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The Effect of Garam Masala Levels Addition on Chocolate Based Functional Beverage

Ratih Hardiyanti *, Anjar Ruspita Sari, Diklusari Isnarosi Norsita, Wildan Fajar Bachtiar

Agroindustri Study Program, Department of Biotechnology and Veterinary, Vocational School, Gadjah Mada University, Indonesia

*Corresponding author (ratih.hardi@ugm.ac.id)

Abstract

The increasing popularity of cocoa-based beverage has encouraged the development of various chocolate beverage formulations. Chocolate beverage formulations with addition of garam masala were carried out to produce functional beverage products which are beneficial to consumers and the product itself. Five different concentration of garam masala (0.01%, 0.02%, 0.03%, 0.04%, and 0.05%) were added into chocolate beverage. Preference test was carried out to evaluate panelists' preference to each formula. Sensory evaluation was performed by giving an assessment using 7-scaled Likert scale for color, aroma, taste, warm sensation (after taste), and overall product. The results showed that the concentration of garam masala addition has an effect ($p \leq 0.10$) on the attributes of aroma, warm sensation, and overall product. The most preferred chocolate beverage was with the addition of 0.03% garam masala. Higher concentration of garam masala addition in chocolate based beverage resulted a higher antioxidant activity as well as phenolic content, as antioxidant component. Overall, the addition of garam masala could affect the properties of chocolate based beverage such as in sensory and its functionality.

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Introduction

Cocoa-based beverages are experiencing growth in the market, including powder drink, ready-to-drink beverage, and chocolate beverage available at cafés or stalls. These days chocolate beverages are not only consumed to satisfy thirst, but also as a part of today's lifestyle. Various formulations of chocolate beverages have been developed to meet consumers demand, not only to add variety of flavors but also for their functionalities. For example, a chocolate drink formulation as immunomodulators with addition of non-dairy creamer (Rosniati *et al.*, 2017), chocolate spiced drink with addition of secang wood extract, lemongrass extract, and ginger extract (Utari, 2015), instant chocolate drinks added with fresh cow milk and dextrins (Nurhidayah *et al.*, 2014), and the addition of bran oil and meniran extract to improve the functional properties of chocolate beverages (Rachman *et al.,* 2012). According to Maulidiansyah (2014), consumers have acknowledged several issues regarding chocolate beverages available on the markets, such as high in calories will contribute to weight gain, less natural taste of chocolate from the use of artificial flavoring, consumers' dislike for its milk content (intolerant), and not practical (consumers have to add creamer and sugar). Recent studies involving nutritional and molecular interventions, concluded that consumption of cocoa rich with flavonoid will improve cardiovascular health (Garcia *et al.*, 2018).

Yogyakarta has made its way to earn a title as a student city due to a large number of students from Indonesia and abroad living in the city, either as a student or participating for a student exchange. With so many students from various cultural backgrounds living in Yogyakarta, it has stimulated the growth of different types of foreign culinary, such as Arab, Malaysian, Indian, European, etc. Moreover, the development of culinary in Yogyakarta is attributable to its other reputation as one of the leading tourist destinations in Indonesia. It is attracting foreign tourists, especially for its cultural attractions. The existence of foreign cuisine in Yogyakarta seems to have been well received and has become equally popular for local people. One of them is Indian or Middle Eastern cuisines which use garam

masala in many of their dishes.

Garam masala available on the market is a mixture of thirteen different spices (Vasavada *et al.*, 2006). Masala is a word usually used in Indian cooking and is simply the Hindi word for spice (Shukla and Nagendra, 2018). In Hindi, garam means hot (to be distinguished with spicy), while masala means spice concoction. Garam masala is commonly added to dishes to enhance their aroma. Spices are not only added to season dishes, but also widely used for beverages, for example black tea with garam masala (Ochanda *et al.*, 2015). The use of garam masala which is rich in spices also serves as a preservative for the product. According to Basu *et al.* (2016), garam masala also has antioxidant properties such as piperine compounds in black pepper and capsaicin in chili, and also contains antimicrobial compounds which can inhibit activities of gram-positive and gram-negative bacteria, mainly of Staphylococcus aureus and Bacillus cereus. Nowadays, garam masala is easy to be found in in supermarket, Arabian or Indian spices store, or by online purchasing. In addition, garam masala also can be produced using local spices which available in the local market. However, there is limited study can be found regarding the effect of garam masala addition in dishes or beverage.

