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ORIGINAL RESEARCH

Different Level of Carotid-Femoral Pulse Wave Velocity and Related Factors in Different Nationality Group in China

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Background: Higher level of carotid-femoral pulse wave velocity (CF-PWV) is indicating higher level of arterial stiffness. China has a population of 1.4 billion, with 1.2 billion population in Han ethnicity, 9.4 million population in Miao ethnicity, 700 thousand population in She ethnicity. We chose these three ethnic groups for analysis, to find some similarities or differences in CF-PWV.

Methods: We launched early vascular lesion detection technology promotion involving several regions such as the Han (Beijing), Miao (Guizhou Province), and She (Fujian Province) ethnicity. We conducted population testing in different regions and based on the inclusion and exclusion criteria, 1481 individuals were ultimately included. There were 942 han subjects, 186 Miao subjects and 353 She subjects. The CF-PWV was measured using a Complior device.

Results: The CF-PWV was significantly higher in Han population than in Miao and She population. Levels of systolic blood pressure (SBP) and diastolic blood pressure (DBP) were significantly lower in Han ethnicity than in Miao and She ethnicity. The composition of male, smoking, hypertension and diabetes mellitus were significantly higher in Han ethnicity than in Miao and She ethnicity. Multiple linear regression analysis showed that age, body mass index (BMI), diabetes mellitus, creatinine, total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), SBP, and ethnicity were independent associated with the CF-PWV in all subjects. And compared with the Han ethnicity, CF-PWV was significantly lower in Miao and She ethnicity ($\beta = -0.295$, $\beta = -0.241$, both $p<0.001$).

Conclusion: CF-PWV was significantly higher in Han ethnicity than in Miao and She ethnicity. The factors associated with the CF-PWV differed among different ethnicity indicated that different prevention and control strategies needed to be adopted for different ethnic groups and risk factors in different regions to reduce the progression of arteriosclerosis in the local population.

Keywords: carotid-femoral pulse wave velocity, Han ethnicity, Miao ethnicity, She ethnicity

Introduction

Vascular-related diseases, such as hypertension, coronary artery disease, stroke and peripheral vascular disease, are the most common causes of death in human. Arteriosclerosis is a basic pathophysiological change of these diseases. Atherosclerosis can be represented by arterial stiffness, which is a predictor of cardiovascular and cerebrovascular events.[1] Arterial stiffness can be represented using pulse wave velocity (PWV), which is the gold standard recommended by guidelines for evaluating arterial stiffness.[2] Our previous research has found a positive correlation between carotid-femoral PWV (CF-PWV) and pulse pressure, and it was elevated in individuals with hypertension and left ventricular hypertrophy.[3,4] Our recent research has also found that the CF-PWV was elevated in healthy individuals with a family history of hypertension.[5]

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China has a population of 1.4 billion and is a vast territory, among which there are 56 ethnic groups. As such, there is 1.2 billion population in Han ethnicity, 9.4 million population in Miao ethnicity, and 700 thousand population in She ethnicity. The living environment, diet and working conditions of each ethnicity are different; therefore, the incidence of vascular-related diseases is speculated to be different. As shown above, increasing CF-PWV was the pathophysiological change in these diseases, so there might be some differences in CF-PWV between these different ethnic groups. Although there are many guidelines for the treatment of vascular-related diseases, adjustments should be made for specific areas. However, there was little research about the difference about CF-PWV between different ethnic groups. In addition, there were many difficulties in collecting data from 56 ethnic groups, so we chose three ethnic groups, Han ethnicity, Miao ethnicity and She ethnicity for the analysis, to find some similarities or differences in CF-PWV in these subjects. Therefore, the present study aimed to provide some guidance for the prevention of vascular-related diseases in different ethnic groups.

