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PERCEPTION OFthe risk of type 2 diabetes mellitus in young adults aged 20-39 years in the department of Guatemala

Perception of the risk of suffering type 2 diabetes mellitus in young and adults aged 20-39 in the department of Guatemala

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SUMMARY

Diabetes mellitus is a chronic metabolic disease with a high social and economic impact worldwide and nationally. The purpose of this study was to identify the population's perception of the risk of suffering type 2 diabetes mellitus in the future, a situation that had not been evaluated in the country. This is a quantitative, cross-sectional and descriptive study, using an electronic survey, shared through social networks initially, selecting people who had family members or worked with people within the age range of the study and who were asked to share their experiences with the study. It allowed to know the perception that the population between 20 and 39 years of age in the department of Guatemala has about suffering from diabetes in the future, the main risk factors and proposals, on the part of the population, for prevention. It was carried outduring November 2023, with a sample of 76 people, 68% women, with an average age of 29.95 years. The results showed that 45% of the population perceived themselves to be at risk for diabetes. The main factors identified that predispose the population surveyed to diabetes are: 75% of family members with diabetes mellitus, not exercising 48%, overweight and obesity 63%, infrequent consumption of fruits and vegetables, as well as lack of knowledge of blood pressure values. Suggestions for reducing risk included improving access to information, making use of social networks, implementation of healthy spaces, health services focused on prevention, and state policies aimed at preventing chronic noncommunicable diseases. It was recommended that surveys be conducted on the perception and dissemination of the main risk factors for diabetes mellitus, with the aim of generating awareness and evidence to improve access to information for the country's population.

RESUMEN

Palabras clave:
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Diabetes, prevención, percepción de riesgo, diabetes en Guatemala, factores de riesgo.

La diabetes mellitus es una enfermedad metabólica crónica, con un alto impacto social y económico a nivel mundial y nacional. Con la finalidad de identificar la percepción que tiene la población sobre el riesgo de padecer diabetes mellitus tipo 2 en un futuro, situación que no había sido evaluada en el país. El presente es un estudio cuantitativo, transversal y descriptivo, utilizando encuesta en formato electrónico, compartida por redes sociales a conveniencia inicialmente, seleccionando personas que tenían familiares o trabajaban con personas comprendidas dentro del rango etario de estudio y a quiénes se les solicitó compartir. Permitió conocer la percepción que tiene la población entre los 20 y 39 años del departamento de Guatemala sobre padecer diabetes en un futuro, los principales factores de riesgo y propuestas, por parte de la población, para la prevención. Fue realizado durante noviembre 2023, con una muestra conformada por 76 personas, 68% mujeres, con media de edad en 29.95 años. Los resultados demostraron que el 45% de la población se percibió en riesgo de padecer de diabetes. Los principales factores identificados y que predisponen a la población encuestada a padecer de diabetes son: familiares que padecen de diabetes mellitus en un 75%, no practicar ejercicio 48%, el sobrepeso y obesidad 63%, poca frecuencia del consumo de frutas y verduras, así también, el desconocimiento de los valores de la presión arterial. Como parte de las sugerencias para reducir el riesgo se planteó mejorar el acceso a la información, haciendo uso de redes sociales; implementación de espacios saludables, servicios de salud con enfoque en prevención y políticas de estado orientadas a la prevención de enfermedades crónicas no transmisibles. Se recomendó realizar encuestas sobre la percepción y dar a conocer los principales factores de riesgo de padecer de Diabetes mellitus, con la finalidad de generar conciencia y evidencia para mejorar el acceso a la información de las personas del país.

Introduction

Diabetes Mellitus type 2 is characterized as a chronic non-communicable metabolic disease, which corresponds to a high level of circulating glucose in the bloodstream. As of 2010, there were 2.4 million people with diabetes in Central America, with an increase to 3 million by 2019. It is estimated that by 2045 there will be an increase to 5.6 million by 2045 among those aged 20 to 79 years. The consequences of the disease have a direct impact on the quality of life of individuals and their families, associated with complications such as heart failure, nephropathy, retinopathy, neuropathy, amputations and an increase in premature deaths, being the second most frequent cause of premature death and disability in Central America (1).

The increase in the number of young people with chronic noncommunicable diseases is a cause for concern. According to WHO/PAHO, 10.3% of women and 8.9% of men over 18 years of age in Central America and the Dominican Republic have high blood glucose or diabetes (2) (2). As a consequence of this phenomenon, the expenses incurred by Central American countries for treatment amounted to USD$8,842 million in 2015 (1). As a consequence of this phenomenon, the high expenditures incurred by Central American countries for treatment amounted to USD$8,842 million in total, including direct and indirect expenses, during 2015 (1).

