



Total Plate Numbers (ALT) Check Andyeast Mold Numbers (YM) In Kunyit Asam Jamu

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Abstract. *Turmeric and tamarind herbal medicine* is a medicinal herb in liquid form that is made from turmeric (*Curcuma domestica* Val.), and tamarind fruit (*Tamarindus indica* L.) produced by the home industry. Jamu Gendong does not require a license to distribute, but the quality of herbal medicine must be so that it is safe for consumption. The purpose of this study was to determine the presence or absence of microbial contamination in the form of bacteria and molds/hamirs in the preparation of Jamu Gendong Kunyit Asam circulated in Harjosari I Village, Medan Amplas Subdistrict. The samples were taken from four locations: Jalan Garu II, Garu III, Garu IV, and Garu VI. The total plate count (PCA) test was carried out by dilution of stratified samples using Lactose Broth (LB) media, for bacterial tests 10⁻¹ to 10⁻⁵ dilutions, and for fungal tests 10⁻¹ to 10⁻³ dilutions. The diluted samples were placed in medium and incubated at 45±1o in an incubator. The bacterial total plate count was performed using Plate Count Agar (PCA) as the medium. It was incubated at 35-37oC for 24 h, and the mold/fungal test used Potato Dekstro Agar (PDA) as media and incubated at 20-25oC for 48 h. For comparison, we used packaging for herbal medicines purchased from supermarkets. Furthermore, the number of bacteria and fungi in the colon was observed and counted. The results showed fungal contamination in the home industry at Jamu Kunyit Asam. It was a sample collected from Garu II, a sample of 86×10³. The samples had many colonists that exceeded the regularity set up in BPOM RI No. 32 of 2019 and SNI 19-2879-1992.

Keywords: total plate count, bacteria, turmeric and tamarind herbal medicine, mold (mold/yeast)

1. BACKGROUND

Indonesia is a country with abundant natural resources such as medicinal plants that are widely used by the community. Some Indonesians still use natural medicines, such as herbal medicines. (Sholehah, 2019). Herbal medicine is believed to be an alternative medicine that is effective in increasing body resistance, preventing disease, and maintaining fitness (Mustofa et al, 2022).

Herbal medicine is a concoction of medicinal plants that is used empirically and has been proven safe and beneficial for health.(A'yunin et al., 2019). Jamu Gendong is a home-made herbal medicine that is quite simple to make, made from medicinal plants, is widely available in markets or yards, and uses relatively simple equipment.(Ramdani, 2021)

The types of herbal medicines include turmeric and tamarind, beras kencur, bitter, temulawak, cabe puyang, uyup-uyup, and sinom (Isnawati, 2021). Turmeric and tamarind herbal medicines, made from turmeric rhizome, tamarind fruit, water, sugar, and with or without the addition of lime juice or betel leaf extract, are widely consumed by the public. Turmeric and tamarind herbal medicines are typically consumed to relieve menstrual pain, refresh the body, and maintain stomach health.(A'yunin et al., 2019).

Turmeric herbal medicine (*Curcuma domestica* Val var.) is one of the most widely used herbal medicines. The rhizome of the turmeric plant is also useful for its anti-inflammatory,

antioxidant, antimicrobial, cancer prevention, and antitumor effects. Turmeric, which gives color and functional properties, is curcuminoid. This compound is a type of antioxidant and has hypocholesterolemic, choleric, bacteriostatic, spasmolytic, antihepatotoxic, and anti-inflammatory properties (Luh et al., 2023). Tamarind has many benefits, including cooking spices. In addition, tamarind flesh can facilitate bowel movement and improve blood circulation (Lissa et al., 2023).

In the process of processing herbal medicine, hygiene must be guaranteed, starting from the stage of selecting herbal ingredients, the processing stage, and serving. The process of processing herbal medicines that are less hygienic is easily contaminated by microorganisms such as fungi, microbes, and other bacteria, and the environment where herbal medicines are sold can also cause microbial contamination in herbal medicine. (Sholehah, 2019).

