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Original Article

Appropriate triglyceride to high-density-lipoprotein cholesterol ratio cutoff to detect cardiovascular risk factors among Uighur adults in Xinjiang, China

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Abstract: Background: The triglyceride/high-density lipoprotein cholesterol ratio (TG/HDL-C) might be a good predictor of cardiovascular diseases. Objective: To determine whether triglyceride/high-density lipoprotein cholesterol ratio (TG/HDL-C), which has been shown to be an indicator of the metabolic syndrome (MetS) and insulin resistance (IR), can predict cardiovascular risk factors in the Chinese Uighur population in Xinjiang. Methods: The Cardiovascular Risk Survey (CRS) was conducted from October 2007 to March 2010. A total of 14,618 representative participants were selected using a four-stage stratified sampling method. A total of 4,767 Uighur participants were included in the study. The sensitivity, specificity, and distance on the receiver operating characteristic (ROC) curve in each TG/HDL level were calculated. The shortest distance in the ROC curves was used to determine the optimal cutoff of the TG/HDL-C ratio for detecting cardiovascular risk factors. Results: The prevalence of hypercholesterolemia and low HDL cholesterol were higher with higher TG/HDL-C ratio for both men and women. The TG/HDL-C ratio was positively associated with systolic blood pressure, diastolic blood pressure and serum concentrations of HDL cholesterol. The optimal TG/HDL-C ratio cutoffs for predicting hypertension, dyslipidemia, diabetes and ≥ two of these risk factors for Uighur adults in Xinjiang were 1.1, 1.2, 1.3, 1.2 in men and 1.1, 1.2, 1.2, 1.2 in women, respectively. Conclusion: The evaluation of TG/HDL-C ratio should be considered for one of cardiovascular risk factor predictors among Uighur adults in Xinjiang.

Keywords: Cutoff, TG/HDL ratio, cardiovascular risk factors, Uighur adults, Xinjiang

Introduction

Cardiovascular disease (CVD) is the leading cause of death in the world, the mortality of CVD is higher in low and middle-income countries comparing with that in developed countries. The economic burden is expected to increase dramatically over the next 10 years [1]. Meanwhile, CVD has become the leading cause of death in China [2]. It was estimated that 43.8% of deaths in Chinese adults aged ≥ 40 years were attributed to heart disease and stroke during 1991-2000 in a national prospective cohort study [3]. Serum lipids levels were constantly increasing in the Chinese population. Without effective intervention, atherosclerosis related diseases may soar in the near future in China [4].

Lipid metabolic disorders have been proved as one of the pathogenesis of atherosclerosis, which is fundamental to the occurrence of CVD. Elevated serum lipids is one of the most important risk factors for cardiovascular disease in Western populations as well as in Asian populations [5-8]. High level of low-density lipoprotein cholesterol (LDL-C) is well established in the development of CHD, the role of triglycerides (TG) and high-density lipoprotein cholesterol (HDL-C) remained controversial. Recently, some studies demonstrated that hypertriglyceridemia is an independent predictor of CHD, and it may be a stronger risk factor than it was previously thought to be [9-13]. The ratio of TG/HDL-C, initially proposed by Gaziano et. al, is an atherogenic index that has proven to be a highly significant independent predictor of cardiovascular disease [14]. Others have linked a high TG/HDL-C ratio to the risk of cardiovascular events [15, 16]. The cutoffs for the TG/HDL-C ratio are more often used to predict metabolic syndrome (MetS) and insulin resistance (IR) [17, 18], while few studies of CVD have focused on Uighur adults in Xinjiang, China.

Xinjiang Uighur Autonomous Region is located in northwest of China and in center of Asia. This largest province in China has a unique culture and life style. The total Uighur population was 9.41 million which is 46% of the total population in Xinjiang in 2006. Several studies have reported the condition of dyslipidemia among adults in Xinjiang [19-21], but the association between TG/HDL ratio and cardiovascular risk factors among Uighur adults in Xinjiang remains unknown. In this study, we aimed at investigating the relationship between TG/HDL ratio and cardiovascular risk factors. We also calculated the optimal cutoff points of TG/HDL ratio to predict cardiovascular risk factors among Uighur adults in Xinjiang.