Materials and Methods

Subjects

Early vascular lesion detection technology was approved by the Ministry of Health of the People`s Republic of China for promotion in China in 2004. According to the process of promoting this technology nationwide, in 2009, we extended this technology to southern provinces and cities in China, such as Guizhou and Fujian provinces. In addition to the Han ethnic group, there are other ethnic groups in the population of these two provinces and cities, such as the Miao ethnic group in Guizhou Province and the She ethnic group in Fujian Province. In addition, Miao ethnicity was located in Xijiang Miao Village in Southeastern of Guizhou Province. She ethnicity was located in Ningde City of Fujian Province. In order to better understand the vascular function status of different ethnic groups, we conducted vascular function testing on the populations of these two ethnic groups. At the same time, we also conducted vascular function testing for the Han population in the outpatient department of Peking University People's Hospital. Therefore, the populations in these three regions became the subjects of this study.

The disease status of subjects was obtained using questionnaires. In the present study, the selected subjects were mainly outpatient patients or health examination subjects. According to early vascular lesion detection technology project's requirements, all subjects were asked if we could use their clinical data for scientific research in the future. If the subjects agreed, they would sign an informed consent form. Subjects who could successfully complete vascular function testing would be included in this project study, regardless of age. In addition, subjects with heart failure, stroke, renal function impairment, liver function impairment, systemic inflammatory diseases, infectious disease or cancer were excluded. Finally, 1481 subjects (M/F 749/732) were enrolled into our study. There were 942 han subjects, 186 Miao subjects and 353 She subjects, respectively. Hypertension was defined as blood pressure measurement ≥140/90mmHg in three occasions at rest or subjects with known cases of diagnosed hypertension before and taking anti-hypertensive drugs at present. Diabetes mellitus was defined as fasting plasma glucose ≥7.0mmol/L or plasma glucose of two hours after meal ≥11.1mmol/L or random plasma glucose ≥11.1mmol/L.

Pulse Wave Velocity Measurement

According to our previously published research methods, arterial stiffness was evaluated by measuring automatic PWV using the Complior device (Complior SP, Artech-Medical, France), which was used for the measurement of PWV widely around the world with great accuracy and reproducibility.[6] The basic principle of PWV assessment is that pressure pulse generated by ventricular ejection is propagated along the arterial system at a speed determined by the elasticity of the arterial wall. Knowing the distance and pulse transit time, the velocity can be calculated. Patients were placed in supine position and, after a 10-minute rest, underwent PWV measurement and carotid-femoral PWV (CF-PWV) was obtained automatically. Estimation of the distance travelled by the pulse is based on measuring the distance between the common carotid artery and the right femoral artery.

Laboratory Measurements

According to our previously published research methods and the methods of our hospital's laboratory department, blood samples were drawn from an antecubital vein in the morning after overnight fasting and collected into vacuum tubes containing EDTA for the measurement of plasma lipid and lipoprotein levels. Fasting plasma glucose (FPG), total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglyceride (TG), creatinine, serum uric acid levels were analyzed by colorimetric enzymatic assays with the use of an autoanalyzer (HITACHI-7170, Hitachi, Tokyo, Japan). The tests of Han ethnicity were done in Peking University People's Hospital, Miao ethnicity were done in Guiyang Third People's Hospital, and She ethnicity were done in Mindong Hospital of Ningde City.

Statistical Analysis

The differences between groups were analyzed by *t*-test, one-way ANOVA and least-significant difference (LSD). Proportions were analyzed by χ^2 -test. Correlation coefficient was done to find linear relation between different variables using Pearson correlation analysis. Multiple linear regressions were used to estimate the coefficients of the linear equation, involving independent variables that affected the value of the dependent variables. Values were shown as mean ± SD unless stand otherwise. p <0.05 (2-tailed) was considered statistically significant.

Results

Clinical Characteristics of the Study Participants

First, these subjects were divided into two groups: male group (n=749), female group (n=732). The clinical characteristics of the study participants were summarized in Table 1. Our results showed that the levels of body mass index (BMI), CF-PWV, diastolic blood pressure (DBP), FPG, creatinine, serum uric acid, and TG were significantly higher in male group than in female group. HDL-C was significantly lower in male than in female group.

