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ARTICLE 1

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RELATIONSHIP BETWEEN GLUCOSE, TRIGLYCERIDES, CHOLESTEROL, AND LIFESTYLE WITH DIABETES AND CARDIOVASCULAR DISEASES

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Abstract: Diabetes and cardiovascular disease represent a global public health problem. In Mexico, while urban communities have access to health services and therefore to timely treatment and diagnosis of diseases, these services are deficient in rural populations in marginalized communities. Diet is a risk factor in the development of diabetes and cardiovascular disease, and it differs between rural and urban communities. **Objective:** The objective of this study was to investigate the relationship between glucose, triglycerides, cholesterol, and lifestyle with diabetes and cardiovascular disease in a rural community. **Materials and methods:** Anthropometric measurements were taken of residents ranging in age from 10 to 80 years. The average glucose level was 132.86 mg/dL, cholesterol 139.640 mg/dL, and triglycerides 189.2 mg/dL. According to the survey, the diet of this population consists of wild game from the region, as well as foods high in fat such as pork. In addition, residents reported low consumption of vegetables and fruits**. Results:** In this population, glucose and triglyceride levels are elevated compared to reference values; however, it is necessary to investigate other biochemical parameters that aid in the timely diagnosis of this type of disease.

Keywords: Glucose, Cholesterol, Triglycerides, Lifestyle, Rural Community.

Introduction

Diabetes and cardiovascular diseases represent significant public health problems worldwide[1] . Various epidemiological studies in developed and developing countries have shown that cardiovascular diseases resulting from arteriosclerosis are among the leading causes of mortality, and that dyslipidemia and diabetes are among the main risk factors[1] . These diseases are associated with alterations in the balance of plasma glucose, cholesterol, and triglyceride levels. Although lipids such as cholesterol and triglycerides are important in the normal physiology of the body, when they are 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 an individual's weight and therefore plasma cholesterol levels in the body, eventually leading to obesity and cardiovascular disease[(2] . Excess weight tends to increase cholesterol known as low-density lipoprotein (LDL) and triglycerides, while reducing levels of high-density lipoprotein (HDL). In cases of excess weight, weight loss is useful in regulating plasma levels of these lipids; thus, with proper nutrition and exercise, high cholesterol and LDL levels can be reduced, while HDL levels increase, promoting the body's biochemical functioning. Recently, a study conducted 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[(3] . However, the prevalence of dyslipidemia in rural communities has received less attention.

On the other hand, in Mexico, diabetes mellitus is the leading cause of mortality overall. The 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 must 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 cities such as Mexico City. Another problem among patients with diabetes is that they do not follow a strict diet, so their diet continues to contain foods high in sugar. This condition is worsened in rural communities where the economy is poor and the culture of health is weak, which leads to a failure to follow a strict diet or take the correct dosage of medication.

Description of the Method

A cross-sectional study was conducted on residents of the rural community of Kanki, located in the municipality of Tenabo, in the state of Campeche. Fifty participants were included, ranging in age from 10 to 80 years old, who had not consumed alcohol in at least five days prior to the study and who had read and signed the informed consent form. This population was surveyed about their eating habits and the presence of family history or personal history of cardiovascular disease and diabetes. Anthropometric measurements of weight and height were taken. Blood samples were obtained by venipuncture under appropriate aseptic and antiseptic conditions after an 8-hour fast without modification of eating habits.

Biochemical parameters. Serum glucose, cholesterol, and triglyceride (TG) levels were determined using automated methods on a MINDRAY BS120 clinical chemistry analyzer.

Statistical analysis. Data analysis was performed using conventional statistics, calculating the mean, mode, median, and standard deviation in the stratified age groups. The association between glucose and cholesterol values, as well as glucose and triglyceride values, was determined using linear regression with GraphPad Prism version 5.0 software.

Results

This study examined 50 individuals from the rural community of KanKi, Municipality of Tenabo, of whom 44% were in the 41-60 age range, representing the majority group. In contrast, the minority group was the 10-20 age group, accounting for only 8%. The 21-40 age group accounted for 36% of the population, while the 61-80 age group represented 12% (Figure 1).

