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Research on Factors of Influencing Atherosclerosis in Community-Dwelling Elderly

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Abstract: *Atherosclerosis is a prevalent cardiovascular disease among the elderly population, and identifying the factors that contribute to its development is crucial for effective prevention and management. This article examines a study conducted in the Dongfeng community of Bengbu City, Anhui Province, which aimed to explore the influencing factors of atherosclerosis in community-dwelling elderly individuals. The study analyzed data from 1522 elderly individuals who underwent health checkups, focusing on body composition indexes, cardiovascular indexes, and bone mineral density. The results revealed a high prevalence of atherosclerosis (87.3%) in the community, with age, weight of the left upper limb, systolic blood pressure, and other factors showing positive correlations. Binary linear regression analysis identified age, systolic blood pressure, and the weight of the right and left upper limbs as influential factors for atherosclerosis in this population. The study emphasizes the need for increased health guidance, improved understanding of healthy living, and customized diet and exercise programs to enhance the health of community-dwelling elderly individuals and delay the progression of atherosclerosis.*

Keywords: *atherosclerosis; elderly; community; influencing factors; cardiovascular health*

1. Introduction

Cardiovascular disease is the leading cause of death in China, accounting for a significant proportion of total urban and rural deaths[1]. Among cardiovascular diseases, atherosclerosis (AS) is a common condition characterized by the thickening and loss of elasticity of arterial walls. AS is an inflammatory disease that poses an independent risk for adverse vascular events such as myocardial infarction, stroke, and peripheral artery disease[2]. Its pathogenesis is associated with processes like inflammation, immune response, oxidative stress, and metabolic syndrome [3-4]. Understanding the current status of atherosclerosis in community-dwelling older adults and analyzing its influencing factors is crucial for developing strategies to promote healthy exercise and diet among this population. This study aims to provide insights for health managers and older adults themselves, helping to improve the health of community-dwelling older adults.

1.1. Objects and Methods

1.1.1. Objects

The study included elderly individuals who underwent health checkups in Dongfeng Community and Hubin Community of Bengbu City from November 2021 to March 2022. The study subjects were selected using convenience sampling. Inclusion Criteria: ①Residency in the community for at least 6 months. ②Informed and voluntary participation in the survey. ③Complete health checkup data. A total of 1522 individuals met the inclusion criteria and were included as valid samples in this study.

1.1.2. Measuring Tools

1.1.2.1. Atherosclerosis Testing Instruments

The study utilized instruments that consisted of three main parts: ①Basic information of the subjects. ②Assessment of vascular obstruction in the lower limbs. ③Assessment of vascular stiffness. These

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instruments were used to measure various parameters, including: ①Bilateral brachial-ankle pulse wave velocity (baPWV) values. ②Ankle-brachial index (ABI) values of the left and right lower limbs. ③ Brachial-ankle index (BAI) values of the left and right lower limbs.

1.1.2.2. Cardiovascular Measurement Instruments

The study also employed cardiovascular measurement instruments to measure the following parameters of the subjects: Systolic blood pressure, Diastolic blood pressure, Pulse pressure (PP) value, Central aortic pressure (CAP) value, Heart rate, Ejection duration (ED) value, Systolic pressure time index (SPTI) value, Diastolic pressure time index (DPTI) value, Subendocardial viability ratio (SEVR) value, Augmentation index (AI) value. These measurement tools were used to collect data on various cardiovascular parameters relevant to the study.

1.1.2.3 Body Composition Analyzers

Body composition analyzers were used to measure various parameters related to body composition. These measurements included:Total water weight, Total defatted weight, Total muscle weight, Total fat weight, Total protein, Total inorganic salts, Left upper extremity defatted weight, Left upper extremity muscle, Left upper extremity weight, Right upper extremity defatted weight, Right upper extremity muscle, And other relevant measurements.These analyzers provided information on the subject's body composition, including muscle mass, fat mass, and other related parameters.

1.2. Data Collection Methods

The researcher conducted free medical checkups for community elders at community health huts. Data were collected after the checkups and compiled for analysis. A total of 1522 community elders' health checkup data were included in this study.

1.3.Statistical Methods

The collected data were analyzed using SPSS 18.0 software. Statistical description, independent samples t-test, and binary linear regression analysis were performed with a significance level set at p=0.05. These statistical methods were used to analyze and interpret the data obtained from the study.