Next, participants were divided into three groups according to different kind of ethnicity. As shown in Table 2, the level of CF-PWV was significantly higher in Han ethnicity than in Miao and She ethnicity. Levels of systolic blood pressure (SBP), DBP and HDL-C were significantly lower in Han ethnicity than in Miao and She ethnicity. Levels of

Table 1 Clinical Characteristics in the Entire Study Group

Characterisitics	Entire (N=1481)	Male (N=749)	Female (N= 732)	*p*
Age (year)	52.80±9.16	52.94±8.68	52.68±9.61	0.587
BMI (Kg/M^2)	24.93±3.41	25.24±3.23	24.60±3.56	<0.001
Smoking (No.,%)	665, 44.9%	595, 79.4%	70, 9.5%	<0.001
Hypertension (No.,%)	611, 41.3%	319, 42.6%	292, 39.9%	0.312
Diabetes Mellitus (No.,%)	233, 15.7%	131, 17.5%	102, 13.9%	0.065
CFPWV (m/s)	10.29±2.20	10.63±2.15	9.94±2.18	<0.001
SBP (mmHg)	139.36±20.75	138.40±19.85	140.39±21.60	0.066
DBP (mmHg)	87.11±11.64	88.03±11.59	86.18±11.63	0.002
FPG (mmol/L)	5.72±1.48	5.93±1.70	5.50±1.18	<0.001
UA (umol/L)	306.91±84.10	352.34±76.50	260.45±64.64	<0.001
TC (mmol/L)	5.05±1.12	5.02±1.16	5.07±1.08	0.413
HDL-C (mmol/L)	1.34±0.41	1.23±0.37	1.46±0.42	<0.001
LDL-C (mmol/L)	2.97±0.92	2.92±0.86	3.02±0.97	0.044
TG (mmol/L)	1.70±1.45	1.91±1.66	1.49±1.17	<0.001
Creatinine (umol/L)	65.42±14.48	73.82±11.65	56.79±11.73	<0.001

Note: p: male vs female.

Abbreviations: BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; FPG, fasting plasma glucose; UA, uric acid; TC, cholesterol; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol; TG, triglycerides; CF-PWV, carotid-femoral pulse wave velocity.

Table 2 Clinical Characteristics in Different Groups

Characterisitics	Han Ethnicity (N=942)	Miao Ethnicity (N=186)	She Ethnicity (N=353)	*p*
Age (year)	55.02±7.88	52.37±10.22*	47.11±9.36*#	<0.001
BMI (Kg/M^2)	25.62±3.25	22.31±2.96*	24.47±3.31*#	<0.001
Male (No.,%)	555, 58.9%	56, 30.1%	138, 39.1%	<0.001
Smoking (No.)	521, 55.3%	44, 23.7%	100, 28.3%	<0.001
Hypertension (No.)	471, 50%	75, 40.3%	65, 18.4%	<0.001
Diabetes Mellitus (No.)	206, 21.9%	6, 3.2%	21, 5.9%	<0.001
RCAVI	7.91±1.11	7.44±1.12*	7.22±1.22*#	<0.001
CFPWV (m/s)	10.82±2.25	8.83±1.91*	9.63±1.56*#	<0.001
SBP (mmHg)	135.41±18.47	140.31±24.46*	149.38±21.10*#	<0.001
DBP (mmHg)	85.20±10.88	88.16±13.32*	91.67±11.37*#	<0.001
FPG (mmol/L)	5.94±1.59	5.11±0.74*	5.46±1.33*#	<0.001
UA (umol/L)	325.92±80.82	265.48±74.78*	278.45±81.54*	<0.001
TC (mmol/L)	5.09±1.15	4.67±0.98*	5.14±1.08#	<0.001
HDL-C (mmol/L)	1.20±0.29	1.64±0.57*	1.60±0.39*	<0.001
LDL-C (mmol/L)	3.01±0.85	2.82±1.20*	2.92±0.89	0.026
TG (mmol/L)	1.92±1.60	1.42±1.01*	1.28±1.05*	<0.001
Creatinine (umol/L)	67.28±14.59	60.57±12.88*	63.01±14.07*	<0.001

