygiene of a food handler is very important in food safety, especially in terms of hand hygiene, because it is one way in which food contamination may occur. Hand sanitizer is one product used to prevent microbial contamination through improper handling of food which causes several diseases. The leaves of Indonesian bay leaf (*Syzigium polyanthum*) and *Muntingia* (*Muntingia calabura*) can be used as active microbial ingredients in hand sanitizers. This study used both qualitative and quantitative descriptive method as well as experimental method. The qualitative and quantitative descriptive method comprised of identification and measurement, while the experimental method comprised of the effectivity and patch test of Polymia hand sanitizer. This study was conducted by preparing the materials, followed by extraction, gel preparation, hand sanitizer production, effectivity and patch test, inhibition test, and pH measurement. The aim of this study was to observe the effect of Polymia hand sanitizer, in terms of hygiene and sanitation, towards food handlers. As conclusions, the level of awareness among food handlers in terms of washing hand before handling foods and after using the toilet was still low. In the effectivity test, Polymia-based hand sanitizer in group P3 had the highest favorability rate (mean=7.9). According to the patch test result, the hand sanitizer base with highest skin irritation rate was P3 (mean=0.1).

Keywords: Polymia Hand Sanitizer; personal hygiene; food handler

1. Introduction

1.1 Background

The tourism industry in Bali, especially Denpasar City, is developing fast. This could be observed by increased number of hotels and restaurants in Denpasar each year (Denpasar Tourism Directory, 2018). According to the article published by Harian Nasional (2013), titled “51% of Foods Served by Hotels are Unhygienic”, the Indonesian National Agency of Drug and Food Control (BPOM) revealed that 51% of Horeka (Hotels, Restaurants & Cafe) served foods that are not in accordance with the food hygiene standards. The personal hygiene of a food handler is very important in food safety, especially in terms of hand hygiene, because it is one way in which food contamination may occur (Little & McLauchlin, 2007, p.169). Cross-contamination also frequently occurs by means of equipment used by food handlers, such as cutting boards, knives, and others (Knowles, 2012).

Recently, along with better education, people are becoming more aware that foods are supposed to be clean and healthy. As mentioned in Harian Nasional (2013), a customer named Andrea Sosrowidjayan said that hygiene is not only about how the food is served, but also about how it is handled.

Although standard operational procedures (SOP) have been established and several efforts such as training have been given, negligence caused by food handlers of restaurants in Denpasar still happens frequently. The authors has been informed by a customer of a restaurant in Denpasar that they found foreign bodies in their food such as hair strands aside from dirty eating utensils. Food handlers are usually well-educated in terms of food and personal hygiene, but often the practice (such as washing hands before handling foods and keeping the work station clean) is not well executed.

Health is one of the most important aspects in life. One way to maintain it is by washing hands properly. Maintaining body health and washing hands are very important in daily life because our hands are often contaminated by microbes which may lead to several diseases such as diarrhea.

Various efforts have been made to reduce digestive system disorders caused by microbes, ranging from prevention to treatment. One practical prevention effort that can be done is to use hand sanitizer. Hand sanitizers generally contain ethyl alcohol 62%, softener, and moisturizer. Based on the study by the Centers for Disease Control and Prevention (CDC), hand sanitizers with alcohol content above 60% can function as antibacterial and antiviral agents. In inhibiting microbial activity, 50-70% alcohol plays a role as denaturing and coagulating proteins, which will cause damage to the enzyme so that microbes cannot fulfill their daily needs and eventually their activity stops. (CDC, 2009). Besides alcohol, the active ingredients of hand sanitizer are triclosan, glycerol, tannin, saponins and other antimicrobial agents. Antibacterial active ingredients such as tannins can be found from natural ingredients such as Indonesian bay leaves and *Muntingia* leaves.

Hand sanitizer is a product that can be used to prevent microbes that contaminate hands which leads to various diseases. Indonesian bay leaves and *Muntingia* leaves can be used as antimicrobial active ingredients in making hand sanitizers. Indonesian bay leaves and *Muntingia* leaves contain tannin and flavonoid compounds which function as antibacterial / antimicrobial agents. Combining Indonesian bay leaf and *Muntingia* leaves extract with other gel-making ingredients into a product called Polymia hand sanitizer is expected to produce a safe hand sanitizer which capable of eradicating bacteria.

1.2 Benefits

The benefits of this research is that the readers, students, general public and governments are informed about the the quality of polymia hand sanitizer towards effectivity of food handlers.