In the case of Guatemala, the direct cost associated with Diabetes was USD$1,385 per capita in the conservative scenario and USD$462 per capita expenditure, which is 6 times higher than in 2000 (2). In addition, a progressive increase in the number of cases diagnosed with diabetes mellitus was identified since 2008 with 47,511 diagnoses, compared to the year 2022 when 147,631 people were diagnosed. During the year 2022, the diagnosis increased in the 40 and older age groups, especially in women, with a 3:1 ratio with the highest risk in the northern and eastern region of the country (3-5).

When analyzing the years of life potentially lost between 2010 - 2020, the impact is greater in women, however, by 2020 it increased in both sexes compared to previous years. In relation to age, there is an increase in mortality after 40 years of age, with a maximum peak at 45 years of age. The sum of the years lost in 2019 is 56,508 and for 2020 81,982. In addition, the relative risk of dying from diabetes mellitus compared to cardiovascular disease is 5 times higher (4).

It is internationally recognized that among the main risk factors related to diabetes are sedentary lifestyle, poor eating habits, as well as hereditary risk factors. Therefore, actions should be oriented to prevent the development of type 2 diabetes according to evidence (6).

The perception that a person may have in relation to suffering in the future from Diabetes Mellitus is subjective, it will depend on the access to information that the person has had during his life, the meaning that this may have or the analysis that has been performed (7). This perception is also associated with the impact or meaning it has had on their life, such as the amputation of a limb or death of a family member.

Since 2003, the FINDRISK test (Finnish Diabetes Risk Score) was proposed to identify the risk of developing diabetes, which was later modified for Latin America (FINDRISK LA) and was based on the results obtained in the study of the same name, where risk factors were identified without the need for laboratory tests. The usefulness of the test is to predict the risk of developing Diabetes mellitus in 5 to 10 years. This test has been validated in different countries, such as Venezuela, Colombia, Peru and has also been used in Guatemala (8-11) (8-11).

In the Hospital de Jutiapa, Guatemala, the FINDRISK test was used to estimate the risk of developing type 2 diabetes mellitus in outpatients, where it was identified that

51.8% of women presented moderate to very high risk and men low or slightly high risk, as well as those under 45 years of age, concluding that it is necessary to define prevention strategies to reduce the risk (10).

The perception of people in the country regarding the possibility of suffering from diabetes or the actions they take to prevent it is not known. This study aimed to identify the perception that people between 20-39 years of age in the department of Guatemala have in relation to suffering from type 2 diabetes in the future, the main risk factors and proposals by the participants on interventions to reduce the risk.

In the country, the perception that people have regarding the possibility of suffering from diabetes or the actions they take to prevent it is not known. The present study aimed to identify the perception that adults between 20-39 years of age in the department of Guatemala have regarding the possibility of suffering from type 2 diabetes in the future.

Therefore, the study will provide a strategic vision to health personnel on the perception that people between the ages of 20-39 years may have about the prevention of diabetes or the risk that each of them may present about the risks associated with the development of this disease.

Method

Research design:

The research was developed with a quantitative, cross-sectional methodology, through the application of a survey in electronic format elaborated with Google Forms and shared by convenience to actors with relatives or with access to people within the age range of the study and requesting to share with other contacts through social networks to people in the department of Guatemala.

Population and sample:

The universe of the study is made up of people between 20 and 39 years of age in the department of Guatemala, considering that this is a population in which interventions for diabetes prevention should be developed (9,12).

Taking into consideration the national statistics of the department of Guatemala, located in the central zone, one of the departments with the greatest economic development, and with the highest number of diagnosed cases of diabetes during the year 2021 (13). It has 17 municipalities with a total population estimated at 3,639,725 for the year 2023 (4). The population between 20 and 39 years of age for the year 2023 was 1,255,485 for both sexes, corresponding to 34.5% of the total estimated population for the department, of which 51.4% (644,939/1,255,485) are women (4). From this finite universe, a probabilistic sample was calculated, using the tool proposed by the European University of the Atlantic, with a confidence index of 95% of representativeness (14).

The sample approach was through a survey, elaborated in Google Forms and sent by convenience to stakeholders with relatives or with access to people within the age range of the study and requested to be shared with other contacts through different social networks such as WhatsApp or Facebook and requested to different stakeholders, among which university professors can be mentioned, to share it with their students.

