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Strategy of using *Meohai Gymnastics* Practice on the Risk of Cardiovascular System (CVS)

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Abstract: This study aims to evaluate the effects of the Meohai exercise program intervention on health indicators, especially on blood pressure, cholesterol profile, and Body Mass Index in postmenopausal women. The method used was quasi-experimental study with pretest-posttest approach involving 60 respondents from Mekar and Leppe Villages in Konawe, Indonesia. All respondents underwent Meohai training for 3 months, with frequency of twice a week, under the guidance of professional instructor. The results of the analysis showed that 93.3% of respondents experienced normalization of blood pressure after the intervention, with p value <0.000. The average cholesterol profile decreased from 239.40 mg/dL to 139.23 mg/dL (p = 0.002), and BMI decreased from 27.41 to 24.67 (p = 0.007). These findings indicate that the Meohai exercise program is effective in improving cardiovascular health in postmenopausal women, and emphasize the importance of lifestyle modification, including regular physical activity, as strategy for the prevention and management of cardiovascular disease risk. The association between decrease in blood pressure, cholesterol, and BMI underscores the need for a comprehensive approach to health intervention design. This study provides empirical evidence that can form the basis for health programs to improve community well-being, especially in vulnerable populations such as postmenopausal women.

Keywords: Cardiovascular system (CVS); Meohai; Practice; Risk; Strategy

Introduction

In recent years, there has been an increasing focus on the impact of various forms of gymnastics on overall health, particularly concerning the cardiovascular system (CVS). The prevalence of cardiovascular diseases (CVD) is a growing concern, emphasizing the necessity for effective preventive measures and health-promoting activities (Ghodeshwar et al., 2023). Gymnastics, recognized as a comprehensive workout regime, presents the potential to positively influence cardiovascular health through diverse physical exertions that engage multiple muscle groups and promote cardiovascular efficiency. Notably, the cardiovascular system is pivotal for sustaining physical performance and ensuring the body's metabolic functionalities. As such, understanding how specific gymnastics practices can enhance cardiovascular health presents a critical area of exploration for improving athlete preparation and general fitness among different populations, including children, adolescents, and the elderly (Achmad et al., 2022; Goulart et al., 2022).

Though not as widely recognized as other forms of exercise, Meohai combines traditional gymnastic techniques with local physical culture practices. This culturally informed approach can enhance participation among women who may be less inclined to partake in conventional exercise regimens. Empirical evidence suggests that culturally relevant exercise programs can improve health outcomes by catering to the specific

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needs of participants, making physical activity more approachable and enjoyable (Hargan et al., 2020; Sukestiningsih et al., 2020).

Physiological transitions experienced during menopause, characterized by a significant reduction in estrogen levels, place women at a heightened risk for obesity, metabolic syndrome, and cardiovascular disorders (Bobescu et al., 2020; Son & Park, 2021). Studies indicate that both aerobic and resistance training modalities can positively influence cardiovascular health by improving lipid profiles and arterial stiffness (Lyall et al., 2022).

In culturally rich regions, Meohai gymnastics may provide significant benefits by aligning with local practices, thus encouraging greater participation. This tailored approach enhances accessibility and fosters social support networks, which are essential for maintaining motivation and compliance with exercise programs (Cheng et al., 2024; Hargan et al., 2020). Additionally, group-based exercise activities, when adapted to local contexts, have demonstrated effectiveness in enhancing both physical and psychological health outcomes (Kulak et al., 2023; Manojlović et al., 2021).

The physiological adaptations elicited by regular exercise—such as improved endothelial function, cardiovascular response, and reduced arterial stiffness—are critical in mediating the relationship between exercise and cardiovascular health. For instance, interval and resistance training have been associated with marked improvements in vascular health and function in postmenopausal populations, which can translate to reduced incidences of cardiovascular events (Lyall et al., 2022; Sun et al., 2024). Given the natural hormonal declines associated with menopause, proactive lifestyle interventions like coordinated exercise efforts are essential (Borges-Silva et al., 2022).