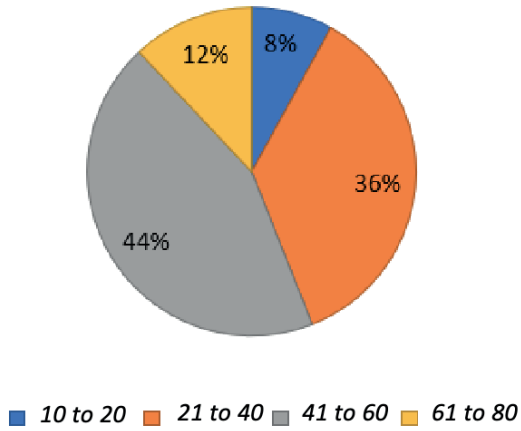

Figure 1. Age range of the study population. Four age ranges are presented: 10-20, 21-40, 41-60, and 61-80. The percentage of the population in each range is shown.

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 fou-

nd, 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). With regard to plasma glucose levels, the affected groups were those in the 21-40, 41-60, and 61-80 age ranges. No group appears to have abnormal cholesterol levels, while for triglycerides, the groups above the reference values are those aged 41-60 and 61-80 (Figure 2).

Parameter	Mean (mg/dL)	Standard deviation	Fashion	Medium
Glucose	132.86	84.74	90	108
Cholesterol	139.64	28.84	134	139
Triglycerides	189.2	89.5	105	164

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

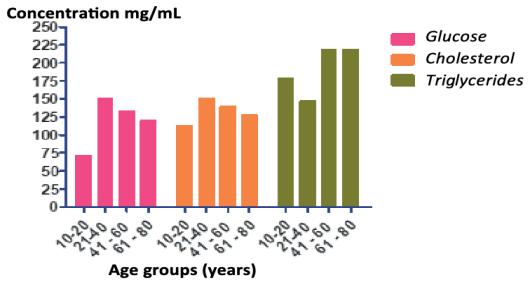

Figure 2. Plasma glucose, cholesterol, and triglyceride levels according to age range.

Linear regression analysis found a positive association between glucose and cholesterol levels with a value of r^2= 0.1267 (Figure 3). Similarly, a positive correlation was found between plasma glucose and triglyceride l vels, showing a value of r^2= 0.03732 (Figure 4).

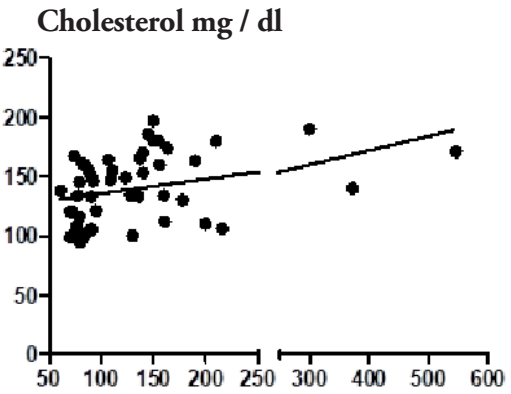

Figure 3. Linear regression analysis between blood cholesterol and glucose levels. Glucose and cholesterol values were analyzed from 50 blood samples. The r2 value obtained was: 0.1267.

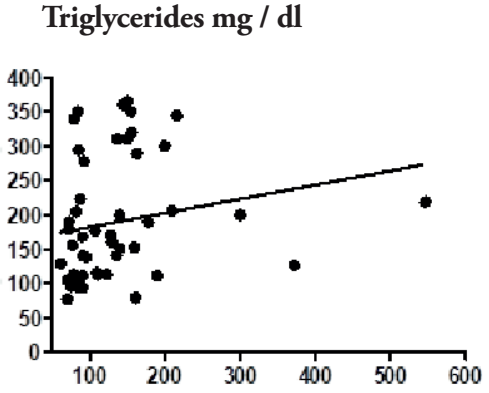

Figure 4. Linear regression analysis between triglyceride and blood glucose levels. The glucose and cholesterol values of 50 blood samples were analyzed. The r2 value obtained was: 0.03732.

Kanki is a rural community in the state of Campeche, which suggests that its diet is significantly different from that of urban communities such as the city of Campeche. The survey found 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 high fat content such as tamales, panuchos, pan de cazón, and sweet bread (36% of the population consumes these foods). Nine percent consume pork, while only 17% of the population consumes fruits and vegetables[4].

CONCLUSIONS

The glucose and triglyceride levels of the inhabitants of Kanki, Campeche are above the reference values established for the Mexican population. Although the diet of these people depends largely on wild animal meat, their consumption of fruits and vegetables is low. This, combined with limited access to health services, could increase the risk of developing cardiovascular disease and/or diabetes. Further studies are needed in rural communities to gain a better understanding of the current health status of this vulnerable group, as well as the implementation of prevention programs that educate them on the importance of a healthy diet and physical activity.

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