

Developing a modified herbal tea bag for high blood pressure: organoleptic testing and acceptance by hypertension patients in Kulon Progo**Adenda Salsabila Nur Widjayanti, Lailla Affianti Fauzi, Farid Imam Nurhadi**

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Abstract: The study aimed to (1) develop a modification of the scientific herbal medicine preparation for hypertension from dry simplicia into tea bags made from biodegradable corn fiber; (2) identify the organoleptic characteristics of the scientific herbal medicine tea bags for hypertension compared to dry simplicia; and (3) identify the level of acceptance of the scientific herbal medicine tea bags by hypertension patients in the Kulon Progo Regency area. This was research and development with a 4D model (to define, design, develop, and disseminate). The research was conducted at the Pengasih II Community Health Center in Kulon Progo Regency. The research subjects were 55 respondents with hypertension who were selected by purposive sampling according to the inclusion and exclusion criteria. The product was developed using six medicinal plants formulated by the Indonesian Ministry of Health's scientific herbal medicine, namely turmeric (*Curcuma longa*), Javanese turmeric (*Curcuma xanthorrhiza*), stonebreaker (*Phyllanthus niruri*), pegagan (*Centella asiatica*), celery (*Apium graveolens*), and cat's whiskers (*Orthosiphon stamineus*). Organoleptic data were collected through a structured assessment sheet that included color, aroma, and clarity, then analyzed using the Wilcoxon test. Organoleptic data were collected using a 5-point Likert Scale questionnaire (13 questions) and analyzed descriptively using SPSS. The research findings indicated that modification of the dosage form into tea bags significantly improved all organoleptic parameters ($p < 0.001$), with the total score increasing from 7.27 ± 2.23 to 12.67 ± 1.62 . The patient acceptance level was in the good category, with an average total score of 53.60 (SD=7.27) out of a maximum score of 65.00. This study concluded that tea bags made from biodegradable corn fiber were worthy of being developed as an alternative form of complementary therapy that is more practical and acceptable to hypertension patients.

Keywords: hypertension, scientific herbal medicine, acceptability, tea bags, organoleptic test

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INTRODUCTION

Hypertension, a chronic noncommunicable disease, often goes undetected by individuals until they have their blood pressure checked, and patients typically do not exhibit any symptoms before the onset of potentially fatal complications (Zainuddin et al., 2022). Research conducted by Telaumbanua & Rahayu (2021) defines hypertension as an increase in blood pressure whether systolic or diastolic classified into essential hypertension, the most common form, and secondary hypertension, which arises due to kidney disease or other factors, with malignant hypertension being a severe form that can occur in both types. According to Pratiwi's (2020) research, hypertension is described as a "silent killer" because it can affect individuals without specific warning signs. One study states that individuals with hypertension have a 12-fold increased risk of stroke and a six-fold increased risk of heart attack (Khairina, 2023).

Hypertension is called the "silent killer" because it often does not present clear symptoms in those affected. Many individuals only discover they have hypertension after serious complications arise, such as heart failure, kidney disease, stroke, or vision problems (Pawitra et al., 2024). This makes hypertension a dangerous health threat because it progresses slowly and unnoticed. Factors such as chronic stress, a high-sodium diet, smoking, and lack of physical activity exacerbate this condition, thereby increasing the risk of premature death if left uncontrolled (Wahidin et al., 2025).

This study focuses on hypertension because it is one of the leading causes of morbidity and mortality in Indonesia, with its prevalence continuing to rise each year. Hypertension not only reduces sleep quality but also imposes a significant economic and social burden due to the costs of long-term treatment (Nur et al., 2021). Additionally, low public awareness regarding the prevention and management of hypertension exacerbates the situation. With efforts to develop herbal-based complementary therapies, it is hoped that these can serve as a safer, more affordable, and more suitable alternative for the Indonesian population in managing high blood pressure.

