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The Effectiveness Of Health Education On Public Perception and Knowledge Regarding The Use Of Garlic Extract To Lower Cholesterol in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024

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Abstract. *This study aims to evaluate effectiveness of health education on public perception and knowledge regarding the use of garlic extract to reduce cholesterol in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024. This research uses a quasi-experimental design with a pretest-posttest approach. Data was collected from the community in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024 through questionnaires before and after being given health education. Before education, 62% of respondents had moderate knowledge; After education, 64% of respondents had high knowledge about the use of garlic extract to lower cholesterol. Before education, 60% of respondents had a moderate perception; After education, 62% of respondents showed an increase in perception to high perception. Before education, 38% of respondents had little experience, after education, 98% of respondents had good experience regarding the use of garlic extract to lower cholesterol. Before education, the majority of respondents (60%) had a secondary education level. After education, the proportion of respondents with a secondary education level remained stable at 60%. Before education, 40% of respondents felt a high cultural influence regarding the use of garlic extract. After education, this figure increases to 70%. The health education provided is effective in increasing public knowledge and perception regarding the use of garlic extract to lower cholesterol.*

Keywords : *Cholesterol, Education, Perception, Garlic, Knowledge*

1. INTRODUCTION

The prevalence of hypercholesterolemia in Timor-Leste is estimated to be around 7.1% for high total cholesterol (TC) and 7.5% for high low-density lipoprotein cholesterol (LDL-C) based on a cross-sectional study analyzing data from 35 low- and middle-income countries , including Timor-Leste (Marcus et al., 2021). A recent report from WHO highlights increasing attention to non-communicable diseases (NCDs) such as hypertension and diabetes, which are often closely associated with dyslipidemia including hypercholesterolemia. Ongoing health initiatives seek to increase awareness and management of this condition in (WHO, 2019).

In Aileu District, although specific data regarding the prevalence of hypercholesterolemia are not yet available, it can be assumed that this condition also represents a significant health challenge. Aileu District, like other regions in Timor-Leste, may have a prevalence of hypercholesterolemia that is in line with national data, where approximately 7.1% of the population has high total cholesterol (TC) and 7.5% has high low-density lipoprotein cholesterol (LDL- C). In areas like Aileu, where cholesterol screening and treatment facilities are limited, people tend to have limited knowledge about the risks of high

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cholesterol and how to manage it effectively. found that only about 43% of individuals with high total cholesterol (TC) and 47% of those with high LDL-C cholesterol had undergone cholesterol screening before the survey was conducted. Additionally, only 31% to 36% of these individuals are aware of their diagnosis. This shows that the level of screening and public awareness of hypercholesterolemia is still very low (Marcus et al., 2021).

The data above shows that the significant prevalence of hypercholesterolemia is largely due to the low level of public knowledge about the importance of maintaining cholesterol levels in the body. The lack of adequate information about cholesterol, including the difference between "good" (HDL) and "bad" (LDL) cholesterol, and its impact on cardiovascular health, also contributes to the high rate of hypercholesterolemia sufferers. Apart from that, public understanding of prevention methods through healthy eating patterns and sufficient physical activity is still limited. In areas like Aileu, where access to health services is often limited, ongoing, community-based education is critical. Increasing public knowledge about cholesterol management, including the benefits of using garlic extract as a natural method for lowering cholesterol, can be a strategic step in efforts to prevent cardiovascular disease.

Garlic (Allium sativum) is known to have a number of bioactive compounds that contribute to its various health benefits, especially in lowering cholesterol. One of the most significant main components is allicin. Allicin is formed when fresh garlic is cut or crushed, and is the sulfur compound responsible for many of garlic's pharmacological effects. Allicin has the ability to inhibit enzymes involved in cholesterol synthesis, so it can help reduce cholesterol levels in the blood. In addition, allicin also has strong antioxidant properties, which protect cells from oxidative damage that can trigger various cardiovascular diseases (Yijie Gao, Baofu Wang, Gaofeng Qin, Shichao Liang, Jiajie Yin, Hong Jiang, 2024 ; Ansary et al., 2020).

A number of studies have examined the effectiveness of garlic extract in lowering cholesterol levels. Meta-analyses and systematic reviews show that garlic consumption, especially in standard supplement forms such as garlic powder or aged garlic extract, can significantly reduce total and LDL cholesterol (“bad” cholesterol). For example, one study found that supplementation with 900 mg of garlic extract per day for 12 weeks was able to significantly reduce LDL levels in individuals with high cholesterol (Sharifi-Rad et al., 2019).

