

Plasma glucose, triglycerides, cholesterol and dietary levels in inhabitants of a Mayan community of Campeche

Niveles plasmáticos de glucosa, triglicéridos, colesterol y dietéticos en habitantes de una comunidad de Maya de Campeche

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Abstract

Objective of this work was to study the blood levels of glucose, cholesterol and triglycerides, and their association with eating habits in inhabitants of the community of Tenabo, Campeche, Mexico. Methodology Anthropometric measurements were made to the inhabitants who ranged in age from 10 to 80 years old. Mean glucose levels were 132.86 mg/dL, cholesterol 139.640 mg/dL, and triglycerides 189.2 mg/dL. According to the applied survey, the diet of this population consists of the consumption of meat from wild animals in the region, as well as foods with a high fat content such as pork, in addition, a low consumption of vegetables and fruits is reported among the inhabitants. Results: In this population, glucose and triglyceride levels are elevated compared to the reference values; however, it is necessary to investigate other biochemical parameters that help the timely diagnosis of this type of disease.

Glucose, Triglycerides, Cholesterol

Resumen

Objetivo de este trabajo fue estudiar los niveles sanguíneos de glucosa colesterol y triglicéridos, y su asociación con los hábitos alimenticios en habitantes de la comunidad de Tenabo, Campeche, México. Metodología Se realizaron mediciones antropométricas a los habitantes que oscilaron en un rango de edad de 10 a 80 años de edad. La media de los niveles de glucosa fue de 132.86 mg/dL, los de colesterol 139.640 mg/dL, y triglicéridos 189.2 mg/dL. De acuerdo con la encuesta aplicada, la alimentación de esta población consiste en consumo de carne de animales silvestres de la región, así como alimentos con alto contenido de grasa como el cerdo, además se reporta un escaso consumo de verduras y frutas entre los habitantes. Resultados: En esta población los niveles de glucosa y triglicéridos se encuentran elevados en comparación con los valores de referencia; sin embargo, es necesario investigar otros parámetros bioquímicos que ayuden al diagnóstico oportuno de este tipo de enfermedades.

Glucosa, Triglicéridos, Colesterol

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Introduction

Diabetes and cardiovascular disease are major public health problems worldwide¹. Epidemiological studies in developed and developing countries have shown that cardiovascular diseases resulting from atherosclerosis are among the leading causes of mortality, and that dyslipidemias and diabetes are among the main risk factors¹. These diseases are associated with alterations in the balance of plasma levels of glucose, cholesterol and triglycerides. Although lipids such as cholesterol and triglycerides are important in the body's normal physiology, when altered they can trigger disorders such as atherosclerosis. Plasma lipid profile values are the result of complex metabolic processes influenced by genetic and environmental factors.

Lifestyle, including dietary habits, can affect parameters such as individual weight and thus plasma cholesterol levels in the body, eventually leading to obesity and cardiovascular disease². Excess weight tends to increase low-density lipoprotein (LDL) and triglyceride cholesterol, and conversely can reduce high-density lipoprotein (HDL) levels. In cases of overweight, weight loss is helpful in regulating plasma levels of these lipids; thus, under conditions of proper nutrition and exercise, elevated cholesterol and LDL levels can be reduced while HDL levels increase, supporting the functioning of the body's biochemistry. Recently, a study in Mexico City found that 34.1 % of the population studied (833 men and 889 women) had cholesterol levels ≥ 200 mg/dL. Triglyceride levels were also found to be altered in 29.9% of the population. However, the prevalence of dyslipidemias in rural communities has received less attention.

On the other hand, in Mexico, diabetes mellitus is the leading cause of mortality in general. Pharmacological treatment of this metabolic syndrome is lifelong, and focuses on controlling clinical manifestations and preventing complications in patients. Unfortunately, for many patients this is not achieved, and the drugs are not freely available, so they need to be purchased with their own resources. In rural populations with few job opportunities, limited income and limited health services, the diagnosis and treatment of this disease is less efficient than in large metropolises such as Mexico City.

Another problem among patients with diabetes is that they do not follow a strict dietary plan, so their diets continue to contain foods high in sugar. This condition is worsened in rural communities where the economy is scarce and the health culture is poor, leading to a lack of strict dietary regimen and proper dosage of medications.