Hypertension in Indonesia has become a serious health issue with a continuously rising prevalence. Data from the 2018 Rickshas survey recorded a prevalence of hypertension among adults at 34.1%, up from 25.8% in the previous survey (Indonesian Ministry of Health, 2018). This increase is driven by unhealthy lifestyles, such as a high-sodium diet, lack of physical activity, and rising stress levels (Ministry of Health, 2024). Several studies confirm that obesity, high salt intake, and low physical activity are major risk factors for hypertension (Rachmawati et al., 2023). Other studies also indicate that the prevalence of hypertension is higher among individuals aged 45 and older and those with a family history of hypertension (Susanti et al., 2022). Hypertension can occur across various age groups, but its prevalence tends to increase with age. The 30–70 age group is the age range most affected by hypertension due to decreased blood vessel elasticity, changes in body metabolism, and the influence of an unhealthy lifestyle. These conditions increase the risk of elevated blood pressure in adults and the elderly.

The prevalence of hypertension in the Special Region of Yogyakarta is recorded at 32.86%. Kulon Progo Regency ranks second among regions in the Special Region of Yogyakarta with the highest prevalence of hypertension. Data from the Kulon Progo Health Office in 2021 indicates that hypertension is the most prevalent disease, with the number of patients reaching 45,721. This situation highlights hypertension as a major health issue in Kulon Progo Regency. The issue of hypertension in this region requires serious attention through sustained prevention and control efforts (Bela et al., 2025). The high prevalence of hypertension in Indonesia, particularly in Kulon Progo Regency, necessitates the implementation of appropriate management strategies to lower blood pressure and prevent complications. Hypertension can be managed in two ways: pharmacological and non-pharmacological treatments. Pharmacological management of hypertension involves the use of medications prescribed by healthcare professionals to lower blood pressure. Some commonly used classes of antihypertensive drugs include: diuretics to help the body excrete excess salt and water through urine, thereby reducing blood volume and lowering blood pressure; Angiotensin Receptor Blockers (ARBs) to block the effects of the hormone angiotensin II, which causes blood vessels to constrict, so that blood vessels remain relaxed and blood pressure decreases; Angiotensin-Converting Enzyme (ACE) Inhibitors to prevent the formation of angiotensin II, helping blood vessels stay open and lowering blood pressure; beta-blockers to reduce the heart's workload and slow the heart rate, thereby lowering blood pressure; and Calcium Channel Blockers to prevent calcium from entering heart muscle and blood vessel cells, thereby relaxing blood vessels and lowering blood pressure (Ma'rifat et al., 2024).

Non-pharmacological treatments have been an integral part of Indonesian public health culture for centuries. These practices are not only passed down through generations but also serve as trusted alternatives for managing mild to moderate health complaints. However, with the progression of time, modernization, and globalization within the healthcare system, there is an urgent need to integrate traditional healing practices into the modern healthcare system. This integration aims to ensure that traditional medicine remains relevant, safe, and effective in meeting the health needs of today's society (Fadholah et al., 2021). Non-pharmacological treatments include exercise, dietary management, and non-drug therapies using herbal formulations (Nada et al., 2024).

In Indonesia, the Ministry of Health has established a classification system for traditional medicines, grouping them based on the level of scientific evidence and production processes into three categories: jamu, standardized herbal medicines, and phytopharmaceuticals (Sukmawati et al., 2020). The scientific study of jamu involves health services-based research to generate scientific evidence through preclinical studies and clinical trials of Indonesian traditional medicines, thereby ensuring their safety, quality, and efficacy (Priadiatna et al., 2021). National policies encourage the development of herbal products from local ingredients toward the standards of standardized herbal medicines or phytopharmaceuticals, to improve the quality, safety, and utilization of these products in healthcare

services. Several plants have been scientifically tested by the Ministry of Health of the Republic of Indonesia and formulated into herbal remedies, one of which is an herbal remedy for hypertension consisting of gotu kola leaves, celery, cat's whiskers, meniran, turmeric, and temulawak. This formula has undergone various testing phases and has been shown to lower high blood pressure when consumed according to the appropriate dosage, measurement, and usage procedures. Therefore, strict protocols are required for monitoring the consumption of this formula. The use of herbal medicines also faces various challenges, particularly regarding standardization, safety, and efficacy. Many herbal products available on the market have not undergone adequate clinical testing, raising doubts about their quality and safety (Adiyasa et al., 2021). Additionally, there remains a lack of education and accurate information regarding the use of herbal medicines among the general public. This situation has the potential to lead to misuse, improper dosing, and the risk of unwanted side effects.