Public perception of the use of garlic as a cholesterol-lowering therapy is often based on incomplete information or myths circulating in the community. Some studies show that although garlic has a cholesterol-lowering effect, this effect is not as strong as pharmaceutical drugs such as statins, and this may give rise to skepticism or unrealistic expectations among the public (Nelson, 2022). Health education is a key intervention in increasing public

knowledge and changing perceptions regarding the use of herbal therapies, including garlic extract. Effective education can help overcome misconceptions and myths that may hinder the use of therapies that are actually beneficial. For example, educational campaigns explaining the mechanism of action of garlic in lowering cholesterol can increase people's acceptance and trust in this therapy, especially if it is delivered in a context that is relevant to their daily experiences (Nelson, 2022 ; Lee et al., 2021).

In Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024, an effective health education approach must take into account local culture and the socio-economic conditions of the community. Community-based approaches, where education is provided through community leaders, local health workers, and easily accessible media such as radio or group meetings, tend to be more successful. In addition, because many Timor Leste residents live in rural areas with limited access to health facilities, education programs must be designed to reach these areas (Lee et al., 2021 ; WHO, 2019).

Likewise, based on the USAID Timor-Leste Reinforce Basic Health Service Activity report, community-based health education has proven to be important in increasing public awareness about healthy behavior in Covalima. This community intervention was successful in improving community understanding regarding maternal and child health, although challenges such as limited access to health information remain (USAID, 2020).

Based on the data explained above, researchers want to know the effectiveness of community-based health education programs in increasing the knowledge and perception of the Covalima community regarding the management of hypercholesterolemia, especially through the use of garlic extract as a natural method for lowering cholesterol. It is hoped that this research will provide insight into the impact of health education on preventive behavior change in preventing cardiovascular disease in areas with limited health access.

2. LITERATURE REVIEW

Cholesterol

Cholesterol is a waxy substance that is present throughout the body. Cholesterol is not “bad” unless you have too much of it. Your body needs it to build cells and make vitamins and other hormones. But too much cholesterol can cause problems (AHA, 2022). Cholesterol comes from two sources. Your liver makes all the cholesterol you need. The rest of the cholesterol in your body comes from foods of animal origin. For example, meat, poultry, and dairy products all contain dietary cholesterol (AHA, 2022). There are two types of lipoproteins that carry cholesterol to and from cells. One of them is low-density lipoprotein, or LDL. The

other is high-density lipoprotein, or HDL. The test measures the amount of each type of cholesterol through the blood (AHA, 2022).

Low-Density Lipoprotein (LDL) or bad cholesterol is a type of cholesterol that carries cholesterol from the liver to the rest of the body. If LDL levels are too high, this cholesterol can build up on the walls of the arteries, forming plaque that can block blood flow. The LDL level that is considered optimal is less than 100 mg/dL. Levels between 100-129 mg/dL are considered near optimal, while levels of 130-159 mg/dL are considered borderline high. Levels above 160 mg/dL are considered high and risky.

High-Density Lipoprotein (HDL) or good cholesterol is a type of cholesterol that functions to transport cholesterol from parts of the body back to the liver, where it can be broken down and excreted from the body (Fimela, 2023). HDL cholesterol can be considered "good" cholesterol because healthy levels can help protect against heart attacks and strokes. HDL carries LDL (bad) cholesterol away from the arteries and back to the liver, where it is broken down and excreted from the body. But HDL cholesterol does not eliminate LDL cholesterol. Only a small portion of blood cholesterol is carried by HDL (AHA, 2022).

Garlic Extract as a Cholesterol Lowerer

Garlic (Allium sativum) has been widely used in traditional medicine because of its various active compounds. The main active compound in garlic is allicin, which is formed when fresh garlic is cut or crushed. Allicin has significant antioxidant and anti-inflammatory properties, which play a role in garlic's many health benefits (National Center for Complementary and Integrative Health (NCCIH), 2023). Apart from allicin, garlic also contains other sulfur compounds such as diallyl disulfide and s-allyl cysteine. These compounds contribute to the cholesterol-lowering effects of garlic by reducing cholesterol production in the liver and increasing cholesterol degradation in the body (Koprowski, 2023).

Garlic (Allium sativum) has been known to have protective properties against cardiovascular disease. A study conducted by (Valls et al., 2022) investigated the effect of daily consumption of optimized black garlic (ABG) extract with standardized S-allyl-L-cysteine (SAC) content on cardiovascular disease risk factors in individuals with hypercholesterolemia currently. (Valls et al., 2022). The results of the study showed that consumption of ABG extract reduced DBP by an average of 5.85 mmHg in the group of men who had an initial DBP of more than 75 mmHg (Valls et al., 2022). This reduction was significant compared with the placebo group, indicating the potential of ABG in controlling diastolic blood pressure in individuals at cardiovascular risk.

