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Research Article

## YAKKUMON TEA: DEVELOPMENT OF A FUNCTIONAL TEA BASED ON DAYAK ONION, BANANA PEEL, AND LEMON AS A PREVENTIVE STRATEGY AGAINST HYPERTENSION

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### ABSTRACT

Hypertension is one of the non-communicable diseases with a continuously increasing prevalence and contributes to various degenerative complications. Innovative strategies based on local food resources are needed as preventive approaches to support the achievement of Sustainable Development Goal (SDG) 3. This study aimed to develop and analyze the nutritional characteristics and antioxidant activity of *Yakkumon Tea*, a tea bag product formulated from Dayak onion (*Eleutherine palmifolia*), banana peel, and lemon, as a potential functional beverage for hypertension prevention. An experimental design was employed, including nutritional content analysis and antioxidant activity testing using the DPPH method to determine the IC<sub>50</sub> value. The results showed that each tea bag contained 4.2 kcal of energy, 0.3 g protein, 0.5 g fat, 5.6 g carbohydrates, 0.1 mg vitamin C, 0.8 mg sodium, and 37 mg potassium. The low sodium and relatively high potassium content indicate its potential role in supporting blood pressure control. The antioxidant activity test demonstrated an IC<sub>50</sub> value of 85.95 µg/mL, which is categorized as strong antioxidant activity. In conclusion, *Yakkumon Tea* possesses nutritional characteristics and antioxidant activity that may support hypertension prevention. This product has the potential to be developed as a local food-based functional beverage suitable for individuals at risk of hypertension.

### ABSTRAK

Hipertensi merupakan salah satu penyakit tidak menular yang prevalensinya terus meningkat dan berkontribusi terhadap berbagai komplikasi degeneratif. Upaya inovatif berbasis pangan lokal diperlukan sebagai strategi preventif untuk mendukung pencapaian Sustainable Development Goals (SDGs) poin 3. Penelitian ini bertujuan mengembangkan dan menganalisis karakteristik gizi serta aktivitas antioksidan *Yakkumon Tea*, teh celup berbahan bawang dayak, kulit pisang, dan lemon, sebagai minuman fungsional potensial untuk pencegahan hipertensi. Penelitian ini menggunakan desain eksperimental dengan analisis kandungan gizi dan uji aktivitas antioksidan metode DPPH untuk menentukan nilai IC<sub>50</sub>. Hasil analisis menunjukkan bahwa setiap kantong teh mengandung energi 4,2 kkal, protein 0,3 g, lemak 0,5 g, karbohidrat 5,6 g, vitamin C 0,1 mg, natrium 0,8 mg, dan kalium 37 mg. Kandungan natrium yang rendah dan kalium yang relatif tinggi mendukung potensi produk dalam membantu pengendalian tekanan darah. Uji aktivitas antioksidan menunjukkan nilai IC<sub>50</sub> sebesar 85,95 µg/mL yang termasuk dalam kategori aktivitas antioksidan kuat. Dengan demikian, *Yakkumon Tea* memiliki karakteristik gizi dan aktivitas antioksidan yang berpotensi mendukung pencegahan hipertensi. Produk ini dapat dikembangkan sebagai alternatif minuman fungsional berbasis pangan lokal yang ramah bagi individu dengan risiko hipertensi.

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## INTRODUCTION

Hypertension is a global health problem defined as a medical condition characterized by chronic elevation of systemic arterial pressure above normal threshold values (Riaz et al., 2021). The study of

hypertension is highly important due to its significant impact on the Sustainable Development Goals (SDGs). Hypertension is closely related to SDG 3, which focuses on ensuring healthy lives and promoting well-being for all at all ages. One of the targets of SDG 3 is to reduce premature mortality by one-third by 2030 (Goit & Yang, 2019; Yin et al., 2022). A combination of prevention, early detection, and treatment is essential to achieve this target (Thakur et al., 2021).

Globally, it is estimated that approximately 1 billion people suffer from hypertension. According to the World Health Organization (WHO), this number is expected to increase, with around 29.2% of the adult population worldwide projected to have hypertension (Paudel et al., 2020). In Indonesia, based on the 2018 Basic Health Research (Riskesdas), the prevalence of hypertension reached 34.1%, with a mortality rate of 0.67%. This represents an increase compared to 27.8% in 2013.

