



The effect of honey and ginger powder on the quality characteristics of instant coffee mix

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ABSTRACT

Coffee Mix is one of the most popular instant drinks in the world, which is widely consumed. This product can cause nutritional problems due to the significant amount of sugar in the formulation. On the other hand, due to its beneficial properties, honey and ginger powder can be used in the instant coffee powder formula, to solve the anti-nutritional effects of sugar and to take advantage of the beneficial properties of ginger and honey powder. In this study, the effect of adding honey powder as a substitute for sugar in amounts of 0, 5, 10, 20, 30, and 35% of the consumed sugar and ginger powder in amounts of 0, 0.05, 0.1, 0.2, and 3 0.0 and 0.35% were added to the 3 in 1 instant coffee formulation and the physicochemical properties, phenolic compounds, antioxidant capacity and sensory properties and microbial properties of the coffee mixture were evaluated. The research results showed that adding honey and ginger powder to the instant coffee mixture improves its physicochemical properties and overall acceptability. Sensory tests conducted by the evaluators also determined that the treatment of 20% honey powder and 0.2% ginger and the treatment of 10% honey powder and 0.3% ginger were more favorable samples in terms of overall acceptability. The treatment of 30% honey powder and 0.3% ginger had the highest amount of phenolic compounds and antioxidant capacity. Therefore, the most appropriate treatment in terms of nutritional characteristics was the treatment of 30% honey powder and 0.3% ginger.

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1- Introduction

Instant coffee mixed powder (three in one) is a product that, according to Iranian national standards No. 11137 and 15545, consists of mixing at least 8% of instant coffee, with/or without sugar, dairy and/or non-dairy creamer powder, with It is obtained with/or without bulking agent, with/or without foaming agent in different proportions. Instant coffee powder is marketed as three-in-one, two-in-one, mochaccino, caffe latte and cappuccino. This product is one of the most popular instant drinks among consumers. The presence of a significant amount of sugar in its formulation can cause problems for consumers of this product. Especially people who are overweight or must follow a special diet [1]. Replacing sugar with substances that have both sweetening and beneficial properties is one of the research priorities of researchers. Honey and ginger powder are among the compounds that can be used in the formulation of beneficial compounds due to their bioactive compounds.

Honey is increasingly used as a sugar substitute in candies, sweets and bakery products, and is also added to various foods such as sausages, beef, fish, fruits and vegetables to increase their shelf life and bioactive properties [2]. However, the use of honey is limited due to its high viscosity, stickiness and the formation of glucose crystals, which causes problems in transportation [3]. To solve these problems, recent studies have focused on the production of honey powders with desirable

physicochemical properties that can be easily stored, transported and mixed with other food products [4]. Currently, honey powder is increasingly used in the food, cosmetic, and pharmaceutical industries, because it avoids the disadvantages of using liquid honey, such as high viscosity, stickiness, and the formation of sugar crystals [5].

Because ginger has special sensory properties, phytochemical compounds include; essential oils, phenolic compounds, carbohydrates, proteins, alkaloids, glycosides, steroids, terpenoids, saponins and tannins, minerals including; Iron, calcium, magnesium, potassium and phosphorus, vitamins such as thiamin, riboflavin, niacin and vitamin C are used as a useful ingredient in food formulation [6, 7].

Our studies show that no research has been done on the use of honey and ginger powder in instant coffee mixes. Therefore, the aim of this research is to produce a beneficial instant coffee product using honey powder as part of sugar substitute and ginger powder as a beneficial and flavoring combination.

2- materials and methods

2-1 Materials

Instant coffee mixture was purchased from Ainazmako (Magoosh coffee), ginger powder from Karalichin (not irradiated) and honey powder from Babel Nectar Production Company (Honey 7) and kept in

the refrigerator until use. All chemicals and microbial environments used were of analytical grade and were obtained from Merck.