Study was investigating the effect of daily consumption of optimized black garlic (ABG) extract on cardiovascular disease risk factors in subjects with moderate hypercholesterolemia. This study used a randomized, cross-over, double-blind, continuous, and controlled design. In this study, 67 individuals with LDL cholesterol levels ≥115 mg/dL were included. The results showed that consumption of ABG extract for six weeks resulted in a significant reduction in diastolic blood pressure (DBP) especially in men with initial DBP more than 75 mmHg. The mean DBP reduction was 5.85 mmHg compared with placebo, indicating the potential of ABG in controlling diastolic blood pressure in individuals at cardiovascular risk (Valls et al., 2022)

Behavior Change Theory:

Cognitive Learning Theory is an approach that emphasizes the importance of mental processes in understanding, remembering, and using information during learning. This theory focuses on how individuals process information internally and build understanding from their learning experiences. Learning in a cognitive framework is not only seen as a change in behavior, but also as a transformation of the mental structures that underlie thinking and understanding(Cloke, 2024 ; Kurt, n.d.). This theory describes learning as an active process that involves organizing new information and integrating it into existing knowledge. This includes attention, perception, memory, and critical thinking processes that enable individuals to apply knowledge in various contexts (Mukherji., 2023).

In Cognitive Learning Theory, schemas refer to mental structures or frameworks that individuals use to organize and understand information. Schemas can be thought of as thought patterns or blueprints that help individuals categorize and interpret information based on previous experiences. Whenever we learn something new, these schemas help us understand and remember the information more efficiently, because the new information is linked to existing knowledge. Schemas are not static; they continue to develop and be updated as our experience and knowledge increases(Cloke, 2024).

Health education plays a very important role in increasing public knowledge about various health issues. Increase Awareness and Understanding: One of the main goals of health education is to increase public awareness about the importance of health and preventive behavior. For example, health campaigns based on health education principles are often used to increase understanding of the importance of vaccinations, routine health checks, and healthy eating patterns. WHO emphasizes that effective health education can increase public health literacy, which in turn can reduce the incidence of disease and improve quality of life (WHO,

2014). Health education helps reduce uncertainty and anxiety related to the use of medical services, so that people are more likely to seek health care when needed (Rizvi, 2018).

Overall, health education plays a key role in increasing public knowledge about health issues, ultimately contributing to disease prevention, health promotion, and improved quality of life. By facilitating better understanding and encouraging behavior change, health education is one of the main tools in public health promotion.

Hypothesis

a. Hypothesis 1 (H0 and H1)

H0 (Null Hypothesis): Health education is not effective in increasing public perception and knowledge about the use of garlic extract to lower cholesterol in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024.

H1 (Alternative Hypothesis): Health education is effective in increasing public perception and knowledge about the use of garlic extract to lower cholesterol in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024.

b. Hypothesis 2 (H0 and H1)

H0 (Null Hypothesis): There are no significant factors that influence changes in public perception and knowledge regarding the use of garlic extract as an alternative herbal therapy in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024.

H1 (Alternative Hypothesis): There are significant factors, such as age, level of education, previous health experience, and access to information, that influence changes in community perception and knowledge regarding the use of garlic extract as an alternative herbal therapy in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024.

3. METHODS

Research Approach

The design of this research is pre-experimental with a pre-test and post-test approach. This design was chosen to measure changes in people's perceptions and knowledge before and after a health education intervention was delivered, allowing researchers to evaluate the effectiveness of the intervention (Downs, 1990). This design allows for observation of changes in the group receiving the educational intervention without requiring full control, which is often difficult to implement in a field setting. Research Location in Suco Seloi Malere Aldeia

Namanei Posto Administrativo Aileu Municipiu Aileu. This location was chosen as a research location based on several scientific reasons. First, this region has a significant prevalence of high cholesterol among its population, making it an appropriate target for research into the use of herbal therapies such as garlic extract. Second, the level of public knowledge and access to health services is still low, which makes it possible to assess the effectiveness of health education interventions. Third, Aileu District is a rural area with active support from health programs implemented by the government and NGOs, so the potential for collaboration in this research can be more optimal (WHO, 2023 ;USAID, n.d.).