Efforts to prevent and manage hypertension can be carried out through the utilization of herbal medicine (Ariyanti et al., 2022). The use of herbal remedies as alternative treatments has become increasingly popular and is widely accepted as part of daily life. The global popularity of herbal medicine is attributed to its effectiveness in treatment and curative potential, ease of accessibility, and relatively low toxicity (Tulunay et al., 2015). Several plants have been reported to be effective in reducing hypertension, including Dayak onion (*Eleutherine bulbosa*), kepok banana peel (*Musa paradisiaca*), and lemon (*Citrus limon*).

Dayak onion is widely found in Kalimantan, particularly Central Kalimantan, with its bulb being the most commonly used part. It contains various phytochemical compounds such as saponins, alkaloids, triterpenoids, glycosides, flavonoids, phenolics, and steroids. It also contains bioactive antioxidant compounds such as eleutherol, eleutherin, and isoeleutherin, which belong to the phenolic group and have potential as antihypertensive agents. In addition, Dayak onion contains allicin, which can reduce blood viscosity, thereby lowering blood pressure (Setiani et al., 2023; Yuswi, 2017). The saponin content also exhibits diuretic effects by inhibiting the  $\text{Na}^+/\text{K}^+$ -ATPase enzyme, leading to reduced sodium and water reabsorption and increased diuresis (Setyawan & Burhanto, 2019). Previous studies have shown that 100% Dayak onion tea significantly reduces blood pressure ( $p = 0.000$ ;  $p < 0.05$ ) (Purba, 2022).

Banana peel contains magnesium, calcium, potassium, high fiber, and flavonoids. The potassium content in kepok banana peel is higher than that in the fruit itself, with 4.08 mg/100 g in the peel and 2.39 mg/100 g in the fruit. High potassium levels help regulate heart rhythm and maintain fluid balance, thereby reducing blood pressure. Additionally, banana peel has antioxidant properties that neutralize free radicals and prevent cellular damage (Santoso et al., 2023).

Lemon is low in sugar, making it more commonly consumed as juice, flavoring, or beverage rather than as fresh fruit. Several studies have reported a relationship between lemon consumption and reduced blood pressure. Lemon contains carbohydrates, potassium, vitamin C, flavonoids, gamma-aminobutyric acid (GABA), and citric acid, which is the most abundant organic compound. Citric acid plays an important role in energy production and has antioxidant properties that reduce the risk of chronic diseases. Flavonoids, GABA, and potassium have been reported to contribute to lowering blood pressure in hypertensive patients (Nakamura et al., 2023).

Based on these considerations and the potential for developing alternative therapeutic products in Indonesia, this study proposes “YAKKUMON TEA: Development of a Functional Tea Based on Dayak Onion, Banana Peel, and Lemon as an Effort to Prevent Hypertension.” This product is intended as an alternative approach for the prevention and management of hypertension through the utilization of local food resources. These ingredients contain various active compounds with antioxidant properties that may reduce blood viscosity and, consequently, lower blood pressure. The development of this functional tea is considered a promising strategy due to its effectiveness, accessibility, and safety for consumption.

## MATERIALS AND METHODS

### Instruments, Materials, and Samples

#### Research Design

This study was a laboratory-based experimental research aimed at developing Yakkumon Tea and analyzing its organoleptic characteristics and antioxidant activity. The study was conducted in the Food Technology Laboratory and Chemistry Laboratory. The research stages included product formulation, organoleptic quality and acceptability testing, nutritional content analysis, and antioxidant activity testing.

#### Materials and Instruments

The main materials used were Dayak onion (*Eleutherine palmifolia*), kepok banana peel (*Musa paradisiaca*), lemon (*Citrus limon*), and cinnamon. The chemical reagents included pro analysis ethanol and

DPPH (1,1-diphenyl-2-picrylhydrazyl). The instruments used included knives, scissors, cutting boards, digital scales, a food dehydrator, mortar and pestle, glassware, microtubes, a Soxhlet extraction apparatus, and a UV-Vis spectrophotometer.

### Preparation of Yakkumon Tea

Dayak onion, banana peel, and lemon were cleaned and washed under running water. The materials were then sliced thinly to increase the drying surface area. Banana peel and lemon were dried using a food dehydrator at 50°C for 12 hours, while Dayak onion was dried at 50°C for 8 hours. After drying, all materials were ground using a mortar and standardized in size. The materials were then mixed according to the predetermined formulation and packed into tea bags.

