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Health Education on The Benefits of Rosella Flower Tea Improves Knowledge, Behavior and Blood Pressure.

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ABSTRACT

Hypertension is a non-communicable disease whose prevalence continues to increase and is often not recognized by sufferers, thus causing the risk of serious complications. This research method uses a descriptive exploratory approach by comparing the knowledge, behavior and blood pressure of Tera exercise participants before and after being educated about the benefits and how to make rosella flower tea (*Hibiscus sabdariffa*). Respondents in this study were 25 Tera exercise participants, selected by accidental sampling. The results of the activity showed an increase in knowledge in the good category from 20.0% to 52.0%, an increase in behavior in the good category from 8.0% to 80.0%, and an increase in blood pressure in the normal category from 8.0% to 36.0%. The conclusion of this activity shows that respondents' knowledge about complementary therapy of rosella flower tea to improve knowledge, behavior, and help control blood pressure in the group that regularly performs Tera Gymnastics.

Keywords: hypertension, rosella flower tea, complementary therapy

Background

Hypertension is often referred to as a silent killer because many cases do not cause symptoms for a long time but can cause serious complications in organs such as the heart, brain, and kidneys(1). Efforts to control hypertension can be done through pharmacological and non-pharmacological therapies. One non-pharmacological approach that can be applied is herbal-based complementary therapy, which is relatively safe, easily accessible, and can be done independently by the community. However, herbal therapy requires consistency and a considerable amount of time to show optimal results (2). The World Health Organization (WHO) states that approximately 1.13 billion people with hypertension are added each year. WHO estimates that by 2025, 1.5 billion people will be living with hypertension, with mortality rates due to hypertension and its complications exceeding 10 million lives per year (3). Other data indicate that in 2021, approximately 1.28 billion adults aged 30-79 worldwide will suffer from hypertension, with the majority living in low- and middle-income countries (4). This situation shows that hypertension is a global health issue that requires comprehensive efforts to address it.

The Tera exercise group was chosen as a partner for this activity because it has a high vulnerability to non-communicable diseases, particularly hypertension, which is influenced by age, physiological changes, and lifestyle. Based on preliminary assessments and interviews with several members, it was found that awareness of the need for regular health checkups at community health centers (Puskesmas) and integrated health service posts (Posyandu) is still relatively low. This is due to limitations in distance, time, and the perception that health checkups are only necessary when experiencing severe complaints. In addition, unhealthy lifestyle tendencies, such as uncontrolled eating patterns and lack of health monitoring, contribute to the emergence of various health problems, especially hypertension. From the initial interviews with 10 members of the Tera exercise group, it was found that 6 people complained of mild to chronic health disorders such as hypertension, and 3 people had a history of diabetes mellitus. The interviews also showed that the members' knowledge of hypertension was still limited, both in terms of understanding, risk factors, and prevention and control efforts.

One herbal plant with potential for use is rosella flower (*Hibiscus sabdariffa*). Rosella is known to have various health benefits, including helping to lower blood pressure, blood sugar, and cholesterol levels, as well as acting as a natural antioxidant and diuretic. The flavonoids, vitamin C, niacin, and calcium content in rosella flowers play a role in increasing blood vessel elasticity, causing vasodilation, and improving blood flow, thereby contributing to a decrease in blood pressure (2). Several studies support the effectiveness of rosella flower tea in lowering blood pressure. Research Results show 18 respondents over 7 days with a dosage of 10 grams of rosella flowers and 200 ml of water showed a decrease in systolic blood pressure from 166 mmHg to 150 mmHg and diastolic blood pressure from 93 mmHg to 88 mmHg (5). The Pariaman Community Health Center area with 18 respondents over 10 days showed a decrease in systolic blood pressure from 153 mmHg to 136 mmHg and diastolic blood pressure from 93 mmHg to 82 mmHg. These results indicate that rosella flower tea has a significant effect in helping to control blood pressure (6). On the other hand, partner regions have great potential in utilizing Family Medicinal Plants that grow in home gardens, including rosella plants. However, this potential has not been optimally utilized due to the community's limited knowledge and skills in processing and utilizing them as complementary therapy. Rosella flower tea is used as a complementary therapy that functions as an adjunct to medical therapy, not as a substitute for pharmacological treatment (7). Therefore, an educational, applicable, and sustainable community nursing approach is needed to address hypertension in the exercise therapy group. This intervention aims to increase the knowledge, awareness, and independence of partners in implementing a healthy lifestyle, particularly through the independent use of herbal plants. Although various studies have shown the effectiveness of rosella flower tea in lowering blood pressure, its use as a complementary therapy based on nursing education at the community level, particularly in the senam tera group, is still not optimal. Additionally, this activity is expected to strengthen community participation in sustainable promotive and preventive efforts, thereby creating a healthier and more independent community.

