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Correlation analysis of homocysteine and triglyceride in elderly patients with metabolic syndrome

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Abstract: Objective: To explore the correlation between serum homocysteine (HCY) and serum triglyceride (TG) in elderly patients with metabolic syndrome and its clinical significance. Methods: From January 2020 to February 2021 in Xi 'an Hospital of Traditional Chinese Medicine,95 elderly patients (age≥60 years old) who met the diagnostic criteria of metabolic syndrome were selected, including 45 cases with normal homocysteine as the control group and 50 cases with increased homocysteine as the observation group. The age, sex, BMI, fasting blood glucose (FPG), low density lipoprotein (LDL-C), high density lipoprotein (HDL-C), TG, systolic blood pressure (SBP), diastolic blood pressure (DBP) and HCY were compared between the two groups. Results: There was no significant difference in sex, age, BMI, FPG, LDL-C, HDL-C and SBP between the group with normal homocysteine and the group with high homocysteine ($P > 0.05$). The difference of TG and SBP between normal homocysteine group and high homocysteine group was statistically significant ($P < 0.05$). Conclusion: In the observed cases, the differences of TG and DBP between the normal homocysteine group and the increased homocysteine group are statistically significant, and the increase of HCY is closely related to TG. Paying close attention to the serum homocysteine level in patients with abnormal lipid metabolism has guiding significance for reducing the probability of cardiovascular and cerebrovascular events in elderly patients with metabolic syndrome.

1. Introduction

Metabolic syndrome (MS) is a group of syndromes that are associated with metabolic risk factors such as obesity, hyperglycemia, hypertension and dyslipidemia. Elderly patients with metabolic syndrome are at high risk of cardiovascular and cerebrovascular diseases, and the risk of cardiovascular and cerebrovascular diseases is significantly increased compared with patients without metabolic syndrome [1]. With the development of social economy and the change of lifestyle and eating habits, the prevalence of metabolic syndrome in the elderly has increased significantly, and MS has become one of the serious public health problems in China [2]. Hyperhomocysteinemia is an independent risk factor of cardiovascular and cerebrovascular events, which is closely related to cerebral infarction, atherosclerosis and plaque formation [3]. The increase of triglyceride content will

lead to the increase of blood viscosity and the decrease of hemorheology, which will promote the formation of atherosclerosis. Intervention of high TG is an important means to prevent coronary heart disease [4]. This study mainly discusses the correlation between HCY and TG in elderly patients with metabolic syndrome and its clinical significance, and provides correct ideas for preventing and reducing the incidence of cardiovascular and cerebrovascular events in elderly patients with MS, so as to guide clinical medication.

2. Materials and methods

2.1 General information

All the cases were from inpatients and outpatients in Xi'an Hospital of Traditional Chinese Medicine from January 2020 to February 2021. There were 95 cases with age ≥60 and meeting MS diagnostic criteria, including 50 cases with normal homocysteine,32 males and 18 females. The age ranged from 58 to 79, (66±5) years old; There were 45 cases in hyperhomocysteinemia group, including 31 males and 14 females. The age ranged from 60 to 86 (68±7) years old. There was no significant difference in age and gender between the two groups ($P > 0.05$).

2.2 Diagnostic criteria,exclusion criteria and inclusion criteria

① Diagnostic criteria: The diagnostic criteria of metabolic syndrome are based on the diagnostic criteria of MS in Chinese Guidelines for the Prevention and Treatment of Type 2 Diabetes (2020 Edition). Specifically:⑴Abdominal obesity (central obesity): waist circumference≥90cm for males and≥85 for females;⑵Hyperglycemia: fasting blood glucose≥6.1 mmol/L or blood glucose ≥7.8 mmol/L 2 hours after glucose loading and/or those who have been diagnosed with diabetes and treated; ⑶ Hypertension: those with blood pressure ≥130/85 mmHg and/or confirmed hypertension and treated; ⑷ Fasting TG ≥ 1.70 mmol/L; ⑸ Fasting HDL-C < 1.04 mmol/L, with three or more items, it can be diagnosed as MS [1]. The diagnostic standard of hyperhomocysteinemia is based on the diagnostic standard of hyperhomocysteinemia in Chinese Guidelines for Prevention and Treatment of Hypertension (2018): HCY≥15μmol/L [5]. ② Inclusion criteria: those who meet the diagnostic criteria of MS; Age≥60 years old. ③ Exclusion criteria: those who do not meet the above diagnostic criteria; People younger than 60 years of age; Secondary hypertension, type 1 diabetes; Long-term use of folic acid and vitamin B12; Severe heart, liver and kidney insufficiency. Severe infection and disturbance of consciousness.