Methodology to be developed

A cross-sectional study was conducted among inhabitants of the rural community of Tenabo, located in the municipality of Tenabo in the state of Campeche. Fifty participants ranging in age from 10 to 80 years, who had not consumed alcohol for at least 5 days prior to the study and who had read and signed the informed consent letter, were included. This population was surveyed about dietary habits and the presence of a family history of cardiovascular disease and diabetes. Anthropometric measurements of weight and height were taken. Blood samples were obtained by venous puncture under adequate conditions of asepsis and antisepsis in an 8-hour fasting period without modification of dietary habits.

Serum glucose, cholesterol and triglyceride (TG) determinations were performed by automated methods on the clinical chemistry analyser, MINDRAY model BS120.

Statistical analysis

Data analysis was performed with conventional statistics by calculating mean, mode, median and standard deviation in age stratified groups.

The association between glucose and cholesterol values, as well as glucose and triglyceride values were done by linear regression using GraphPad Prism software version 5.0.

Results

In this study, 50 individuals from the Tenabo community were studied (Figure 1), of which 44 % were in the age range 41-60 years, being the majority group. In contrast, the minority group was the 10 to 20 year age group, accounting for only 8 % of the total. The 21-40 age range accounted for 36 % of the population, while 61-80 years of age accounted for 12 % (Figure 2).

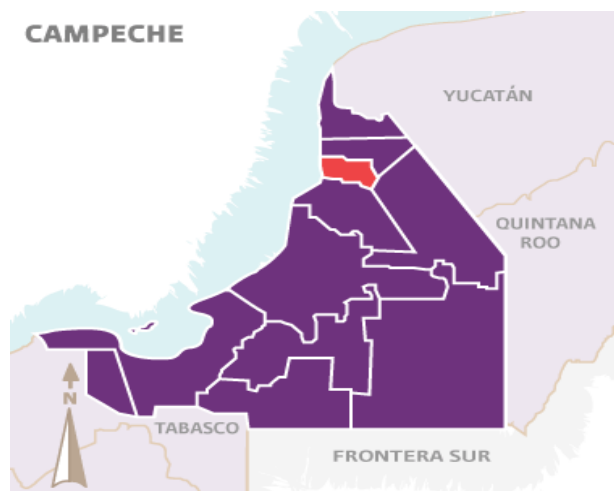
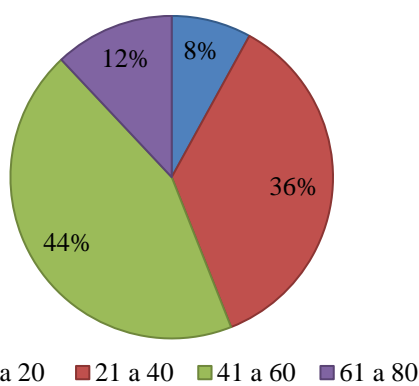


Figure 1 Municipality of Tenabo in the state of Campeche



Four age ranges are presented: 10-20, 21-40, 41 to 60 and 61-80. The % of the population that falls into each range is expressed

Figure 2 Age range of the population studied

Blood glucose, cholesterol and triglyceride measurements are presented in table 1. Glucose levels in this population were 132.86 mg/dL, which is above the reference values (70-100 mg/dL). With regard to cholesterol, a mean of 139.64 mg/dL was found, which is within the established reference values (≤ 200 mg/dL). For triglycerides, a mean of 189.2 mg/dL was found, which is above the reference values (≤ 150 mg/dL). Concerning plasma glucose levels, the affected groups were in the age ranges 21-40, 41-60 and 61-80 years. For cholesterol no group appears to be altered, while for triglycerides it is observed that the groups that are above the reference values are 41-60 and 61-80 years of age (figure 3).

Table 1 Statistical data on plasma glucose, cholesterol and triglyceride levels. Mean, standard deviation, mode and median are presented

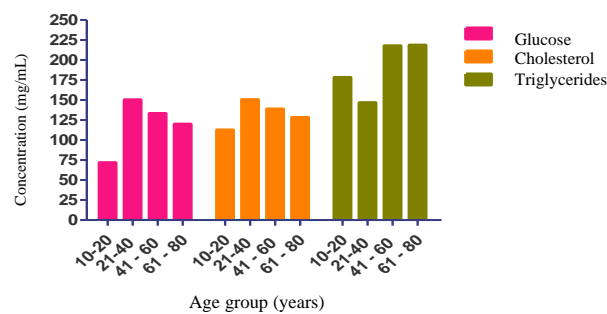


Figure 3 Plasma levels of glucose, cholesterol and triglycerides according to age range

In the linear regression analysis a positive association was found between glucose and cholesterol levels with a value of $r^2=0.1267$ (Figure 4), likewise a positive correlation was found between plasma glucose and triglyceride levels, showing a value of $r^2=0.03732$ (Figure 5).