Herbal medicines contaminated by microbes should not be consumed by the public. According to BPOM No. 32 of 2019 concerning the safety and quality requirements for traditional medicines, the process of making liquid preparations of internal medicines must meet the requirements for a total bacterial plate count of $\leq 10^5$ colonies/ml and the number of yeast mold fungi is $\leq 10^3$ colonies/ml (BPOMRI Agency, 2019). Testing for bacterial and fungal contamination in the preparation using the Total Plate Count (TLC) and Yeast Mold Count (YM) methods. This method is one of the parameters for microbiological quality assurance in herbal medicines. The TLC method was used to determine the amount of mesophilic aerobic bacterial contamination in samples using the pouring method on solid media (Tivani, 2018). The YM method is one of the parameters that determine the safety of herbal medicines. The number of yeast molds is used as a parameter in the manufacturing of traditional medicine using traditional medicine manufacturing methods (CPOTB). The smaller the number of molds or yeasts in a herbal medicine product, the better the process of making herbal medicine by implementing CPOTB (Thearesti, 2015). Based on the above, researchers are interested in conducting research on the microbiological aspects of turmeric and tamarind herbal medicine circulating in Harjosari I Village, Medan Amplas District, using the ALT and AKK methods..

2. THEORETICAL STUDY

AKK examination aims to determine the number of mold and yeast colonies contained in a sample. Based on field observations, serving turmeric and tamarind herbal medicine in an open space can facilitate mold and yeast contamination, where mold and yeast microorganisms can adhere to micro solid materials such as dust (Rachmawan, 2001). This is in line with

research conducted by Rahayu (2018), namely, that mold growth in turmeric herbal medicine can be caused by contamination from the environment, namely air. Another factor that can affect the AKK value is during packaging, where it was found that herbal medicine traders used plastic jerry cans and plastic bottles of mineral water as containers for the turmeric herbal medicine sold. Good herbal medicine packaging should use glass bottles or plastic bottles that comply with established health standards, not plastic bottles of mineral water or other plastic bottles that do not comply with food grade (Ministry of Health of the Republic of Indonesia, 2015).

3. RESEARCH METHODS

This study is descriptive in nature, describing the level of microbial contamination using the Total Plate Count (TPC) and Yeast Mold Count (YM) methods for turmeric and tamarind herbal drinks. This study was conducted from June 2024 to July 2024. This study was conducted in the research laboratory of the S1 Pharmacy Study Program, STIKes Indah Medan. The tools used in conducting this research are laboratory glassware, aluminum foil, autoclave (Actostar), stirring rod, Bunsen, petri dish, colony counter, hot plate, incubator (B-one), loop needle, sterile gauze, sterile cotton, parchment paper, filter paper, microscope (XS2-107BN), analytical balance, test tube rack, spatula, alcohol.

4. RESULTS AND DISCUSSION

This study was conducted on turmeric and tamarind herbal medicines and packaged herbal medicines found in supermarkets. All samples were produced and sold by herbal medicine sellers around the Harjosari I area, Medan Amplas District, namely, Jalan Garu II marked as sample Garu II, Jalan Garu III marked as sample Garu III, Jalan Garu IV marked as sample IV, and Jalan Garu VI marked as sample Garu VI.

The samples were taken randomly, and one sample was taken from each location, so that the number of samples of the turmeric and tamarind herbal medicine *washome industries*, as many as four samples, and one sample of packaged herbal medicine or Sidomuncul turmeric and tamarind herbal medicine.

Total Plate Count (TLC) Test for Bacteria in Samples

Total plate count testing for bacteria from the turmeric and tamarind herbal medicine samples consisting of sample Garu II, sample Garu III, sample Garu IV, sample Garu VI, and comparison samples was carried out using the media *Plate Count Agar* (PCA) and incubated for 24 h in an incubator at a temperature $-35-37^{\circ}\text{C}$.

Table 1 Total Plate Count (TPC) test for bacteria in samples

No	Sample	Average number of bacterial colonies (CFU/g)		Conclusion
1	Harrow Sample II	29 x 10 ³	29,000	Qualify
2	Harrow Sample III	25.7 x 10 ³	25,700	Qualify
3	Harrow Sample IV	33 x 10 ³	33,000	Qualify
4	Harrow Sample VI	19.5 x 10 ³	19,500	Qualify
5	Comparison Sample	14.3 x 10 ³	14,300	Qualify

Table 1. above shows that there is bacterial contamination in the home industry turmeric and tamarind herbal medicine, but all of them do not exceed the requirements set by BPOM RI Number 32 of 2019, that is, the total plate count for bacteria is not more than 10⁵. Therefore, they are safe to consume.

The presence of bacterial contamination in the turmeric and tamarind herbal medicine *home industry* possibly obtained from the process of making herbal medicine, such as the lack of cleanliness in washing raw materials and tools used to make herbal medicine. In addition to the containers used, namely jerry cans made of plastic that are less hygienic, and the lack of seller hygiene in the manufacturing process, such as sellers not paying attention to cleanliness in the manufacturing process and the environment where they sell is not clean, there may be bacterial contamination that can occur during the process of opening and closing herbal medicines and contamination from bacteria in the air.

