



The Effect of Cassia Vera Additional in Physico Chemical Properties of Instant Powder Drink Meniran Extract with Stevia Sugar Sweetener

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ARTICLE INFO

Article History:

Received: 28 June 2023

Final Revision: 31 July 2023

Accepted: 15 August 2023

Online Publication: 18 August 2023

KEYWORDS

Cassia vera, Instan Powder Drink, Meniran

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ABSTRACT

This research was aimed to know the characteristic of in addition meniran extract (*Phyllanthus niruri*) physico-chemical in instant drink powder and know the best quality of addition meniran. This research was used Completely Randomized Design (CRD) that consists of 5 treatments and 3 repetitions. The data were analyzed statistically by using ANOVA and followed by Duncan's New Multiple Range Test (DNMRT) on the level 5%. The treatment in research was adding meniran extract by 0,2 g; 0,4 g; 0,6 g; 0,8 g; and 1,0 g. The observations to the result of instant powder of drink which produced were physical analysis such as timing soluble, insoluble water content. The chemical analysis which were observed such as water content, ash content, total sugar, total polyphenol, total antioxidant activity, and lignan compound (filantin). The microbiological analysis was total plate number and organoleptic test (color, smell, flavor and appearance). The result of this research showed that the difference the concentration of the adition of meniran extract were significantly on the analysis of ash content, total polyphenol, total antioxidant activity, total plate number, organoleptic test and it was not significant to the timing soluble, insoluble water content, water content, and total sugar. Based on organoleptic test, the best product in instant powder of drink was in the treatment C (the addition of meniran extract by 0,6 g) with a rate of 4,30 of color, 4,30 of smell, 4,50 of flavor and 4,50 of appearance. The result of physico-chemical analysis instant powder of drink of treatment C (the addition of meniran extrac by 0,6 g) the value of the analysis of timing soluble by 65,60 second, insoluble water content by 1,31%, total sugar by 2^oBrix, lignan content (filantin) + , and total plate numbers 1,1 x 10³ cfu/ml.

1. INTRODUCTION

1.1. Research Background

The lifestyle of society to days to live in unhealthy life such as consuming junk food frequently and stress due to routine work can trigger degenerative. Degenerative diseases such as cardiovascular, hypertension, and diabetes mellitus are the main causes of death in developed and developing countries [1,2]. The meniran plant (*Phyllanthus niruri*) can be used as a health drink because it contains many flavonoids, lignans, tannins, alkaloids and saponins—especially lignan compounds (phylanthin) as

antioxidants that can counteract free radicals. But the weakness of this drink is that it has a slightly bitter taste and an unpleasant aroma, so it is necessary to add ingredients that can give the preferred taste and aroma to instant powdered drinks from meniran. Based meniran water extract has a Lethal Concentration of 50 (LC 50) 1520 ppm, which is a safe limit at this concentration.

Besides meniran, cinnamon is also a plant high in antioxidants, and has a distinctive taste and aroma, so it is good to add to food and drinks to give it a good taste [3]. Stevia (*Stevia rebaudiana*, Bertoni) is a source of natural sweetener which has a much higher level of sweetness than sucrose (cane sugar) and is low in calories [4].



Preliminary research has been carried out with the addition of meniran dry extract to instant powdered drinks of 0.2 g, 0.4 g, 0.6 g, 0.8 g and 1.0 g, different results were obtained in terms of organoleptic but unknown physically and chemically. Based on this, research will be carried out on making instant powder drinks with the addition of cassia vera 0.2 g, stevia 1 g into meniran extract according to the treatment specified with the title "Effect of adding cassia vera extract to meniran extract instant powder drinks with added stevia sweeteners".

1.2. Literature Review

The main ingredients found in meniran plants are lignan compounds (filantin, hypophyllantin, nirantin, nirtetralin, nirfilin, filetralin, lintetralin, isotetralin and finnirurin), phylantic substances, triterpenes, flavonoids, tannins, alkaloids, phenolic acids, and potassium. Lignans are colorless crystalline substances that resemble simple aromatic compounds in their chemical properties. Lignans are sometimes found in the form of glycosides which are used as antioxidants in food, besides that lignans are also active compounds in certain medicinal plants. Meniran is a plant that has potential as a hepatoprotector agent because of the chemical substances contained therein, namely filantin which has antioxidative and antihepatotoxic effects against CCl₄ and galactosanin [5].