2-2- Formulation of instant coffee mixture containing honey and ginger powder

The formulation of the instant coffee mixture and the addition of ginger powder and honey powder, after the initial tests, were carried out according to the treatments in the table below in the research and

development department of Ainaz Mako (Magoosh Coffee) company, then they were mixed in a mixer and packed in lidded cans in order to prevent the penetration of moisture. And all physical and chemical tests were done in the laboratory of the mentioned company and Islamic Azad University, Mako branch. It is necessary to explain that the honey powder with the mentioned percentages replaced the sugar in the coffee mix formulation.

Table 1. Coffee mix treatment with honey powder and ginger

Treatment no.	Ginger powder(%)	Honey powder(%)
Control	0	0
1	0.2	20
2	0.05	20
3	0.1	20
4	0.3	10
5	0.2	5
6	0.35	20
7	0.2	35
8	0.1	30
9	0.3	30

2-3- Measurement of physical and chemical properties

To determine the physical and chemical properties of the product, the methods included in the national standard of Iran were used. To measure the appearance characteristics (particle size, specific color and odor), moisture content and ash, the national standard of Iran No. 11137 was used [8]. measurement pH using a HANNA model pH meter made by METHROM, Switzerland; The ability to dissolve in cold and hot water was done

according to the national standard of Iran No. 3623 [9]. The amount of fat was measured using the Rosgatlip method and the amount of total sugar was measured using the Linn and Inon method in accordance with the Iranian national standard number 2865 [10].

2-4- How to extract extracts

To measure the content of total phenol and the percentage of inhibitory activity, the extracts were extracted according to the method of Chan and partners (2008) was done [11]. in such a way that instant coffee powder mixed twice by methanol (1:50 w/v)

for 2 hours with rotation at room temperature (°C22) were extracted. These methanolic extracts were prepared to measure radical scavenging DPPH and the amount of total phenolic content was used.

2-5- Measuring the amount of phenolic compounds

The amount of total phenolic compounds was determined by Folin-Ciocalto method [12]. After preparing the extracts, 0.5 ml of the extract was poured into a test tube and mixed well with 5 ml of Folin-Ciocalto reagent diluted 1:10 with distilled water and 4 ml of one molar sodium carbonate solution. The samples were kept in the dark for 15 minutes at room temperature. Then, the absorption value of the solution was read by a spectrophotometer at a wavelength of 765 nm. The total amount of phenolic compounds was plotted using the line equation ($Y = 1.0752X - 1.075$) for gallic acid was expressed based on gallic acid and as mg/g of dry sample [12].

2-6- Measurement of antioxidant capacity

The measurement of antioxidant capacity was evaluated using the percent inhibition of DPPH radicals, by the method of Brand-Williams et al. (1995) [13]. The test method was that 0.5 ml of DPPH methanolic solution with a concentration of 0.2 M was added to 2 ml of the extract and the obtained mixture was vigorously stirred. The test tubes were placed in a dark place at room temperature for half an hour. After this period, the absorption value was read at the wavelength of 517 nm. Finally, the inhibition of DPPH free radicals by the

extract was calculated by the following equation:

$$\frac{A_c - A_s}{A_c} = \text{percentage of inhibition of free radicals}$$

where in: A_c = absorbance of the control sample

A_s = absorbance of extract sample

7-2- Sensory evaluation

Iranian national standard method number 11137 was used to evaluate the sensory properties of the product. In this order, 18 grams of instant coffee powder sample was weighed in a glass container and its color and smell were examined. Then it was transferred to a 150 ml china cup and 150 ml of freshly boiled water was poured over it and the mixture was stirred well. The temperature of coffee when drinking it should be 60 ± 2 degrees Celsius [8].

To compare different treatments, ten trained evaluators evaluated the desired characteristics. Sensory evaluation was done on different drink samples, based on the quality characteristics of color, taste, aroma, consistency and overall acceptability. A 5-point hedonic scale was used for scoring, ranging from very bad (1) to very good (5). Statistical analysis using analysis of variance (ANOVA) according to Etkuroni method and Angudi (1985) was done [14].

8-2- Microbial tests

Microbial characteristics of coffee mix product were tested according to the national standard of Iran, and the total count of microorganisms and the amount of mold and yeast was done. To prepare the samples, the

national standard of Iran No. 4-8923 was used. In this way, using aseptic methods, the powdered product was completely mixed in the original container using a sterile spatula or spoon and then weighed. To reduce the osmotic shock to the microflora of the product, it was carefully added to a volume of diluent (buffered peptone water) that was previously distributed in sterile containers [15]. For the general count of microorganisms, the Iranian national standard No. 5272-1 was used [16].