Note: *vs Han ethnicity p<0.05, #vs Miao ethnicity p<0.05.
Abbreviations: BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; FPG, fasting plasma glucose; UA, uric acid; TC, cholesterol; LDL-C, low-density lipoprotein cholesterol. HDL-C, high-density lipoprotein cholesterol. TG, triglycerides. CF-PWV, carotid-femoral pulse wave velocity.

FBG and uric acid were significantly higher in Han ethnicity than in Miao and She ethnicity. In addition, the composition of male, smoking, hypertension, and diabetes mellitus were significantly higher in Han ethnicity than in Miao and She ethnicity.

Pearson Correlation between CF-PWV and Metabolic Markers

Next, we investigated the Pearson correlation between CF-PWV and metabolic markers and other variables in the entire group. As shown in Table 3, our results showed that CF-PWV was positively correlated with age, SBP, DBP, FBG, uric acid, TC, TG and creatinine in the entire study group (all p<0.05). There was a negative correlation between CF-PWV and HDL-C in the entire study group.

Table 3 Spearman Correlations Between CF-PWV and Study Variables Among Entire Study Group

	CFPWV	
	r	P value
Age (year)	0.348	<0.001
BMI (Kg/M^2)	0.101	<0.001
SBP (mmHg)	0.328	<0.001
DBP (mmHg)	0.230	<0.001
FPG (mmol/L)	0.188	<0.001
UA (umol/L)	0.158	<0.001

(*Continued*)

Table 3 (Continued).

	CFPWV	
	r	**P value**
TC (mmol/L)	0.056	0.032
HDL-C (mmol/L)	−0.200	<0.001
LDL-C (mmol/L)	0.000	0.991
TG (mmol/L)	0.131	<0.001
Creatinine (umol/L)	0.184	<0.001

Abbreviations: BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; FPG, fasting plasma glucose; UA, uric acid; TC, cholesterol; LDL-C, low-density lipoprotein cholesterol. HDL-C, high-density lipoprotein cholesterol. TG, triglycerides. CF-PWV, carotid-femoral pulse wave velocity.

Multiple Linear Regression Analysis

Multiple linear regressions were used to estimate the coefficients of the linear equation, involving independent variables including age, gender, BMI, smoking, hypertension, diabetes mellitus, SBP, DBP, FPG, serum uric acid, creatinine, TC, TG, HDL-C and LDL-C, which affected CFPWV value. As shown in Table 4, our results showed that age, BMI, diabetes mellitus, creatinine, TC, HDL-C, LDL-C, SBP, and ethnicity were independent associated with CF-PWV in all subjects.

Table 4 Multiple Linear Regression Analysis for the Relationship Between CFPWV and Study Variables Among Entire Study Group