2.Results

2.1. Independent Sample t-test of Health Checkup Indicators and Atherosclerosis Detection

Table 1 Presents the results of the independent sample t-test conducted to analyze the relationship between health checkup indicators and atherosclerosis detection in community-dwelling elderly individuals. The study considered atherosclerosis as the dependent variable and cardiovascular indicators, body composition indicators, and bone densitometry indicators as independent variables.The detection rate of atherosclerosis in the community-dwelling elderly individuals was found to be 87.3%. The t-test results revealed that several variables were statistically significant ($p < 0.05$) in relation to atherosclerosis detection. These significant variables included age, weight of the left upper limb, weight of the left lower limb, weight of the right lower limb, systolic blood pressure, diastolic blood pressure, pulse pressure (PP) value, central aortic pressure (CAP) value, heart rate, systolic pressure time index (SPTI) value, diastolic pressure time index (DPTI) value, subendocardial viability ratio (SEVR) value, bone strength, speed of sound (SOS) value, T value, and Z value.

Table 1: Presents the mean values and standard deviations of cardiovascular indices, body composition measurements, bone mineral density testing, and atherosclerosis detection in the community-dwelling older adults (n=1522).

sports event	AS Group (1329)	Non-AS (193)	P
age	72.5±6.6	68.5±5.3	<0.05
sexes	41.8%	58.2%	0.511
height	162.6±7.3	163.6±7.4	0.335
weight	67.3±13.3	68.5±18.3	0.635
BMI	25.4±4.4	25.6±6.8	0.849
ABI	1.8±0.1	1.8±0.1	0.970
Total moisture weight	35.6±6.4	34.6±6.2	0.232
Total Degreased Weight	45.6±8.6	46.8±8.5	0.512
total muscle weight	45.0±8.3	44.2±8.2	0.516
Total fat weight	19.2±7.2	17.7±6.9	0.119
total protein	11.7±2.2	11.5±2.1	0.516
total inorganic salt	2.6±0.4	2.5±0.4	0.449
Left upper extremity debridement weight	2.5±0.6	2.4±0.6	0.209

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Left upper extremity muscle weight	2.3±0.6	2.2±0.6	0.245
Left Upper Extremity Weight	3.3±0.7	3.1±0.6	<0.05
Right upper extremity debridement weight	2.6±0.7	2.5±0.7	0.566
Right upper extremity muscle weight	2.4±0.6	2.4±0.6	0.535
Right upper extremity weight	3.4±0.7	3.3±0.7	0.101
Left lower extremity debridement weight	8.5±2.1	8.1±1.9	0.164
Left lower extremity muscle weight	7.9±1.9	7.6±1.8	0.172
Left lower extremity weight	12.1±2.1	11.5±1.9	<0.05
Right lower extremity debridement weight	8.5±2.1	8.2±1.9	0.162
Right lower extremity muscle weight	8.0±2.0	7.7±1.9	0.170
Right lower extremity weight	12.2±2.2	11.5±2.0	<0.05
Trunk defatted weight	25.4±3.5	25.2±3.5	0.797
trunk muscle	24.3±3.5	24.4±3.5	0.847
torso weight	35.8±5.9	35.0±5.7	0.317
systolic blood pressure	131±15.4	114±9.8	<0.05
diastolic blood pressure	74.3±8.4	69.5±6.8	<0.05
PP value	56.7±13.4	44.9±7.1	<0.05
CAP value	122.9±15.7	107.9±9.9	<0.05
pulse rate	70.3±9.8	66.9±7.5	<0.05
ED value	0.41±0.1	0.40±0.1	0.232
SPTI value	2836.8±442.8	2449.8±257.9	<0.05
DPTI value	3018.4±511.4	2843.8±397.2	<0.05
SEVR value	1.1±0.2	1.0±0.2	<0.05
AI value	0.8±0.1	0.9±0.1	0.785
Bone Strength Index (BSI)	84.5±20.4	78.6±17.5	<0.05
BUA value	45.9±4.8	45.5±4.8	0.458
SOS value	1562.5±35.1	1552.4±28.9	<0.05
T-value	-1.1±1.1	-1.5±0.9	<0.05
Z-value	0.5±1.6	-0.07±1.4	<0.05
Fracture risk index	2.89±1.5	3.2±1.9	0.079

2.2. Correlation between Atherosclerosis and Cardiovascular Indices, Body Composition Measurements, and Bone Density TestsTable 2 displays the correlation between atherosclerosis and various health checkup indexes conducted in health huts for community-dwelling elderly individuals