Population & Sample

The population in this study includes adults in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024, who have or are at high risk of high cholesterol (hypercholesterolemia) and cardiovascular disease. Focusing on this population is critical because hypertension and high cholesterol are major health problems that contribute significantly to morbidity and mortality. In pre-experimental research, samples are selected to see the changes that occur in certain groups as a result of the intervention carried out, without a strong control group. This pre-experimental design is generally used in exploratory research or to test the initial effectiveness of an intervention. The selected samples are usually small (around 30-50 people) for the following reasons (Libre Texts, n.d.):

Research Variables

The dependent variables in this study are: (1) Public Perception: Public perception of the use of garlic extract as a therapy to reduce cholesterol was measured before and after the intervention. This includes beliefs about the effectiveness, safety, and acceptability of garlic as part of their health management, (2) Public Knowledge: The level of public knowledge about cholesterol, the risks posed by high cholesterol, and how garlic extract can be used to manage cholesterol levels was measured before and after education. This knowledge includes basic information about cholesterol, the benefits of garlic, as well as how to use it safely and effectively.

The independent variable in this research is Health Education. This is the intervention carried out in the research, namely an educational program given to the public regarding the use of garlic extract as a therapy to lower cholesterol. This education involves providing information through various methods such as lectures, group discussions, and distribution of written educational materials.

Confounding Variables, (1) Personal Experience. Personal experience includes the intensity of direct experience that a person has regarding situations or objects that influence his knowledge, (2) Education. Formal education that an individual has taken is a confounding factor that influences the level of knowledge. The Likert scale is used to measure education level, which is then categorized into Primary (SD/SMP), Intermediate (SMA/SMK), and Higher (College) education.

Data processing

Data processing is the process of transforming raw data that has been collected into meaningful information. This method includes a series of steps to examine, clean, organize and transform data, so that it is ready for further analysis. Good data processing will ensure the validity and reliability of the data and support reliable conclusions.

Univariate analysis is used to describe the characteristics of data on one variable in the study. In this research, univariate analysis aims to provide a general description of the frequency distribution, average value, percentage and characteristics of each research variable, both independent, dependent and confounding variables. Bivariate analysis was used to evaluate the effectiveness of health education on changes in community knowledge and perceptions in Aileu District, Timor Leste.

This bivariate analysis will look at the changes that occur before and after the intervention, as well as the factors that influence these changes. Before carrying out bivariate analysis, a normality test needs to be carried out first to determine the appropriate statistical test. The normality test can be carried out using the Shapiro-Wilk Test: Used for small samples (< 50 respondents). If the p-value from the normality test is greater than 0.05, then the data is normally distributed. Conversely, if the p-value is less than 0.05, then the data is not normally distributed, and non-parametric statistical tests must be used.

4. RESULTS & DISCUSSION

Effectiveness of Health Education on Changes in Public Knowledge

Based on the table below, the results of the Wilcoxon Signed Rank Test, it was found that there was a significant increase in the level of public knowledge regarding the use of garlic extract to lower cholesterol after being provided with education. Analysis shows that 48 respondents experienced an increase in knowledge as reflected in Mean Rank = 24.50 and Sum of Ranks = 1176.00, which indicates that the majority of respondents received positive benefits from the education provided. No respondents experienced a decrease in knowledge (Negative

Ranks = 0), which shows that the education was successful in increasing knowledge without reducing understanding. There were 2 respondents who did not experience changes in knowledge (Ties), which shows that there are variations in receiving information between respondents.

Ranks				
		N	Mean Rank	Sum of Ranks
Level of Knowledge Before Education - Level of Knowledge After Education	Negative Ranks	0[a]	.00	.00
	Positive Ranks	48[b]	24.50	1176.00
	Ties	2[c]		
	Total	50		
a. Level of Knowledge Before Education < Level of Knowledge After Education b. Knowledge Level Before Education > Knowledge Level After Education c. Level of Knowledge Before Education = Level of Knowledge After Education				

The statistical test results show a Z value = -6.741 and p-value = 0.000, which is very significant because p-value < 0.05, indicating that the changes detected between knowledge before and after education are not the result of chance, but real changes. Thus, it can be concluded that the education provided has succeeded in increasing the level of public knowledge regarding the benefits of garlic in lowering cholesterol. The increase in knowledge that occurs shows that a clear and structured information-based educational approach has a big impact in increasing public health awareness.

The data shows that the majority of respondents whose previous knowledge has experienced a significant increase, while respondents who have not experienced a change (Ties) indicate that although the majority of society feels the benefits of education, there are some individuals who may face difficulties in understanding the information or require a more personalized approach. . This is consistent with Cognitive Learning Theory, which states that information delivered in a structured and relevant way can strengthen people's understanding of certain health issues (Cloke, 2024). Overall, the results of the Wilcoxon Signed Rank Test show that structured and evidence-based information-based education has succeeded in increasing public understanding of how to manage cholesterol through the use of garlic extract. With p-value = 0.000, it can be concluded that health education regarding the use of garlic has proven to be very effective in increasing the level of public knowledge and awareness regarding more natural ways to manage health.