Methods and materials

Ethics statement

The present study was approved by the Ethics Committee of The First Affiliated Hospital of Xinjiang Medical University and was conducted according to the standards of the Declaration of Helsinki. Written, informed consent was obtained from the participants.

Sample design

Eligible patients were selected from the Cardiovascular Risk Survey (CRS) study, the detailed description of the study population and the methods were described previously [22, 23]. Briefly, the CRS study used a 4-stage stratified sampling method to select a representative sample of the general population in Xinjiang, northwest of China. The research sites included Urumqi City, Kelamayi City, Fukang City, Turpan Prefecture, Hetian Prefecture and Yili Prefecture. The time period was from October 2007 to March 2010. The selections made from sampling units based on geographic area, sex, and age groups using household registries. The 4-stage stratified sampling method was as follows: Stage one, according to population census data of Xinjiang in 2000, the area mentioned above were selected based on population, ethnicity, geography, economic and cultural development level respectively. Stage two, according to the ethnic aggregation status, one district or county was randomly selected from the Uighur population dominated area. Stage three, one community or town (village) was randomly selected from each district or county. Stage four, subjects aged above 35 years were randomly selected from each community or town (village) as research participants. The staff conducted surveys in households and administered questionnaires. The questionnaires included the demographic, socioeconomic, dietary, and medical history of each participant. In total, the CRS included 14,618 participants (5,757 Hans, 4,767 Uighurs, and 4,094 Kazakhs). 4,767 Uighur participants with complete data were enrolled in the present study. 2,032 participants were male and 2,735 participants were female. The age of the participants were from 35 to 101 years old with the mean ± SD age of 50±13 (men, 53±14; women, 49±12).

Laboratory methods

Blood samples were obtained from an antecubital vein into vacutainer tubes containing EDTA in the morning after an overnight fasting period. Blood samples were centrifuged within two hours at the survey site. Plasma was transferred to separate labeled tubes and transported immediately on dry ice at prearranged intervals to the Xinjiang Key Laboratory of Cardiovascular Disease. Serum concentrations of serum total cholesterol, triglycerides, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and fasting glucose were measured by the Clinical Laboratory Department of the First Affiliated Hospital of Xinjiang Medical University with a biochemical analyzer (Dimension AR/AVL Clinical Chemistry System, Newark, NJ, USA [22, 23]).

Blood pressure measurement

A mercury sphygmomanometer was used to measure blood pressure in the sitting position after a 10-minute rest period. During the 30 minutes preceding measurement, the subjects were required to refrain from smoking or consuming caffeine. The appearance of the first sound was used to define systolic blood pressure, and the disappearance of sound was

Table 1. Age-standardized cardiovascular disease risk factors in the Chinese Uighur men by TG/HDL-C category

	TG/HDL-C ≤ 0.5	0.5 < TG/HDL-C ≤ 1.0	1.0 < TG/HDL-C ≤ 1.5	1.5 < TG/HDL-C ≤ 2.0	2.0 < TG/HDL-C ≤ 2.5	TG/HDL-C > 2.5	*P* value
Men							
Population distribution (%)	396 (19.50%)	578 (28.40%)	386 (19.00%)	230 (11.30%)	170 (8.40%)	272 (13.40%)	
Age (years)	51.48±14.87	54.02±14.50	52.12±13.16	54.57±12.74	53.29±11.71	50.02±10.91	< 0.001
Systolic blood pressure (mmHg)	128.38±19.60	130.76±19.11	131.69±19.90	134.04±17.94	135.23±22.11	133.15±20.00	< 0.001
Diastolic blood pressure (mmHg)	77.73±13.62	79.71±13.86	80.51±15.05	81.67±13.05	83.82±16.47	83.36±15.19	< 0.001
Total cholesterol (mmol/L)	3.84±1.14	4.03±0.91	4.37±1.00	4.64±1.07	4.57±0.54	4.87±1.22	< 0.001
HDL cholesterol (mmol/L)	1.65±0.69	1.37±0.33	1.22±0.38	1.16±0.35	1.02±0.33	0.87±0.37	< 0.001
LDL cholesterol (mmol/L)	3.06±0.98	3.02±0.88	2.82±0.87	2.80±0.93	2.80±0.88	2.54±0.87	< 0.001
Triglycerides (mmol/L)	1.03±1.25	1.00±0.26	1.48±0.48	2.00±0.62	2.26±0.74	3.42±2.09	< 0.001
Fasting glucose (mmol/L)	4.63±1.40	4.68±1.24	4.94±1.52	5.32±2.45	5.20±2.09	5.35±2.62	< 0.001
BMI (kg/m^2)	24.38±3.95	24.35±3.76	25.78±4.22	26.45±3.83	26.63±3.84	27.73±3.94	< 0.001