	Unstandardized β	**Std. Error**	**Standardized β**	**t**	**95% CI for β**	**P value**
Constant	3.525	0.879		4.012	[1.801, 5.250]	<0.001
Gender	−0.037	0.165	−0.008	−0.222	[−0.360, 0.287]	0.824
Age (year)	0.046	0.007	0.197	6.994	[0.033, 0.059]	<0.001
BMI (Kg/M^2)	−0.081	0.018	−0.122	−4.482	[−0.116, −0.046]	<0.001
Hypertension	0.083	0.132	0.018	0.631	[−0.176, 0.343]	0.528
Diabetes Mellitus	0.407	0.127	0.084	3.197	[0.157, 0.657]	0.001
Smoking	−0.064	0.078	−0.025	−0.815	[−0.217, 0.090]	0.416
FPG (mmol/L)	0.062	0.042	0.040	1.472	[−0.021, 0.145]	0.141
Creatinine (umol/L)	0.023	0.005	0.148	4.920	[0.014, 0.032]	<0.001
UA (umol/L)	0.000	0.001	−0.016	−0.517	[−0.002, 0.001]	0.606
TC (mmol/L)	0.285	0.115	0.140	2.469	[0.059, 0.511]	0.014
HDL-C (mmol/L)	−0.501	0.189	−0.097	−2.658	[−0.872, −0.131]	0.008
LDL-C (mmol/L)	−0.412	0.118	−0.175	−3.502	[−0.642, −0.181]	<0.001
TG (mmol/L)	0.068	0.053	0.040	1.285	[−0.036, 0.172]	0.199
SBP (mmHg)	0.040	0.004	0.375	8.850	[0.031, 0.048]	<0.001
DBP (mmHg)	0.000	0.008	−0.002	−0.055	[−0.016, 0.015]	0.956
Miao ethnicity	−1.851	0.186	−0.295	−9.975	[−2.215, −1.487]	<0.001
She ethnicity	−1.176	0.169	−0.241	−6.976	[−1.507, −0.0845]	<0.001
Han ethnicity	0					

Abbreviations: BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; FPG, fasting plasma glucose; UA, uric acid; TC, cholesterol; LDL-C, low-density lipoprotein cholesterol. HDL-C, high-density lipoprotein cholesterol. TG, triglycerides. CF-PWV, carotid-femoral pulse wave velocity.

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And compared with the Han ethnicity, CF-PWV was significantly lower in Miao ethnicity and She ethnicity (β= −0.295, β= −0.241, both p<0.001).

As shown in Table 5, SBP, creatinine, age, BMI, diabetes mellitus, LDL-C, TC and HDL-C were independent associating factors of CFPWV in Han ethnicity. As shown in Table 6, DBP and age were independent associating factors of CFPWV in Miao ethnicity. As shown in Table 7, SBP, TG, FBG, age and BMI were independent associating factors of CFPWV in She ethnicity. In addition, interaction analysis was used to test whether any of the predictors varies including gender, age, BMI, hypertension, diabetes mellitus, smoking, FPG, creatinine, UA, TC, HDL-C, LDL-C, TG, SBP and DBP in its relationship with CF-PWV across ethnicity. Our present study showed that the interaction between SBP and ethnicity on CF-PWV was significant (F=1.596, p<0.001), and there was no interaction between other varies and ethnicity on CF-PWV.

Table 5 Multiple Linear Regression Analysis for the Relationship Between CFPWV and Study Variables in Han Ethnicity

	Unstandardized β	Std. Error	Standardized β	t	95% CI for β	P value
Constant	1.321	1.150	–	1.149	[−0.937, 3.580]	0.251
SBP (mmHg)	0.055	0.005	0.427	12.212	[0.046, 0.064]	<0.001
Creatinine (umol/L)	0.030	0.005	0.191	5.668	[0.020, 0.040]	<0.001
Age (year)	0.066	0.011	0.209	6.202	[0.045, 0.086]	<0.001
BMI (Kg/M^2)	−0.127	0.027	−0.171	−4.732	[−0.180, −0.074]	<0.001
Diabetes Mellitus	0.583	0.191	0.103	3.046	[0.207, 0.959]	0.002
LDL-C (mmol/L)	−0.895	0.175	−0.322	−5.102	[−1.240, −0.551]	<0.001
TC (mmol/L)	0.659	0.142	0.310	4.6448	[0.380, 0.937]	<0.001
HDL-C (mmol/L)	−0.911	0.289	−0.119	−3.156	[−1.478,-0.344]	0.002

Abbreviations: BMI, body mass index; SBP, systolic blood pressure; TC, cholesterol; LDL-C, low-density lipoprotein cholesterol. HDL-C, high-density lipoprotein cholesterol. CF-PWV, carotid-femoral pulse wave velocity.