Meohai gymnastics, through its varied movement patterns and integrated aerobic and resistance training aspects, may effectively enhance muscle strength, cardiorespiratory fitness, and balance—key elements in reducing fall risk and complications prevalent among older adults (Afif Wibowo et al., 2022; Nine et al., 2024). The positive adaptations achieved through regular practice may contribute to lower rates of osteoporosis, hypertension, and dyslipidemia commonly observed in postmenopausal women (Chang et al., 2022). Evidence indicates that structured resistance exercises correlate with preserved bone mineral density (BMD) and improved muscle strength, which are vital for preventing osteoporotic fractures (Bragonzoni et al., 2020; Olaru et al., 2021).

Moreover, engaging in consistent physical activity carries significant mental health benefits. Improvements in overall quality of life and mental well-being from regular participation in culturally adapted exercises can foster a sense of empowerment in women navigating the complexities of postmenopause (Kulak et al., 2023; Sukestiningsih et al., 2020). Various studies emphasize that enjoyable, socially engaging exercise programs can alleviate depressive symptoms and enhance life satisfaction, addressing both physical and emotional health dimensions in postmenopausal women (Anklam et al., 2021).

Research consistently demonstrates the efficacy of tailored exercise interventions in promoting cardiovascular health in postmenopausal women by addressing environmental and social aspects of the risks they face. Specifically, participation in culturally relevant exercise regimes like Meohai gymnastics can yield significant improvements in health metrics, highlighting the importance of community involvement, cultural acceptance, and adherence to exercise (Bobescu et al., 2020; Son & Park, 2021).

The principal objective of this research is to develop a comprehensive model of gymnastics practice that integrates cardiovascular risk assessment and the unique physiological demands imposed by this form of gymnastics. The importance of this research lies in its potential contribution to public health, particularly for postmenopausal women who are at increased risk for cardiovascular diseases (CVD). Women in this demographic often experience physiological changes that adversely affect cardiovascular health, such as increased blood pressure, elevated cholesterol levels, and changes in body composition. By examining the effects of the Meohai gymnastics practice, this study provides crucial insights into an effective intervention that promotes lifestyle modification through regular physical activity. Enhancing awareness and understanding of cardiovascular risk factors directly addresses an urgent health need. The statistically significant reductions in blood pressure, cholesterol levels, and Body Mass Index (BMI) in the study participants suggest that structured physical exercise can serve as a feasible and low-cost strategy for improving cardiovascular health outcomes. Furthermore, this research aligns with global health initiatives aimed at reducing the incidence of CVD and emphasizes preventative measures that can be integrated into community health programs, fostering overall health literacy and improving quality of life for vulnerable populations.

The novelty of this study lies in the application of the Meohai exercise intervention program specifically designed to improve health in postmenopausal women. Although many previous studies have explored the effects of exercise in women, few have focused on the specific combination of the Meohai program and its

effects on health indicators such as blood pressure, cholesterol profile, and body mass index (BMI) in the postmenopausal population.

Method

Design

The design of this study is a quasi-experimental study with a pretest-posttest approach in the same group. This study aims to evaluate the effects of Meohai gymnastics intervention on health indicators of postmenopausal women. This design selects one group of participants, where health data are measured before and after the intervention.

Population

The population in this study consisted of postmenopausal women living in Mekar and Leppe Villages in Soropia District, Konawe Regency. postmenopausal women were chosen as research subjects because they experience significant physiological changes that can affect various health indicators, including blood pressure, cholesterol levels, and body mass index.

The sample to be used in the study was determined using the Slovin formula with a 10% margin of error. Sampling was carried out using the Purposive Sampling technique, where researchers selected samples according to the inclusion and exclusion criteria that had been set. Inclusion criteria were postmenopausal women aged 45 to 60 years with no history of heart disease, diabetes, or other medical conditions that could affect the results of the study. Exclusion criteria were women undergoing hormonal therapy or certain diet programs. By using this method, it is hoped that the samples taken can represent a larger population accurately and validly.

Research Variables

The independent variable in this study was the provision of Meohai gymnastics, which is a physical intervention designed to improve the physical and mental health of postmenopausal women. This gymnastics is carried out in the form of exercises designed to improve flexibility, muscle strength, and stamina, and can help in better regulation of blood pressure and cholesterol levels.