An alternative formulation of chocolate based beverage that is different from those in the market needs to be developed to add the variety of chocolate based beverages which is not only delicious but also serving functional properties. Addition of garam masala to a chocolate based beverage is expected to result a distinctive aroma and beneficial effect for the body. To the best of authors' knowledge, there are no prior studies regarding the formulation of chocolate based beverage containing garam masala. Therefore, this study aims to determine the effects of adding garam masala on chocolate based beverage to consumers preference. Moreover, antioxidant content in the product is determined to ensure the benefits of chocolate based beverage enriched with garam masala.

Materials and Methods

The main material in this study was cocoa powder originated from Kampung Cokelat Blitar, Jawa Tengah, with a composition of 100% cocoa powder. Meanwhile, local garam masala from the brand Cairo Food which was widely available on the market was used. The composition of garam masala from Cairo Food consisted of coriander seeds, cumin, black pepper, cloves, cinnamon, bay leaves, green cardamom, ginger, red chili, nutmeg, and rice (as a 1.9% anticaking agent). The chemicals used in this research were analytical reagent grade.

Chocolate Based Beverage with Garam Masala

Formulation of chocolate based beverage was carried out by adding garam masala powder in five levels of concentration. The formulation was done by combining garam masala without adding any sugar or cream. The concentrations of garam masala were 0.01, 0.02, 0.03, 0.04, and 0.05%. Garam masala and 5 g of cocoa powder were packed in a filter paper. Subsequently, the powder was incorporated to 100 ml of hot water at 90°C for 15 minutes. Garam masala concentration of 0.01% means that in 100 ml of hot water, 0.01 g of garam masala was added. Garam masala was added to give a warm sensation to the drink, for its antioxidant properties and functional effects for the consumers.

Sensory Evaluation

Sensory evaluation was carried out to understand the preferences of the panelists to the five different formulations of masala spiced chocolate beverage. In this study, among other sensory evaluation methods, hedonic test or preference test was performed. It includes several attributes, namely color, aroma, taste, warm sensation, and overall product using a 7-scaled Likert scale (7 = very satisfied, 6 = satisfied, 5 = slightly satisfied, 4 = neutral, 3 = slightly dissatisfied, 2= dissatisfied, 1= very dissatisfied). In this test, the chocolate beverage formulations were evaluated by 50 untrained panelists who are fond of chocolate products. Panelists were asked to taste randomly coded samples to avoid bias. After panelists finished evaluating one sample, they were required to wash their mouth with drinking water to neutralize their taste buds.

Total Phenolic Content Analysis

Total Phenolic Content was determined by following Folin-ciocalteu method (Andarwulan *et al.*, 1999). The method was performed by extracting 0.05 ml of sample with 1 ml of ethanol, 5 ml of distilled water, and 0.5 ml of Folin-ciocalteu reagent (50%) in a tube test and mixed in a vortex. After 5 minutes, 1 ml of Na_2CO_3 (5%) was added and homogenized in a vortex. The mixture was incubated in a dark room by wrapping it in aluminum foil for 60 minutes. Subsequently, the absorbance value was measured at a wavelength of 725 nm by a spectrophotometer. The standard curve was made using the same steps by replacing the sample with gallic acid concentration of 0.01, 0.02, 0.03, 0.04, and 0.05 g/ml.