2.3 Diagnostic criteria,exclusion criteria and inclusion criteria

2.3.1 Observation indicators

① Baseline data: SBP, DBP, BMI, HCY, FPG, TG, LDL-C and HDL-C were measured for all patients. ② HCY. The above biochemical tests were sent to the laboratory of Xi'an Hospital of Traditional Chinese Medicine for examination. SDP, SBP systolic and diastolic blood pressure of right upper arm were measured by mercury standard cuff sphygmomanometer at rest.

2.3.2 Statistical methods

SPSS 25.0 statistical software package was used for data processing. Measurement data is expressed by mean standard deviation. Before comparison of measurement data, normal distribution and homogeneity test of variance are carried out. If it accords with normal distribution, two independent samples T test is used for comparison between groups. If it does not conform to normal

distribution,independent sample nonparametric test will be used. P < 0.05 is a significant difference with statistical significance.

3. Results and analysis

Compared with baseline data of normal homocysteine group and high homocysteine group, SBP, BMI, FPG, LDL-C and HDL-C have no significant difference (P>0.05). See table 1. Compared with the normal homocysteine group and the increased homocysteine group,the difference in DBP and TG was statistically significant (P<0.05). See table 2.

Table 1: Comparison of clinical baseline indexes between patients with normal HCY and patients with high Hcy (x±s)

group	BMI	FPG	HDL-C	LDL-C	SBP	DBP
Control group (n=50)	25.38±2.748	9.75±3.67	2.98±13.14	2.18±1.12	156.60±16.85	90.04±11.97
Observation group (n=45)	25.39±3.15	8.50±2.98	1.13±0.31	1.97±0.81	159.04±31.86	96.98±16.34
T value	0.028	-1.811	-0.941	-1.031	0.474	2.376
P value	0.978	0.073	0.349	0.305	0.637	0.02

Table 2: Comparison of TG indexes between patients with normal HCY and patients with increased Hcy (X)±s

group	Case number	TG
HCY normal group	50	3.60±2.90
HCY increased group	45	2.57±1.34
P value		＜0.05

4. Conclusions and Discussion

Metabolic syndrome is characterized by insulin resistance, with impaired glucose metabolism, abnormal lipid metabolism, elevated blood pressure and abdominal obesity as the main manifestations. This syndrome should be regarded as an important problem for the elderly, because aging is the main factor of the prevalence of cardiovascular diseases and metabolic risk factors that constitute this syndrome [6]. In the global epidemiological survey, there is a correlation between metabolic syndrome and the increased risk of death, in which the mortality rate of the elderly group (age ≥65) is higher than that of the young group (20-65 years old) (27.2 vs.3.1%,P < 0.001) [7],so the elderly patients with metabolic syndrome are a group that we must pay attention to. When discussing the metabolic syndrome of the elderly, whether it is regarded as a unique group or not, it is very necessary to identify and manage its components to reduce the morbidity and mortality related to diabetes and CVD [8]. The decrease of insulin sensitivity plays an important role in regulating the metabolism of homocysteine, which is the intermediate product of methionine metabolism. Insulin resistance causes the increase of HCY concentration by changing the activity of enzymes involved in HCY metabolism [9]. A large number of evidences show that the increase of homocysteine can lead to chronic inflammation, endothelial dysfunction, extracellular matrix remodeling, platelet activation, and enhanced coagulation activity of coagulation factors,thus increasing thrombosis [10] and greatly increasing the risk of cardiovascular and cerebrovascular events. It is an important risk factor for the decrease of insulin sensitivity [11]. TG is an ester of glycerol and three fatty acids, which mainly exists in β -lipoprotein and chyle particles [12]. Hypertriglyceridemia can lead to impaired endothelium-dependent diastolic function of blood vessels [13],disorder of anti-inflammatory factors

in pro-inflammatory factors, abnormal expression of growth factors, inflammatory factors and vasoactive peptides, and increase the risk of atherosclerosis [14],and increase the risk of myocardial infarction,,acute coronary syndrome and death [15]. According to this study, we can find that there is a significant correlation between serum triglyceride level and homocysteine level in elderly patients with metabolic syndrome,,which is statistically different. It is suggested that both of them may be involved in the occurrence and development of metabolic syndrome and cardiovascular and cerebrovascular events. There is a positive correlation between serum triglyceride and homocysteine level, which has guiding significance for preventing cardiovascular and cerebrovascular events in elderly patients with metabolic syndrome. When abnormal serum triglyceride is found in elderly patients with metabolic syndrome, the serum homocysteine level should be actively detected, which has predictive significance for cardiovascular and cerebrovascular events.

