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Identification of The Noodles Combination Formulation of Infusions Mango (*Mangifera indica* L.) and Yellow Pumpkin (*Cucurbita moschata* D.) with an Diet Food

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ABSTRACT

Background: Employing natural substances as a natural antidiabetic remedy can be a favourable option for the general population due to its comparatively little adverse effects in comparison to manufactured medications. **Aims:** The objective of this study was to investigate the mechanisms by which yellow pumpkin (*Cucurbita moschata* D.) and leaves of mango arumanis (*Mangifera indica* L) work to reduce blood glucose levels, as well as the effects of food products processed using instant noodles from yellow pumpkin flour and infusions of mango Arumanis leaves. **Method:** The experimental research method involves conducting laboratory tests to identify the organoleptic characteristics and sucrose levels. The food laboratory at Makassar Health Polytechnic performed a sugar test and organoleptic qualities of Noodles were determined in the Faculty of Pharmacy at UMI. Result: The analysis of the sensory characteristics of noodles for each treatment revealed a predominantly pale colour. The results of Friedman's test for colour value reveal that there is a significant difference in the dosage of code Ds01q, Ds02w, DS03e, andDs04r for the colour of maize, as indicated by the p-value of 0.000, which is less than 0.05. **Conclusion:** The presence of Noodles products that utilise a blend of yellow pumpkin (Cucurbitamoschata D) and infusion of mango arumanis leaves (Mangifera indica L) is expected to effectively reduce blood glucose levels in patients with diabetes mellitus, while also having preventive properties against diabetes.

Keywords: Mango, Pumpkin, Noodles, Diet Food, Diabetes Mellitus.

INTRODUCTION

Diabetes mellitus is a significant global public health issue, particularly in Indonesia. According to the most recent data from the International Diabetes Federation (IDF), the number of individuals with diabetes in 2015 was around 415 million, which is four times more than the 108 million reported in the 1980s. It is projected that this number would climb to 642 million by the year 2040. This condition belongs to the family of metabolic disorders characterised by elevated blood glucose levels resulting from dysfunction in insulin secretion and/or insulin action.

Various strategies can be employed to mitigate metabolic dysfunction in individuals with diabetes mellitus, such as adhering to a controlled diet and utilising synthetic oral hypoglycemic medications. Nevertheless, prolonged consumption of synthetic medications might result in adverse effects such as severe hypoglycemia, renal impairment, hepatic injury, and lactic acidosis. Hence, employing natural substances as a natural antidiabetic remedy can be a favourable option for the general population due to its comparatively little adverse effects in comparison to manufactured medications (Li et al., 2022; Yasin et al., 2022).

The yellow pumpkin is a rich source of carbohydrates that contain carotenoids, which have beneficial antioxidant characteristics. These features help to fight the effects of ageing, cancer, diabetes, and cataracts. The anti-diabetic efficacy of Arumanis mango leaf extract is evident from studies showing a drop in glucose levels upon measurement. Mangiferin has the ability to reduce blood sugar and fat levels in diabetic mice whether administered orally or through intraperitoneal injection. The objective of this study was to investigate the mechanisms by which yellow pumpkin (*Cucurbita moschata* D.) and leaves of mango arumanis (*Mangifera indica* L) work to reduce blood glucose levels, as well as the effects of food products processed using instant noodles from yellow piper flour and infusions of mango Arumanis leaves. Therefore, we began creating a blend of yellow pumpkin flour and fragrant mango leaves in the shape of an instant processed noodle product (Infante-Garcia et al., 2017; Pasupuleti et al., 2023; Uuh-Narvaez et al., 2021; Zarasvand et al., 2023). This was done in recognition of the fact that instant noodles are widely consumed as a popular quick snack, despite being frequently criticised for being harmful and unsuitable for individuals with diabetes mellitus. The objective of this study is to identify the specific attributes of the fundamental components that may serve as nutritious sustenance for individuals of all ages (Uuh-Narváez et al., 2021; Villas Boas et al., 2020).