Table 2: Presents the correlations between community-dwelling older adults and cardiovascular indices, body composition measurements, and bone mineral density testing based on the data obtained from the study (n=1522).

sports event	baPWV
age	0.330
Left Upper Extremity Weight	0.091
Right upper extremity weight	0.095
Left lower extremity weight	0.097
Right lower extremity weight	0.094
systolic blood pressure	0.433
diastolic blood pressure	0.244
PP value	0.359
CAP value	0.374
pulse rate	0.117
SPTI value	0.345
DPTI value	0.189
SEVR value	-0.128
Bone Strength Index (BSI)	0.090
SOS value	0.100
Z-value	0.112

Note: All P < 0.05

Atherosclerosis in community-dwelling older adults was considered as the dependent variable, while the health checkup indexes were treated as independent variables.The results showed that several variables were significantly correlated with atherosclerosis in community-dwelling older adults. These variables included age, weight of the left upper limb, weight of the left lower limb, weight of the right upper limb, weight of the right lower limb, systolic blood pressure, diastolic blood pressure, pulse pressure (PP) value, central aortic pressure (CAP) value, heart rate, systolic pressure time index (SPTI) value, diastolic pressure time index (DPTI) value, bone strength, speed of sound (SOS) value, and Z value. These variables exhibited a positive correlation with atherosclerosis in community-dwelling older adults.Interestingly, the subendocardial viability ratio (SEVR) value showed a negative correlation with atherosclerosis in community-dwelling older adults.

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2.3. Multifactorial Analysis of Atherosclerosis in Community Elderly

In order to further understand the factors contributing to atherosclerosis in community-dwelling elderly individuals, a binary linear regression analysis was conducted. The dependent variable in this analysis was the presence or absence of atherosclerosis in the community elderly. The independent variables included age, weight of the left upper extremity, weight of the left lower extremity, weight of the right lower extremity, and other statistically significant variables identified in the independent samples t-test.The results of the regression analysis revealed that five variables significantly contributed to the prediction of atherosclerosis in community-dwelling older adults. These variables were systolic blood pressure, heart rate, systolic pressure time index (SPTI), diastolic pressure time index (DPTI), and subendocardial viability ratio (SEVR). Together, these variables explained 40.3% of the total variance in atherosclerosis in the community elderly , as shown in Table 3.

Table 3: Presents the results of the multifactorial analysis, displaying the factors affecting atherosclerosis in community-dwelling elderly individuals (n=1522).

	B	S.E	Wals	Sig.	Exp (B)
systolic blood pressure	.093	.035	6.894	<0.05	1.097
pulse rate	.041	.026	2.407	<0.05	1.041
SPTI value	.005	.002	5.074	<0.05	1.006
DPTI value	-.003	.002	3.405	<0.05	0.997
SEVR value	8.813	4.398	4.016	<0.05	1.677

2.4. Discussion

The findings of this study reveal that the proportion of community elderly with atherosclerosis in the Dongfeng and Lakeshore communities is alarmingly high, reaching 87.3%. This prevalence surpasses the rates reported in other studies [5], indicating a pressing need for increased attention from families and community hospitals. Early screening during health checkups should be prioritized to identify individuals suffering from atherosclerosis within the community.The significance of early screening lies in its potential to facilitate targeted health guidance for elderly individuals affected by atherosclerosis. By identifying those at risk, appropriate interventions can be implemented to minimize the incidence of cardiovascular events [6]. It is crucial to prioritize the personal and property safety of the elderly residing in the community by taking proactive measures to reduce the occurrence of such events.Community hospitals and healthcare providers play a vital role in ensuring the well-being of the elderly population. By recognizing the heightened prevalence of atherosclerosis in these communities, healthcare professionals can develop tailored health programs and interventions. These initiatives should focus on promoting healthy lifestyles, managing risk factors, and providing necessary medical treatments to mitigate the adverse effects of atherosclerosis.Furthermore, community engagement and education are essential components of addressing this issue. Raising awareness among community members about the risks and consequences of atherosclerosis can empower individuals to take proactive steps in maintaining their cardiovascular health. Community-wide initiatives, such as health campaigns and educational workshops, can facilitate the dissemination of information and encourage healthy behaviors.In conclusion, the high prevalence of atherosclerosis among the elderly in the Dongfeng and Lakeshore communities necessitates immediate attention and action. Early screening, targeted health guidance, and community-wide interventions are crucial in reducing the occurrence of cardiovascular events and safeguarding the personal and property safety of the elderly. By prioritizing the well-being of this vulnerable population, we can promote healthier aging and enhance the overall quality of life within the community.

