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Original/*Deporte y ejercicio*

Blood lipid profile and glucose of university students (China)

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Abstract

Objective: **The main objective of this study was to estimate the blood glucose and blood lipid profile of students in a university in China.**

Methods: **This descriptive study was based on the health screening data for university students in 2013. The blood glucose (GLU), lipid profiles (total cholesterol (TC), triglyceride (TG, and high density lipoprotein (HDL-C)) was measured by using Hitachi model 747 automatic analyzer. The LDL cholesterol values were calculated according to the formula: LDL-C = TC-HDL-C-TG/5.**

Results: **The mean of HDL was 51.31 and 56.30 mg/dL for male and female, respectively (p<0.05). The majority of students have normal level of GLU (65-110mgl/dL). Elevated TC and LDL were observed in 6.92% and 5.82 % of male, similarly, 5.91%and 3.57% of female. High levels of TC, LDL and TG in male university students were1.02%,0.71% and 1.41%, respectively; in female university students were1.26%,1.04 and 0.68%, respectively. Reduced levels of HDL were observed in5.59% of male and 2.62% of female.**

Conclusion: **The study shows that the prevalence of blood glucose and blood lipid in university students, especially reduced levels of HDL and elevated TC and LDL in university students has become a critical health issue. Relevant department of school and government should pay more attention to students' physical health.**

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Key words: *Blood. Lipid, glucose. University students.*

PERFIL DE LÍPIDOS Y GLUCOSA EN LA SANGRE DE LOS ESTUDIANTES UNIVERSITARIOS (CHINA)

Resumen

Objetivo: **El objetivo principal de este estudio fue estimar la glucosa de la sangre y el perfil lípido de la sangre de estudio en una universidad en China.**

Métodos: **Estudio descriptivo basado en la revision de salud; datos para estudiantes universitarios en 2013. La glucosa en la sangre (GLU), perfiles de lípidos (colesterol total (CT), triglicéridos (Tg) y lipoproteína de alta densidad (HDL - c) se midió utilizando Hitachi modelo 747 Analizador automático. Los valores de colesterol LDL se calculan según la fórmula: C - LDL HDL - C = TC Ching Ching TG / 5.**

Resultados: **La media de HDL fueron 51,31 y 56.30 mg / dl para varón y mujer, respectivamente (p < 0,05) y LDL (p < 0.05). La mayoría de los estudiantes tienen nivel normal de Glu (65-110mgl / dl). TC y LDL elevados fueron observados en 6.92% y el 5,82% de varones, asimismo, 5,91% y el 3,57% de mujeres. Altos niveles de TC, LDL y TG fueron detectados en estudiantes universitarios masculinos; 1.02% 0,71% y un 1,41%, respectivamente; en mujeres estudiantes de la Universidad were1.26%, 1.04 y 0,68%, respectivamente. La reducción de los niveles de HDL fueron observados en 5.59% de hombres y el 2,62% de mujeres.**

Conclusión: **El estudio demostró que la prevalencia de la glucosa de la sangre y de lípidos en sangre en los estudiantes universitarios, especialmente la reducción de los niveles de HDL y LDL elevados de TC y en estudiantes universitarios, se ha convertido en un problema de salud crítico. Colegios, escuelas y el Gobierno deben prestar más atención a la salud física de los estudiantes.**

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Palabras clave: *Sangre. Lípidos. Glucosa. Estudiantes universitarios.*