Note: TG/HDL-C, triglycerides/high density lipoprotein cholesterol; HDL, high density lipoprotein; LDL, low density lipoprotein; BMI, body mass index.

Table 2. Age-standardized cardiovascular disease risk factors in the Chinese Uighur women by TG/HDL-C category

	TG/HDL-C ≤ 0.5	0.5 < TG/HDL-C ≤ 1.0	1.0 < TG/HDL-C ≤ 1.5	1.5 < TG/HDL-C ≤ 2.0	2.0 < TG/HDL-C ≤ 2.5	TG/HDL-C > 2.5	*P* value
Women							
Population distribution (%)	518 (18.90%)	794 (29.00%)	510 (18.60%)	341 (12.50%)	208 (7.60%)	364 (13.30%)	
Age (years)	45.60±12.82	48.39±12.78	50.79±11.94	50.47±11.58	52.05±12.26	51.59±10.56	< 0.001
Systolic blood pressure (mmHg)	125.78±21.91	129.22±21.87	133.09±22.33	134.60±21.41	134.87±21.56	137.16±22.60	< 0.001
Diastolic blood pressure (mmHg)	76.41±15.03	78.47±14.64	80.65±15.42	81.53±14.90	81.84±14.53	83.47±115.35	< 0.001
Total cholesterol (mmol/L)	3.98±1.20	4.18±0.98	4.46±1.02	4.65±1.16	4.75±1.12	4.94±1.30	< 0.001
HDL cholesterol (mmol/L)	1.68±0.54	1.38±0.33	1.22±0.33	1.11±0.34	1.02±.29	0.84±0.33	< 0.001
LDL cholesterol (mmol/L)	3.07±0.97	3.06±0.89	2.78±0.84	2.73±0.95	2.78±0.94	2.48±0.89	< 0.001
Triacylglycerol (mmol/L)	1.03±1.30	1.02±0.30	1.49±0.44	1.93±0.61	2.28±0.65	3.20±1.61	< 0.001
Fasting glucose (mmol/L)	4.73±1.57	4.80±1.38	4.89±1.39	5.09±1.64	5.05±1.40	5.34±1.82	< 0.001
BMI (kg/m^2)	24.99±4.54	25.17±4.49	26.37±4.64	27.14±4.48	26.93±4.44	27.69±4.36	< 0.001

Note: TG/HDL-C, triglycerides/high density lipoprotein cholesterol; HDL, high density lipoprotein; LDL, low density lipoprotein; BMI, body mass index.

used to define diastolic blood pressure [24]. Two readings each of systolic and diastolic blood pressures were recorded, and the average of each measurement was used for data analysis. If the first two measurements differed by more than 5 mmHg, additional readings were taken.

Definition of risk factors

Hypertension was defined as self-reported use of antihypertensive medication within the past 2 weeks or an average systolic blood pressure ≥ 140 mmHg, an average diastolic blood pressure ≥ 90 mmHg, or both. Diabetes was defined as fasting plasma glucose ≥ 7.0 mmol/L, use of insulin or oral hypoglycemic agents, or a self-reported history of diabetes. Total cholesterol concentrations > 6.22 mmol/L (240 mg/dl) were defined as hypercholesterolemia. Triglyceride concentrations > 2.26 mmol/L (200 mg/dl) were defined as hypertriglyceridemia. LDL cholesterol concentrations > 4.14 mmol/L (160 mg/dl) were defined as high LDL cholesterol. HDL cholesterol concentrations < 1.04 mmol/L (40 mg/dl) were defined as low HDL cholesterol. BMI ≥ 24 (kg/m^2) were defined as overweight. Dyslipidemia was defined as TG ≥ 2.26 mmol/l, TC ≥ 6.22 mmol/l, LDL-C ≥ 4.14 mmol/l or HDL-C < 1.04 mmol/l, or if receiving a lipid-lowering drug [25].