RESEARCH METHOD

The experimental research method involves conducting laboratory tests to identify the organoleptic characteristics and sucrose levels. The food laboratory at Makassar Health Polytechnic performed a sugar test at the Pharmacology Laboratory of the Pharmaceutical Faculty at the University of Muslim Indonesia. The organoleptic qualities of Noodles were determined in the Faculty of Pharmacy at UMI. The tools utilised in this study include a bowl, a drying cabinet, a measuring glass, a clove of pepper, a gas stove, a pan, a dough mixer, a knife, a teaspoon and an

analytical scale. The components utilised include 100 mL of water, aromatic mango leaf infusion, glucose, yellow pumpkin flour, salt, eggs, and wheat flour. Noodles's chemical analysis measures the sucrose concentration in terms of degrees Brix. The sucrose concentration, measured in °Brix, is a disaccharide composed of glucose and fructose monomers, with the chemical formula C12H22O11. Brix refers to the concentration of sugar in water, with 1 degree Brix representing 1 gramme of sucrose in 100 grammes of solution. This substance is produced by plants and serves as a source of nutrition, unlike mammals and other organisms (de Melo et al., 2024; Minniti et al., 2023; Salimi et al., 2023; Tzean et al., 2024).

1. Preparatory phase the yellow pumpkin is first peeled and cleaned to remove the seeds, and then thinly sliced with a slicer. The iris is organised in a solution and dehydrated using a drying cabinet set at a temperature of 50oC for a duration of 15 hours. The dried yellow mushroom is ground using a grinder and then packed with 60 mesh slices.
2. The production of mango leaf infusion employs the infusion extraction method, which is chosen due to its compatibility with the nature and objective of the extraction process. This method aims to isolate the water-soluble active substances from the plant materials to be incorporated into food. In addition, this approach is more straightforward and more accessible for the community, as it can be implemented using common household equipment as an alternative.

To prepare a mango leaf infusion with a concentration of 10%, 10 grammes of dried simplisia are placed in separate infusion pots and each pot is filled with 100 mL of water. Next, elevate the temperature to 90°C and maintain it for a duration of 15 minutes. The duration of heating is measured as 15 minutes when the temperature of the top pot reaches 90 °C, with occasional stirring. The outcome was subsequently strained through a flannel fabric. The infusion is thereafter partitioned into four aliquots of 100 mL each. The tested product will undergo additional evaluation. The evaluation is centred on assessing the efficacy of investigating the physiological processes of yellow pumpkin (*Cucurbita moschata* D.) and aromatic mango leaves (*Mangifera indica* L) in reducing blood glucose levels. The data collected from the research on organoleptic qualities is processed and analysed using statistical tools that include data normalisation tests (Kleijn et al., 2024; Sakaguchi et al., 2023).

RESULT AND DISCUSSION

Research findings indicate that yellow pumpkin and mango leaves has antidiabetic properties. Mulquie (2015) found that the extract from Arumanis mango leaves, administered at a dosage of 8.4 g per 20 g of body weight, exhibits anti-diabetic properties as demonstrated by glucose-lowering tests. Wahyuni's 2017 study demonstrates that consuming 0.64 g/200 g BB of yellow pumpkin flour will effectively reduce blood glucose levels. To create a high-quality peanut butter, simply incorporate dried flour. Furthermore, the presence of dehydrated butter in the butter can elevate blood glucose levels. According to Sugitha's 2015 research, it has been verified that consuming yellow turmeric biscuits, as opposed to yellow and terigou flour at a ratio of 120 g to 380 g (or 1 to 3), can effectively reduce the increase in blood sugar levels in diabetic mice by up to 23.5 mg/dl. This writing is intended to create Noodles based on that. The mixture is made by combining extracts from mango arumanis leaves, yellow pumpkin flour, and terigu flour. The ratio of each ingredient in the mixture is 10% b/v : 20 g : 60 g. The data obtained from the study has been analysed using the Friedman method to assess the organoleptic qualities. Additionally, the Sucrose Rate Brix (°Bx) data was determined using a Hand Refraktometer for chemical analysis (López-Ríos et al., 2020; Xu et al., 2024).