The dependent variables measured in this study included three health indicators: blood pressure, cholesterol levels, and body mass index (BMI). Blood pressure was measured to evaluate cardiovascular function, cholesterol levels were measured to assess the risk of heart disease, and BMI was calculated as an indicator of nutritional status that shows the relationship between weight and height.

Place and Time

This research was conducted in Mekar Village and Leppe Village, Soropia District, Konawe Regency. The research activity Ranging from October 2024 to April 2025. This timing was chosen to ensure that all stages of the research could be carried out optimally and to reduce confounding variables that may arise from seasonal factors.

Materials and Tools

In this study, various materials and tools were used for accurate and relevant data collection. The tools used included adult scales to measure weight, height meters to determine height, and a series of medical devices such as handscoen, 3 ml syringes, alcohol swabs, plasters, and hand sanitizers.

Cholesterol testing using a portable tool branded autocheck. This tool consists of a measuring device, test strips, and blood samples taken using a small needle. The testing procedure begins by cleaning the puncture area on the finger, then using a tool to remove a drop of blood. This is then placed on the test strip that has been installed in the portable tool. After a few minutes, the total cholesterol results can be read on the device screen.

Data Collection Format

In the present study, the data collection format encompasses several critical components designed to ensure the integrity and efficacy of the research process. First, the research explanation serves to inform participants about the objectives and methodologies involved, fostering transparency and facilitating informed participation. Following this, informed consent is obtained through a comprehensive document delineating the rights and responsibilities of the participants, thereby emphasizing ethical considerations in the research. The research questionnaire constitutes a primary tool for gathering essential demographic and health-related data, enabling researchers to analyze variables relevant to the study. Additionally, direct measurements of blood pressure, weight, and height are conducted to calculate participants' body mass index (BMI) and to assess other pertinent health indicators. Collectively, these components provide a robust framework for gathering reliable data while upholding ethical standards in research.

Research Procedures

The research procedure began with anamnesis of postmenopausal women who received training to meet the inclusion and exclusion criteria. After the criteria were determined, the researcher provided an explanation of the study and asked participants to provide informed consent. Next, pre-test measurements

were taken of blood pressure, cholesterol, and body mass index.

The intervention was carried out in the form of Meohai gymnastics training for 3 months, with a duration of each session of 30 minutes and a frequency of twice a week. Each gymnastics session was guided by an expert (certified exercise instructor) to ensure that the exercises were carried out correctly. After the intervention period ended, re-measurements were carried out to obtain post-test data for further analysis.

Data Analysis Techniques

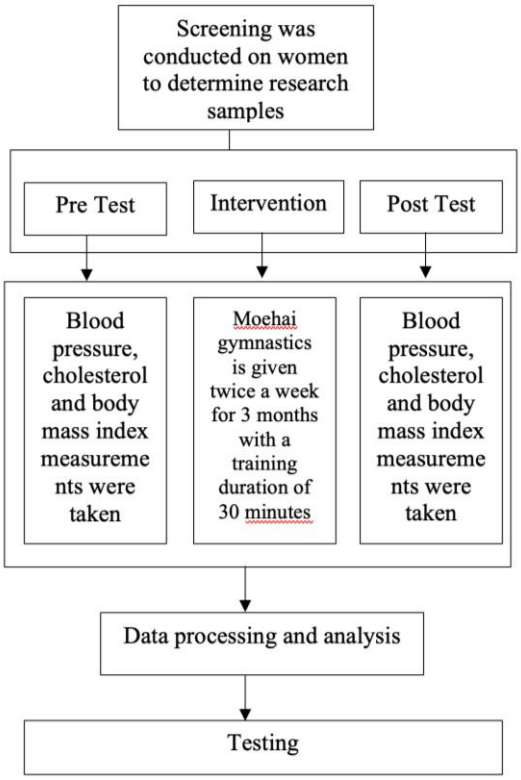

Figure 1. Research flow

To determine the nature of the data distribution, the Kolmogorov-Smirnov normality test is used. This test aims to assess whether the data is normally distributed or not, which is very important for choosing the right statistical analysis. The decision criteria for this normality test are as follows: if the p-value is greater than 0.05, it can be concluded that the data is normally distributed, so that parametric analysis can be applied to the measured variables, including blood pressure, cholesterol levels, and BMI. Conversely, if the p-value is less than 0.05, the data is said to be not normally distributed, which requires the use of non-parametric methods.