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Introduction

Due to the economic growth, reducing physical work and increasing popularity of western foods, dietary pattern of people in China is at the stage of rapid transformation. The prevalence of dyslipidaemia and pathoglycemia were obvious rising in the urban and rural residents. Cardiovascular diseases (CVD), especially coronary heart disease (CHD), are the leading causes of death in many countries. In Europe, higher death rates of CHD have been demonstrated among South Asians in the UK[1].High serum cholesterol is generally regarded as being one of the most important causes of coronary atheroscle-rosis[1]. The age standardized death rate of coronary heart diseases has been increasing slowly in Taiwan, but steadily in the past two decades[2]. Cardiovascular disease is combined with hypertension, heart disease, and stroke is the leading cause of mortality and morbidity in the US[3]. Elevated serum lipids is a vital, potentially risk factor for cardiovascular chronic diseases in adults[4]. Many factors such as smoking, alcohol consumption and physical activity have a significant impact on blood lipid levels [5-7]. However, elevated blood lipids is qualifiable and can be reduced by healthy lifestyle and rational medical intervention. There is also large amount of evidence to support screening for hypertension, blood glucose and lipid abnormalities in women. Many women died each year due to CVDs than from all types of cancers combined [8]. However, of those sudden cardiac deaths among women, approximately two-thirds (64 %) have no previous symptoms[9]. High total cholesterol (TC) and low density lipoprotein cholesterol (LDL-C), and low high density lipoprotein cholesterol (HDL-C), are associated with vascular death[10], and high level of triglyceride (TG) is an important and independent predictor of cardiovascular disease[11,12]. Therefore, rational level of blood lipid and blood glucose are crucial to preventing cardiovascular disease.

According to what we know, there were plenty of researches have assessed the prevalence of blood lipid and blood glucose in adults who were engaged in all kinds of jobs, but few studies have done in university students. This study can complete the main object that is to describe the prevalence of blood lipid and blood glucose among university students in China.

Methods

Subjects and Methods

Participants

A school-based cross-sectional study was preceded in a university student who admitted routine health screening in 2013. This study contains a total of 3484 subjects (1270 male and 2214 female) was recruited in 2013, aged 15-26 years. All subjects agreed to provide their personal information regarding the objective and the procedures of our study, and all signed informed consent. This study was approved by local ethics committee.

Blood samples

The data used in this study was from health screening in 2013 The blood samples were extracted in the fasting state. Before the test, the subjects fasted for 10–12 h. The blood glucose (GLU), TC, TG and HDL-C was measured by using Hitachi model 747 automatic analyzer. The LDL cholesterol values was calculated according to a formula which Friedewald etc[13] proposed: LDL-C = TC-HDL-C-TG/5.

Definitions

The level of blood glucose were classified into three subgroups ① <65mgl/dL, ② 65-110mgl/dL, ③ >110mg/dL, The levels of blood lipid were classified according to the Third Report of the National Cholesterol Education Program Expert Panel[14]. TC concentrations are classified into 3 categories: Desirable (<200 mg/dL), borderline (200–239 mg/dL), and" high"(>239 mg/dL). It has been suggested that HDL cholesterol concentrations defined as ''low'' (<40 mg/dL), ''desirable'' (40–59 mg/dL), and ''optimal'' (>59 mg/dL). LDL cholesterol levels were classified as ''optimal'' (<100 mg/dL), ''desirable'' (100–129 mg/dL), ''borderline'' (130–159 mg/dL), ''high (160–189) and ''very high'' (>189 mg/dL). TG levels were defined as ''desirable'' (<150 mg/dL),"borderline" (150–199 mg/dL), "high" (200–499 mg/dL) and "very high" (>499 mg/dL).

Statistical analysis

Excel software was performed to describe the prevalence of blood lipid and glucose abnormal among university students. Bar charts were draw for the prevalence of blood lipid and glucose among university students by sex.

Results

In this study a total of 3484 subjects (1270 male and 2214 female) were recruited in 2013, aged 15-26 years. The mean values (±SD) of GLU, TG, TC,HDL and LDL are shown in table I. The mean of HDL were 51.31 and 56.30 mg/dL for male and female, respectively (p = 0.00). The normal level of GLU (65-110mgl/dL) was observed in 98.78% of male and 98.50% female. Elevated TC and LDL were observed in 6.92% and 5.82 % male, similarly, 5.91% and 3.57% female. High levels of TC, LDL and TG in male university

Table I
Mean (±SD) of GLU, TG, TC,HDL and LDL of university students according to sex

Item	*Male*	*Female*	*t*	*P*
GLU(mg/dL)	84.80±9.01	84.72±8.03	0.26	0.80
TG(mg/dL)	80.79±35.25	78.57±32.01	1.90	0.06
TC(mg/dL)	159.12±28.38	160.77±27.45	1.69	0.09
HDL(mg/dL)	51.31±7.92	56.30±9.43	15.91	0.00
LDL(mg/dL)	91.78±24.67	88.88±23.10	3.49	0.00

students were1.02%,0.71% and 1.41%, respectively; in female university students were 1.26%, 1.04% and 0.68%, respectively. Reduced levels of HDL were observed in 5.59% male and 2.62% female.