Methods

The research method uses a descriptive approach, which aims to describe and evaluate changes in knowledge, behavior, and blood pressure conditions of the community after being given an intervention in the form of health education and the application of complementary therapy of rosella flower tea (*Hibiscus Sabdariffa*) for hypertension. This community service activity was carried out in the Sukorejo Tera Gymnastics training group. The number of respondents was 25 Tera Gymnastics participants, taken by accidental sampling. The implementation of the study by comparing the values of knowledge, behavior and blood pressure of respondents before and after the implementation of education on the application of complementary therapy before and after the education was carried out. The instrument used to assess knowledge and behavior was a questionnaire, while measuring blood pressure using a calibrated tensiometer.

Results

The results of this study show changes in the distribution of the three main variables observed, namely the participants' level of knowledge about hypertension and herbal plants, their behavior in consuming rosella flower tea as a complementary therapy, and their blood pressure categories before and after the intervention. Descriptive analysis was performed on 25 participants who took part in a series of health education and guidance on rosella flower tea consumption for one week. Measurements were taken at two points in time, namely before the intervention (pre-test) and after the intervention (post-test), thus enabling observation of the dynamics of change that occurred during that period. In the initial measurement, the distribution of participants' knowledge level about hypertension showed that most were still in the adequate and poor categories. Only 20.0% of participants were in the good category for hypertension, while 48.0% were in the adequate category and 32.0% were in the poor category. This indicates that more than half of the participants had not yet achieved an optimal level of understanding regarding the definition of hypertension, risk factors, complications, and blood pressure control strategies. This condition reflects that there is considerable room for improvement in health literacy among the target group.

A similar pattern was also seen in knowledge about herbal plants as complementary therapy. The proportion of the good category in this aspect was even lower, at 16.0%, with the adequate category at

44.0% and the poor category at 40.0%. This distribution shows that before the intervention was carried out, participants' understanding of the use of herbal plants, including rosella flower tea, was still limited. The majority of participants did not fully understand how to use herbal plants, their potential benefits, or the role of complementary therapy as an adjunct to medical treatment in controlling hypertension. After receiving health education through lectures, interactive discussions, and leaflets containing information about hypertension and rosella flower tea as a complementary therapy, there was a change in the distribution of knowledge levels. The proportion of participants in the good category increased significantly in both aspects measured. In terms of knowledge about hypertension, the good category increased to 52.0%, while the adequate category became 36.0% and the poor category decreased to 12.0%. A similar increase was seen in knowledge about herbal plants, where the good category increased to 56.0%, the adequate category became 32.0%, and the poor category decreased to 12.0%.

This change in distribution indicates a dominant shift from the adequate and poor categories to the good category after the intervention. The statistically significant decrease in the proportion of the poor category indicates that most participants who previously had a low level of understanding experienced an improvement in the final measurement. Overall, these results illustrate a change in participants' cognitive achievement during the one-week intervention period, with a tendency toward improvement in both domains of knowledge observed.

Table 1. Distribution of Participants' Knowledge Levels about Hypertension and Herbal Plants Before and After Education

Knowledge Level	Before (n)	Before (%)	After (n)	After (%)
Hypertension				
Good	5	20.0	13	52.0
Fair	12	48.0	9	36.0
Less	8	32.0	3	12.0%
Herbal Plants				
Good	4	16.0%	14	56.0%
Fair	11	44.0	8	32.0
Less	10	40.0	3	12.0
Total	25	100%	25	100

In addition to changes in knowledge, the results of the study also showed changes in rosella flower tea consumption behavior. Before the intervention, the majority of participants were in the poor behavior category (52.0%), the adequate category was 40.0%, and the good category was only 8.0%. This condition shows that in the early stages, the application of complementary therapy was not yet consistent and had not become part of the participants' health habits. After one week of guidance and monitoring of rosella flower tea consumption, the distribution of behaviors showed a significant change. The good category increased to 80.0%, while the poor category decreased to 4.0%. This change indicates a shift in behavioral tendencies from an inconsistent pattern to a more regular pattern in line with the intervention recommendations.