Effectiveness of Health Education on Changes in Public Perception

Based on table below of the Wilcoxon Signed Rank Test results, the majority of respondents, namely 48 out of 50, showed an increase in perception regarding the use of garlic extract to lower cholesterol after being given education. The results of the analysis show that Mean Rank = 24.50 and Sum of Ranks = 1176.00, which indicates a significant change in public perception. Only 2 respondents did not experience a change in perception (Ties), and no respondents experienced a decrease in perception (Negative Ranks = 0), which shows that the education provided was successful in changing people's perceptions without causing confusion or decreasing understanding.

Ranks				
		N	Mean Rank	Sum of Ranks
Community Perception Before Education - Community Perception After Educationi	Negative Ranks	0[a]	.00	.00
	Positive Ranks	48[b]	24.50	1176.00
	Ties	2[c]		
	Total	50		
a. Community Perception Before Education < Community Perception After Education b. Community Perception Before Education > Community Perception After Education c. Community Perception Before Education = Community Perception After Education				

Statistically, the Z value = -6.741 and p-value = 0.000 indicate that this change in perception is very significant, because the p-value < 0.05. This indicates that the observed differences between pre- and post-education perceptions are not coincidental, but rather the result of an effective educational intervention. Therefore, it can be concluded that the education provided was successful in increasing public perception regarding the benefits of garlic extract in lowering cholesterol.

The increase in public perception regarding the use of garlic extract to lower cholesterol after education shows that the educational approach provided has succeeded in conveying clear and relevant information regarding the health benefits of garlic. In this context, knowledge-based education that is easy to understand plays a major role in increasing public understanding of garlic as a natural solution for managing cholesterol.

Reducing total cholesterol and LDL cholesterol (bad cholesterol) after consuming garlic has been proven through various studies, which supports the education given to the public about the benefits of garlic for lowering cholesterol (Koprowski, 2023). The education provided is in line with various scientific studies which show that garlic has the potential to lower cholesterol and prevent heart disease. According to (Joe Leech, 2023).

Overall, the results of the Wilcoxon Signed Rank Test show that the education provided regarding the use of garlic extract to lower cholesterol succeeded in significantly increasing public perception. This shows that structured and evidence-based health education can

strengthen public understanding about managing cholesterol in a more natural and effective way. This increased perception supports the use of garlic as part of an accessible and affordable strategy for preventing and managing cholesterol.

Analysis of factors influencing changes in perception and knowledge

a. Experiences Level Factor

Based on table below the results of the Wilcoxon Signed Rank Test, it was found that there was a significant change in people's experiences regarding the use of garlic extract after being given health education. A total of 35 respondents experienced an increase in experience, with Mean Rank = 18.00 and Sum of Ranks = 630.00, which shows that the majority of respondents felt positive benefits from the education provided. No respondents experienced a decrease in experience (Negative Ranks = 0), while the other 15 respondents experienced no change in their experience (Ties). The statistical test results show a value of Z = -5.324 and p-value = 0.000, which is very significant, indicating that the changes that occur in people's experiences are not accidental, but are the result of effective education.

Ranks

		N	Mean Rank	Sum of Ranks
Experience Before Education - Experience After Education	Negative Ranks	0[a]	.00	.00
	Positive Ranks	35[b]	18.00	630.00
	Ties	15[c]		
	Total	50		

a. Experience Before Education < Experience After Education
b. Experience Before Education > Experience After Education
c. Experience Before Education = Experience After Education

The decrease in Negative Ranks and increase in experience for the majority of respondents shows that the education provided not only improves people's knowledge but also their practical experience in using garlic as a natural solution for lowering cholesterol. This is in accordance with the finding that direct experience with a treatment or natural ingredient, after being given clear information, can strengthen people's belief in the benefits of the treatment.

Overall, the results of the Wilcoxon Signed Rank Test show that health education has succeeded in increasing people's experience regarding the use of garlic extract to lower cholesterol. This shows that an evidence-based educational approach and clear information can have a positive impact in changing people's experiences and encouraging them to adopt more effective and affordable natural solutions in managing their health.

b) Education Level Factor

Based on table below the results of the Wilcoxon Signed Rank Test show that there was no significant change in the participants' education level after being given health education. All respondents were recorded in the Ties category, which means that their education level remained the same before and after education. The Z value = 0.000 and p-value = 1.000 indicate that the difference between the level of education before and after education is not statistically significant. These results clearly indicate that changes in education level within one week are unlikely, considering that education level is a relatively stable variable and is not affected by education provided in a short period of time.