Antioxidant Analysis

Antioxidant activity was analyzed based on its ability to capture radical scavenging activity DPPH following a method described by Gadow *et al.* (1997) with some modifications. 1 ml of reagent DPPH (400 µM in ethanol), 3 ml ethanol, and 0.1 ml of the sample were homogenized in a vortex. The mixture was allowed to stand for 20 minutes. The absorbance value was measured at a wavelength of 517 nm by a spectrophotometer. Antioxidant activity is expressed as inhibition.

Data Analysis

In order to understand the effects of adding different concentration of garam masala on the sensory attributes and preference of panelists to chocolate based beverage, statistical analysis (ANOVA) was performed using SPSS software version 22 ($p<0.10$) while others were describe descriptively. Further statistical tests were performed to compare mean value from each concentration of garam masala.

Results and Discussion

Effects of Garam Masala Addition to Sensory Attributes

Addition of different concentrations of garam masala was expected to influence sensory attributes of chocolate beverage. Table 1 shows the effects of adding different concentration of garam masala to sensory attributes of chocolate drink.

Table 1. ANOVA test on the effects of adding different concentration of garam masala to sensory attributes of chocolate drink

No	Sensory attributes	*p value*
1	Colour	0.11
2	Aroma	0.95
3	Taste	0.15
4	Warm Sensation	0.06
5	*Overall*	0.10

According to Table 1, different concentration of garam masala influence warm sensation and overall product characteristics (p≤0.10). Warm sensation and overall characteristics were affected because bigger amount of garam masala contributed to bigger amount of spices components in the chocolate beverage.

Effects of Garam Masala Addition to Preference Level

Preference test was performed to investigate the preference level of the panelists to the observed quality attributes. Preference test is also useful when the test employed semi-trained and untrained panelists. In this study, untrained panelists aged 19 to 30 years old participated in the preference test. Although the panelists were untrained ones, they were included because of their liking to chocolate products. The results of preference test can be seen on Table 2.

Different concentration of garam masala did not significantly affect aroma attribute or did not indicate a difference on the preference level of the panelists. However, panelists showed a higher preference for color and taste attributes for chocolate drink added with garam masala of 0.01, 0.02, and 0.03% concentration. Furthermore, the most preferred warm sensation were chocolate beverages added with garam masala 0.03 and 0.04%. Meanwhile, in general the most preferred chocolate beverages were those added with 0,01, 0.02, and 0.03% garam masala. Therefore, based on preference test with the defined sensory attributes, it can be concluded that chocolate drink added with garam masala 0.3% was the most preferred by the panelists.

Effects of Adding Garam Masala to Antioxidant Activity

The antioxidant content of chocolate drink enriched with garam masala was estimated using total phenolic content. Based on the gallic acid curve obtained by each chocolate formulation (Figure 1), the gallic acid component has positive relationship with the absorbance value. Total phenolic content for each beverage formula was estimated using formula y=0,7167x + 0,0126, where y represent the absorbance value and x represent the concentration of total phenolic content. Figure 2 shows that higher concentration of garam masala increases phenolic level of the chocolate beverage. Antioxidant activity was estimated by inhibitory activity of each formula. Figure 3 shows that higher antioxidant activity is characterized by higher concentration of garam masala in the chocolate beverage. Higher total phenolic content as well as antioxidant activity caused by the higher active compound that consist in garam masala composition as mention by Basu *et al.* (2016).