8-2- Statistical analysis

Analysis of variance was used to analyze the results and averages were compared using

Duncan's test. Data analysis was done using SPSS version 21 software and graphs were drawn using Excel 2013 software.

3- Results and discussion

1-3-Physical and chemical tests

3-1-1- The effect of honey and ginger powder on the amount of moisture, ash, total sugar and fat of instant coffee mixture.

The effect of adding honey and ginger powder on the adequate properties of the mix is shown in Table 1. The results of analysis of variance show that there is a significant difference between the treatments ($p < 0.05$).

Table 1. The effect of honey and ginger powder on coffee mix specification

Treatment no.	Moisture (%)	Total sugar (%)	Fat (%)	Ash(%)
Control	1.74 ± 0.014 ^g	56.04 ± 0.056 _{cd}	12.20 ± 0.141 _c	1.70 ± 0.014 _g
1	2.18 ± 0.028 ^d	55.13 ± 0.042 ^{lt is}	13.30 ± 0.212 _b	1.95 ± 0.070 _{lt is}
2	2.26 ± 0.014 ^c	56.35 ± 0.070 ^c	12.50 ± 0.424 _c	2.00 ± 0.014 _d
3	2.12 ± 0.042 ^{lt is}	58.95 ± 0.070 ^b	11.15 ± 0.070 _d	2.15 ± 0.084 _b
4	2.24 ± 0.014 ^c	49.75 ± 0.056 ^g	10.40 ± 0.282 _{lt is}	2.50 ± 0.099 _a
5	1.66 ± 0.014 ^h	48.10 ± 0.148 ^h	12.23 ± 0.141 _c	2.00 ± 0.014 _d
6	2.02 ± 0.028 ^f	55.73 ± 0.042 ^d	14.85 ± 0.282 _a	2.50 ± 0.028 _a
7	2.12 ± 0.014 ^{lt is}	59.64 ± 0.056 ^a	13.45 ± 0.141 _b	2.05 ± 0.070 _c
8	2.54 ± 0.028 ^b	49.40 ± 0.565 ^g	11.60 ± 0.141 _d	2.05 ± 0.042 _c
9	2.62 ± 0.014 ^a	51.51 ± 0.084 ^f	10.35 ± 0.070 _{lt is}	1.75 ± 0.028 _f

Different letters in each column indicate the significant difference between treatments ($P < 0.05$).

As can be seen in the table, the highest level of humidity is related to treatment 9 and the lowest level is related to treatment 5. The results of the research showed that with the increase in the percentage of honey and ginger powder, the amount of moisture increases. The higher humidity with the increase in the percentage of honey and ginger powder is due to the high humidity of honey powder and ginger powder added to the product. Also, honey powder absorbs more moisture due to its hygroscopic properties. It is necessary to explain that despite the high humidity of the treatments compared to the control sample, the humidity of all the treatments is within the standard and acceptable range.

The amount of total sugar between different test treatments is also significant at the 5% error level. The highest amount of total sugar was observed in treatment 7 and the lowest in treatment 5. The comparison of the test results showed that with the increase in the percentage of honey powder, the amount of total sugar increases and with the increase

in the percentage of ginger, the amount of total sugar decreases.

The highest amount of ash was observed in treatments 4 and 6 and the lowest amount was observed in the control treatment. The comparison of the test results showed that with the increase in the percentage of honey and ginger powder, the amount of ash increased. The higher ash with the increase in the percentage of honey and ginger powder is due to the high mineral content of honey powder compared to sugar. Ginger powder also contains significant amounts of minerals, which increases the amount of ash in the product.

3-2-1- The effect of adding honey and ginger powder on the solubility of instant coffee

The dissolution rate of instant coffee in water is one of the important parameters in the quality evaluation of this product [17]. The effect of honey and ginger powder on the solubility of coffee mixture in hot and cold water is shown in Figures 1-A and B.