2. Literature Review

There are two previous studies related to this study. First is the research conducted by Febriani and Ferdinand (2013) titled "Relationship between Levels of Knowledge of Food Handler Behavior Seen from Sanitation and Hygiene and Petra Codex 1.0 on the Implementation of Safe Food Handling". The results of this study indicated that there is a relationship between the level of knowledge in behavior of food handlers measured by sanitation and hygiene and petra codex 1.0 on the application of safe food handling to the food product laboratory. The other study is one published by Desiyanto and Djannah (2013) titled "Effectiveness of Hand Washing Using Hand Sanitizer Liquid Related to the Germs Count". The results of this study indicated that there was significant difference in the germs count between hand washing using running water, soap, hand sanitizer A, hand sanitizer B, and the control group (without hand washing). Antiseptic hand sanitizer is effective for decreasing the germs count and the most effective method described was hand sanitizer B (containing 60% alcohol). Based from the two studies above, the similarities lie in terms of focusing on hygiene and sanitation, while the difference lie in terms the usage of Polymia hand sanitizer.

2.1 Indonesian Bay Leaf (*Syzygium polyanthum*).

2.1.1 Morphology and Taxonomy of Indonesian Bay Leaf.

Indonesian bay leaf plants grow at an altitude of 5 meters to 1,000 meters above sea level. The trees can grow in the lowlands to mountains with an altitude of 1,000 meters. They grow in form of trees or shrubs. It has a height ranging from 18 meters to 27 meters and usually grows wild in the forest.

The direction of growth of the stem is straight, cylindrical in shape with a grooved surface. Their woody stems are usually hard and strong with monopodial stems. The tree trunk could always be seen clear. Most Indonesian bay leaf flower are pansy flowers consisting of 4 to 5 petal and the same number of crown leaves, sometimes attached.

Bay leaves have a leaf shape that is oval to elliptical or round with a pointed base. The shape of the tip varies from sharp to blunt with a length of 50 millimeters to 150 millimeters, 35 millimeters wide to 65 millimeters, with 6 to 10 lateral leaf veins. The length of the leaf stalk is ranging from 5 millimeters to 12 millimeters (Murtini, 2006).

2.1.2 The Contents and Benefits of Indonesian Bay Leaf.

Indonesian bay leaf plants have an essential chemical content of 0.2% (sitral, eugenol), flavonoids (catechins and routine), tannins and methyl cavicol (methyl chavicol), also known as estragole or pallylanisole.

These compounds have activities as antioxidants. Tanin and flavonoids are active ingredients that have anti-inflammatory and antimicrobial effects (Adjirni, 1999; Katzer, 2001; Sumono and Wulan, 2009; Lelono, et al., 2013). Its essential oils generally have an effect as an antimicrobial, analgesic, and increase the ability of phagocytes. The essential oils of Indonesian bay leaves consist of simple phenols, phenolic acids such as gallic acid, sesquiterpenoid, and lactone, and also contain saponins, fats, and carbohydrates. From the literatures, it has been proven that Indonesian bay leaf plant has pharmacological effects.

2.2 *Muntingia* Leaves (*Muntingia calabura L.*)

2.2.1 Morphology and Taxonomy of *Muntingia* Leaves.

Muntingia belongs to an annual plant with a height reaching as high as 12 m. The stem of this plant is woody, erect, round and has sympodial branches. The branching is horizontal, hanging towards the tip, downy, with ovoid to lanceolate single leaves. The leaf sheet has a real and asymmetrical base with a size reaching 14 cm x 4cm, jagged leaf edges, while the bottom of the leaf is light green with dense hair on the underside of the leaf.

The stem can grow to reach a height of 12 cm, but generally has a diameter of 1-4m and forms shady shade, while the flowers are white and located at the axilla on the right side of the leaf. It has a long stem, a flat-edge petals, a round egg shape, a large number of stamens between 10-100 strands.

The *Muntingia* fruit is round in shape. It tastes sweet, appears green when it is young and red after it is ripe with plenty of sand-like seeds. The seeds are 0.5 mm in size and yellowish (Kosasih dkl, 2013).

2.2.2 The contents and Benefits of *Muntingia* Leaves.

Muntingia plants have long been used by the people of Peru as traditional medicinal plants. *Muntingia* leaves are used as headache and anti-inflammatory drugs in Peru. *Muntingia* leaves contain flavonoids, tannins, triterpenoids, saponins and polyphenols which show antioxidative and antimicrobial activity (Haki, 2009).