Preliminary observations in Karang Sari Village, Pengasih Subdistrict, Kulon Progo revealed that 64% of people still consume herbal remedies purchased directly from herbal vendors because it is more practical, efficient, and affordable, while 9% of people also use fresh plants harvested from their own gardens and consumed directly as herbal remedies, without drying them. This is because their daily busyness or activities have made them feel too lazy to prepare herbal remedies for consumption. Additionally, 27% of people choose to consume herbal remedies by first drying the herbs to make preparation easier and to ensure the herbs last much longer allowing them to make herbal remedies at any time rather than using undried herbs, which spoil more quickly.

The challenge posed by the public's low interest in consuming traditional herbal remedies that are still in the form of dried crude drugs highlights the need for modifications to create dosage forms that are more practical, safe, hygienic, and of guaranteed quality. One potential solution is to develop scientifically validated herbal formulations into single-use tea bags that are easier to use and align with the lifestyles of modern society. This modification not only enhances convenience and ease of consumption but also addresses environmental sustainability through the use of tea bags made from biodegradable corn fiber. This material can decompose naturally without polluting the environment, thereby supporting the concept of herbal products that are both healthy and environmentally friendly. Another objective of this modification is to enhance the convenience and ease of consuming herbal formulations, minimize the growth of mold or fungi, simplify the storage process for herbs, and ensure quality and safety through standardized dosages and scientifically based processing methods.

Based on this, this study focuses on analyzing the organoleptic characteristics and acceptability of a modified scientific herbal tea formulation for lowering high blood pressure in hypertensive patients. It evaluates organoleptic aspects and acceptability levels compared to the dried herb form, thereby determining the most suitable dosage form that meets patients' needs and acceptance when consuming herbal remedies as a complementary therapy for hypertension.

METHOD

This study is a research and development (R&D) project focused on modifying a scientifically validated herbal formula for high blood pressure into a single-use tea bag made from biodegradable corn fiber. This study does not aim to create a new formulation but rather to develop a more practical, hygienic, and environmentally friendly dosage form without altering the composition of the scientifically validated herbal ingredients. The development model used is limited-scale research and development, based on the 4D model (Define, Design, Develop, and Disseminate). This model was developed by Sivasailam Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel in 1974 (Sihombing, 2024).

In the Define stage, the needs and problems were identified: the public remains uninterested in consuming herbal remedies in the form of dried crude drugs because they are considered impractical. The design stage involved creating a tea bag formulation from a scientifically validated herbal blend for high blood pressure, consisting of celery, gotu kola, cat's whiskers, meniran, turmeric, and temulawak. Additionally, the process included drying the ingredients into crude drug forms, grinding them into coarse powder, and packaging them using biodegradable corn fiber tea bags. The development phase was carried out using an experimental approach, encompassing the testing of the modified product through organoleptic tests (color, aroma, clarity) and acceptability tests.

Subsequently, the dissemination phase involved drafting a publication manuscript. The research results were published in the form of a scientific article focusing on the organoleptic analysis and acceptability of the scientific herbal tea formulation for lowering blood pressure. This publication aims to disseminate the development results to the scientific and academic communities as a contribution to strengthening the scientific basis of traditional herbal medicine and herbal product innovation. Through this publication, it is hoped that the developed product can serve as a reference for future research and the development of similar products.