Statistical analysis

Statistical analysis was conducted using SPSS version 17.0 for Windows (SPSS Inc., Chicago, IL, USA). Continuous variables were expressed as sex-specific means and standard deviations, and discrete variables were expressed as sex-specific proportions. Analysis of variance was used for continuous variables and the chi-square test was used for categorical variables. The distribution of clinical characteristics among participants stratified by ethnic groups was analyzed using one-way ANOVA (with the least significant difference post hoc test) or chi-square tests. The age-standardized prevalence of adverse CVD risk profiles were determined for the overall study population by age groups and by gender, separately. The significance of the differences across subgroups was compared using the Wald X^2 test. A value of $P < 0.05$ indicates a statistically significant difference. Age standardization was performed by the direct method by using the Han population according to the population census data of Xinjiang in 2000 as the standard population. The sensitivity and specificity of each TG/HDL level for the detection of hypertension, dyslipidemia, diabetes, and two or more of these risk factors were calculated by creating dichotomous variables for each TG/HDL value. Additionally, the distance on the receiver operating characteristic (ROC) curve of each TG/HDL value was calculated as the square root of $[(1 - \text{sensitivity})^2 + (1 - \text{specificity})^2]$. The TG/HDL value with the shortest distance on the ROC curve was considered in the determination of optimal cutoff. The overall performance of the TG/HDL test for detecting cardiovascular risk factors was assessed by computing the area under the curves (AUC). An AUC of 1 is considered to have perfect discriminatory power, and AUC of 0.5 suggests that the discriminatory power is no better than chance.

Results

Age-standardized cardiovascular disease risk factors in the Chinese Uighur by TG/HDL-C category

As presented in **Tables 1** and **2**, for both men and women, the serum HDL cholesterol decreased with the increase of TG/HDL-C ratio. We also noticed the systolic blood pressure, diastolic blood pressure, and total cholesterol accelerated with the increase of TG/HDL-C ratio in women, we did not notice the trend in men.

Age-standardized prevalence of risk factors in the Chinese Uighur by TG/HDL-C category

The prevalence of hypercholesterolemia and low HDL cholesterol increased as the TG/HDL-C ratio increased, the prevalence of diabetes, high LDL cholesterol and hypertriglyceridemia did not show any significant relationship with TG/HDL-C ratio for both men and women. The prevalence of hypertension increased as the TG/HDL-C ratio increased in women, however we did not observe any relationship with this variable and TG/HDL-C ratio in men (**Tables 3** and **4**).

Sensitivity, specificity, and distance in the ROC curve for TG/HDL-C cutoffs in the Chinese Uighur

The population distribution of each TG/HDL-C ratio and the sensitivity, specificity, and distance on the ROC curve for the detection of hypertension, dyslipidemia, diabetes, and ≥

Table 3. Age-standardized prevalence of risk factors in the Chinese Uighur men by TG/HDL-C category

	TG/HDL-C ≤ 0.5	0.5 < TG/ HDL-C ≤ 1.0	1.0 < TG/ HDL-C ≤ 1.5	1.5 < TG/ HDL-C ≤ 2.0	2.0 < TG/ HDL-C ≤ 2.5	TG/HDL-C > 2.5	*P* value
Men							
Hypertension	26.60%	33.20%	31.70%	33.60%	33.10%	36.20%	< 0.001
Diabetes	2.60%	3.80%	5.70%	10.40%	9.40%	11.40%	< 0.001
Hypercholesterolemia	5.80%	9.30%	16.90%	23.00%	25.90%	30.90%	< 0.001
High LDL cholesterol	42.00%	45.30%	36.30%	33.50%	35.90%	24.30%	< 0.001
Low HDL cholesterol	8.50%	14.90%	34.70%	43.00%	58.80%	68.40%	< 0.001
Hypertriglyceridemia	9.30%	1.60%	23.60%	64.80%	72.90%	86.80%	< 0.001

Note: TG/HDL-C, triglycerides/high density lipoprotein cholesterol; HDL, high density lipoprotein; LDL, low density lipoprotein.