In the present study, several factors were identified as contributors to arterial stiffness among community-dwelling elderly individuals. These factors include systolic blood pressure, heart rate, SPTI value, DPTI value, and SEVR value. Additionally, age, weight of the upper and lower limbs, systolic and diastolic blood pressure, pulse pressure (PP) value, central augmentation pressure (CAP) value, heart rate, SPTI value, DPTI value, SEVR value, bone strength, speed of sound (SOS) value, and Z value were found to have correlations with arterial stiffness in this population.The weight of the upper and lower limbs reflects changes in body composition that occur with age. One of the most significant features of these changes is the progressive decline in muscle weight and strength, which can have adverse consequences for the elderly, including falls, debilitation, and increased mortality [7-8]. As the weight of the upper and lower limbs increases in the elderly, muscle mass tends to decrease while fat mass increases. To address this issue, it is recommended that elderly individuals engage in resistance exercises, such as resistance to self-weighted exercises and progressive resistance exercises using elastic bands [9]. These exercises can help increase muscle weight, decrease fat mass, and improve overall muscle mass in the

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elderly.By incorporating resistance exercises into their daily routines, elderly individuals can counteract the age-related decline in muscle mass and strength. Resistance exercises, such as self-weight resistance exercises and progressive resistance exercises using elastic bands, offer a safe and effective means of increasing muscle weight and improving body composition in the elderly [9]. These exercises can be tailored to individual capabilities and gradually progressed to ensure optimal results.In conclusion, the present study highlights the factors influencing arterial stiffness in community-dwelling elderly individuals, including weight of the upper and lower limbs. The age-related decline in muscle weight and strength underscores the importance of incorporating resistance exercises into the daily routines of the elderly. By engaging in resistance exercises, such as resistance to self-weighted exercises and progressive resistance exercises using elastic bands, the elderly can improve their muscle mass, decrease fat mass, and enhance their overall body composition.Atherosclerosis in older adults is closely associated with cardiovascular markers, particularly systolic and diastolic blood pressure [10]. To effectively control blood pressure and improve the heart's ability to supply oxygen, it is recommended that older adults with high blood pressure adhere to their medication regimen, engage in regular exercise, and manage their emotions. Additionally, older adults who do not have hypertension should maintain a healthy diet and engage in regular physical activity.Bone density measurements have also been found to be associated with atherosclerosis in older adults, as supported by a longitudinal study conducted in Japan [11]. The underlying mechanisms for this association are not yet fully understood, but it is known that age-related bone loss and osteoporosis can contribute to atherosclerosis. To address this, it is recommended that older adults pay attention to their calcium intake and engage in exercise within their physical capabilities.The factors identified in the study, including systolic blood pressure, heart rate, SPTI value, DPTI value, and SEVR value, can serve as predictors of atherosclerosis in older adults within the community. By monitoring and addressing these factors, healthcare professionals can identify individuals who may be at higher risk for atherosclerosis and implement appropriate interventions to mitigate the progression of the disease.In conclusion, atherosclerosis in older adults is influenced by various cardiovascular markers, particularly blood pressure. Managing blood pressure through medication adherence, regular exercise, and emotional control is crucial for preventing and controlling atherosclerosis in this population. Additionally, bone density measurements and calcium intake should be considered to address the association between bone health and atherosclerosis. By identifying and monitoring the factors identified in the study, healthcare professionals can effectively predict and manage atherosclerosis in older adults within the community.

3.Conclusion

Furthermore, resistance exercises, such as self-weight resistance exercises and progressive resistance exercises with elastic bands, can be beneficial in improving muscle mass, reducing fat mass, and maintaining overall physical health in the elderly population. These exercises can help prevent falls, debilitation, and other adverse consequences associated with age-related muscle decline.It is also important for older adults to manage their blood pressure effectively through regular medication use, consistent exercise, and stress management. Additionally, maintaining good bone health through proper nutrition and weight-bearing exercises is crucial in reducing the risk of atherosclerosis.In conclusion, by considering these factors and implementing appropriate interventions, the incidence of cardiovascular events can be minimized, and the overall well-being and safety of the elderly in the community can be ensured. Regular health checkups, healthy lifestyle choices, and targeted health guidance are essential in promoting healthy aging and reducing the burden of atherosclerosis in older adults.

4.Cknowledgements

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