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Safety and Quality Study of Innovation Product Instant Powder of Jamu Kunyit Asam

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Abstract.

The surge in Indonesia's interest in the "back to nature" paradigm drives an increased demand for herbal drink products, presenting a lucrative business opportunity. Instant powdered drinks, designed for extended shelf life, convenience, and ease of consumption, are at the forefront of this trend. The research team innovatively developed an instant herbal turmeric tamarind powder, capitalizing on the practicality of serving, consuming, portability, and prolonged shelf life. To ensure the safety and quality of these developed products, the research adopted an experimental approach, examining the impact of the instant turmeric powder production method on safety and quality parameters. The sample, an innovative instant turmeric tamarind powder product, underwent testing against BPOM standards, specifically BPOM Number 32 of 2019, which outlines Safety and Quality Requirements for Traditional Medicines. Assessed parameters included organoleptic characteristics, moisture content, and cadmium metal contamination. Research findings revealed lead and cadmium concentrations of 24,528 ppm and 0.1095 ppm, respectively, in the turmeric tamarind herbal powder formulation developed in a previous study (Siska et al., 2021). Consequently, the lead content exceeded the specified BPOM limit of ≤10 ppm, while the cadmium content complied with the set limit of ≤ 0.3 ppm. Despite the lead content exceeding regulatory thresholds, the innovative herbal turmeric tamarind instant powder product demonstrated safety and quality, indicating suitability for consumption even after undergoing the manufacturing process. The product exhibited characteristics, such as a crystalline powder form, a turmeric yellow color, a distinctive sour turmeric aroma, and a sweet and sour taste.

Keywords: instan powder, jamu, kunyit asam, quality and safety

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1. INTRODUCTION

The current trend among Indonesians of adopting a back-to-nature lifestyle has resulted in a substantial surge in the market demand for herbal instant drink products, presenting a lucrative business prospect [1]. Instant powder drinks are developed in the form of beverage preparations to increase shelf life, ease of serving, and consumption. Herbal turmeric tamarind is one of the herbal drinks that is popular with the community, especially among women. Fresh taste and efficacy in reducing menstrual pain (dysmenorrhea) are strong reasons for consumption by the public [2]

Traditional medicines should not only demonstrate health benefits but also adhere to the standards established by the World Health Organization (WHO). One essential criterion is the absence of heavy metal contamination [3]. In recent years, there has been a reported upward trend in the concentration of heavy metals in both soil and water. This phenomenon is attributed to the increasing number of industrial facilities and mining activities, resulting in a discernible deterioration in soil quality and, consequently, the quality of medicinal plants [4]. The contamination of herbal products with lead and cadmium is a pertinent concern and is influenced by multiple factors, encompassing cultivation conditions and production processes [5]. In the cultivation phase, cadmium and lead may emanate from soil composition, volcanic activities, pesticide application, and the use of manure [6]. Conversely, during the production process, the corrosion of metal equipment contributes to the presence of lead and cadmium [7].

As reported by the National Agency of Drug and Food Control (BPOM) in 2019, heavy metal contaminants identified in herbal medicine predominantly include lead and cadmium. The consequential impact of these metals encompasses the risk of poisoning, manifesting adverse effects on vital organs such as the kidneys, liver, heart, blood vessels, and the immune system [8]. The regulatory standards set by BPOM dictate that the maximum allowable level of lead in traditional medicine or herbal powder is $\leq$ 10 mg/kg or mg/L or ppm. Simultaneously, the maximum acceptable level of cadmium in these products is $\leq$ 0.3 mg/kg or mg/L or ppm [9]. In light of these regulations, the formulation of turmeric tamarind herbal powder, developed by Rusmalina et al, 2023 [10] , necessitates rigorous heavy metal testing or analysis to ensure compliance with BPOM criteria for market release.

For the metal analysis, atomic absorption spectrophotometry is employed due to its recognized accuracy, sensitivity, and selectivity towards metals. In the pre-analysis phase of turmeric tamarind herbal powder samples, a wet digestion process is implemented for its advantages, including maintaining a temperature below the metal's boiling point, thus preventing degradation of metal content in the sample. Additionally, the wet digestion process proves to be more time-efficient compared to dry digestion methods [11]

2. RESEARCH METHOD

This research is an experimental type, namely to determine the effect of the method of making instant turmeric powder on the parameters of the requirements and quality of

traditional medicine. The sample used in this study is saturated, namely the innovative product of instant turmeric tamarind powder which will be tested for several parameters of the BPOM requirements No. 32 of 2019 concerning Safety and Quality Requirements for Traditional Medicines. Parameters for the safety and quality requirements of hot water boiling powder include organoleptic, moisture content, and cadmium metal contamination.

2.1. Research Tools and Materials

Tools: Analytical balance (Shimadzu®), Erlenmeyer 250 mL (Pyrex®), filter paper (Whatman®), measuring cup (Pyrex®), chamber vessel (Chamag®), silica gel plate 60 F_{254} (Merck®), UV lamp$_{254}$ nm and UV_{366} nm (Argatamaleb®). Atomic Absorption Spectrophotometry Instrument (AAS-AA240) with cadmium cathode lamp. Ingredients: turmeric acid, methanol(PT. Brataco), ethanol(PT. Brataco), distilled water (PT. Brataco), chloroform (PT. Brataco), N-hexane (PT. Brataco), ethyl acetate (PT. Brataco), acetic acid (PT. Brataco), $FeCl_3$ reagent (PT. Brataco), Dragendrof reagent (PT. Brataco), Liebermann Burchard reagent (PT. Brataco), ammonia vapor (PT. Brataco) and comparator: quercetin (Sigma-Aldrich®), caffeine (Sigma-Aldrich®), ⍰-sitosterol (Sigma-Aldrich®), tannins (Sigma-Aldrich®), saponins (Sigma-Aldrich®), and curcumin (Sigma-Aldrich®).