Fig 1. The structure of filantin compound

Instant beverage products are a type of processed food that is available in powdered form. These products are designed to dissolve easily in water, making them convenient to prepare and serve. Additionally, they are known for their extended shelf life. The underlying principle behind the production of powdered beverages is dehydration. During this process, the inclusion of fillers is typically necessary to serve as a binding agent for the constituents of the substance that may undergo degradation during the drying phase [6]. The production of instant powder can be achieved by both conventional and contemporary methods, contingent upon the used technological processes. Historically, the production of instant powders involved the process of sun-drying or heating a solution containing the constituent components while continuously stirring until a desiccated powder was achieved. Various methods are employed in the production of instant powders, including spray drying, foaming drying, freeze drying, and other techniques [7].

1.3. Research Objective

This study aims to evaluate optimal parameters for the determinant effect of adding meniran extract on the characteristics of instant powder drinks from their mixture with cassia vera extract and stevia extract produced. The treatment in research was adding meniran extract by 0.2 g; 0.4 g; 0.6 g; 0.8 g; and 1.0 g.

2. MATERIALS AND METHODS

2.1. Preparation of substrates

The raw materials used are good and undamaged meniran plants obtained from Binuang Village, Kec. Wow, Padang. AA quality cassia vera sticks from BPMB Air Tawar, Padang and ready-to-use stevia powder ordered from CV. God of Nature, Surabaya. Fresh meniran plants as much as 1 kg are washed thoroughly, then cut into small pieces \pm 1 cm. Grind the meniran with a blender and add hot water with a temperature of 60°C as much as 1:4, then filter it with a filter cloth and remove the dregs so that a liquid extract of meniran is obtained. Meniran liquid extract was added with 5% (w/v) gum arabic or 5 g gum arabic in 100 ml of meniran extract, then homogenized by stirring using a magnetic stirrer. Then dried using a spray dryer at an inlet temperature of 150°C and an outlet temperature of 70°C.

Cassia vera was first reduced in size and then put into the maserator using 96% ethanol solvent with a ratio of 1:5 for 40 minutes while stirring with a magnetic stirrer. Then filtered, added 5% gum arabic and concentrated with a rotary evaporator at 55°C until all the solvent was evaporated, dried with a spray drier to obtain cassia vera dry extract.

A number of meniran dry extract according to the treatment was added with cassia vera dry extract and stevia extract, according to a predetermined formulation. Mix until homogeneous, then pack with aluminum foil as much as 1 gram of packaging, then do physical tests, chemical analysis, microbiological tests and organoleptic tests.

2.2. Raw material pretreatment

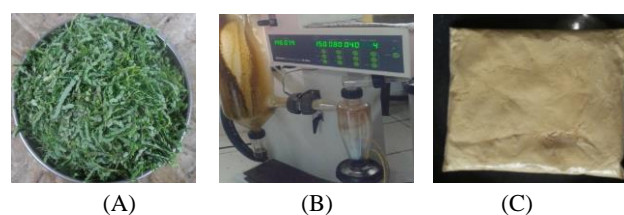


Fig. 2. Pretreatment of extract : (A) Raw material, (B) Spray dryer, (C) Powder extract



Fig. 3. (A) Meniran powder extract, (B) Cassia vera powder extract, (C) Stevia sweeteners

2.3. Analytical methods

All parameters in this study were conducted in triplicates and followed: WDT (water dissolving time), water content, ash content, polyphenol content, antioxidant activity, and qualitative test for the content of lignan compounds. The microbiological test is the total plate count test—organoleptic test which includes color, aroma, taste and appearance.

3. RESULT AND DISCUSSION

3.1. Raw material

Based on Table 4 it can be seen that the antioxidant activity value of cassia vera liquid extract is 9.7% higher than meniran liquid extract, while the total polyphenol value in cassia vera liquid extract is almost the same as meniran liquid extract which is only 0.03% difference [8], the main phytochemicals contained in meniran include flavonoids, saponins, tannins, alkaloids and lignan compounds which are generally found in all parts of the meniran plant and these compounds act as antioxidants.

The main compounds that make up the ethanol extract of cassia vera are tannins, flavonoids, triterpenoids, and saponins. Compounds that act as antioxidants are tannins and flavonoids, while triterpenoids and saponins may act as anti-platelet aggregation [9]. Based on the remaining ethanol solvent test carried out on the cassia vera extract, no residual solvent was found; this was caused by the evaporation and drying process using a rotary evaporator and spray dryer, which can evaporate the ethanol solvent. Compared with the quality standard of plant extracts, which stipulates that the remaining ethanol solvent allowed in food is 30 ppm, this instant powder drink meets the requirements.