Discussion

The impact of dyslipidaemia and pathoglycemia on cardiac function and its economic consequences makes it a major public health concern in worldwide. As far as I know, this study was the first time to investigate the prevalence of blood lipid and glucose in university students in China. This study finds that the high levels of TC, LDL and TG in male university students were1.02%,0.71% and 1.41%, respectively; in female university students were 1.26%, 1.04% and 0.68%, respectively. The prevalence of these high levels in university students is lower than people in other position such as bus drivers[15], famers[16]. This indicate the levels of these index are nomal as a whole. However, elevated TC and LDL were observed in 6.92% and 5.82 % of male, similarly, 5.91% and 3.57% of female. These values indicate that university students are surrounded by many risks and they are in borderline. They are likely to turn into hyperlipidemia without any measures be taken for them.

The mean of TC level was 159.12 mg/dL and 160.77 mg/dL for male and female. This was similar with a study conducted in 1993 by Swai et al.[17] Tanzania, also found that female participants had a higher mean TC levels than that of male participants. There are lots of factors affect the level of TC. Generally, the female university students are protected by estrogen, so they would have a relatively low risk to cardiovascular diseases. However, previous studies demonstrated that the female advantage is decreased in women when other risk factors including high blood glucose and hyperlipidemia presented[18]. Values of triglycerides have also been associated with obesity and alcoholism in Singapore with multi-ethnic populations [19]. Thus, the level of TC have a significant effect on health of students.

Reduced levels of HDL was observed in 5.59% male and 2.62% female. This may be contacted with smoking habits, current smoking was always associated with low HDL-cholesterol, high triglycerides. On the other hand, smoking cessation leads to weight gain, and increases the risk factor changes noted in the metabolic syndrome[20]. Equally, high alcohol intake was associated with low total and LDL-cholesterol, as well as with high triglycerides and high HDL-cholesterol[21,22], however, the relation between alcohol intake and LDL-C has been unclear[23].

The normal level of GLU (65-110mgl/dL) was observed in 98.78% male and 98.50% female. The values of GLU in Chinese university students present a favourable trend. There are 4.5%(159/3483) of students were divided into hypoglycemia and only 0.34%(12/3484) of students were classified into hyperglycemia.The pattern of this blood glucose is better than other's as a whole.

Overall, the relationships between life styles, environments, social economics, blood glucose and blood lipid profiles should be taken into consideration in developing prevention strategy for dyslipidemia and pathoglycemia. Government and schools also should pay more attention to university students' health, so that the risks can be reduced and students can be in a healthy condition.

Conclusions

The study shows that the prevalence of blood glucose and blood lipid in university students, especially reduced levels of HDL and elevated TC and LDL in university students has become a critical health issue. Relevant department of school and government should pay more attention to students' physical health.

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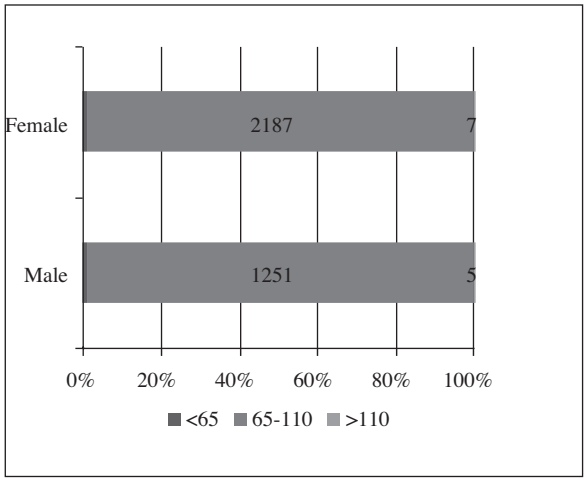

Fig. 1.—The distribution of GLU for university students according to sex.