Table 4. Age-standardized prevalence of risk factors in the Chinese Uighur women by TG/HDL-C category

	TG/HDL-C ≤ 0.5	0.5 < TG/ HDL-C ≤ 1.0	1.0 < TG/ HDL-C ≤ 1.5	1.5 < TG/ HDL-C ≤ 2.0	2.0 < TG/ HDL-C ≤ 2.5	TG/HDL-C > 2.5	*P* value
Women							
Hypertension	25.30%	30.00%	34.50%	38.70%	39.00%	43.70%	< 0.001
Diabetes	4.90%	3.50%	4.70%	5.30%	7.20%	12.60%	< 0.001
Hypercholesterolemia	9.70%	12.90%	20.20%	24.30%	27.90%	35.80%	< 0.001
High LDL cholesterol	43.40%	44.30%	32.90%	29.90%	34.10%	22.80%	< 0.001
Low HDL cholesterol	5.80%	12.50%	32.90%	49.30%	59.10%	74.50%	< 0.001
Hypertriglyceridemia	8.80%	2.60%	28.20%	57.80%	81.30%	87.10%	< 0.001

Note: TG/HDL-C, triglycerides/high density lipoprotein cholesterol; HDL, high density lipoprotein; LDL, low density lipoprotein.

two of these risk factors for men and women were shown in **Tables 5** and **6**, respectively. In men, the cutoff for dyslipidemia and ≥ two of these risk factors were 1.2. The shortest distances on the ROC curve of hypertension and diabetes was 1.3 and 1.1, respectively. A TG/HDL-C ratio of 1.2 appeared to be the optimal TG/HDL-C ratio cutoff in men. In women, the shortest distance on the ROC curve for diabetes and hypertension was 1.1. The shortest distance on the ROC curve for dyslipidemia, diabetes, and ≥ two of these risk factors was 1.2. A TG/HDL-C ratio of 1.2 appeared to be the optimal TG/HDL-C ratio cutoff in women.

The ROC curves for men and women were shown in **Figure 1**. We found that the discriminatory power of TG/HDL-C ratio for cardiovascular risk factors was slightly better in women than in men.

Discussion

The total Uighur population was 9.41 million which is 46% of the total population in Xinjiang in 2006. This study provides population-based data on the optimal cutoff of the triglyceride to HDL-cholesterol ratio for detecting cardiovascular risk factors in Chinese Uighur population in Xinjiang aged over 35 years. To our knowledge, this is the first large-scale, population-based, cross-sectional survey to estimate the TG/HDL-C ratio cutoff in the Uighur population in Xinjiang, China. We also found a relationship between the TG/HDL-C ratio and cardiovascular risk factors.

Although some lipid variables were associated with the extent of coronary disease, the ratio of triglycerides to HDL-cholesterol (TG/HDL-C) showed the strongest association with extent [26]. The TG to HDL-C ratio has been proposed as a useful lipid parameter associated with metabolic syndrome (MetS), insulin resistance (IR), cardio-metabolic risk [15, 17, 26]. It has been successfully used in predicting the development of diabetes, coronary heart disease, cardiovascular events and all-cause mortality [27-29]. MetS is a cluster of metabolic abnormalities characterized as central obesity, a raised level of triglycerides (TG), reduced high-density lipoprotein cholesterol (HDL-C), raised

Table 5. Sensitivity (Sens), specificity (Spec), and distance in the receiver operating characteristic (ROC) curve for TG/HDL-C cutoffs in the Chinese Uighur men

	Hypertension	Dislipidemia	Diabetes	≥ 2 risk factoes
Men				
TG/HDL-C cutoffs	1.1	1.2	1.3	1.2
Percentile	45.80%	49.30%	53.10%	49.30%
Sensitivity	0.53	0.84	0.55	0.78
Specificity	0.56	0.79	0.62	0.64
Distance in ROC curve	0.65	0.26	0.59	0.42
AUC	0.551	0.877	0.504	0.759

Note: TG/HDL-C, triglycerides/high density lipoprotein cholesterol.