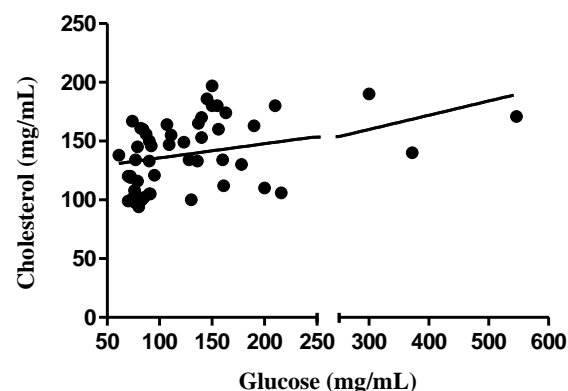


Figure 4 Linear regression analysis between cholesterol and blood glucose levels. Glucose and cholesterol values from 50 blood samples were analysed. The r^2 value obtained was: 0.1267

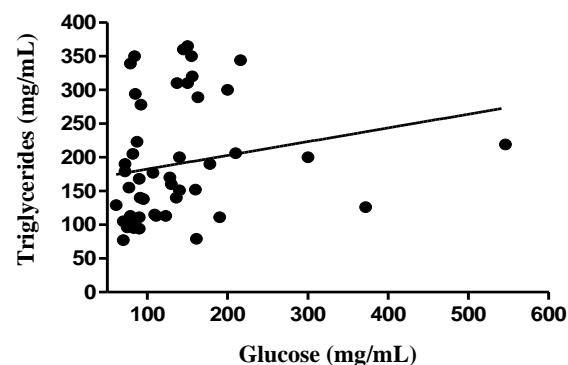


Figure 5 Linear regression analysis between cholesterol and blood glucose levels. Glucose and cholesterol values from 50 blood samples were analysed. The r^2 value obtained was: 0.03732

Tenabo is a rural community in the state of Campeche, which suggests that its diet is significantly different from urban communities such as the city of Campeche. In the survey it was determined that the diet of this population is mainly based on wild animal meat such as wild pig, armadillo, deer and pizotes (38% of the population consumes it). However, they also consume traditional foods with a high fat content, such as tamales, panuchos, pan de cazón, pan dulce (36 % of the population consumes it). 9 % of the population consumes pork, while only 17 % of the population consumes fruits and vegetables.

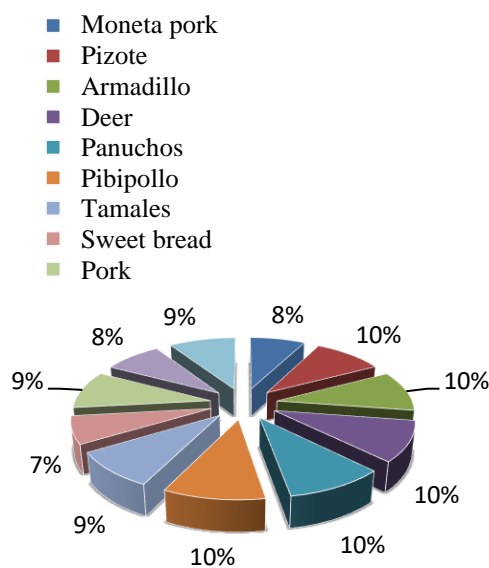


Figure 4 Type of diet of the population studied. The % of the population that consumes each of the foods is expressed as follows

Conclusions

The glucose and triglyceride levels of the inhabitants of Tinun, Campeche are above the reference values established for the Mexican population. Although the diet of these people relies heavily on bushmeat, fruit and vegetable consumption is low, this coupled with limited access to health services could increase the risk of developing cardiovascular disease and/or diabetes. Further studies in rural communities are needed to get a better picture of the current health of this vulnerable group, as well as the implementation of prevention programmes to inform them about the importance of a healthy diet and sports activities.

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