Flavonoids are commonly found in plants, bound to sugar as glycosides and aglycones. Flavonoids can function as antimicrobial, antiviral, antioxidant, antihypertensive, stimulating estrogen formation and treating liver function disorders (Binawati and Amilah, 2013).

2.3. Hand Sanitizer

Hand sanitizer is one of the antiseptic ingredients in the form of a gel that is often used by the community as a practical hand washing media. The use of hand sanitizers is more effective and efficient compared to using soap and water so that many people are interested in using it (Miller, 2006; Myers, 2008).

The advantages of hand sanitizer can kill germs in a relatively fast time, because they contain alcohol compounds (ethanol, propanol, isopropanol) with concentrations of \pm 60% to 80% and phenol groups (chlorhexidine, triclosan). The compounds contained in the hand sanitizer works by denaturing and coagulating germ cell proteins.

2.4. Personal Higiene

Personal hygiene is an effort to maintain one's health which aims to prevent the transmission of an illness and to improve his health status (Perry & Potter, 2005). In using Polymia hand sanitizer, a food handler must frequently wash his hands to prevent the transmission of bacteria originating from his body or as a result of interacting with the food itself (Gaman & Sherrington, 2006).

2.5. Conceptual Basis

Based on NSW Food Authority (2011), a food handler is considered as anyone involved in food

business and handles the foods, or those directly in contact with outer surface of food (such as spoons, forks, and plates).

This is an experimental study using qualitative-quantitative descriptive method. The qualitative and quantitative descriptive method comprised of identification and measurement, while the experimental method comprised of testing the inhibitory effect of the constituent extract of the hand sanitizer towards *E. coli* bacteria, pH measurement, as well as assessing the effectivity (hedonic test) and skin irritation test (patch test). The study was carried out on 39 respondents.

3. Methodology

3.1. Location

This study was conducted at the kitchen laboratory of The Bali International Institute of Tourism Campus, Denpasar, Bali and the laboratory of the Faculty of Agricultural Engineering, Udayana University.

3.2. Data Analysis

This study used both qualitative and quantitative descriptive method as well as experimental method. The qualitative and quantitative descriptive method comprised of identification and measurement, while the experimental method comprised of the effectivity and skin irritation test of Polymia hand sanitizer. This study was conducted by preparing the materials, followed by extraction, gel preparation, hand sanitizer production, effectivity and patch test, inhibition test, and pH measurement.

The result of effectivity and patch test was analysed based on the evaluation from all panelists. It was carried out by presenting the data as well as providing the assessment criteria, followed by giving samples to the panelists, carrying out measurements, and simplifying the data in form of graphs to make it easier to understand.

4. Results and Discussion

4.1. The Effectivity Test of Polymia Hand Sanitizer.

In this study, effectivity test (hedonic test) was carried out to obtain the effectivity rate of food handlers in using Polymia hand sanitizer. The results on 39 respondents are represented in Figure 4.1.

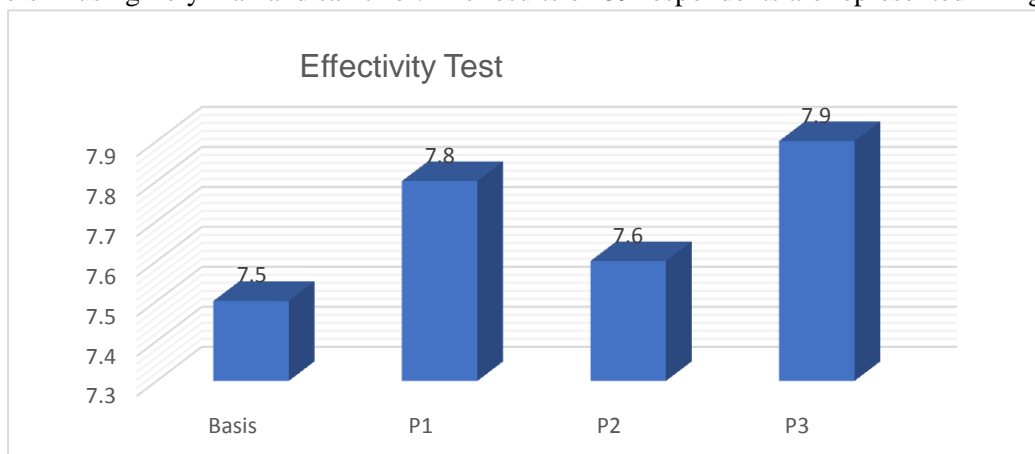


Figure 1. The Effectivity Test Result of Polymia Hand Sanitizer

Based on Figure 1, the mean effectivity of hand sanitizer base, P1, P2, and P3 are 7.5, 7.8, 7.6, and 7.9 (respectively), which means that the most effective hand sanitizer was P3.