### Acceptability and Organoleptic Test

The acceptability test was conducted to evaluate panelists' preferences toward the quality of Yakkumon Tea, including color, aroma, taste, and texture. The test involved 40 semi-trained panelists who completed a response sheet using a hedonic scale: 5 = very like, 4 = like, 3 = moderately like, 2 = dislike, and 1 = strongly dislike.

The organoleptic test used human sensory perception as the primary tool to assess product characteristics ([Gusnadi et al., 2021](#)), including color, aroma, and taste ([Faizin et al., 2022](#); [Puni et al., 2020](#)). The evaluation was conducted with 40 semi-trained panelists using the following scales:

Color: 1 = slightly reddish, 2 = red, 3 = brownish, 4 = brown

Aroma: 1 = very aromatic, 2 = aromatic, 3 = slightly aromatic, 4 = not aromatic

Taste: 1 = very bitter, 2 = bitter, 3 = slightly bitter, 4 = not bitter

### Nutritional Content Analysis

The nutritional content of Yakkumon Tea was determined using NutriSurvey software based on ingredient composition and formulation per tea bag. Input data included ingredient type, weight of each component, and processing loss factors during drying. The output included estimated values of energy (kcal), protein (g), fat (g), carbohydrates (g), vitamin C (mg), sodium (mg), and potassium (mg) per serving.

### Antioxidant Activity Test

Antioxidant activity was determined using the DPPH (1,1-diphenyl-2-picrylhydrazyl) method based on Djoueudam et al. (2019) and Ralte et al. (2021) with modifications. A total of 10 g of sample was extracted with 100 mL ethanol using a Soxhlet apparatus for 25 cycles. The extract was then evaporated to obtain a concentrated extract. A total of 0.0002 g extract was dissolved in 10 mL ethanol and prepared into concentrations of 12.5, 25, 50, 100, and 200 µg/mL. Each solution was mixed with DPPH solution (28 µg/mL) in a ratio of 1:5, then incubated in the dark for 30 minutes. Absorbance was measured at 517 nm using a UV-Vis spectrophotometer.

### Data Analysis

Acceptability data were analyzed using the Kruskal–Wallis test to determine differences in panelist preferences. Organoleptic quality data were presented descriptively in tables and frequency distributions. Antioxidant activity data were analyzed to determine the IC<sub>50</sub> value based on a linear regression curve between sample concentration and percentage inhibition.

## RESULT AND DISCUSSION

The innovative tea bag product developed in this study is named **Yakkumon Tea** (Figure 1). The name “Yakkumon” is an acronym derived from its main ingredients: Dayak onion, banana peel, and lemon. This formulation is further enriched with cinnamon as an additional ingredient, which is known to contain bioactive compounds with potential benefits in supporting blood pressure regulation. The net weight of each tea bag is 6 g.



**Figure 1** Yakkumon Tea Product

The selection of ingredients in the Yakkumon Tea formulation was based on their potential bioactive compound content. Dayak onion is known to contain flavonoids, phenolics, and other antioxidant compounds that play a role in scavenging free radicals and may provide protective effects against oxidative stress, one of the risk factors for hypertension ([Harlita et al., 2018](#); [Khan et al., 2021](#); [Mutha et al., 2021](#)). Banana peel contains relatively high levels of potassium, a mineral that contributes to blood pressure regulation through sodium–potassium balance mechanisms ([Oyeyinka & Afolayan, 2019](#); [Weaver, 2013](#)). Meanwhile, lemon serves as a source of vitamin C and natural antioxidants that support endothelial function ([Hashemipour et al., 2016](#)). The addition of cinnamon further enhances the phytochemical content, potentially providing cardioprotective effects ([Badalzadeh et al., 2014](#)).

This product is intended for adult consumers, both male and female, particularly individuals with a risk or history of hypertension. Its consumption without added sugar also makes it suitable as an alternative beverage for individuals at risk of diabetes, considering that the antioxidant content of Dayak onion may contribute to blood glucose regulation ([Lolok et al., 2019](#)).

**Tabel 1** Nutritional Content of Yakkumon Tea (per tea bag)

Nutrient	Value
Energy	4,2 kkal
Protein	0,3 g
Fat	0,5 g
Carbohydrate	5,6 g
Vitamin C	0,1 mg
Sodium	0,8 mg
Potassium	37 mg

Based on the analysis using NutriSurvey, the nutritional content per serving of Yakkumon Tea is presented in Table 1. The results indicate that the product is low in sodium and contains potassium, which theoretically supports blood pressure management. Thus, in terms of composition and bioactive potential, Yakkumon Tea has promising prospects as a functional beverage based on local food resources to support hypertension prevention.