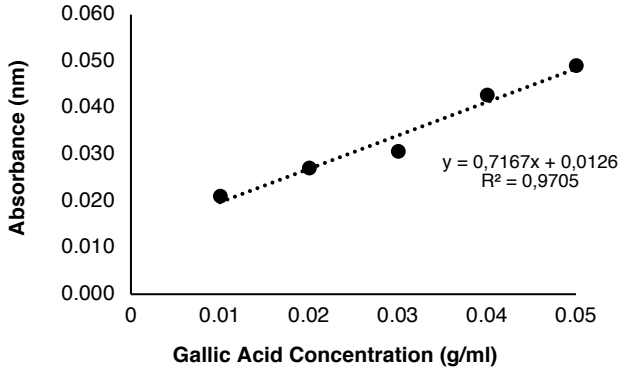

Figure 1. Standard curve of gallic acid at 0.01-0.05 g/ml

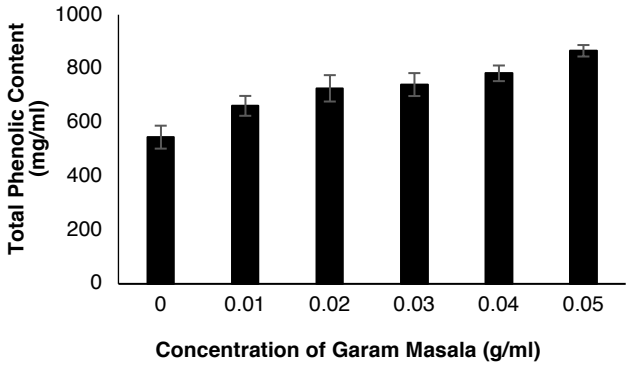

Figure 2. Total phenolic content of chocolate beverage with 0–0.05% garam masala

Table 2. Results of preference test of chocolate beverage added with concentration of 0.01–0.05% garam masala

No	Concentration	Colour	Aroma	Taste	Warm Sensation	Overall
1	0.01	5.60 ± 0.97^{a}	4.29 ± 1.30^{a}	4.06 ± 1.34^{a}	3.69 ± 1.30^{a}	4.57 ± 1.15^{b}
2	0.02	5.55 ± 1.00^{a}	4.46 ± 1.38^{a}	4.00 ± 1.20^{a}	4.09 ± 1.22^{ab}	4.52 ± 1.06^{b}
3	0.03	5.40 ± 0.95^{ab}	4.42 ± 1.44^{a}	3.97 ± 1.49^{a}	4.17 ± 1.42^{ab}	4.52 ± 1.04^{b}
4	0.04	5.09 ± 1.30^{b}	4.33 ± 1.45^{a}	3.73 ± 1.35^{ab}	4.60 ± 1.33^{b}	4.21 ± 1.34^{ab}
5	0.05	5.19 ± 1.30^{ab}	4.25 ± 1.63^{a}	3.27 ± 1.68^{b}	4.37 ± 1.42^{b}	3.95 ± 1.51^{a}

Notes: numbers in the same bracket with different letters represent a significant difference (p≤0.10).

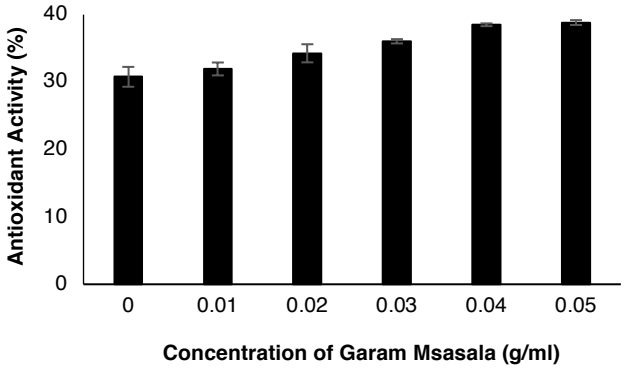

Figure 3. Antioxidant activity of chocolate beverage enriched with garam masala at 00.05%

Conclusion

Garam masala can be added to chocolate based beverage to enhance its functional properties. Different concentration of garam masala may influence warm sensation and overall product characteristics ($p \leq 0.10$). According to the evaluation on color, aroma, taste, warm sensation, and overall product characteristics, the most preferred formula was added with 0.03% garam masala. Higher concentration of garam masala in chocolate based beverage resulted a higher antioxidant activity as well as phenolic content, as antioxidant component.

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