4.2 The Patch Test of Polymia Hand Sanitizer.

In this study, patch test was carried out to obtain the skin irritation rate of the panelists' skin after using Polymia hand sanitizer. The results on 39 respondents are represented in Figure 2.

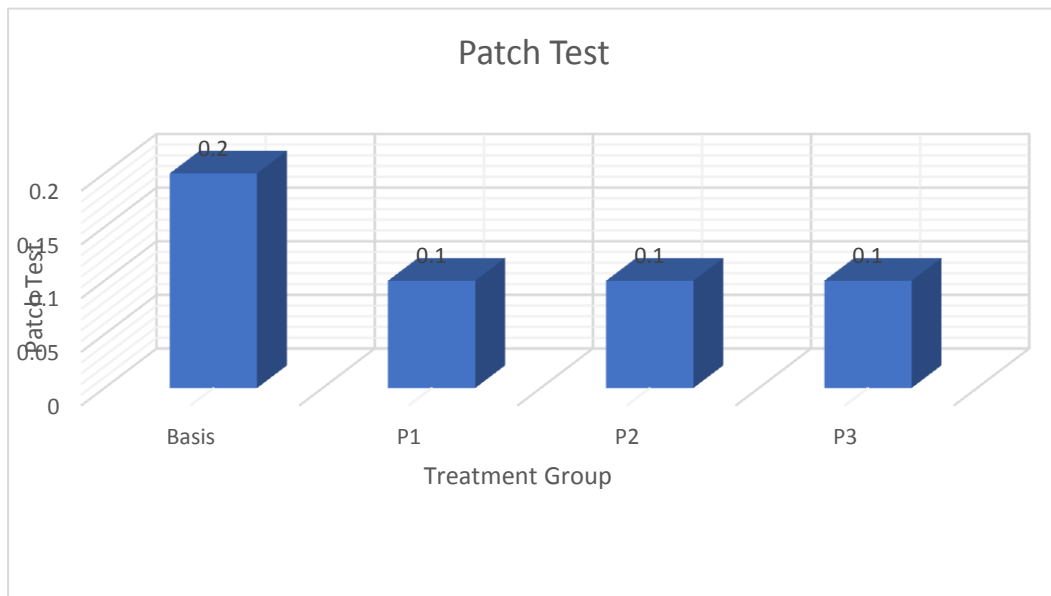


Figure 2. The Patch Test Result of Polymia Hand Sanitizer

Based on Figure 2, the mean value of hand sanitizer base, P1, P2, and P3 are 0.2, 0.1, 0.1, and 0.1 (respectively), which meant that P3 had the highest rate of skin irritation.

Hand sanitizer made from the combination of Indonesian bay leaf and *Muntingia* leaves extract is potential to be further developed and has been proven to be effective when used by food handlers. The authors discovered that food handlers do not wash their hands due to forgetfulness, requiring more time to do in case of rush hours, and their belief that they do not touch anything dirty after using the toilet.

This is not in accordance with the theory of proper time to wash hands, which mentioned that one should wash their hands after using the toilet; before and after handling raw meat, poultry and seafood; after handling chemicals; after taking the trash out; after cleaning the tables or dirty utensils; after holding uniforms or aprons; and after handling money (Gisslen, 2006).

Based on the interview conducted by the authors, the practice of food and personal hygiene in food handlers was merely due to the regulations that required employees to obey it, as well as supportive environment, rather than the awareness of food handlers themselves.

5. Conclusion

Based on this study, the authors concluded as follows:

- The awareness of food handlers in terms of wearing clean uniforms, aprons, and shoes at work was quite high, while their awareness in terms of washing hands before handling foods and after using the toilet was still low.
- Based on the result of effectivity test (hedonic test), the most favourable Polymia hand sanitizer was P3 (mean=7.9), so this particular hand sanitizer could be used by food handlers without the need of frequent hand-washing.
- Based on the results of patch test, P3 had the highest rate of skin irritation (mean=0.1), which means it was safe to be used by food handlers..

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