The analysis showed that the potassium content in one tea bag of Yakkumon Tea is 37 mg. Compared to the recommended daily intake of potassium for adults in Indonesia, which is approximately 4,700 mg/day ([Strohm et al., 2017](#)), one serving contributes about 0.8% of the daily requirement. Although this contribution is relatively small, the presence of potassium in this product still provides functional value, particularly as part of a regular dietary pattern rich in potassium and low in sodium.

Potassium is an essential mineral that plays a key role in maintaining fluid and electrolyte balance, as well as the concentration gradient between intracellular and extracellular fluids. Increased potassium intake has been associated with reduced blood pressure through several mechanisms, including enhanced sodium

excretion (natriuretic effect), reduced extracellular fluid volume, and decreased peripheral vascular resistance (Murrell et al., 2021; Stone et al., 2016; Yamada & Inaba, 2021). In addition, potassium contributes to the modulation of the renin–angiotensin–aldosterone system and sympathetic nervous system activity involved in blood pressure regulation. Its vasodilatory effects on blood vessels also contribute to lowering blood pressure (Hadi, 2025; Muñoz-Durango et al., 2016). Therefore, although Yakkumon Tea is not a primary source of potassium, its content may provide additional benefits in supporting blood pressure control when consumed regularly as part of a balanced diet.

The acceptability test of Yakkumon Tea, which included parameters of color, aroma, and taste, was conducted on 40 semi-trained panelists. The results are presented in Table 2. Overall, the color parameter received a positive response, with 19 panelists indicating that they “liked” the product’s color. Color is the initial sensory attribute observed by consumers and plays an important role in shaping perceptions of quality and product acceptance. Psychologically, an appealing visual impression can increase the willingness to try and consume a product (Prisila et al., 2020). This finding is consistent with Puni et al. (2020), who reported that color is the primary factor influencing consumer decisions before other sensory attributes are considered.

Yakkumon Tea produces a reddish-brown color after brewing. This color is likely derived from the combination of natural pigments in Dayak onion, which is rich in phenolic compounds, the drying process, and the contribution of cinnamon and banana peel. The resulting color intensity indicates that the formulation and drying processes were able to preserve appealing visual characteristics. These findings suggest that, visually, Yakkumon Tea has good acceptability and potential to be well received by consumers as a functional beverage based on local ingredients. Its distinctive and natural color also adds value, as it reflects the use of ingredients without synthetic colorants.

**Table 2** Acceptability Test Results of Yakkumon Tea

Hedonic Scale	Frequency		
	Color	Aroma	Taste
Dislike	0	10	8
Slightly Dislike	6	11	13
Moderately Like	10	12	10
Like	19	3	7
Very Like	5	4	2

Aroma is an important sensory attribute in organoleptic evaluation as it contributes to the initial perception of product quality and flavor. Aroma is perceived by olfactory receptors when volatile compounds are inhaled through the nose. During consumption, aroma perception occurs not only before ingestion but also retronasally while the product is in the oral cavity, significantly influencing consumer acceptance (Apra, 2020; Prisila et al., 2020). Based on the acceptability test (Table 2), 12 panelists rated the aroma of Yakkumon Tea as “moderately liked.” The aroma exhibited a distinctive characteristic of Dayak onion, which was relatively dominant. This is likely due to the presence of natural volatile compounds in Dayak onion that remain after the drying process.

Although this distinctive aroma represents the identity of a local ingredient-based product, the “moderately liked” rating suggests that the aroma intensity may require optimization to enhance acceptability, particularly among consumers unfamiliar with Dayak onion characteristics. The addition of lemon and cinnamon in the formulation may function as aroma modifiers; however, their proportions could be further adjusted to improve acceptability without compromising the functional value of the product. Overall, these findings indicate that the aroma of Yakkumon Tea is generally acceptable, although there remains potential for formulation improvement.

In addition to color and aroma, taste is a key parameter in determining overall product acceptance. While visual appearance may attract initial interest, the final decision to accept or reject a product is largely influenced by taste perception. Taste is detected by gustatory receptors on the tongue when the product is in the oral cavity and is influenced by interactions between food chemical components and these receptors (Yana et al., 2022).