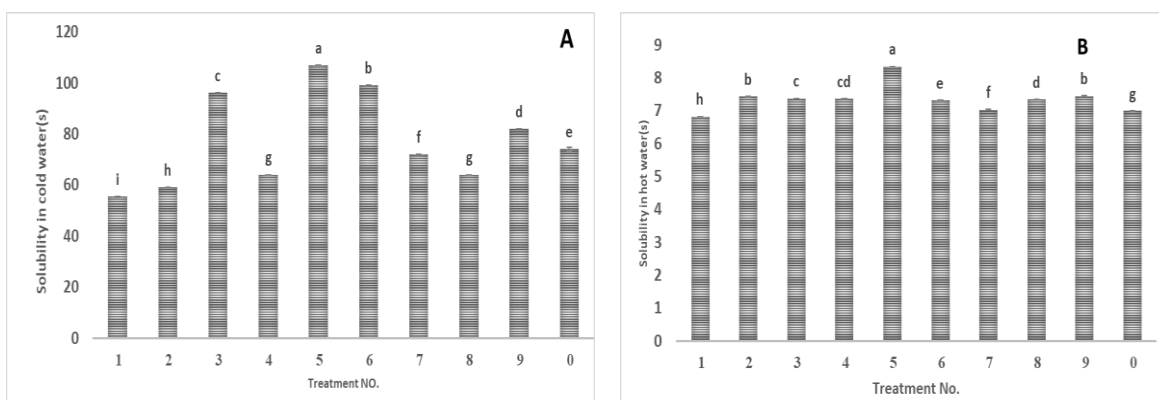


Fig 1. The solubility of coffee mix in cold and hot water (s)
Different letters in each column indicate the significant difference between treatments($P < 0.05$).

The results showed that the highest solubility in cold water and hot water was in treatment 1 and the lowest in treatment 5. The comparison of the test results showed that with the increase in the percentage of honey powder, the solubility of the coffee mixture in cold and hot water increased, and with the increase in the percentage of ginger, the solubility decreased, which is normal considering the properties of these two substances. It should be noted that the solubility of all formulations is acceptable and within the standard range.

3-3-1- Total phenolic compounds and antioxidant capacity

Table 2 shows the effect of honey and ginger powder on the amount of total phenolic compounds and antioxidant capacity of instant coffee mixture at the 5% error level. The highest amount of total phenolic compounds was observed in treatment 9 and the lowest amount was

observed in control treatment. The comparison of the test results showed that with the increase in the percentage of honey and ginger powder, the total amount of phenolic compounds increased. The higher amount of total phenolic compounds with increasing percentage of honey and ginger powder is due to the high phenolic compounds of honey powder and ginger powder added to the product. The results of this research are consistent with the studies of Kosovardani et al. (2021), Rauf et al. (2017) and Samborska et al. (2019), who respectively added rangebill extract to the ready-to-drink drink of decaffeinated Robusta coffee; and evaluated the physicochemical properties of honey powder; corresponds to [18, 19, 20].

Table 2. The effect of honey and ginger powder on phenolic compounds and antioxidant capacity of coffee mix

Treatment no.	Phenolic compounds (mg/g)	Antioxidant capacity(%)
Control	0.80 ± 0.141 ^j	0.096 ± 0.01 ^j
1	13.08 ± 0.042 ^d	1.74 ± 0.01 ^{It is}
2	3.84 ± 0.028 ^h	0.43 ± 0.02 ⁱ
3	3.28 ± 0.028 ⁱ	0.45 ± 0.01 ^h
4	9.82 ± 0.028 ^f	1.16 ± 0.02 ^f
5	4.30 ± 0.424 ^g	0.516 ± 0.02 ^g
6	22.20 ± 0.282 ^b	2.65 ± 0.01 ^b
7	19.70 ± 0.070 ^c	2.56 ± 0.01 ^c
8	10.70 ± 0.141 ^{It is}	1.80 ± 0.01 ^d
9	29.20 ± 0.282 ^a	3.80 ± 0.02 ^a