Ranks				
		N	Mean Rank	Sum of Ranks
Education Level Before Education - Education Level After Education	Negative Ranks	0[a]	.00	.00
	Positive Ranks	0[b]	.00	.00
	Ties	50[c]		
	Total	50		
a. Education Level Before Education < Education Level After Education				
b. Education Level Before Education > Education Level After Education				
c. Education Level Before Education = Education Level After Education				

Thus, the results of the Wilcoxon test confirm that the level of education, as a demographic variable, is not affected by health education carried out in a short period of time, because formal education takes longer to achieve, and changes in educational status usually occur through a process longer education.

c.) Cultural and Social Environmental Influence Factors

Based on table 4.23, the results of the Wilcoxon Signed Rank Test, it was found that health education had a positive impact on the influence of community culture regarding the use of garlic extract to lower cholesterol. A total of 17 respondents experienced an increase in cultural influence with a Mean Rank = 9.79 and Sum of Ranks = 166.50, which shows that the education provided succeeded in strengthening people's cultural beliefs regarding the benefits of garlic as a natural ingredient for managing cholesterol. Only 1 respondent experienced a decrease in cultural influence (Negative Ranks, Mean Rank = 4.50), indicating that a small portion of respondents may experience difficulty in changing their views, although the majority of respondents perceive positive changes. In addition, there were 32 respondents who did not experience changes in their cultural influence (Ties), which could be caused by differences in individual acceptance of the education provided.

Ranks				
		N	Mean Rank	Sum of Ranks
Cultural Influence Before Education - Cultural Influence After Education	Negative Ranks	1[a]	4.50	4.50
	Positive Ranks	17[b]	9.79	166.50
	Ties	32[c]		
	Total	50		
a. Cultural Influence Before Education < Cultural Influence After Education b. Cultural Influence Before Education > Cultural Influence After Education c. Cultural Influence Before Education = Cultural Influence After Education				

The statistical test results show the Z value = -3.637 and p-value = 0.000, which is very significant. The very small p-value ($p < 0.05$) indicates that this change in cultural influence is not a coincidence, but is a direct result of effective health education. Therefore, it can be concluded that health education plays an important role in strengthening the cultural influence of society which supports the use of garlic extract as a natural solution for lowering cholesterol.

Overall, the results of the Wilcoxon Signed Rank Test show that the health education provided succeeded in strengthening the cultural influence that supports the use of garlic extract to lower cholesterol. With p-value = 0.000, it can be concluded that evidence-based education that is relevant to people's culture is able to have a positive impact in strengthening people's understanding and healthy behavior, especially in terms of natural cholesterol management.

Effectiveness of Health Education on Overall Changes in Knowledge and Perception

Based on table bellow of the Wilcoxon Signed Rank Test results, it was found that health education has a significant influence on changes in the level of knowledge and perception of the public regarding the use of garlic extract to lower cholesterol. For the level of knowledge, the majority of respondents, namely 48 out of 50, showed a significant increase after being given education, which is reflected in the Mean Rank = 24.50 and Sum of Ranks = 1176. The results of statistical tests show the Z value = -6.741 and p-value = 0.000, which shows that there is a significant difference between the level of knowledge of respondents before and after education. Thus, it can be concluded that education has succeeded in increasing public knowledge regarding the use of garlic extract to manage cholesterol.

Ranks				
		N	Mean Rank	Sum of Ranks
Level of Knowledge Before Education - Level of Knowledge After Education	Negative Ranks	0[a]	.00	.00
	Positive Ranks	48[b]	24.50	1176.00
	Ties	2[c]		
	Total	50		
Community Perception Before Education - Community Perception After Educationi	Negative Ranks	0[d]	.00	.00
	Positive Ranks	48[e]	24.50	1176.00
	Ties	2[f]		
	Total	50		

a. Level of Knowledge Before Education < Level of Knowledge After Education b. Knowledge Level Before Education > Knowledge Level After Education c. Level of Knowledge Before Education = Level of Knowledge After Education d. Community Perception Before Education < Community Perception After Education e. Community Perception Before Education > Community Perception After Education f. Community Perception Before Education = Community Perception After Education

Apart from that, similar results were found in public perceptions regarding the use of garlic extract to lower cholesterol. Most respondents showed an improvement in their perception after being provided with education, indicating that they not only gained new knowledge, but also experienced a change in their views on the use of this natural ingredient. The two respondents who did not experience a change in perception (Ties) indicate that although education is successful for the majority, there are some individuals who may not fully accept or realize the benefits provided by the education. Mean Rank = 24.50 and Sum of Ranks = 1176, with Z = -6.741 and p-value = 0.000, indicating that this change in perception is also very significant, because the p-value < 0.05, which indicates that this change in perception occurred as a result of effective education.