Table 6. Sensitivity (Sens), specificity (Spec), and distance in the receiver operating characteristic (ROC) curve for TG/HDL-C cutoff in the Chinese Uighur women

	Hypertension	Dislipidemia	Diabetes	≥ 2 risk factoes
Women				
TG/HDL-C cutoffs	1.1	1.2	1.2	1.2
Percentile	46.30%	50.30%	50.30%	50.30%
Sensitivity	0.56	0.79	0.59	0.78
Specificity	0.58	0.8	0.59	0.64
Distance in ROC curve	0.61	0.29	0.58	0.42
AUC	0.593	0.869	0.623	0.765

Note: TG/HDL-C, triglycerides/high density lipoprotein cholesterol.

blood pressure (BP) and raised fasting plasma glucose (FPG) or previously diagnosed type 2 diabetes, all these factors are associated with cardiovascular disease [18]. TG/HDL-C is a relatively new atherogenic parameter for MetS, the reports on this specific risk factor in the Chinese population are limited.

According to the ATPIII and JIS criteria, the optimal cut-off for TG/HDL-C was 1.6 and 1.2 in men and 1.1 and 1.1 in women, respectively. The cut-off values of the markers to detect the MetS in Guangdong women was 0.88 [30] and the cutoff value in Ghanaian women was 0.61 [31]. Another study was reported that TG/HDL-C ratio contributed to a diagnosis of metabolic syndrome and 80% sensitivity and 78% specificity, the cutoff values were > 2.75 in men and > 1.65 in women on the basis of a European Spanish population [32]. Similarly, for a multiethnic sample, TG/HDL-C readings of 1.62 or greater in men and 1.18 or greater in women can help primary care physicians easily identify individuals at increased risk for CVD [33].

In the present study, based on the sensitivity, specificity, and ROC calculations, the optimal cutoffs of TG/HDL-C ratio for Uighur men and women in Xinjiang were 1.2 and 1.2, respectively. Additionally, this study showed an increasing trend in prevalence of hypertension, hypercholesterolemia, hypertriglyceridemia and diabetes with higher TG/HDL-C among Uighur adults. These elevated cardiovascular risks are associated with MetS and IR. Current studies have reported that the cutoffs of BMI, waist circumference (WC), waist-to-hip ratio (WHR) in Xinjiang were slightly higher comparing to the WHO criteria [34, 35]. Similarly, the cutoffs of TG/HDL-C ratio in Xinjiang are different from those in other regions or with other criterions.

It remains unclear why the cutoffs to detect the metabolic syndrome in a Uighur population were higher than those in Guangdong and Ghanaian and lower than those in the European population. Possible reasons may be associated with differences in diet, living conditions, climate and some important genes that regulate body fat distribution. First, the main reason may be a difference in diet in Xinjiang Uighur adults compared with Guangdong and Ghanaian. The Uighur population in Xinjiang consumes more mutton, salt, milk products and pasta. These foods carry more calorie and fat. However, when compared with European population, they consume more dessert and fried food than Uighur population. Second, a characteristic feature of the living conditions and climate in Xinjiang is that the temperature difference during day and night is considerable, summer is extremely hot and winter is extremely cold. Therefore, drinking strong wine, eating more animal fat, a higher salt intake in the Uighur population may lead to thicker fat deposition when compared with other populations for