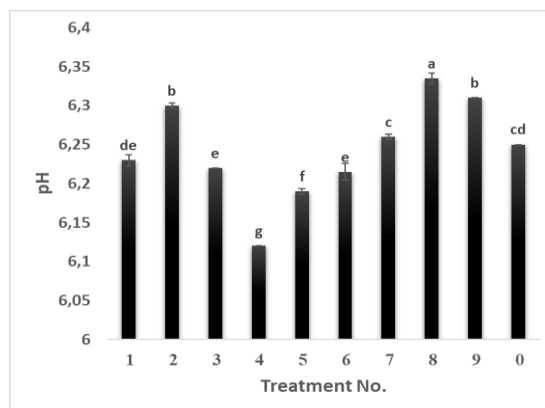
Different letters in each column indicate the significant difference between treatments ($P < 0.05$).

The highest amount of antioxidant capacity was observed in treatment 9 and the lowest amount was observed in the control treatment. The comparison of the research results showed that with the increase in the percentage of honey and ginger powder, the antioxidant capacity of the product increased. The higher antioxidant capacity with an increase in the percentage of honey and ginger powder is due to the higher antioxidant capacity of honey powder compared to sugar and ginger powder added to the product. The results of this research are in agreement with the studies of Murcia et al. (2004), Singh et al. (2008), who investigated the active compounds of ginger powder and reported the high antioxidant capacity of ginger; and Osiz et al. (2022) who investigated the antioxidant, antimicrobial and anti-inflammatory properties of honey powder [21, 22, 5].

3-1-4- The effect of honey and ginger powder on pH level

The effect of honey and ginger powder on the pH of the coffee mixture is shown in Figure 2. The results of the experiment showed that with increasing the percentage of honey powder, the pH increased and with increasing the percentage of ginger, the pH decreased. Higher pH with increasing percentage of honey powder and decreasing pH with increasing percentage of ginger is due to the presence of neutral compounds in the structure of honey powder. Maltodextrin and nutritose are usually used as carriers in honey drying, which have a higher pH than

sugar [20]. Also, the presence of phytochemical compounds in ginger reduces the pH of the product. These findings are similar to the research results of Abdullahi et al. (2020) who monitored the



phytochemical compounds of ginger [23].

Fig 2. The effect of honey and ginger powder on coffee mix pH. Different letters in each column indicate the significant difference between treatments ($P < 0.05$)

3-2- Evaluation of sensory properties of the product

The addition of honey and ginger powder had a significant effect on the sensory properties of the instant coffee mixture. Color, taste, aroma, consistency and overall acceptability are among the sensory properties of instant coffee drink that are of interest to consumers. The sensory test results of instant coffee mixture containing honey and ginger powder by trained sensory evaluators are summarized in Table 3.

Table 3. The effect of honey and ginger powder on organoleptic properties of coffee mix

Treatment no.	Color	Taste and flavour	Aroma	Consistency	Overall acceptance		
		Control	4.50 ± 0.5 ^a	3.60 ± 0.5 ^{ab}	3.00 ± 0.4 ^{bc}	3.60 ± 0.5 ^a	3.50 ± 0.5 ^d
1			4.70 ± 0.4 ^a	4.00 ± 0.7 ^{ab}	4.00 ± 0.9 ^a	3.90 ± 0.7 ^a	4.10 ± 0.5 ^c
2			4.70 ± 0.4 ^a	3.60 ± 0.5 ^{ab}	3.60 ± 0.5 ^{ab}	3.90 ± 0.8 ^a	4.10 ± 0.5 ^c
3			4.60 ± 0.5 ^a	3.70 ± 0.8 ^{ab}	2.80 ± 0.9 ^c	3.60 ± 0.8 ^a	3.60 ± 0.5 ^{cd}
4			4.60 ± 0.5 ^a	4.10 ± 0.8 ^{ab}	4.00 ± 0.8 ^a	4.30 ± 0.4^a	4.30 ± 0.5 ^a
5			4.50 ± 0.5 ^a	3.40 ± 0.5 ^b	3.60 ± 0.7 ^{ab}	3.70 ± 0.8 ^a	3.90 ± 0.5 ^{bcd}
6			4.50 ± 0.5 ^a	3.90 ± 0.7 ^{ab}	3.80 ± 0.6 ^a	4.00 ± 0.9 ^a	4.30 ± 0.4 ^{ab}
7			4.70 ± 0.4 ^a	3.50 ± 0.8 ^{ab}	4.30 ± 0.8^a	4.00 ± 0.6 ^a	4.40 ± 0.4^{ab}
8			4.50 ± 0.5 ^a	4.20 ± 0.7^a	3.90 ± 0.8 ^a	4.30 ± 0.4^a	4.40 ± 0.5^{ab}
9			4.60 ± 0.5 ^a	3.70 ± 0.9 ^{ab}	3.80 ± 0.7 ^a	4.00 ± 0.7 ^a	4.00 ± 0.7 ^{abcd}