This study is a comparative experimental study comparing two formulations of a scientific herbal remedy for high blood pressure: a dried crude drug form as the control and a tea bag made from biodegradable corn fiber. The study involved two treatments, in which respondents evaluated both formulations based on color, aroma, clarity, and overall acceptability using a hedonic scale questionnaire. The evaluation results for both formulations were then compared to determine which formulation was most preferred and accepted by the respondents. The data obtained were subsequently analyzed using quantitative descriptive methods to describe the differences in characteristics and the level of patient acceptance of the two formulation types. Through this method, it is hoped that a more practical, hygienic, and patient-friendly formulation of herbal medicine for high blood pressure can be developed, while still maintaining the quality and efficacy of the scientific herbal ingredients used.

The study population consisted of hypertensive patients at Pengasih II Community Health Center, Kulon Progo Regency, who underwent routine check-ups at the village health post or at the community health center. The study sample consisted of a portion of the population selected using purposive sampling, resulting in 55 hypertensive patients registered at the health center with ICD-10 diagnosis code I10, aged 30–70, and meeting the study’s inclusion and exclusion criteria. The study was conducted from January 10 to March 31, 2026.

The research instruments consisted of two main tools. First, a structured organoleptic assessment sheet covering the parameters of color, aroma, and clarity. Second, an acceptability questionnaire that had been validated by three experts (content validity) and tested for reliability (Cronbach’s Alpha). Data collection was conducted face-to-face. Respondents first evaluated the dried crude drug, then evaluated the brewed tea bags prepared according to standard protocol (1 bag in 1 liter of hot water, steeped for 5 minutes). Data were analyzed using descriptive quantitative methods with SPSS to calculate the mean, standard deviation, and acceptability categories, as well as the Wilcoxon test to compare the organoleptic test results between the two preparations at a significance level of $p < 0.05$.

This study obtained ethical approval from the authorized Ethics Committee as well as official permits from the Kulon Progo District Health Office and the Pengasih II Community Health Center. All participants were provided with a complete explanation regarding the study’s objectives, procedures, benefits, and risks before participation, and the confidentiality of their data was guaranteed in accordance with the principles of health research ethics.

Using this method, it is hoped that a scientifically formulated herbal tea bag for hypertension can be produced that possesses better organoleptic characteristics and a high level of acceptability among hypertensive patients.

RESULTS AND DISCUSSION

This study involved 55 hypertensive patients at the Pengasih II Community Health Center in Kulon Progo Regency. The demographic characteristics of the respondents are presented in Table 1.

Table 1. Respondent Characteristics

Gender	n	%
Female	32	58,2%
Male	23	41,8%
Age		
<50 years	5	9,1%
>50 years	50	90,9%
Duration of hypertension		
<1 years	7	12,7%

<5 years	18	32,7%
>5 years	30	54,5%
Antihypertensive Medications Taken		
Amlodipine/ Candesartan	2	3,6%
Amlodipine	50	90,9%
Adalat Oros (Nifedipine)	1	1,8%
Candesartan	2	3,6%

The majority of respondents were female, totaling 32 people (58.2%), while the male group consisted of 23 people (41.8%). In terms of age, 50 respondents (90.9%) were over 50 years old, and only 5 respondents (9.1%) were under 50 years old. Based on the duration of hypertension history, 30 respondents (54.5%) had a history of the disease for more than 5 years, 18 respondents (32.7%) had a history of less than 5 years, and 7 respondents (12.7%) had a history of less than 1 year.

In terms of antihypertensive medication use, the majority of respondents (50 people or 90.9%) took amlodipine as their primary therapy. A total of 2 respondents (3.6%) took amlodipine or candesartan alternately depending on drug availability, 2 respondents took candesartan (3.6%), and 1 respondent (1.8%) took Adalat Oros (Nifedipine).