Table 2. Distribution of Rosella Flower Tea Consumption Behavior Among Participants

Behavior Category	Before (n)	Before (%)	After (n)	After (%)
Good	2	8.0	20	80.0
Fair	10	40.0	4	16.0
Less	13	52.0	1	4.0
Total	25	100%	25	100

In clinical terms, blood pressure measurements prior to intervention showed that most participants

were in the prehypertension category (28.0%) and stage 1 hypertension (32.0%), with stage 2 hypertension (24.0%) and hypertensive crisis (8.0%) also still present. The proportion of normal blood pressure at the initial measurement was relatively low, at 8.0%. This distribution illustrates that the majority of participants were in the blood pressure spectrum that required further control. After one week of intervention in the form of health education and consumption of rosella flower tea, there was a change in the distribution of blood pressure categories. The proportion of normal blood pressure increased to 36.0%, the prehypertension category to 40.0%, and stage 1 hypertension decreased to 24.0%. In addition, the stage 2 hypertension and hypertensive crisis categories were no longer found in the final measurement. This shift indicates a change in blood pressure categories towards lower levels after the intervention period.

Table 3. Distribution of Blood Pressure Categories Among Participants

Blood Pressure Category	Before (n)	Before (%)	After (n)	After (%)
Normal	2	8.0%	9	36.0
Prehypertension	7	28.0	10	40.0
Stage 1 Hypertension	8	32.0	6	24
Stage 2 Hypertension	6	24.0	0	0
Hypertensive crisis	2	8.0%	0	0.0%
Total	25	100%	25	100

Overall, findings in the clinical aspect show changes in the distribution pattern of participants' blood pressure after the intervention period. The shift in proportion from the higher hypertension category to the lower category and the increase in the proportion of normal blood pressure indicate physiological response dynamics during the observation period. Although the analysis presented in this study is descriptive, these changes in distribution provide an initial picture of the possible contribution of health education interventions and the application of complementary therapies in the process of controlling blood pressure in the target group. The consistent pattern of change between knowledge, behavior, and blood pressure categories shows a tendency for a relationship between increased understanding, behavioral change, and the clinical condition of participants during the study period.

Discussion

Participants' Knowledge

The increase in the distribution of participants' knowledge after the health education intervention indicates a change in the cognitive dimension that forms the foundation of health behavior. Before the intervention, the proportion of participants with good knowledge was relatively low, both in terms of hypertension and the use of herbal plants as complementary therapy. This condition can be understood as a reflection of limited health literacy, not only includes the ability to read health information, but also the capacity to understand, evaluate, and apply this information in decision making. Low health literacy has the potential to limit an individual's ability to identify risk factors, understand the long-term consequences of hypertension, and choose rational control strategies (8). Hypertension is known as a silent disease, which often does not cause significant symptoms in its early stages. In the perspective of the Health Belief Model, low knowledge can reduce perceived susceptibility and perceived severity of the disease. Individuals who do not understand the risks of complications such as stroke, kidney failure, or coronary heart disease tend to have low motivation to take preventive measures. Therefore, the increase in knowledge that occurred after the intervention not only represented a change in the distribution of categories but also indicated a potential change in the participants' perception of risk (9).

The educational strategies used in this study, including lectures, interactive discussions, and leaflets, reflect the adult learning (andragogy) approach as. In this theory, adults learn more effectively when the material is related to their life experiences, is problem-centered, and is relevant to their real needs(10). Interactive discussions allowed participants to relate information about hypertension to their personal experiences or those of family members, making the process of internalizing knowledge more

meaningful. Meanwhile, the use of leaflets as visual and written media served as cognitive enhancers that could improve information retention(11).

The increase in the knowledge category after the intervention shows that this multimodal approach is able to facilitate learning that is not only informative but also transformative. In the framework of critical health literacy, increased knowledge enables individuals to not only understand basic information but also begin to develop the capacity to evaluate treatment options, including herbal-based complementary therapies. With a better understanding of the benefits and mechanisms of rosella flower tea, participants have a rational basis for deciding to use it as part of their blood pressure control strategy. Furthermore, in the context of health behavior theory, increased knowledge acts as a cue to action, which is a trigger that encourages individuals to take action. Information about the risks of hypertension and the benefits of complementary therapies can reinforce perceived benefits and reduce perceived barriers to behavioral change (12). Thus, the changes in knowledge distribution observed in this study can be positioned as the initial stage in a broader process of health behavior change.