Based on the acceptability test results, 13 panelists rated the taste of Yakkumon Tea as “slightly disliked” (Table 2). This response is likely associated with the slightly bitter taste of the product. The bitterness

may originate from phenolic compounds, flavonoids, and other bioactive components present in Dayak onion and banana peel. These compounds are known for their antioxidant activity; however, they can also produce a bitter aftertaste that affects consumer preference (Maulida et al., 2024).

Although bitterness is often associated with beneficial functional compounds, the lower acceptance level for this parameter indicates the need for formulation optimization. Adjustments in ingredient proportions or the addition of natural flavor-balancing components may be considered to improve palatability without reducing the functional properties. Therefore, from a sensory perspective, taste represents the main challenge in the development of Yakkumon Tea, despite its promising bioactive composition and potential health benefits.

**Tabel 3** Organoleptic Quality Test Results for Color

Parameter	Frequency
Slightly Reddish	2
Red	3
Brownish	13
Brown	0

The results of the organoleptic quality test showed that 13 panelists rated the color of Yakkumon Tea infusion as brownish (Table 3). This color is influenced by both the composition of the ingredients and the processing methods applied. Dayak onion is known to contain anthocyanins, natural pigments belonging to the flavonoid group that contribute to red to purple coloration in food materials (Ulfa et al., 2020). In addition, kepok banana peel contains flavonoids, saponins, and triterpenoids, which may also contribute to the natural color formation of the product (Santi et al., 2020; Saragih et al., 2014).

The shift toward a brownish color is likely due to anthocyanin degradation during heating and drying processes (Yamagishi, 2022). Anthocyanins are sensitive to temperature, and thermal processing can lead to structural degradation, resulting in changes in color intensity and stability (Suzery et al., 2020). Furthermore, the drying process at elevated temperatures may promote browning reactions and pigment degradation, leading to a darker infusion color (Maharani et al., 2022).

Thus, the brownish color of Yakkumon Tea reflects not only the characteristics of the raw materials but also the interaction between bioactive compounds and processing conditions. The naturally derived color indicates that the product does not require synthetic colorants, supporting its positioning as a natural and safe functional beverage based on local food resources.

The organoleptic quality test for aroma showed that 16 panelists rated Yakkumon Tea as aromatic (Table 4). The resulting aroma is a distinctive combination of Dayak onion and lemon as the main ingredients. This aroma profile is influenced by the type of raw materials and the processing methods, which may alter the composition of volatile compounds in the sample (Santi et al., 2020).

**Tabel 4** Organoleptic Quality Test Results for Aroma

Parameter	Frequency
Very Aromatic	15
Aromatic	16
Slightly Aromatic	9
Not Aromatic	0

The compounds responsible for aroma in the product primarily originate from essential oil components that are volatile in nature (Mohammed et al., 2025). Dayak onion and lemon are known to contain volatile compounds such as terpenoids and other aromatic constituents that contribute to their distinctive aroma (Hidayat et al., 2022; Ou et al., 2023). During the drying process, some of these volatile compounds may undergo evaporation, oxidation, or degradation, which can affect both the intensity and the overall aroma profile of the product (Chen et al., 2025).

Drying time and temperature are critical factors influencing the aroma quality of the product. Excessive drying duration or high temperatures may accelerate the oxidation of aromatic compounds, thereby reducing the intensity of fresh aroma and altering its profile (Faizin et al., 2022). Conversely, optimal drying

conditions can help preserve the balance of volatile compounds, resulting in an aroma that remains distinctive and acceptable to panelists ([Chen et al., 2025](#)).

Therefore, the aroma of Yakkumon Tea reflects the interaction between the natural composition of the ingredients and the processing conditions. The resulting aroma profile indicates that the product formulation is able to retain the identity of local ingredients while providing a sensory experience that is generally acceptable to panelists.

**Tabel 5** Organoleptic Quality Test Results for Taste

Parameter	Frequency
Very Bitter	0
Bitter	0
Slightly Bitter	24
Not Bitter	16

The results of the organoleptic quality test for taste showed that 24 panelists rated Yakkumon Tea as slightly bitter (Table 5). This taste characteristic is likely influenced by the presence of bioactive compounds in the main ingredients, particularly Dayak onion and kepok banana peel. Both ingredients are known to contain saponins, alkaloids, and phenolic compounds, which can sensorially produce bitter and astringent tastes ([Setiani et al., 2023](#); [Ulfa et al., 2020](#)).