Table 2. Antihypertensive medication

Statement	Female (N=32)	Male (N=23)
Consumption of Herbal Remedies		
Yes	15 (46,8%)	14 (60,8%)
No	17 (53,1%)	9 (39,1%)
Frequency of Consumption		
Sometimes	11 (34,3%)	10 (43,4)
Often	4 (12,5%)	3 (13,0%)
Regularly	0 (0%)	1 (4,3%)
Tea Consumption Patterns		
Yes	28 (87,5%)	21(91,3%)
No	4 (12,5%)	2 (8,6%)
Consumption Frequency		
Sometimes	17 (53,1%)	9 (39,1%)
Often	5 (15,6%)	5 (21,7%)
Regularly	6 (18,7%)	7 (30,4%)

Of the respondents in this study, 52.7% were patients who had consumed herbal remedies, with men accounting for the majority at 60.8%; consumption frequency was predominantly occasional, frequent, or regular. A total of 89.1% of respondents consumed tea occasionally, frequently, or regularly, with men again accounting for the majority at 91.2%.

Table 3. The most commonly used parts of the plant

Parts used	Female (N=32)	Male (N=23)
Leaves	3 (9,3%)	2 (8,6%)
Rhizomes	11 (34,3%)	10 (43,4%)
Fruit	0 (0%)	2 (8,6%)
Stem	0 (0%)	1 (4,3%)
Method of use		
Decoction	13 (40,6%)	13 (56,5%)
Infusion	2 (6,2%)	1 (4,3%)

Based on Table, the plant part most commonly used is the rhizome, with 21 respondents (approximately 38.2%). Meanwhile, the most common method of preparing herbal medicine is boiling, with 26 respondents (47.3%).

An organoleptic test was conducted to compare the scientific herbal formula for hypertension before modification (dried herbal ingredients) with the post-modification version (biodegradable corn fiber tea bags). The parameters evaluated were color, aroma, and clarity of the first infusion, using a 1–5 scale. The following table presents the average organoleptic test scores from the completed study:

Table 4. Organoleptic test

Parameter	Before modification (Mean ± SD)	After modification (Mean ± SD)	Z
Color	2,43±0,87	4,21±0,65	-5,955
Aroma	2,45±1,033	4,09±0,84	-5,711
Clarity	2,38±1,04	4,36±0,67	-5,990
Total Score	7,27±2,32	12,67±1,62	-6,197

Based on Table 9, it is evident that the average organoleptic test scores increased across all parameters following the modifications. For the color parameter, the average score increased from 2.43 ± 0.87 to 4.21 ± 0.65. The aroma parameter also showed an increase from 2.45 ± 1.03 to 4.09 ± 0.84. Similarly, for the clarity parameter, the average score increased from 2.38 ± 1.045 to 4.36 ± 0.67. Overall, the total organoleptic test score increased from 7.27 ± 2.32 before modification to 12.67 ± 1.62 after modification.

The results of the Wilcoxon Signed-Rank Test showed that all parameters had a significance level of $p < 0.001$, with Z-values of -5.9955 for color, -5.711 for aroma, -5.990 for clarity, and -6.197 for the total score. This indicates that there were significant differences between before and after modification for all organoleptic test parameters. Data analysis for the acceptability test was conducted using SPSS software, employing a descriptive frequency method on 55 respondents. Responses were measured using a 5-point Likert scale: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), and Strongly Agree (SA).

Table 4. Wilcoxon Signed-Rank Tes

Variabel	N	Min	Max	Mean	Std. Deviation
Total Question	55	29	65	53,60	7,276

Based on the results of the analysis using SPSS, descriptive statistics were obtained for the total number of items in the acceptability test, with a sample size of 55 respondents. The minimum score was 29.00, the maximum score was 65.00, with a mean of 53.60 and a standard deviation of 7.27. Based on the scoring scale, these scores fall into the “good” category. The relatively small standard deviation (SD = 7.27) with a mean of 53.60 on a scale of 13–65 indicates that respondents’ ratings were homogeneous and not widely dispersed, suggesting consistent positive perceptions among respondents.