These findings are in line with previous studies showing that structured educational interventions contribute significantly to increasing knowledge and health literacy in patients with chronic diseases. However, it is conceptually important to emphasize that increased knowledge does not automatically guarantee sustainable behavioral change. Knowledge is an important prerequisite, but long-term effectiveness still depends on the integration of motivational factors, social support, and consistent reinforcement of behavior. Thus, the increase in knowledge found in this study can be understood as an early indicator of the strengthening of participants' cognitive capacity in managing hypertension. Health education does not only function as a transfer of information, but as an empowerment process that strengthens individuals' ability to make more rational and responsible health decisions.

Rosella Flower Tea Consumption Behavior

Changes in the distribution of rosella flower tea consumption behavior after the intervention indicate a transformation in the participants' health practices. Before the intervention, most participants did not consistently consume rosella flower tea as part of their blood pressure control efforts. This condition reflects that although some participants may have been aware of herbal therapies, this knowledge had not been internalized into sustainable real actions. In the context of health behavior, the gap between knowing and doing is a common phenomenon.

After receiving education and guidance, the proportion of participants in the good behavior category increased substantially. This change shows that the intervention not only had an impact on the cognitive aspect but was also able to influence the conative dimension or tendency to act. Within the framework of the Health Belief Model, this behavioral change can be explained by an increase in perceived benefits and a strengthening of perceived susceptibility to the risk of hypertension. When participants understand the long-term consequences of hypertension and the potential benefits of rosella flower tea in helping to control blood pressure, perceptual barriers to consumption practices tend to decrease. The information obtained during education serves as a cue to action that encourages more adaptive health behaviors.

In addition, these findings can also be analyzed through the Theory of Planned Behavior, which emphasizes that behavior is influenced by intention, which in turn is shaped by attitudes toward behavior, subjective norms, and perceived behavioral control (13). Health education has the potential to shape positive attitudes towards rosella flower tea consumption, while assistance and monitoring during the intervention can increase participants' perceived behavioral control in consistently applying these habits. When individuals feel capable and confident in performing an action, the likelihood of maintaining that behavior becomes greater. The support provided during the intervention period is also relevant in the perspective of Social Cognitive Theory (14). This theory emphasizes the importance of the interaction between personal, environmental, and behavioral factors (reciprocal determinism). Support and monitoring for one week serve as external reinforcement that helps participants build new habits. The process of observation, feedback, and social support in a group context can increase self-efficacy, which is an individual's belief in their ability to perform certain behaviors consistently. Increased self-efficacy is an important determinant in the sustainability of health behaviors.

Thus, the change in rosella flower tea consumption behavior in this study cannot be understood solely as a linear consequence of increased knowledge. Instead, this change is the result of a complex interaction between cognitive factors (knowledge and perception), motivational factors (intentions and

attitudes), and environmental factors (support and guidance).

The integration of education and monitoring acts as a reinforcing mechanism that bridges the gap between knowledge and practice. However, it is important to note that the sustainability of behavior after the intervention period ends cannot yet be ascertained. In many community health interventions, short-term behavioral changes are often influenced by the intensity of guidance (15). Therefore, long-term evaluation is needed to assess whether the habit of consuming rosella flower tea can be maintained independently without intensive external support. Considering these aspects, the findings of this study provide preliminary indications that an educational approach combined with mentoring has the potential to encourage health behavior change in communities at risk of hypertension.

Blood Pressure Categories

Changes in the distribution of blood pressure categories after the intervention period showed a tendency to shift toward clinically lower categories. Before the intervention, the majority of participants were in the prehypertension to advanced hypertension range, and there were even cases of hypertensive crisis that were clinically at risk for acute cardiovascular events. This initial composition illustrates that the target group was at significant risk, making blood pressure control interventions highly relevant. After one week of intervention, the proportion of participants with normal blood pressure increased proportionally, while stage 2 hypertension and hypertensive crisis categories were no longer found. This shift indicates the dynamics of clinical parameter changes during the observation period. Descriptively, this pattern indicates an improvement in blood pressure distribution at the small population level studied. However, these changes need to be analyzed carefully, considering the various mechanisms that may contribute to them.