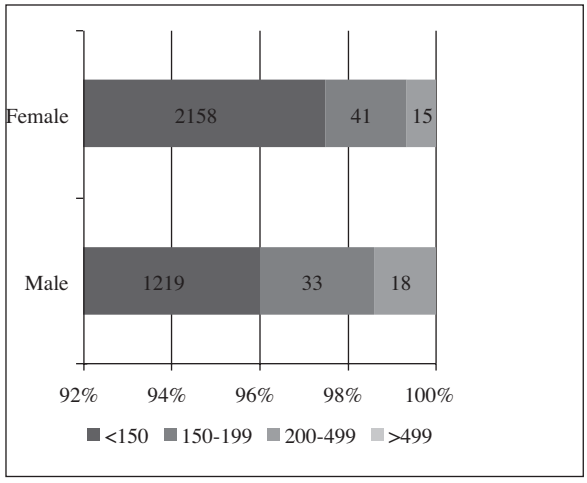

Fig. 2.—The distribution of TG for university students according to sex.

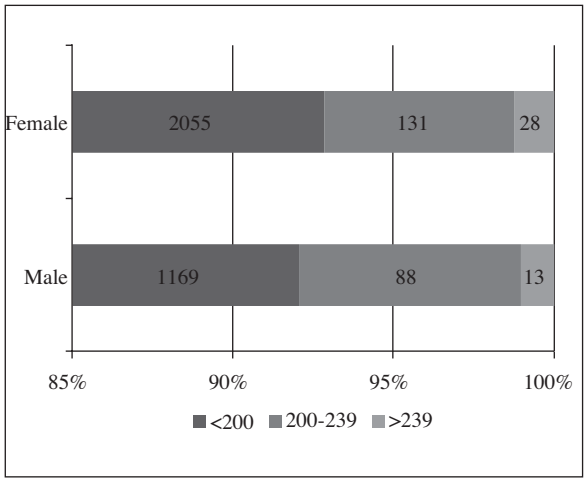

Fig. 3.—The distribution of TC for university students according to sex.

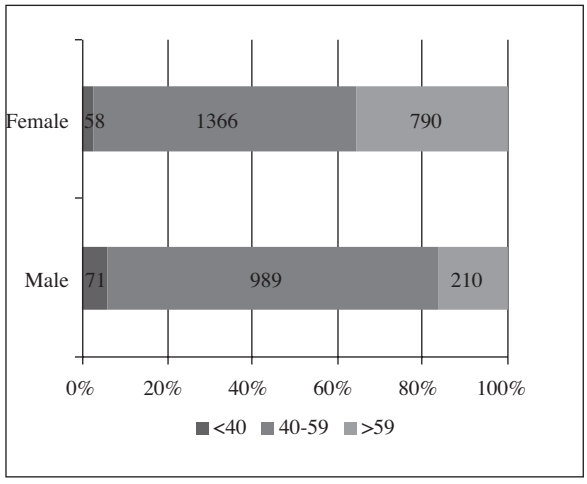

Fig. 4.—The distribution of HDL for university students according to sex.

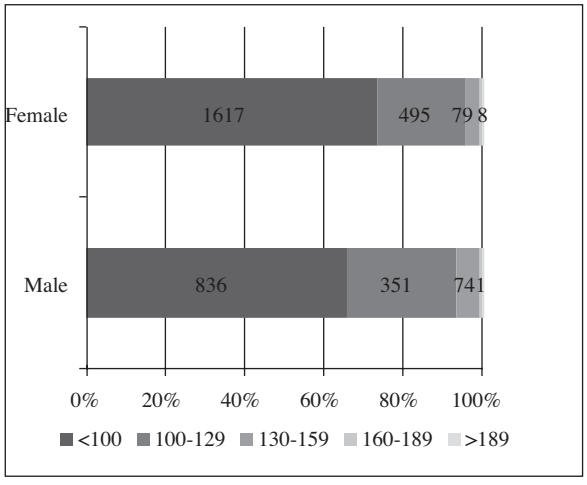

Fig. 5.—The distribution of LDL for university students according to sex.

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