Different letters in each column indicate the significant difference between treatments ($P < 0.05$).

The results of the research showed that increasing the percentage of honey and ginger powder had no effect on the color score of different treatments from the point of view of sensory evaluators. Also, the results of the survey showed that with the increase in the percentage of honey powder, the taste score increased, but the increase in the percentage of ginger did not have much effect on the acceptability of the taste of different treatments. The comparison of the test results showed that with the increase in

the percentage of honey and ginger powder, the aroma score increased. The higher acceptability of aroma and smell with the increase in the percentage of honey and ginger powder is due to the desirable aroma of honey and ginger powder added to the product. The sensory tests performed by the evaluators determined that honey and ginger powder had a significant effect on the overall acceptance score of the product. Treatment 7 (35% honey powder and 0.2% ginger) and treatment 8 (30% honey powder and 0.1% ginger) were recognized as better

samples in terms of overall acceptance score.

3-4- The effect of honey and ginger powder on the microbial properties of the product

The effect of honey and ginger powder on total microbial count and mold and yeast count of coffee mixture is shown in Table 4. Microbial load values of different treatments in terms of (standard deviation \pm mean) are displayed in the table. Variance analysis showed that the microbial load between different test treatments is significant at the

5% error level. The highest microbial load was observed in treatment 8 and the lowest in control treatment. In other words, with the increase in the percentage of honey and ginger powder, the amount of microbial load increased. The higher microbial load with an increase in the percentage of honey and ginger powder is probably a result of the high initial microbial load of honey powder and ginger powder added to the product, which can be reduced by irradiation or other methods. However, the level of microbial contamination of the product was within the standard and acceptable level.

Table 4. The effect of honey and ginger powder on microbial properties of coffee mix

Treatment no.	Total count (cfu/g)	Yeas and mold
Control	177.00 \pm 0.000 ¹	0
1	281.00 \pm 4.243 ^c	0
2	250.00 \pm 0.000 ^d	0
3	327.00 \pm 2.828 ^b	0
4	200.00 \pm 2.828 ^g	0
5	191.00 \pm 1.414 ^h	0
6	209.00 \pm 0.000 ^f	0
7	227.00 \pm 2.828 ^{lt} is	0
8	422.00 \pm 2.828 ^a	0
9	254.00 \pm 5.657 ^d	0

Different letters in each column indicate the significant difference between treatments ($P < 0.05$).

4- total resulting

Based on the research conducted so far, the effect of replacing sugar with honey powder as an additive with sugar and ginger powder as a natural substance containing bioactive compounds in the instant coffee mixture has not been reported. Therefore, in this research, these two substances were added to the formulation of instant coffee and its

chemical and microbial properties were evaluated. The results of the statistical analysis showed that the effect of honey and ginger powder on instant coffee can increase the overall acceptance of the product and improve its quality properties, it can also increase the amount of phenolic compounds and its antioxidant properties, and it can be

used as an ultra-beneficial product. Consumers are placed.

[1] Gyntelberg, F., Hein, H. O., Suadicani, P., & for the COPENHAGEN MALE STUDY. (2009). Sugar in coffee or tea and risk of obesity: A neglected issue. *International Journal of Food Sciences and Nutrition*, 60(sup3), 56-64.