References

[1] Diabetes Branch of Chinese Medical Association. Guidelines for the Prevention and Treatment of Type 2 Diabetes in China (2020 Edition) [J]. international journal of endocrinology and metabolism, 2021,41(05):482-548.

[2] Gu Dongfeng, Reynolds K, Yang Wenjie, Chen Shufeng, Wu Xigui, Duan Xiufang, Pu Xiaodong, Xu Lihua, Wu Xianping, Chen Xiangfu, Wei Renmin, Chen Naying, Wu Tianyi, Wang Ligui, Yao Cailiang, Mou Jianjun, Ma Yifeng, Wang Xiaofei, Whelton P, He Jiang. Prevalence of metabolic syndrome in Chinese adults.

[3] Zhao Dongyi. Study on the correlation between plasma homocysteine and cerebral infarction and carotid atherosclerosis [J]. Electronic Journal of Cardiovascular Diseases of Integrated Traditional Chinese and Western Medicine, 2014,2(07):56-57.

[4] Cheng Kun, Yang Xiaoqin, Dan Shihong, et al. Correlation analysis between serum triglyceride level and coronary heart disease [J]. Medical Information, 2013,(21):144-145.

[5]. Guidelines for prevention and treatment of hypertension in China (revised in 2018) [J]. chinese journal of cardiovascular medicine, 2019,24(01):24-56.

[6] Ligia J. Dominguez,Mario Barbagallo. The biology of the metabolic syndrome and aging[J]. Current Opinion in Clinical Nutrition and Metabolic Care,2016,19(1).

[7] Kane Alice E,Gregson Edward,Theou Olga,Rockwood Kenneth,Howlett Susan E. The association between frailty, the metabolic syndrome, and mortality over the lifespan.[J]. GeroScience,2017,39(2).

[8] Sang-Yhun Ju, June-Young Lee, Do-Hoon Kim. Association of metabolic syndrome and its components with all cause and card iovascular mortality in the elderly.[J]. Medicine (Baltimore). 2017 Nov; 96(45): e8491.

[9] Liu Jie. Hyperhomocysteinemia and insulin resistance and its intervention treatment [J]. Shanxi Journal of Medicine, 2006(08): 671-674.

[10] N. Dionisio,I. Jardin,G. M. Salido,J. A. Rosado. Homocysteine, Intracellular Signaling and Thrombotic Disorders[J]. Current Medicinal Chemistry,2010,17(27).

[11] Sun Yan, Li Wanmei. Correlation analysis between triglyceride/high density lipoprotein cholesterol ratio and insulin resistance in newly diagnosed diabetic patients [J]. China Medical Innovation, 2018,15(33):25-28.

[12] Wan Xuehong, Lu Xuefeng. Diagnostics [M].8 Edition. Beijing. People's Health Publishing House, 2013.

[13] Huang Yun, Dai Guizhu, Feng Zongchen, Lu Chengfa, Cheng Bei, Wang Qiufen, Nie Fuding, Li Jingdong. The effect of hypertriglyceridemia on vascular endothelial function [J]. chinese journal of cardiology, 2003(06):24-26.

[14] Wouter C. Meijers, Manuel Maglione, Stephan J.L. Bakker,Rupert Oberhuber,Lyanne M. Kieneker,Steven de Jong, Bernhard J. Haubner, Wouter B. Nagengast, Alexander R. Lyon,Bert van der Vegt,Dirk J. van Veldhuisen,B. Daan Westenbrink,Peter van der Meer,Herman H.W. Silljé, Rudolf A. de Boer. The Failing Heart Stimulates Tumor Growth by Circulating Factors [J]. Circulation, 2018.

[15] Consensus of Chinese experts on prevention and treatment of dyslipidemia with increased triglyceride [J]. Journal of Practical Diabetes, 2012 ,8(01): 13-16.