Fig. 4. Instant powder drinks that have been diluted with water (A) 0,2 g, (B) 0,4 g, (C) 0,6 g, (D) 0,6 g, (E) 1 g addition cassia vera extract

3.2. Variation of water content (WC), ash content (AC), polyphenol content (PC)

The results of the analysis of water content obtained ranged from 1.57 – 2.18%. The lowest water content was in treatment A (added 0.2 meniran extract) and the highest was in treatment E (added 1.0 g meniran extract). Water functions as a driving force for chemical and microbiological reactions that occur in food. Removing water from food ingredients can inhibit the occurrence of these chemical reactions and can extend the shelf life of a food product because it inhibits the growth of microorganisms [10].

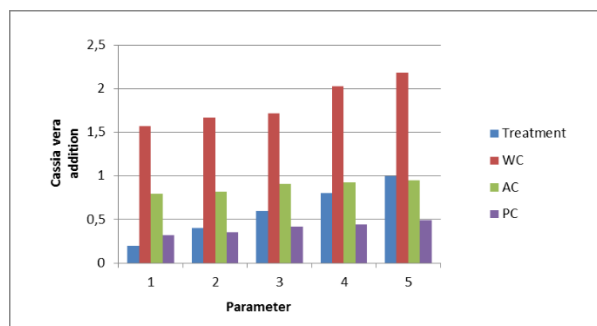


Fig. 5. Variation of WC, AC and PC

The ash content ranges from 0.79 – 0.95%. The highest ash content was found in treatment E (addition of 1.0 g meniran extract) while the lowest was found in treatment A (addition of 0.2 g meniran extract). Based on the quality standard of SNI (01-4320-1996) the allowed ash content value for instant powdered drinks is a maximum of 1.5%, while the ash content obtained for instant powdered drinks is 0.79 – 0.95%, so this instant powdered drink meets the requirements. The more addition of meniran extract, the higher the ash content of the instant powder drink. The ash content of a product is affected by the mineral content in the food. This is caused by meniran containing mineral compounds, namely potassium [8]. This is by the opinion of that meniran has a mineral content in the form of potassium which has an important role in glucose metabolism. Potassium levels in the body are very important for ion stability which is important for the health of blood vessels. Potassium deficiency can increase blood sugar levels and decrease insulin response to glucose loading.

Total rate of polyphenols ranged from 0.32 – 0.49 mg/ml. The lowest total polyphenol content of instant powder drink was found in treatment A (addition of 0.2 g meniran extract), while the highest total polyphenol content was found in treatment E (addition of 1.0 g meniran extract). The higher the addition of meniran extract, the higher the total polyphenol content produced. This is caused by flavonoids, tannins, and saponins which are the constituent components of polyphenolic compounds [8]. Meniran contains polyphenolic compounds in the form of flavonoids which are the largest group, tannins and saponins, which are polyphenol groups found in all vascular plants. Flavonoids in the meniran plant were identified as quercetin, quercitrin, isoquercitrin, astragalin and rutin [11].

3.3. The content of lignan and antioxidant activity

The content of lignan compounds in all instant powder drink treatments was positively detected. Lignans are one of the main components of meniran which has an activity to protect the liver from toxic compounds in the form of parasites, drugs, viruses and bacteria. In other studies also showed that lignans isolated from *Phyllanthus niruri* showed activity in protecting liver hepatocyte cells from carbon tetrachloride and cytotoxicity induced by galactosamine. Phyllantin is found in the roots, stems, leaves, and seeds of meniran fruit [5].

The quality of meniran is determined by the content of a single marker compound from the lignan group, the main lignan compounds of this genus are phyllanthin and hypophyllanthin. The presence of filantin can be used as an identity compound in analyzing meniran herbal extracts. Based on research [12], meniran water extract at a dose of 3 cc can repair liver cells damaged by 10% CCL4 administration but has not reached normal levels. Repair of liver cells is caused by the active substance in meniran, namely lignan group compounds that can activate kufer cells in the process of liver cell regeneration.

The antioxidant activity of the resulting instant powder drink ranged from 32.57–57.30%. The highest antioxidant activity was in treatment E (addition of 1.0 g meniran extract) while the lowest was in treatment A (addition of 0.2 g meniran extract). The more addition of meniran extract, the higher the antioxidant activity of the resulting instant powder drink. This is because meniran contains several compounds that act as antioxidants including flavonoids, alkaloids, tannins, saponins and lignans—especially flavonoids as antioxidants that can counteract free radicals [8]. Flavonoid compounds present in meniran are compounds that have potential as more robust antioxidants compared to vitamin E. Flavonoids are found in all parts of the plant, including the roots, these compounds can stimulate the body's immunity. Flavonoids rutine and quercetin can inhibit the synthesis of histamine which is an essential mediator of allergic dermatitis. Nirurin and quercetin contained in meniran are efficacious as urine laxatives. Phylantine lignans, hypophyllanthin, tannins play a role in enhancing the immune system and as hepatoprotectors. Polyphenol compounds contribute more than 90% of antioxidant activity and antioxidant activity has a positive correlation with total phenols.