Overall, the results of the Wilcoxon Signed Rank Test show that the health education provided was successful in increasing the level of public knowledge and perception regarding the use of garlic extract to lower cholesterol. Significant changes in these two aspects indicate that evidence-based education can strengthen people's understanding and belief in the benefits of natural ingredients in managing cholesterol, which in turn can encourage healthier behavioral changes in society.

Multivariate Analysis Interpretation

Based on data below, the results of the Friedman test show that there are significant differences between conditions before and after education in various variables studied, including perception, knowledge, experience and cultural influence. Specifically, respondents' knowledge showed a significant decline, with the mean rank before education (12.18) being higher than after education (5.61), indicating a reduction in knowledge.

The same thing happened in public perception, with the mean rank before education (12.28) being higher than after education (5.83), as well as in experience, where the mean rank before education (10.03) was higher than after education (3.78). The influence of culture also decreased, with the mean rank before education (8.35) being higher than after education (5.44). The statistical test results show a Z value = -4.681 and p-value = 0.000, which shows that the changes that occur in all of these variables are very statistically significant, indicating that education has a significant impact on changes in each of the variables studied.

Ranks	
	Mean Rank
Knowledge Level After Education	5.61
Level of Knowledge Before Education	12.18
Community Perception After Education	5.83
Community Perception Before Education	12.28
Experience After Edication	3.78
Experience Before Education	10.03
Cultural Influence After Education	5.44
Cultural Influence Before Education	8.35
Education Level After Education	11.10
Education Level Before Education	11.10
Needs and Motivation After Education	10.25
Needs and Motivation Before Education	11.74
Contextual Factors After Education	4.90
Contextual Factors Before Education	9.43
Attention After Education	4.62
Attention Before Education	9.36

The decline in knowledge, perception, experience, and cultural influence after education can be explained by several factors. Although health education aims to increase public knowledge and awareness regarding cholesterol management, in reality, the expected changes in perceptions and experiences do not always occur immediately. The decline in knowledge and perception could be caused by the lack of clarity or complexity of the material presented, or it could also be caused by the limited duration of education which is not enough to instill significant changes in the level of awareness and attitudes of the community. In addition, although education aims to change cultural influences, in many cases, cultural norms that are deeply ingrained in society are often difficult to change in the short term, which could explain the decline in cultural influence after education. A decrease in experience can also be caused by a lack of opportunities to apply the information provided in daily life after education. Overall, the results of the Friedman test show significant changes in the respondents' knowledge, perceptions, experiences and cultural influences after education. However, a decrease in these variables indicates that health education carried out in a short period of time cannot always produce the desired changes in all aspects, especially those related to cultural influences that have been internalized in society. Therefore, more sustainable and structured education is needed to ensure more significant changes in public perception, knowledge and experience regarding cholesterol management, as well as to strengthen the cultural influence that supports the use of natural ingredients such as garlic.

5. CONCLUSION

Public Knowledge Before education, 62% of respondents had moderate knowledge and After education, there was a significant increase in public knowledge, where 64% of respondents now have high knowledge about the use of garlic extract to lower cholesterol in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Aileu Municipality in 2024.

Community Perception Before education, most people had a moderate (fair) perception with 60% of respondents and after education, most respondents experienced an increase in their perception to a high (good) perception, with 62% of respondents regarding the use of garlic extract to lower cholesterol in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu Year 2024.

The effectiveness of health education on public perception and knowledge regarding the use of garlic extract to lower cholesterol in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024: (1) Health education succeeded in increasing the level of public knowledge significantly, with 64% of respondents indicating high knowledge after education about the use of garlic extract to lower cholesterol in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024, (2) Education also increases public perception about the use of garlic extract, with 62% of respondents experiencing an increase in perception after education about the use of garlic extract to lower cholesterol in Suco Seloi Malere Aldeia Namanei Posto Administrativo Aileu Municipiu Aileu in 2024, (3) Factors that strengthen education are personal experience, cultural support, and a higher level of education that strengthen the results of education about the use of garlic extract to lower cholesterol in Suco Seloi Malere Aldeia Namanei

REFERENCES

American Heart Association. (n.d.). Understanding blood pressure readings. https://www.heart.org/en/health-topics/high-blood-pressure/understanding-blood-pressure-readings

Ansary, J., Forbes-Hernández, T. Y., Gil, E., Cianciosi, D., Zhang, J., Elexpuru-Zabaleta, M., Simal-Gandara, J., Giampieri, F., & Battino, M. (2020). Potential health benefit of garlic based on human intervention studies: A brief overview. Antioxidants, 9(7). https://doi.org/10.3390/antiox9070619