Paired t-test is used to analyze ratio data, in this case hemoglobin levels or other measurement variables before and after the Meohai exercise intervention. Before conducting a t-test, researchers need to ensure that the data to be tested is normally distributed. If it has been proven that the data is normally distributed, then the testing process is continued using the t-test. However, if the data does not meet the assumption of normality, alternative analyses such as the Wilcoxon test will be applied.

Result and Discussion

Table 1 presents the characteristics of respondents in the study, classified by age, maternal education level, and height. In the age category, there were 60 respondents with an age range ranging from 50 to 57 years. The majority of respondents were 55 years old (21.7%), with an average age of 53.5 years and a standard deviation of 2.6 years for the group with data. In terms of education, it was divided into four categories: Primary Education (40%), Junior High Education (36.7%), Senior High Education (23.3%). The average years of maternal education were recorded as 9.4 years with a standard deviation of 3.8 years. The height category shows that most respondents were 156 cm tall (21.7%), with an average height of 154.5 cm and a standard deviation of 3.1 cm. The information in this table is important to understand the demographic background that may affect the results of the study.

Table 1. Respondent Characteristics

Age	n	%	Mean (Years)	SD (Years)	Mother's Education	n	%	Mean (Years)	SD (Years)	Height	n	%	Mean (cm)	SD (cm)
50	9	15			Elementary School	24	40			150 cm	10	16.7		
51	3	5			Senior High School	14	23.3			152 cm	6	10		
52	8	13.3			Junior High School	22	36.7			153 cm	5	8.3		
53	6	10								154 cm	11	18.3		
54	10	16.7	53.5	2.6				9.4	3.8	155 cm	11	18.3	154.5	3.1
55	13	21.7								156 cm	13	21.7		
56	10	16.7								157 cm	3	5		
57	1	1.7								160 cm	1	1.7		
Total	60	100			Total	60	100			Total	60	100		

Table 2 shows that all respondents had abnormal blood pressure at pretest, while the majority had normal blood pressure at posttest. Table 2 showed decrease in cholesterol profile and body mass index after the intervention, with significant decreases in the mean values of both measures. These results indicate a positive effect of the intervention on the health of the respondents.

Table 2. Descriptive Analysis Based on Blood Pressure, Cholesterol Levels, and Body Mass Index

Variables	Pretest	Posttest
Blood pressure		
Normal	0 (0%)	56 (93.3%)
Not normal	60 (100.0%)	4 (6.7%)
Descriptive Statistics of Cholesterol		
Mean	239.40	139.23
Median	244.50	140.0
Std. Deviation	17,558	7,625
Range	65	25
Minimum	200	125
Maximum	265	150
Descriptive Statistics of Body Mass Index		
Mean	27.41	24,673
Median	27.45	24.60
Std. Deviation	1,3402	0.7519
Range	7	3.4
Minimum	23	23
Maximum	30	26.4

The results of the analysis showed p-value < α (0.05) for all variables. In the field of blood pressure, there has been a significant change from abnormal to normal conditions after exercise. Cholesterol levels also decreased significantly from 239.40 to 139.23, and BMI decreased from 27.41 to 24.67. Thus, Meohai Exercise has been proven to have a positive effect on these three health indicators.

Table 3. Statistical Test

Variables	N	Pretest Mean	Posttest Mean	p-value
Blood pressure	60	Normal (0%)	Normal (93.3%)	0,000
Cholesterol	60	239.40	139.23	0.002
Body Mass Index	60	27.41	24.67	0.007

The analysis of demographic characteristics among a sample of respondents reveals distinct patterns across age, education, and height. The predominant age group included individuals aged 55, while the least represented age was 57. Educational attainment demonstrated that a significant portion of the respondents had completed elementary education, whereas those with high school education were comparatively fewer. Regarding physical stature, a notable number of respondents fell within a specific height range, with the shortest individual being significantly less represented in the sample.