3.4. Total plate count

The total plate number of instant powder drinks ranges from $9.1 \times 10^2 - 1.5 \times 10^3$ (cfu/gram). The lowest total plate number was in treatment E (addition of 1.0 g meniran extract) while the highest total plate number was in treatment A (addition of 0.2 g meniran extract).

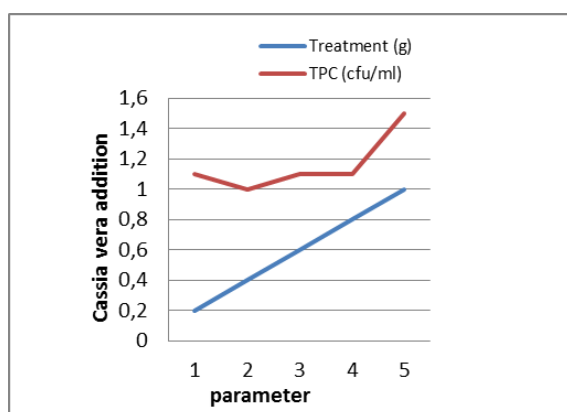


Fig 6. Total plate count (TPC)

According to the SNI instant powder drink quality standard (01-4320-1996) the maximum total plate number in instant powder drink is 3.0×10^3 cfu/gram. Based on the quality requirements of SNI (01-4320-1996), the total plate number on instant powder drink meets the requirements. The higher the addition of meniran extract, the lower the total plate count of

instant powder drinks produced. This is because meniran contains compounds from the class of alkaloids, flavonoids and lignans which act as antimicrobials [12].

3.5. Organoleptic Value

The difference in the addition of meniran extract in the instant powder drink has a significantly different effect on the organoleptic value of the resulting instant powder drink.

The color of the instant powder drink dissolved in water ranges from 2.8 to 4.3. The best value was the highest value in treatment C (addition of 0.6 g meniran extract), namely 4.3, while the panelist's least preferred color was in treatment A (addition of 0.2 g meniran extract), namely 2.8. The average aroma value ranges from 2.8 to 4.3. The value of the aroma that panelists liked the most was in treatment C (addition of 0.6 g meniran extract) which was 4.5 while the aroma that panelists did not like was in treatment A (addition of 0.2 g meniran extract) which was 2.8. The average value for the taste of instant powder drinks ranges from 3.0 - 4.5. The highest taste value was in treatment C (addition of 0.6 g meniran extract) which was 4.5 while the taste value that was less liked by the panelists was in treatment A (addition of 0.2 g meniran extract) which was 3.0. The display value of instant powder drinks ranged from 2.8–4.5. The highest display value was found in treatment C (addition of 0.6 g of meniran extract) which was 4.5 while the lowest appearance value was found in treatment A (addition of 0.2 g of meniran extract) which was 2.8.

Based on the radar chart above, it can be seen that the panelist's most preferred treatment was instant powder drink in treatment C (0.6 g meniran extract added) with an average preference value of color 4.3, aroma 4.3, taste 4.5 and appearance 4.5.

4. CONCLUSION

It can be concluded that the addition of different meniran extracts to the manufacture of instant powder drinks from their mixture with cassia vera extract and stevia extract had a significant effect on ash content, total polyphenols, antioxidant activity, total plate number and organoleptic values. Based on physical tests and chemical analysis that had been carried out on instant powdered drinks from meniran extract, cassia vera extract and stevia extract, it was determined that the best product was treatment C (addition of 0.6 g meniran extract). This product has characteristics: physical properties, water-soluble time value of 65.60 seconds, water-insoluble portion of 1.31%, chemical properties water content of 1.72%, ash content of 0.91%, total polyphenols 0.42 mg/ml, the antioxidant activity of 38.17%, the content of positive lignan compounds and a total plate number of 1.1×10^3 cfu/gram with organoleptic values by panelists for color (4.3), aroma (4.3), taste (4.5) and appearance (4.5). Based on the tests that have been carried out on instant powder drinks, in general, this product meets the requirements of SNI (01-4320-1996).

ACKNOWLEDGMENT

Authors gratefully acknowledged for using equipment from the Faculty of Agriculture Technology, Andalas University, Padang, Indonesia.

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