Physiologically, rosella flower tea (*Hibiscus sabdariffa*) is known to contain bioactive compounds such as anthocyanins, flavonoids, and organic acids that have potential antihypertensive effects. Several experimental studies have shown that these components can play a role in improving endothelial function, stimulating vasodilation through the nitric oxide pathway, and providing a mild diuretic effect that contributes to a decrease in systolic and diastolic blood pressure (6). This mechanism theoretically supports the possibility of blood pressure improvement after regular consumption over a certain period. However, changes in blood pressure categories in this study cannot be solely attributed to the pharmacological effects of rosella flower tea. In the context of health behavior, increased knowledge and risk awareness may encourage participants to make additional lifestyle modifications, such as reducing salt intake, increasing light physical activity, or adhering to previously prescribed medical treatment. Within the framework of Social Cognitive Theory, individual behavioral change is the result of interactions between personal factors (knowledge and self-efficacy), environmental factors (group support), and the behavior it self (14). Thus, the shift in blood pressure is likely the result of multifactorial interactions, not a single effect of herbal intervention.

Furthermore, from a biopsychosocial perspective, health education also has the potential to reduce participants' anxiety levels related to their hypertension. Reduced psychological stress can contribute to blood pressure stabilization through neuroendocrine mechanisms (5). Factors such as the Hawthorne effect, where participants exhibit behavioral changes because they feel they are being observed, also need to be considered as possible contributors to the observed changes. The shift in blood pressure distribution found in this study is descriptive and has not been supported by inferential analysis comparing the statistical significance of changes before and after the intervention. Furthermore, the relatively short duration of the intervention and the absence of a control group limit the ability to draw strong causal conclusions. Therefore, these results are best positioned as preliminary indications of the potential benefits of integrating health education and complementary therapies into community-based blood pressure control. Considering these aspects, the findings of this study contribute to the discourse on hypertension management through an integrative approach, which focuses not only on pharmacological therapy but also on strengthening health literacy, behavioral change, and the rational and controlled use of complementary therapies. Further research with a stronger experimental design, a longer follow-up period, and additional biomarker measurements is needed to strengthen the validity of the findings and ensure the sustainability of the observed clinical effects.

Conclusions and Recommendations

Based on the research results, interventions that integrate health education on hypertension and the use of herbal plants with the application of rosella flower tea complementary therapy show positive changes in the participants' knowledge, behavior, and blood pressure categories. The increase in the distribution of knowledge categories in both hypertension and herbal plants indicates an increase in participants' health literacy after the education process. These changes were followed by an increase in the consistent consumption of rosella flower tea. This shows that the intervention not only had an impact on the cognitive dimension but was also associated with changes in more adaptive health practices. The integration of education and mentoring may have played a role in strengthening the participants' motivation and compliance in applying complementary therapy.

Clinically, there was a shift in the distribution of blood pressure categories toward lower levels, marked by an increase in the proportion of normal blood pressure and the absence of stage 2 hypertension and hypertensive crisis in the final measurement. Although these findings are descriptive and need to be interpreted considering the limitations of the study design and intervention duration, the results provide preliminary indications that an integrative approach based on education and complementary therapy has the potential to support blood pressure control efforts at the community level. Overall, this study emphasizes the importance of integrating health literacy improvement, behavior reinforcement, and the rational use of complementary therapies into promotive and preventive strategies for hypertension control in the community.

The implications of these research results cover several aspects at the individual, health service, community program, and research development levels. At the community level, especially for individuals with hypertension, the findings of this study emphasize the importance of implementing a sustainable healthy lifestyle, routine blood pressure monitoring, and the rational use of herbal complementary therapies as a complement to medical treatment. Improved health literacy gained through education can be the basis for more independent and informed health decision-making. At the healthcare provider level, the results of this study underscore the strategic role of health promotion and education in managing hypertension in the community. Integrating information on the safe and evidence-based use of herbal plants can be part of a comprehensive educational approach. This approach not only strengthens patients' understanding of pharmacological therapy but also provides complementary alternatives that remain within the framework of controlled and responsible health practices.

In the context of public health programs, these findings indicate that community-based education and assistance activities have the potential to support increased knowledge, behavioral change, and improved health indicators. The systematic continuation of similar programs can contribute to strengthening promotional and preventive strategies in controlling hypertension at the population level. In terms of research development, the results obtained in this study open up opportunities for further exploration with a stronger research design. The use of longer intervention durations, larger sample sizes, and the application of experimental designs with control groups can provide a more comprehensive understanding of the effectiveness of rosella flower tea complementary therapy in blood pressure control. This approach also allows for the evaluation of the sustainability of behavioral changes and clinical impacts over a longer period of time.

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