Cloke, H. (2024). Cognitivism: Your guide to cognitive learning theory. https://www.growthengineering.co.uk/cognitive-learning-theory/

Downs, F. S. (1990). Handbook of research methodology. Dimensions of Critical Care Nursing, 9(1), 60. https://doi.org/10.1097/00003465-199001000-00018

Fimela. (2023). Apa perbedaan kolesterol baik dan jahat? Simak penjelasan ini. https://www.fimela.com/health/read/5613144/apa-perbedaan-kolesterol-baik-dan-jahat-simak-penjelasan-ini

Joe Leech. (2023). 11 proven health benefits of garlic. https://www.healthline.com/nutrition/11-proven-health-benefits-of-garlic

Koprowski, B. (2023). What to know about garlic and cholesterol. https://www.medicalnewstoday.com/articles/does-garlic-lower-cholesterol

Kurt, S. (n.d.). Cognitivism learning theory, strategies and examples. https://educationaltechnology.net/cognitivism-learning-theory-strategies-and-examples/

Lee, Z. V., Llanes, E. J., Sukmawan, R., Thongtang, N., Ho, H. Q. T., & Barter, P. (2021). Prevalence of plasma lipid disorders with an emphasis on LDL cholesterol in selected countries in the Asia-Pacific region. Lipids in Health and Disease, 20(1), 1–12. https://doi.org/10.1186/s12944-021-01450-8

Libre Texts. (n.d.). Pre-experimental designs. https://socialsci.libretexts.org/Courses/Orange_Coast_College/SOC_200%3A_Introduction_to_Sociology_Research_Methods_(Ridnor)/07%3A_Experiments/7.04%3A_Pre-Experimental_Designs

Marcus, M. E., Ebert, C., Geldsetzer, P., Theilmann, M., Bicaba, B. W., Andall-Brereton, G., Bovet, P., Farzadfar, F., Gurung, M. S., Houehanou, C., Malekpour, M. R., Martins, J. S., Moghaddam, S. S., Mohammadi, E., Norov, B., Quesnel-Crooks, S., Wong-McClure, R., Davies, J. I., Hlatky, M. A., … Vollmer, S. (2021). Unmet need for hypercholesterolemia care in 35 low- and middle-income countries: A cross-sectional study of nationally representative surveys. PLoS Medicine, 18(10), 1–20. https://doi.org/10.1371/journal.pmed.1003841

Mukherji, M. H. G. P. (2023). Learning theories. https://www.ncbi.nlm.nih.gov/books/NBK562189/

National Center for Complementary and Integrative Health (NCCIH). (2023). Garlic. https://www.nccih.nih.gov/health/garlic

Nelson, C. (2022). High cholesterol facts and statistics: What you need to know. https://www.verywellhealth.com/high-cholesterol-facts-and-statistics-5525711

Rizvi, D. S. (2018). Health education and global health: Practices, applications, and future research. January, 1–6. https://doi.org/10.4103/jehp.jehp

Sharifi-Rad, J., Silva, N. C. C., Jantwal, A., Bhatt, I. D., Sharopov, F., Cho, W. C., Taheri, Y., & Martins, N. (2019). Therapeutic potential of allicin-rich garlic preparations: Emphasis on clinical evidence toward upcoming drugs formulation. Applied Sciences (Switzerland), 9(24), 1–16. https://doi.org/10.3390/app9245555

USAID. (n.d.). Global health. https://www.usaid.gov/timor-leste/global-health

Valls, R. M., Companys, J., Calderón-Pérez, L., Salamanca, P., Pla-Pagà, L., Sandoval-Ramírez, B. A., Bueno, A., Puzo, J., Crescenti, A., Del Bas, J. M., Caimari, A., Salamanca, A., Espinel, A. E., Pedret, A., Arola, L., & Solà, R. (2022). Effects of an optimized aged garlic extract on cardiovascular disease risk factors in moderate hypercholesterolemic subjects: A randomized, crossover, double-blind, sustained and controlled study. Nutrients, 14(3), 1–18. https://doi.org/10.3390/nu14030405

WHO. (2019). Hypertension Timor-Leste 2023 country profile. 7550.

WHO. (2023a). Timor-Leste's integrated health program – a path to universal health coverage. https://www.who.int/timorleste/news/detail/12-12-2023-timor-leste-s-integrated-health-program---a-path-to-universal-health-coverage

Yijie Gao, B., Wang, G., Qin, S., Liang, S., Yin, J., Jiang, H., M. L., & X. L. (2024). Therapeutic potentials of allicin in cardiovascular disease: Advances and future directions. Cardiovascular Medicine Journal. https://cmjournal.biomedcentral.com/articles/10.1186/s13020-024-00936-8