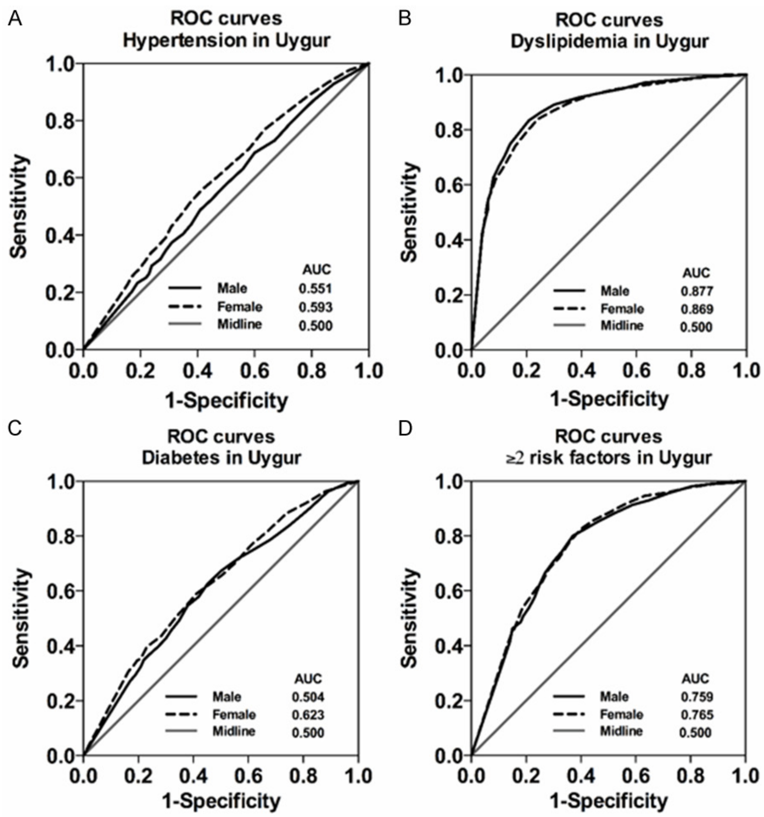

Figure 1. ROC curves to detect CVD risk factors by sex. (A) ROC curves for both men and women for the detection of hypertension, (B) dyslipidemia, (C) diabetes and (D) ≥ 2 of these risk factors (risk factors include hypertension, dyslipidemia, diabetes).

adaptation to the external environment in Xinjiang. Third, certain genes that regulate body fat distribution may be different in different populations, so that body fat is more likely to accumulate [36-38].

In addition, the difference in optimal values of TG/HDL-C ratio between populations might be due to varied body size, physical activity and metabolic status. We also found that the TG/HDL-C cutoff in Uighur women in Xinjiang was the higher than Guangdong, Ghanaian and the ATPIII and JIS criteria. The reason why there are higher optimal cutoffs may be associated with differences of eating habits and lifestyles. We also found that the cutoffs in Uighur men were lower than those in the European population and diagnosed with ATPIII criteria. The reason why there are lower cutoffs may due to the ethnicity variation, which needs further study.

The ratio TG/HDL-C, initially proposed by Gaziano et al, is an atherogenic index that has proven to be a highly significant independent predictor of cardiovascular disease, even stronger than TC/HDL-C and LDL-C/HDL-C [14]. The Copenhagen Male Study showed that TG/HDL-C levels could more accurately predict coronary disease [39]. The possible mechanism may be that high triglycerides and low HDL-C may lead to the accumulation of small and dense LDL-C, these LDL-C particles may cause HDL-C particles to undergo accelerated catabolism, which could close the atherogenic circle [40, 41]. The current study indicates that the cutoff of TG/HDL-C ratio is a good predictor of CAD [42]. This specific ratio has the best sensitivity and specificity, and it will be an easy, non-invasive means of predicting the presence and extent of coronary atherosclerosis.

Our study has several strengths. It is the first representative sample of the general adult Uighur population in Xinjiang. These results may be generalized to the full adult population of Uighurs aged above 35 years. Additionally, we provided information on cutoffs and AUC for many anthropometric and atherogenic parameters stratified by sex. Future studies can use the cut-offs suggested here for the screening and intervention of cardiovascular disease in a representative sample of the adult Uighur population in Xinjiang. The limitation of this study is this is a cross-sectional study, it may not able to predict the prognosis of the disorders. Future studies can use the ratio of TG/HDL-C cutoffs suggested here as a reference to evaluate the associated risk factors and intervention effects of dyslipidemia in other adult Uighur population.

Conclusion

In conclusion, this study showed a TG/HDL-C ratio value of 1.2 and 1.2 in men and women respectively as an appropriate cutoff to distinguish high cardiovascular risk patients. The continuous relationship between cardiovascular disease risk factors and triglyceride/high-density lipoprotein cholesterol (TG/HDL-C) ratio were documented here. For all the anthropometric and atherogenic parameters, the ratio of TG/HDL-C cutoff had the best predicting ability of CVD in both men and women.

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Disclosure of conflict of interest

None.

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