Table 6 Multiple Linear Regression Analysis for the Relationship Between CFPWV and Study Variables in Miao Ethnicity

	Unstandardized β	Std. Error	Standardized β	t	95% CI for β	P value
Constant	2.387	0.953	–	2.504	[0.505, 4.269]	0.013
DBP (mmHg)	0.048	0.010	0.350	4.989	[0.029,0.067]	<0.001
Age (year)	0.041	0.013	0.225	3.208	[0.016,0.066]	0.002

Abbreviations: DBP, diastolic blood pressure; CF-PWV, carotid-femoral pulse wave velocity.

Table 7 Multiple Linear Regression Analysis for the Relationship Between CFPWV and Study Variables in She Ethnicity

	Unstandardized β	Std. Error	Standardized β	t	95% CI for β	P value
Constant	3.187	0.667	–	4.777	[1.875, 4.498]	<0.001
SBP (mmHg)	0.033	0.003	0.448	9.972	[0.026, 0.039]	<0.001
TG (mmol/L)	0.353	0.061	0.240	5.738	[0.232, 0.474]	<0.001
Age (year)	0.031	0.008	0.182	4.022	[0.016, 0.045]	<0.001
FPG (mmol/L)	0.190	0.049	0.163	3.894	[0.094, 0.286]	<0.001
BMI (Kg/M^2)	−0.058	0.020	−0.123	−2.939	[−0.097, −0.019]	0.004

Abbreviations: BMI, body mass index; SBP, systolic blood pressure; FPG, fasting plasma glucose; TG, triglycerides. CF-PWV, carotid-femoral pulse wave velocity.

Discussion

Our present study showed that CF-PWV was significantly higher in Han ethnicity than in Miao and She ethnicity. The factors associated with the CF-PWV differed among different ethnic groups.

Elevated arterial stiffness is the first change discovered during the progression of arteriosclerosis.[7] Pulse wave velocity (PWV) can reflect the level of arteriosclerosis and stiffness. Research has revealed the predictive value of pulse wave velocity in cardiovascular and cerebrovascular diseases.[8] We all know that BMI, hypertension, HDL-C, TG, and glucose are the members of metabolic syndrome. Our present study showed that CF-PWV was positively correlated with SBP, DBP, GLU, UA, LDL-C and TG, with negative correlation between CF-PWV and HDL-C, similar results to our previous study.[9]

There are 1.4 billion people in China, and the prevalence of vascular-related disease such as hypertension, coronary artery disease and stroke is increasing annually. Recent study showed that the annual number of deaths due to cardiovascular disease increased from 2.51 million to 3.97 million between 1990 and 2016. There was a huge economic burden and social pressure caused by this disease in China.[10] So the early detection and treatment of high-risk patients has been enforced as a key strategy in the prevention of cardiovascular diseases to reduce the incidences of death and disability of cardiovascular diseases apart from the treatment of serious vascular events. Early vascular lesion detection technology was approved by the Ministry of Health of the People's Republic of China for promotion in China in 2004. We established an early vascular lesion detection system and published the first guideline in 2006:[11] early vascular disease detection technology standardization proposal of China (draft) and renewed this guideline in 2011: Chinese guideline for early vascular disease detection (2011 second report).[12]