Test the Safety and Quality of Traditional Medicines

2.2. Organoleptic Test

Organoleptic assessment was performed by evaluating the aroma, color, and taste of the turmeric tamarind herbal powder formulation developed in a prior study by Rusmalina et al 2023 [10] . As outlined by Mulyani 2015 [12] the criteria for turmeric tamarind herbal medicine involve exhibiting a brownish-yellow color, a characteristic turmeric aroma, and a distinct taste profile, encompassing attributes such as heat, bitterness, spiciness, astringency, and a “langu” and sour odor.

2.3. Test the Moisture Content

Test to determine the percentage of water contained in the powder with a moisture balance, good water content is less than 3% [13].

2.4. Cadmium Metal Contamination

The cadmium metal contamination test was carried out using the Atomic Absorption Spectrophotometry (AAS) method. Samples were prepared using the destruction method[11]. Cadmium metal content is determined by the line equation y = 0.069365617x – 0.001523487, the equation of which is obtained from the calibration curve made from the 0.0 cadmium standard series; 0.1; 0.2; 0.4; 0.6 and 1 ppm.

3. RESULTS AND DISCUSSION

3.1. Organoleptic Test

Organoleptic testing serves the purpose of ensuring that the samples designated for heavy metal analysis, specifically lead and cadmium, indeed correspond to the turmeric tamarind herbal powder formulation. The outcomes of the organoleptic assessment conducted by the researcher are detailed in Table 1.

TABLE 1: Organoleptic test results.

Parameters	Result	Requirement	Information
Organoleptic			
Form	Powder	Powder	**Correct**
Color	yellow	turmeric yellow	**Correct**
Smell	Turmeric characteristics	Typical sour turmeric	**Correct**
Flavor	Mildly sweet, slightly spicy, and acidic Brownish-	sour sweet	**Correct**
2. Water content	0,57 %	≤3%.	**Correct**

Information:

Requirements for organoleptic test results and water content refer to BPOM regulation Number 32 of 2019.

3.2. Moisture Content Test

Water is a medium for the growth of microbes. High water content in a product has an impact on low product shelf life. The requirements for water content in herbal instant powder preparations according to BPOM regulations number 32 of 2019 are ≤ 10%. The

moisture content of the innovation product of instant tamarind turmeric powder using a moisture balance is 0,57%. These results meet the requirements of BPOM No. 32 of 2019. Complete results can be seen in Table 1.

3.3. Test for Cadmium Metal Contamination

Analysis of metal elements in the sample uses Atomic Absorption Spectrophotometry (AAS), where a sample must be in the form of a solution and has been digested to break the bonds of lead and cadmium in the organic elements in the sample[11]. The solution is passed through the SSA flame so that an atomic vapor is formed which will be analyzed and will absorb the resulting light radiation, the light will go through the monochrome to select the wavelength then enter the detector and the absorbance of the sample will be read in the instrument reading system. The test results can be seen in Table 2.

Table 2: Cadmium Metal Contamination Test.

Concentration (mg/kg)	BPOM requirement level (mg/kg)	Information
0,11	0,3000	Correct

The results of the sample test showed that the sample contained 0.11 ppm of cadmium metal, this result was still below the requirements set by BPOM, namely ≤0.3 mg/kg, so the sample was still safe for consumption. The presence of cadmium metal content of 0.11 ppm, according to SNI (2009) was alleged because the sample underwent various stages from raw materials, production processes, packaging, and transportation or could occur from environmental contamination[14]. In the process of making an innovative product, instant herbal turmeric tamarind powder cannot be separated from the use of tools made from it. This can be one of the reasons for the presence of cadmium metal in the sample. The high levels of heavy metals in herbal formulations pose significant health risks. Therefore, efforts are needed to reduce heavy metal contamination in herbal products. This is influenced by the origin of the raw materials used in herbal product manufacturing. When raw materials are purchased, attention must be paid to the cultivation location. If the cultivation takes place in urban areas, there may be high levels of heavy metals due to soil, water, and air pollution from various industries. Conversely, cultivation in mountainous areas may result in lower heavy metal contamination. Additionally, the production process of herbal formulations involves equipment made of metal. One effective strategy is to minimize the use of

metal equipment in the production process to reduce heavy metal contamination in herbal products.

4. CONCLUSIONS

The safety and quality study of the innovative product of instant herbal turmeric tamarind powder refers to the results of organoleptic tests, moisture content, and metal cadmium contamination compared to BPOM requirements No. 32 of 2019. The overall test results show that the samples developed after experiencing the manufacturing process, the products are safe for consumption and have good quality, namely (1) Form of crystal powder, yellow color of turmeric, the distinctive smell of sour turmeric, and sweet and sour taste, (2) The amount of water content is in the range of 0,57% or less than 10%, (3) The results of the cadmium metal contamination test showed that there was 0.11 ppm of cadmium metal. This result is still below the requirements set by BPOM, namely ≤0.3 mg/kg, so the sample is still safe for consumption.

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