The data on significant health improvements following lifestyle interventions highlights their efficacy in reducing blood pressure, cholesterol levels, and body mass index (BMI). A study found that educational interventions resulted in considerable reductions in both systolic and diastolic blood pressure as well as total cholesterol levels among participants with hypertension (Debela et al., 2023). Byrne et al. demonstrated that participants engaged in a multi-faceted intervention exhibited enhanced understanding and control regarding their health, which contributed to improved management of their blood pressure and waist circumference (Byrne et al., 2020).

These findings are consistent with the growing body of evidence that suggests structured lifestyle changes not only improve cardiovascular health indicators but also promote long-term engagement in health-promoting behaviors (Chen et al., 2020). Specifically, while Byrne et al. noted increased control and understanding leading to better health outcomes, there was no significant change in BMI or other related metrics in their study (Byrne et al., 2020). This indicates the complexity of lifestyle interventions and underscores the need for tailored approaches to address individual health challenges.

The notable reduction in cholesterol levels from an average of 239.40 mg/dL to 139.23 mg/dL following lifestyle modifications highlights the substantial impact of dietary alterations, physical activity, and smoking cessation on lipid profiles. Zaki et al. emphasize that consistent physical activity not only improves lipid profiles but can also significantly benefit cardiovascular health in adolescents, asserting that such behavioral changes can effectively mitigate cardiovascular risk factors over extended periods (Al Zaki et al., 2023). A complementary view by Amin et al. illustrates how dietary adherence, involving the reduction of cholesterol-rich foods, plays a crucial role in managing hypertension, which is intrinsically linked to cholesterol levels and overall cardiovascular health (Amin et al., 2023). However, the reference by Angie et al. appears less relevant as it primarily discusses oxidative stress in the context of diabetes rather than directly addressing cholesterol management; therefore, the supporting claim regarding broader health improvements associated with lifestyle modifications should be removed. These collective findings strongly advocate for lifestyle interventions as a pivotal strategy in cholesterol management. In particular, lifestyle interventions that incorporate dietary counseling have been documented to lead to marked decrease in cholesterol profiles, which are crucial for the prevention of cardiovascular disease (Farras, 2024). Such

interventions are critically important as elevated cholesterol is closely linked with heightened cardiovascular health risks.

A significant decrease in mean body mass index (BMI) from 27.41 to 24.67 suggests a potential improvement in overall body weight and metabolic health, supporting findings that indicate lifestyle modifications, including diet and exercise, are effective in reducing BMI across various populations. These lifestyle interventions can enhance insulin sensitivity, allowing cells to better respond to insulin, thereby reducing risks associated with type 2 diabetes and improving metabolic health outcomes (Rosalia & Sumadi, 2023). Additionally, physical activity has been shown to improve metabolic parameters, reinforcing the relationship between lifestyle adjustments and health improvement (Zaki et al., 2023). Moreover, community-based education interventions have effectively promoted positive lifestyle changes, highlighting the importance of informed health education in managing body weight and related health indices (Al Zaki et al., 2023; Asnidar et al., 2023). Lifestyle interventions focused on weight management have proven effective in reducing both blood pressure and cholesterol levels, thereby mitigating the risk factors associated with cardiovascular diseases (Bergum et al., 2021; Prabawati & Lorica, 2022).

The significant changes noted in blood pressure and BMI emphasize the interrelated nature of these health metrics; for instance, weight loss has been linked to decreases in blood pressure levels as well as decrease in cholesterol profiles (Ghammam et al., 2022; Xu & Long, 2020). Comprehensive interventions that address multiple risk factors, including hypertension, obesity, and dyslipidemia, are crucial for effective cardiovascular disease prevention strategies. Epidemiological studies have pointed out that reductions in blood pressure and BMI due to lifestyle modifications can substantially lower the overall risk of developing heart disease and stroke (Iso et al., 2021; Treciokiene et al., 2021).

The intervention's effectiveness is reflected not only in quantitative results but also in the qualitative lifestyle changes that accompany health decrease efforts. Behavioral counseling and lifestyle education have emerged as key components of successful health interventions, facilitating the participants' understanding and management of their health conditions (Malakar et al., 2024; O'Connor et al., 2020). Furthermore, the integration of technology, such as smartphone applications, has been recognized as a means to enhance adherence to lifestyle changes by providing users with real-time monitoring feedback, which can reinforce positive behaviors (Uken et al., 2021).