For the 13 assessment questions, the majority of respondents rated their responses in the Agree (A) and Strongly Agree (SS) categories. The highest percentage was found in question 13 at 90.9% (I am confident that consuming this tea bag is safe), while the lowest was in question 6 at 58.2% (the serving method is appropriate for someone with hypertension), though it still falls within the positive category. The characteristics of the respondents in this study indicate that the majority were women (58.2%) and were in the age group over 50 years (90.9%). This reflects the common epidemiological pattern of hypertension in the general population, where prevalence increases with age. In the field of Hypertension Epidemiology, advancing age is associated with a decrease in vascular elasticity, increased peripheral resistance, and structural changes in blood vessels that contribute to elevated blood pressure (Connelly et al., 2021). Additionally, in postmenopausal women, a decline in estrogen levels which plays a role in maintaining endothelial function increases the risk of hypertension (Somani et al., 2026).

The prevalence of hypertension lasting more than 5 years among respondents indicates that hypertension is a chronic condition requiring long-term management (Safety, 2026). This is supported by Chowdhury et al., 2025, who state that patients with chronic hypertension tend to require ongoing

therapy and often seek additional treatments such as herbal remedies. Additionally, the study results also indicate that the majority of respondents take the antihypertensive medication amlodipine, which belongs to the calcium channel blocker class and is commonly prescribed due to its effectiveness in lowering blood pressure and its favorable safety profile (Wang et al., 2023).

Based on the research results, modifying the formulation of a scientific herbal remedy for hypertension from dried crude drug to a tea bag made of biodegradable corn fiber had a significant effect on all organoleptic parameters tested. The results of the Wilcoxon statistical test showed a significance level of $p < 0.001$ for the parameters of color, aroma, clarity, and total score, confirming that this change in formulation is not merely physical but an improvement in the formulation's aesthetic quality and acceptability in the eyes of the panelists. The increase in average scores indicates that the use of corn fiber tea bags is effective in filtering out coarse particles of the crude drug, which typically make traditional infusions appear cloudy and unappealing. Technically, the pores in the biodegradable corn fiber material allow the extraction of active compounds to proceed optimally while retaining solid residues within the bag. As a result, the resulting infusion is significantly clearer and has a more uniform color compared to conventional herbal infusion methods, which often leave behind sediment or plant fragments (Activity & Zea, 2018).

Regarding the aroma parameter, there was a significant increase in the score from 2.45 ± 1.03 to 4.09 ± 0.84 . This increase is likely influenced by the modification of the herbal material's particle size during its conversion into tea bags. Reducing particle size or arranging the material within the tea bag increases the surface area in contact with the solvent (hot water), allowing essential oils and aromatic compounds in the herbal mixture to be released more easily and detected by the sense of smell. Additionally, the use of food-grade corn fiber material with minimal synthetic odor helps preserve the original aroma profile of the medicinal plant without interference from the packaging material itself (Teknologi et al., 2018). Overall, the nearly twofold increase in the total organoleptic score (from 7.27 ± 2.32 to 12.67 ± 1.62) reflects the success of the formulation modification in improving patient acceptability. This improvement indicates that modifying the dosage form from dried crude drug to tea bags enhances the physical characteristics of the infusion. The more appealing color and higher clarity are likely due to the natural filtration process through the tea bag, which retains coarse particles, resulting in a clearer infusion. Additionally, the powdered form in the tea bag allows for more optimal extraction of active and volatile compounds, thereby enhancing the infusion's aroma (Romadhoni et al., 2024).