[2] Hakim, D. A., Tjahjaningsih, W. T., & Sudarno. (2019). Antibacterial activity of honey in preserving high-pressure cooked milkfish stored at room temperature. *IOP Conference Series: Earth and Environmental Science*, 236, Article 012079.

[3] Suhag, Y., Nayik, G. A., & Nanda, V. (2016). Effect of gum Arabic concentration and inlet temperature during spray drying on physical and antioxidant properties of honey powder. *Food Measure*, 10, 350–356.

[4] Suhag, Y., Nayik, G. A., Karabagias, I. K., & Nanda, V. (2021). Development and characterization of a nutritionally rich spray-dried honey powder. *Foods*, 10, 162.

[5] Osés, S.M., Cantero, L., Puertas, G., Fernández-Muiño, M.Á. and Sancho, M.T., 2022. Antioxidant, antimicrobial and anti-inflammatory activities of ling-heather honey powder obtained by different methods with several carriers. *LWT*, p.113235.

[6] Rehman R, Akram M, Akhtar N, Jabeen G, Saeed T, Ali shah SM, Ahmed Kh, Shaheen Gh, Asif HM. Zingiber officinale Roscoe (pharmacological activity). *Journal of Medicinal Plants Research*.2011; 5: 344-438.

6- Resources

[7] Feng T, Su H, Ding ZH, Zheng YT, Li Y, Leng Y, Liu JK. Chemical constituents and their bioactivities of “Tongling white ginger” (*Zingiber officinale*). *Agricultural and Food Chemistry*. 2011; 5: 11690-11695.

[8] ISIRI (Institute of Standards and Industrial Research of Iran), 2012. First review. Coffee and its products. instant coffee mix powder Test characteristics and methods. National Standard No. 11137.

[9] ISIRI (Institute of Standards and Industrial Research of Iran), 2010. Instant coffee Test characteristics and methods. National Standard No. 3623.

[10] ISIRI (Institute of Standards and Industrial Research of Iran), 2007. First revision. Fruit juices. Test methods. National Standard No. 2685.

[11] Chan, E. W. C., Lim, Y. Y., Wong, L. F., Lianto, F. S., Wong, S. K., Lim, K. K., et al. 2008. Antioxidant and tyrosinase inhibition properties of leaves and rhizomes of ginger species. *Food Chemistry*, 109(3), 477-483.

[12] McDonald, S., Prenzler, P.D., Autolovich, M., and Robards, K. 2001. Phenolic content and antioxidant activity of olive extracts. *Food Chemistry*, 73: 73-84.

[13] Brand-Williams, W., Cuveleir, M. E., & Berset, C. 1995. Use of a free radical method to evaluate antioxidant activity. *LWT - Food Science and Technology*, 28(1): 25-3.

[14] Ihekoronye Al, Ngoddy PO (1985). *Integrated food science and technology for*

the tropics. Macmillan Publishers. London and Basingstoke.

[15] ISIRI (Institute of Standards and Industrial Research of Iran), 2018. Microbiology of food and animal feed. Test preparation, initial suspension and decimal dilutions for microbiology test. Part 4: Special provisions for the preparation of miscellaneous products. National Standard No. 8923-4.

[16] ISIRI (Institute of Standards and Industrial Research of Iran), 2014. Microbiology of the food chain. A comprehensive method for the enumeration of microorganisms. Part 1: Colony counting at 30 °C using mixed culture method. No. 5272-1.

[18] Zanin, R. C., Smrke, S., Kurozawa, L. E., Yamashita, F., & Yeretian, C. (2020). Novel experimental approach to study aroma release upon reconstitution of instant coffee products. *Food chemistry*, 317, 126455.

[18] Kuswardhani, N., Mukti, N.P. and Sari, P., 2021, February. Antioxidant and sensory properties of ready to drink coffee-ginger made from decaffeinated and non-decaffeinated robusta coffee beans. In *IOP Conference Series: Earth and Environmental Science* (Vol. 653, No. 1, p. 012050). IOP Publishing.

[19] Raof, G.F.A., Mohamed, K.Y. and Mohammed, H.M., 2017. Phytochemical evaluation, anti-obesity and

antihyperlipidemic effects of combined administration of green coffee, cinnamon and ginger. *Plant*, 5(5), pp.80-84.