The statistical analysis presented in Table 3 indicates that the implementation of Meohai Exercise yielded significant positive changes in critical health indicators: blood pressure, cholesterol levels, and Body Mass Index (BMI). The p-values associated with these outcomes 0.000 for blood pressure, 0.002 for cholesterol, and 0.007 for BMI are all less than the significance threshold of 0.05, validating the effectiveness of the exercise program.

In terms of blood pressure, the results reveal a marked improvement post-exercise, with a transition from abnormal to normal. These findings correspond well with previous studies, such as Gultom et al., which demonstrated the effects of exercise on both systolic and diastolic blood pressure in individuals with hypertension ($p = 0.000$) (Boru Gultom et al., 2023). Exercise has been documented to enhance cardiovascular health significantly, often leading to reduced systolic and diastolic blood pressure values in hypertensive individuals, as outlined in the systematic review by Liu et al. (Xinwen et al., 2024).

The analysis further reports a substantial decrease in cholesterol levels, specifically total cholesterol dropping from 239.40 to 139.23. These values highlight the critical role of exercise in lipid management. Studies have frequently demonstrated that consistent physical activity leads to favorable adjustments in lipid profiles, particularly increasing HDL (good cholesterol) while decreasing LDL (bad cholesterol) and total cholesterol (Amadea et al., 2022; Turgut & Soylu, 2021). Thus, the substantial reduction in cholesterol levels recorded in this study aligns with evidence supporting exercise as an effective strategy to combat hypercholesterolemia and improve cardiovascular health outcomes (Lima et al., 2020).

Moreover, the reduction in BMI from 27.41 to 24.67 signifies a shift towards healthier body composition in participants engaged in the Meohai Exercise program. This outcome is further corroborated by literature that highlights the positive correlation between physical activity and decreases in both BMI and fat mass (Santos et al., 2020). Regular exercise is known to stimulate metabolic processes that facilitate weight loss and maintenance, emphasizing the role of physical fitness in the regulation of obesity-related conditions (Rebolledo-Cobos et al., 2021). Furthermore, as physical activity helps in building muscle mass and expending calories, it significantly reduces the risk of obesity-associated diseases, reinforcing the findings observed in this analysis (Doi et al., 2021).

Exploring the interconnectedness of these variables emphasizes the holistic benefits of the Meohai Exercise program. Decrease in blood pressure not only enhance heart health but are also intricately linked to variations in cholesterol levels and overall BMI.

Regardless of the individual contributions of each factor, the cumulative benefits underscore the need for continuous advocacy of exercise as a key public health strategy. By fostering an understanding of these relationships, health professionals can better promote exercise interventions in populations at risk for cardiovascular disease and related metabolic disorders.

Additionally, it is imperative to consider demographic factors that may influence these health indicators. The study's findings echo those presented by Morelli et al., which highlighted how vigorous physical activity positively impacted body composition and lipid profiles across different age groups (Morelli et al., 2020). Similarly, Abedini et al.'s research stresses the importance of physical activity in modulating patient health, advocating for exercise interventions as critical components of treatment paradigms for chronic diseases (Abedini et al., 2020).

Conclusion

This study showed that the Meohai exercise program intervention significantly improved health indicators in postmenopausal women, including normalization of blood pressure, decrease of cholesterol profile, and decrease of Body Mass Index (BMI). The analysis results showed that 93.3% of respondents experienced normalization of blood pressure with p value <0.000; decrease of mean Cholesterol profile from 239.40 mg/dL to 139.23 mg/dL (p = 0.002); and decrease of BMI from 27.41 to 24.67 (p = 0.007). These findings demonstrate the effectiveness of the Meohai Exercise program in improving cardiovascular health and underscore the importance of lifestyle modification, including regular physical activity, as a strategy for prevention and management of cardiovascular disease risk. The decrease of blood pressure, Cholesterol, and BMI reinforces the need for a comprehensive approach in designing health interventions. This study provides empirical evidence that can be the basis for health programs to improve community well-being, especially in vulnerable populations such as postmenopausal women.

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The authors declare no conflict of interest.

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