Saponins possess natural surfactant properties that can create a bitter and slightly astringent sensation in the oral cavity, while alkaloids and certain phenolic compounds also contribute to bitterness perception ([Kurhaluk et al., 2025](#)). In addition, the drying and brewing processes may enhance the extraction of these compounds into the tea infusion, thereby intensifying the bitter taste ([Bahar et al., 2025](#)).

Although bitterness is often associated with the presence of beneficial bioactive compounds, the relatively lower level of panelist acceptance indicates that palatability remains an important consideration in product development. Formulation optimization, such as adjusting ingredient proportions or incorporating natural flavor-balancing components, may be an effective strategy to improve acceptability without reducing the functional properties of the product. Therefore, the slightly bitter taste of Yakkumon Tea reflects its rich phytochemical content, while also representing a key challenge in enhancing consumer preference for this local functional beverage.

The antioxidant activity of Yakkumon Tea was evaluated using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) method at concentrations of 12.5, 25, 50, 100, and 200 µg/mL. Antioxidant activity was expressed as the Inhibitory Concentration 50% (IC<sub>50</sub>), which represents the concentration of the sample required to scavenge 50% of DPPH free radicals. The IC<sub>50</sub> value is a commonly used parameter to assess antioxidant capacity, where a lower IC<sub>50</sub> value indicates higher antioxidant activity ([Akullo et al., 2023](#)).

**Tabel 6** IC<sub>50</sub> Value of Yakkumon Tea

Sample	IC <sub>50</sub> (µg/ml) ± SD	Antioxidant Activity
Yakkumon Tea	85,95±0,21	Strong

Based on the test results (Table 6), Yakkumon Tea exhibited an IC<sub>50</sub> value of 85.95 ± 0.21 µg/mL, which falls into the category of strong antioxidant activity. This classification is based on the criterion that IC<sub>50</sub> values within the range of 50–100 µg/mL indicate strong antioxidant activity ([Bahriul et al., 2014](#)). These findings suggest that the Yakkumon Tea formulation contains bioactive compounds with the potential to scavenge free radicals.

The observed antioxidant activity is consistent with previous studies reporting that ethanol extract of Dayak onion demonstrated very strong antioxidant activity with an IC<sub>50</sub> value of 41.46 µg/mL. Similarly, ethanol extract of kepok banana peel showed very strong antioxidant activity with an IC<sub>50</sub> value of 9.702 µg/mL, while lemon juice exhibited strong antioxidant activity with an IC<sub>50</sub> value of 76.83 µg/mL ([Puspitasari et al., 2020](#)). The differences in IC<sub>50</sub> values may be attributed to variations in processing methods. In this study, all ingredients were used in fresh form and subsequently dried without undergoing extraction, resulting in a

relatively lower concentration of dissolved active compounds compared to pure extracts. Nevertheless, this approach is more applicable as it reflects real-world consumption practices.

The presence of antioxidant compounds in Yakkumon Tea may provide protective effects against oxidative stress, which plays a role in the pathogenesis of hypertension. Therefore, this product has potential as a functional beverage based on local food resources to support hypertension prevention efforts.

For optimal consumption, Yakkumon Tea is recommended to be brewed using warm water at 50 °C for approximately 5 minutes, allowing the release of its characteristic aroma from lemon and cinnamon. For hypertension prevention, it may be consumed at a dose of 75 mL once daily before meals and is considered safe for regular consumption. For individuals with hypertension, it is recommended to consume 75 mL twice daily before meals for one week ([Setyawan & Burhanto, 2019](#)).

## CONCLUSION

Based on the findings of this study, Yakkumon Tea, a functional teabag formulated from Dayak onion, banana peel, lemon, and cinnamon, demonstrates potential as a supportive beverage for hypertension prevention. The product contains potassium, which may contribute to blood pressure regulation, and exhibits strong antioxidant activity with an IC<sub>50</sub> value of 85.95 ± 0.21 µg/mL.

The acceptability test results indicate that the color of the infusion was well accepted by panelists, the aroma was moderately liked, while the slightly bitter taste was identified as the main factor reducing overall preference. These organoleptic characteristics are closely associated with the presence of bioactive compounds in the ingredients.

Therefore, Yakkumon Tea shows promise as a functional beverage based on local food resources for hypertension prevention. However, formulation improvements, particularly in taste optimization, are necessary to enhance consumer acceptance. Further studies are recommended to evaluate its effectiveness in reducing blood pressure through clinical trials.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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