Yeast Mold Number Test (YC) of Fungi on Samples

Mold/yeast number testing was carried out using media *Potato Dextrose Agar* (PDA) supplemented with chloramphenicol. The addition of chloramphenicol is antibacterial; therefore, it is expected that the colonies that grow on PDA media are mold/yeast. The reason for using Chloramphenicol is used because it is a broad-spectrum antibiotic that inhibits the growth of many bacteria.

Dilution series was performed up to 10⁻³. After the sample was diluted and planted on PDA media, it was incubated upside down for 3 × 24 h at a temperature of 20o-25oC which is the optimum temperature for fungal growth, and the growth of the colony was observed until the third day.

Table 2 Mold/Yeast Count Test (YAC) on samples

No	Sample	Number of bacterial colonies		Conclusion
1	Harrow Sample II	86 x 10 ³	86,000	Not eligible
2	Harrow Sample III	5 x 10 ²	500	Qualify
3	Harrow Sample IV	7.09 x 10 ²	709	Qualify

4	Harrow Sample VI	5.7 x 10 ²	570	Qualify
5	Comparison Sample	29 x 10 ¹	290	Qualify

Table 2 shows the results of the calculations obtained during the study, and the five herbal medicine samples showed growth of mold/yeast colonies on the cup. Based on the data obtained, the value of the old yeast number (AKK) in the Garu II sample, which was 86,000, exceeded the AKK value requirement set by BPOM RI Number 32 of 2019, which is $\leq 10^3$ colonies/g. Herbal medicines contaminated by mold and yeast can be caused by several factors, such as humidity and water content. Therefore, they are unsafe for consumption. The side effects of mold-contaminating herbal medicine can cause food poisoning, such as nausea, vomiting, diarrhea, and stomach ache.

Table 2 shows that for sample Garu III, sample Garu IV, and sample Garu VI, there is bacterial contamination in the turmeric and tamarind herbal medicine *home industry*, but it does not exceed the limit set by BPOM RI Number 32 of 2019; namely, the total plate count for bacteria is not more than 103. Therefore, they are safe to consume.

Some factors that influence the development of fungi are likely the seller's lack of hygiene in making them, such as the seller not paying attention to cleanliness in making and the sanitary conditions of the place where the herbal medicine is made, during the processing process not boiling the herbal medicine until it is really boiling; the container used is still using a jerry made of plastic, which causes fungal contamination; and other factors that cause herbal medicine to be contaminated by mold and yeast can be caused by the water content of the stored product, the temperature of the storage room, and the storage period of the herbal medicine. The influence of the location factor for selling herbal medicine where some traditional herbal medicine sellers sell herbal medicine in unhygienic areas such as on the side of the road that is polluted by vehicle smoke and dust so that it can allow a lot of contamination of herbal medicines by air microbes.

In packaged herbal medicine, even though there is bacterial contamination, it still meets the requirement of approximately 10^1 . This is still allowed because herbal medicine is not a sterile product; it is still allowed to have bacterial content below the permitted number. Fungal contamination in herbal medicine can be caused by the nutritional content contained in the composition of herbal medicine products, such as sugar, and is used by yeast as a growth medium because it is rich in nutritional sources. Another factor is the storage of herbal medicines after manufacturing. Turmeric and tamarind herbal medicines are stored directly in

closed containers, which can cause water vapor. The resulting water vapor caused the humidity in the container to increase. High humidity can be a good place for the growth of molds/yeasts.

5. CONCLUSION AND SUGGESTIONS

Based on the results of the research conducted, it can be concluded that:

- a. There was bacterial contamination in the turmeric and tamarind herbal medicine, but none of the test results obtained exceeded the requirements set/permitted by BPOM RI Number 32 of 2019, namely the total plate count for bacteria was ≤ 105 .
- b. There is fungal contamination (mold/yeast) in the home industry turmeric and tamarind herbal medicine, and some exceed the requirement limit, namely, the Garu II sample of 86×10^3 , which exceeds the requirement limit that has been set/permitted by BPOM RI Number 32 of 2019, namely, the total plate count for bacteria is ≤ 103 .

It is expected that the manufacturers of home industry turmeric tamarind herbal medicine should pay attention to the cleanliness of raw material processing, herbal medicine processing, and presentation to produce safe and high-quality home industry turmeric tamarind herbal medicine products. Consumers of turmeric tamarind herbal medicine in the home industry should be more careful and thorough in buying or consuming turmeric tamarind herbal medicine.

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