Scientifically, this improvement in organoleptic quality indicates that formulation design impacts not only practicality but also the sensory quality of the product. This is significant because organoleptic characteristics are a primary factor influencing respondents' adherence to and sustained consumption of herbal products. In the context of scientific herbal medicine, patients' psychological perceptions of a formulation's appearance and scent are crucial; formulations that appear clean, practical, and have a soothing aroma tend to improve medication adherence. Thus, the modification into this biodegradable tea bag form is not only superior in terms of environmental friendliness but also significantly improves the physical quality of the formulation, making it more modern and acceptable to the general public. The acceptance test analysis used a 5-point Likert scale for 13 questions covering aspects of color, aroma, taste, clarity, ease of preparation, practicality, ease of consumption, suitability for people with hypertension, and intention to consume regularly. The analysis results showed a total average acceptability score of 53.60 (SD = 7.27) on a scale ranging from a minimum of 29.00 to a maximum of 65.00. Based on the scoring categories, this score falls into the "good" category. For the 13 evaluation questions, the majority of respondents rated their responses in the 'Agree' (A) and 'Strongly Agree' (SA) categories. Not a single question had a mode in the 'Strongly Disagree' or 'Disagree' categories, indicating an overall very high level of acceptance.

This high level of acceptance can be interpreted through several dimensions. First, in terms of practicality, the tea bag formulation eliminates all procedural barriers that have long been the main reason for low compliance with the consumption of herbal crude drugs: no special pot is required, there is no lengthy boiling process, there is no risk of contamination from improper storage of crude drugs, and there are no residues that need to be strained. The preparation process requires only hot water and a cup, which can be done anywhere and anytime. Second, regarding product consistency, the standardized composition in each tea bag ensures that the dose of active compounds consumed with each brewing is

consistent, unlike boiled herbal decoctions, whose quality is highly dependent on the amount of water, boiling time, and the varying quality of raw materials.

Yundari's (2021) study on the production of celery leaf tea bags with stevia substitution as an antihypertensive beverage found that the optimal formula received positive organoleptic ratings from panelists, concluding that the tea bag format significantly enhances the acceptability of antihypertensive herbal preparations compared to conventional formulations. These findings align with the results of this study, in which the acceptability of scientific herbal tea bags was rated as "good" by the majority of respondents. Cahyaningtyas's (2025) study, published in the *Journal of Sustainable Agroindustry*, on the sensory characteristics of meniran tea bags with added stevia and mint found that optimizing herbal tea bag formulas involving multiple types of crude drugs yields higher hedonic scores compared to infusions of single crude drugs, as the combination of aromatic compounds from multiple plants creates a more complex and pleasant flavor and aroma profile. This supports the rationale for developing a six-herb combination formula in this study. The relatively small standard deviation (SD = 7.27) with a mean of 53.60 on a 13–65 scale indicates that respondents' evaluations were homogeneous and not widely dispersed, suggesting consistent positive perceptions among respondents. This is methodologically important because it suggests that the results of this acceptability test can be generalized to a broader population with similar characteristics.

CONCLUSION

Based on the results of a study conducted on the development of a modified herbal tea blend for high blood pressure using organoleptic testing and patient acceptance among hypertensive patients at the Pengasih II Community Health Center in Kulon Progo Regency, the following conclusions can be drawn: Modifying the formulation from dried herbal materials into herbal tea bags made of biodegradable corn fiber significantly improved all organoleptic parameters ($p < 0.001$) based on the Wilcoxon Signed Rank Test. The nearly twofold increase in the total score reflects the success of the modification in improving sensory quality. The corn fiber bags effectively filter out coarse particles, resulting in a clearer infusion, a more homogeneous color, and a stronger aroma due to more optimal extraction of active compounds. The scientific herbal tea bag formulation for hypertension has a good level of acceptability among hypertensive patients. The average total acceptability score reached 53.60 out of a maximum score of 65.00, which falls into the "good" category. These results indicate that modifying the formulation into tea bags significantly improves patient acceptance compared to dried herbal materials, which are considered less practical and less hygienic. Overall, this study demonstrates that the scientific approach to herbal medicine through formulation engineering (from dried herbal materials to tea bags) can address the main weaknesses of traditional herbal formulas, namely low sensory quality, inconsistency, and lack of practicality. The scientific herbal tea bag formulation for hypertension has great potential to become a complementary therapy alternative that is better suited to the needs of modern society and hypertensive patients in Kulon Progo.

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