[20] Samborska, K., Wiktor, A., Jedlińska, A., Matwijczuk, A., Jamróz, W., Skwarczyńska-Maj, K., Kielczewski, D., Tułodziecki, M., Błażowski, Ł. and Witrowa-Rajchert, D., 2019. Development and characterization of physical properties of honey-rich powder. *Food and bioproducts processing*, 115, pp.78-86.

[21] Murcia, M. A. I., Egea, F., Romojaro, P., Parras Jimenez, A. M. & Martinez-Tome, M. (2004). Antioxidant evaluation in dessert spices compared with common food additives. Influence of irradiation procedure. *Journal of Agricultural food chemistry*, 52: 1872-1881.

[22] Singh, G., Kapoor, I. P. S., Singh, P., Heluani, G. S. D. & Lampasona, M. P. D. (2008). Chemistry, antioxidant and antimicrobial investigations on essential oil and oleoresins of *Zingiber Officinale*. *Food and Chemical Toxicology*, 46: 3295-3302.

[23] Abdullahi, A., Khairulmazmi, A., Yasmeeen, S., Ismail, I. S., Norhayu, A., Sulaiman, M. R., ... & Ismail, M. R. (2020). Phytochemical profiling and antimicrobial activity of ginger (*Zingiber officinale*) essential oils against important phytopathogens. *Arabian Journal of Chemistry*, 13(11), 8012-8025.



تأثیر پودر عسل و زنجبیل بر خصوصیات کیفی مخلوط قهوه فوری

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چکیده

اطلاعات مقاله

مخلوط قهوه (Coffee Mix) یکی از نوشیدنی‌های فوری محبوب در دنیا است که مصرف فراوانی پیدا کرده است. این محصول به دلیل داشتن مقدار قابل توجهی شکر در فرمولاسیون می‌تواند مشکلات تغذیه‌ای به دنبال داشته باشد. از طرف دیگر پودر عسل و زنجبیل به دلیل داشتن خواص فراسودمند می‌تواند در فرمول پودر مخلوط قهوه فوری مورد استفاده قرار گیرد، تا هم اثرات ضد تغذیه‌ای شکر را حل نموده و هم از خصوصیات فراسودمند زنجبیل و پودر عسل بهره‌گیری شود. در این پژوهش تأثیر افزودن پودر عسل به عنوان جایگزین شکر در مقادیر ۰، ۵، ۱۰، ۲۰، ۳۰ و ۳۵ درصد شکر مصرفی و پودر زنجبیل در مقادیر ۰، ۰/۰۵، ۰/۱، ۰/۲، ۰/۳ و ۰/۳۵ درصد به فرمولاسیون قهوه فوری ۳ در ۱ اضافه شده و خصوصیات فیزیکوشیمیایی، ترکیبات فنولی، ظرفیت آنتی‌اکسیدانی و ویژگی‌های حسی و خصوصیات میکروبی مخلوط قهوه مورد ارزیابی قرار گرفت. نتایج تحقیقات نشان داد افزودن پودر عسل و زنجبیل به مخلوط قهوه فوری موجب بهبود خواص فیزیکوشیمیایی و مقبولیت کلی آن می‌گردد. آزمون‌های حسی انجام شده توسط ارزیابان نیز مشخص کرد که تیمار ۲۰ درصد پودر عسل و ۰/۲ درصد زنجبیل و تیمار ۱۰ درصد پودر عسل و ۰/۳ درصد زنجبیل از نظر مقبولیت کلی، نمونه‌های مطلوبتری بودند. تیمار ۳۰ درصد پودر عسل و ۰/۳ درصد زنجبیل بالاترین میزان ترکیبات فنولی و ظرفیت آنتی‌اکسیدانی را داشت. بنابراین مناسب‌ترین تیمار از لحاظ خصوصیات تغذیه‌ای، تیمار ۳۰ درصد پودر عسل و ۰/۳ درصد زنجبیل بود.

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کلمات کلیدی:

پودر عسل،

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قهوه فراسودمند،

ترکیبات فنولی،

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