During the past 16 years, early vascular lesion detection technology has been promoted to the whole China, and we conducted some research. As we know, there are 56 ethnic groups in China. There are some special characteristics of these ethnic groups with large populations. Among these ethnic groups, Han ethnicity constituted the majority of the population. Our results showed that Han ethnicity had higher risk factors such as hypertension, diabetes mellitus, smoking and so on. However, our results showed a slight difference, that was, the levels of SBP and DBP in Miao and She ethnicity were significantly higher than in Han ethnicity, but CF-PWV was significantly lower than in Han ethnicity. We speculated that there might be several reasons. First, the proportion of males in Miao ethnicity or She ethnicity was relatively lower. CF-PWV in males was higher than that in females in the entire study group, and the proportion of smokers in males was higher than that in females. Second, the geographical environments were different. Han ethnicity in this study was mainly concentrated in the north, mainly among Beijing residents. Miao ethnicity was in Guizhou Province, and She ethnicity was in Fujian province. Both were located in the south. The north subjects mainly ate high-salt diet, whereas the south subjects mainly ate light diet. A previous study showed that a decrease in salt consumption could help to reduce arterial stiffness.[13] Third, the mental stress differed. The Han ethnicity was mainly urban residents, while the Miao, and She ethnicity were mainly primitive villages, with less external interference, which might lead to differences in arterial stiffness. Previous study showed that mental stress was accompanied by significant increases in epinephrine levels and PWV.[14] Positive (laughter) and negative (stress) behavioral interventions had divergent acute effects on arterial stiffness and wave reflections.[15] Increased pulse wave velocity in patients with panic disorder might justify the associated risk and be useful in identifying the patients with higher risk of future cardiovascular complications.[16]

The study showed that ethnicity was an independent factor of CF-PWV in the entire study group. Age, SBP and metabolic effects were independent factors of CF-PWV in Han ethnicity. Age and DBP were independent factors of CF-PWV in Miao ethnicity. Age, TG and SBP were independent factors of CF-PWV in She ethnicity. In addition, the interaction between SBP and ethnicity in CF-PWV was significant. As we know, SBP is a strong influencing factor of CF-PWV. In addition to conventional age and SBP, the influencing factors of CF-PWV varied among different ethnic groups, which mean that in the diagnosis and treatment of diseases in different ethnic groups, in addition to conventional risk factor control, targeted diagnosis and treatment plans were needed to be adopted based on the characteristics of the ethnic group. The present study showed that the influence of different ethnic groups on CFPWV factors was different; this could provide certain theoretical basis for the prevention and control of vascular function in different population

provides. And previous study showed that CF-PWV was different between white, brown and black adults, and there was relationship between race and arterial stiffness in brown and black women.[17] A meta-analysis found that racial disparities in CF-PWV persist among African American racial groups in the United States.[18] As found in the previous study, the cardiovascular disease burden appeared to be lower in coastal provinces with higher economic development. The between-province gap in the relative burden of cardiovascular disease increased from 1990 to 2016, with faster decline in economically developed provinces. Geographically targeted considerations are needed to tailor future strategies to enhance cardiovascular disease health throughout China and in specific provinces.[10]

A major limitation of our study is its cross-sectional design; another limitation was that the subjects' numbers of each group were not balanced, especially for the Miao and She ethnic groups, the population was relatively small, resulting in fewer predictive factors, but it also suggested that the influencing factors of CF-PWV might vary among different ethnic groups. In addition, as mentioned above, diet and stress may have been involved; however, we did not include them including drug usage in the questionnaire. Finally, we did not obtain a diagnosis of coronary artery disease in Miao and She ethnicity due to the limitations of medical conditions, therefore we did not analyze the prevalence of coronary artery disease in Miao and She ethnicity. Therefore, a prospective study with a larger sample size is warranted in the future.

In conclusion, CF-PWV was significantly higher in Han ethnicity than in Miao and She ethnicity, indicating the higher level of arterial stiffness. The factors associated with the CF-PWV differed among different ethnic groups indicated that different prevention and control strategies needed to be adopted for different ethnic groups and risk factors in different regions to reduce the progression of arteriosclerosis in the local population.

Ethics Approval

This study was approved by the ethics committee of Peking University Shougang Hospital (reference number, SGYYZ202105). This study complied with the Declaration of Helsinki.

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Disclosure

The authors report no conflicts of interest, financial or otherwise in this work.

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