Table 1. Separate dose for sample

No.	Dose Code	Mango leaf (%)	Flour (g)	Pumpkin Flour (g)
1	Ds01q	10	80	-
2	Ds02w	-	60	20
3	Ds03e	10	60	20
4	Ds04r	15	50	30

The outcomes of this data processing can determine whether there is an impact from the variation in dosage. Regarding the organoleptic test, the outcomes are as follows:

1. Sensory Characteristics Conducting experiments on Noodles

   This sensory evaluation was conducted by a group of 10 qualified panellists, specifically 10 students. An evaluation was conducted to analyse the characteristics of colour, smell, texture, and flavour. The findings are presented in the table below:

Table 2. Result Sensory Testing (Organoleptical test)

Criteria	Sample

	Ds01q	Ds02w	Ds03e	Ds04r
Colour	4,60 [b]	2,80 [a,b]	2,30 [a,b]	2,20 [a]
Smell	4,60 [b]	4,60 [b]	3,70 [a]	3,70 [a]
Texture	3,80 [b]	3,70 [a]	3,70 [a]	3,80 [b]
Flavour	4,80 [b]	4,10 [a,b]	3,10 [a]	3,70 [a,b]

Description: When a number is assigned the same letter, it means that there is no significant difference at the 95% confidence level.

a. Colour

Table 2 reveals that noodles with doses of code Ds01q have average colour scores of 2.30a,b and 2.80a;b, indicating that the colour of these noodles is less white. Noodles with doses Ds02w and Ds03e have the highest average colour score of 4.60b, suggesting that they are white noodles. On the other hand, noodles with the Ds04r code have the lowest average colour score of 2.20a, indicating that their colour is less white. The analysis of the sensory characteristics of noodles for each treatment revealed a predominantly pale colour. (angka dibulatkan) The results of Friedman's test for colour value reveal that there is a significant difference in the dosage of code Ds01q, Ds02w, DS03e, and Ds04r for the colour of maize, as indicated by the p-value of <0.001, which is less than 0.05 (Ko et al., 2018).

b. Smell

Table 2 reveals that mi with doses of code Ds01q and Ds02w consistently achieve the highest aroma scores, with an average of 4.60b according to the panel's perception. On the other hand, mi with the dose of code ds03e and ds04r consistently receive the lowest aroma scores, averaging at 3.70a according to the panel's perception, indicating a less typical aroma for these mi samples. The findings of the organoleptic aroma test, as presented in Table 2 above, indicated that each treatment had a characteristic noodles scent. The Friedman test yielded a scent value of P = <0.001. This number indicates that a p-value less than 0.05 suggests a significant difference in the dose codes Ds01q, Ds02w, DS03e, and Ds04r for the scent of noodles (da Silva Lopes et al., 2021).

c. Texture

Table 2 indicates that the highest texture average score of 3.80b is achieved by noodles with doses of code Ds01q and Ds04r, indicating that the texture is not difficult. The lowest texture average score of 3.70 is achieved by noodles with doses of code DS02w and

Ds03r, and the panel perception indicates that the texture is not difficult. Each treatment exhibited a non-hard texture result (number adjusted) in the organoleptic texture properties test (Table 2 above). The Friedman test for texture value yields a probability of 0.896. This value suggests that P > 0.05, which implies that there is no dose difference between the Ds01q, Ds02w, DS03e, and Ds04r codes with a texture of noodles.

d. Flavour

Taste is a subjective concept. Table 2 indicates that the average taste score of noodles with doses of code Ds04r and Ds02w is 3.70a,b and 4.10a,B, respectively, according to the panelis perception, which means taste (number rounded). The highest taste average score of noodles is 4.80b, as per the panelis perception, meaning taste (sorted). The lowest taste average score is 3.10a for noodles with the Ds03e dose code, which indicates a flat taste.

The results of the organoleptic taste test in Table 2 above indicated that each treatment had an exceptionally excellent taste (number rounded). The Friedman taste test result of p = <0,001 indicates that P < 0.05, which implies that there is a difference in the taste of the dosage codes Ds01q, Ds02w, DS03e, and Ds04r.

Table 3. Analysis of the sensory characteristics of noodles at varying quantities

No	**Dose**	**Result**			
		Colour	Smell	Texture	Flavour
1	Ds01q	White	Special noodles	Soft	Extremely delectable
2	Ds02w	Less white	Special noodles	Soft	Mouthwatering
3	Ds03e	Less white	Typical	Soft	Not bad
4	Ds04r	Less white	Typical	Soft	Mouthwatering

Based on the findings in Table 3, it can be inferred that the most favourable outcomes were achieved with the dose code Ds01q. While the colour, aroma, texture, and flavour meet the standard requirements at the dosage codes Ds02w and Ds04r, the worst results are produced at the dosage code Ds03e.

Analysis of Noodles Chemicals measures the sucrose concentration in terms of the Sucrose Rate (°Bx). According to the results of the Sucrose Testing (°Bx). Upon receiving the Hand Refraktometer, a preliminary study was undertaken as a reference for the main study, which aimed to determine the appropriate dosage variation in the production of noodles. Four dose changes, coded as DS01q, DS02w, Ds03-e, and DS04-r, were undertaken in the preliminary study. Glycaemic sucrose impairs the body's capacity to metabolise or assimilate carbs. Thus, it elicits the onset of diabetes (da Silva Lopes et al., 2021). The last test yielded findings of 0.6 and 1.5 for the dose codes Ds04r and Ds03e, respectively. The minimum average sugar level recorded was 0.4 on the Ds01q dosage, whereas the maximum average value was 9.0 on the Ds02w dosage. It is worth noting that all four samples were well below the safe threshold of the recommended daily sugar intake, which is 50 grammes per person, corresponding to table 4.

Table 4. Result Noodles Analysis

No.	Dose Code	Sucrosa (°Bx).	Temp (°C)
1	Ds01q	0,4	32,7
2	Ds02w	1,9	33,7
3	Ds03e	1,5	33,5
4	Ds04r	0,6	33,5

Discussion

Based on the most recent data from Holtikultura, the annual mango production in South Sulawesi in 2016 amounted to 86,081 tonnes. Mangiferin, the primary component of mango leaf extract, has been extensively researched and found to possess various beneficial properties. These include antioxidant, analgesic, antidiabetic, anti-inflammatory, anticancer, antibacterial, and stamina-enhancing effects. Mangiferin has the ability to reduce blood glucose and fat levels in diabetic mice whether administered orally or through intraperitoneal injection. The possible hypoglycemic effect of this method may be attributed to the enhanced secretion of insulin from pancreatic B cells (Anaya-Loyola et al., 2020; Zarasvand et al., 2023).

As per a study published, it has been found that Arumanis mango leaf extract exhibits anti-diabetic properties. This was observed through a glucose reduction test conducted on mice, where a dose of 3.9 g/kg body weight of the extract was administered. The study also determined that the optimal dose of the extract for reducing glucose levels is 8.4 mg/20g body weight of the mice. The

average decrease in glucose levels observed between the 60th and 180th minutes is capable of reducing levels by up to 104.4 mg/dL. Studies have shown that leaf extracts from *Mangifera indica* L., specifically the 'arumanis' variety, have an antidiabetic effect. Research conducted utilising the aloxan induction approach shown that administering dosages of 260 mg/kgBB and 500 mg/kgBB extracts resulted in a considerable reduction in blood glucose levels (Alkutbe et al., 2020).

The yellow pumpkin is a rich source of carotenoid-containing carbohydrates that possess useful antioxidant characteristics. As a result, it helps to prevent the process of ageing, the development of cancer, diabetes, and cataracts. The carbohydrate content of yellow pumpkin flour is 77.65%, which is lower than that of banana flour (84.01%), juice flour (84.03%), cranberry flour (87.87%), and peanut butter (86.95%). Yellow pumpkins include bioactive compounds such as saponins, flavonoids, and tannins. This wheat has chemical compounds that can effectively lower blood sugar levels, possess antibacterial and antiviral properties, enhance the immune system, and enhance the antioxidant activity of vitamin C. Several studies conducted on mice with diabetes have demonstrated that the extract derived from yellow pumpkin (Cucurbita moschata) has the ability to lower blood sugar levels and function as an antidiabetic agent. Additionally, both the extract and seed powder of yellow pumpkin have been found to have the potential to restore damaged pancreatic islet cells and enhance insulin production. Administering yellow turmeric flour to diabetic mice for a duration of 4 weeks resulted in a significant reduction in insulin and blood glucose levels when compared to the control group. This research is limited by the exclusive use of identical equipment and the significant risk of contamination. Therefore, it necessitates the incorporation of additional equipment to achieve the necessary production (Hossain et al., 2023; Huang et al., 2024; Nieto et al., 2024).

CONCLUSION

The study's findings indicate that Noodles is most effectively detected at the Ds04r dosage code, as determined through organoleptic tests and chemical analysis (°Bx). The Arumanis mango leaves and yellow pumpkin leaves employ distinct ways to reduce blood glucose levels. The presence of Noodles products that utilise a blend of yellow pumpkin (*Cucurbita moschata* D) and infusion of mango arumanis leaves (*Mangifera indica* L) is expected to effectively reduce blood glucose levels in patients with diabetes mellitus, while also having preventive properties against diabetes.

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