Inclusion criteria were:

a. People between 20 and 39 years of age
b. Persons who voluntarily agree to fill out the survey electronically
c. People living in any of the 13 municipalities of the department of Guatemala. A filter for these people was included in the survey that discriminates against people residing in other departments.

Among the exclusion criteria, the following were considered:

a. People diagnosed with Diabetes Mellitus

The population reached with the research was a total of 123 people, which after applying the inclusion and exclusion factors left 76 people, who were considered within the sample.

Measuring instruments and techniques

In order to analyze the main factors that predispose to diabetes mellitus, the "Latin American Finnish Diabetes Risk Score -LA FINDRISK- scale was used as a guide, detailing the main factors within the survey and finally to quantify the score according to the parameters proposed by the scale, which was compared with what was indicated by the participants as self-perception (8).

Procedures

We began with a literature review on the prevention, risk factors and possible strategies for the prevention of type 2 diabetes mellitus. Epidemiological information from Guatemala related to the disease was reviewed and analyzed, as well as the cost of the care of this disease and what it may imply at the national level.

With the information obtained, the question was posed: is the population aware of or do they identify themselves as being at risk for diabetes mellitus? Taking into consideration that the risk of suffering it increases from the age of 40 onward (12). At the same time, the question was posed: How to identify the perception of risk of suffering from diabetes? According to the documentary review, the FINDRISC LA test was identified (8) to measure the risk of suffering from diabetes. The general objective was to determine the perceived risk of developing type 2 diabetes mellitus in people between 20 and 39 years of age. Subsequently, the semi-structured survey was constructed in digital format with Google Forms, a QR code was generated and an electronic link through which the survey was shared.

The survey was completed voluntarily and virtually, and was available from October 28 to November 30, 2023, with data entry monitored every two days.

The information obtained was cleaned and tabulated in an Excel spreadsheet where pivot tables were created for analysis. With the tabulated information, statistical analysis was carried out using "R study" and prevention strategies were proposed according to what was contributed by the participants.

Statistical analysis

The statistical analysis of the study was performed at three points in time:

a. Descriptive statistics of the sample: to characterize the sample, a simple table of frequencies and grouping by five-year period in relation to age was made using Excel statistical analysis, with which the mean, median, variance and standard deviation were calculated. With the information obtained, the behavior of the sample was calculated with the "R" and "R study" programs, as well as with the

online descriptive statistics calculator - DATAtab and the online descriptive statistics calculator Mathcracker.com. For the analysis of the sample, percentages and bivariate comparison between sex and each of the demographic variables included in the study were obtained in an Excel spreadsheet.

b. Analysis of risk factors for diabetes mellitus: comparative tables were generated in an Excel spreadsheet, with which multivariate analysis was performed by sex and each of the factors, defined as independent variables and the number of people by sex as dependent variables. The analysis was complemented with the calculation of Odds Ratio (OR) and relative risk (RR) to identify the correlation of the results between self-identified groups with and without risk of diabetes, as well as the calculation of the range according to the 95% confidence index.
c. To generate the different interventions and improve access to information, an Excel spreadsheet was used to classify the different interventions suggested by the study population and integrated according to intervention affinity.

Results

The sample included a total of 76 people, of whom 68% (52/76) were women. Participants ranged in age from 20 to 39 years, with a mean of 29.95 years, variance of 31.25, standard deviation of 5.59 and standard error of 0.6458.

In Table 1 we can see the detail of the sociodemographic variables, where 66% of the total population surveyed was single, 91% belonged to the mestizo people, 91% were originally from the department of Guatemala, 51% lived in the municipality of Guatemala, 45% were university students, 39% worked as professionals or technicians in similar proportion, as we can see in Table 1.

Table 1.

Sociodemographic variables of the study population classified by sex.

Marital status	**Men % Men % Men % Men % Men % Men % Men % Men % Men**	**Women % Women**	**Total**
Single	19 (38%)	31 (62%)	50 (66%)
Married	3 (17%)	15 (83%)	18 (24%)
De facto union	2 (29%)	5 (71%)	7 (9%)
Divorced	0 (0%)	1 (100%)	1 (1%)
Town	**Men % Men % Men % Men % Men % Men % Men % Men %**	**Women % Women**	**Total**

	Men % Men % Men		
Maya	1 (14%)	6 (86%)	7 (9%)
Mongrel/ladino	23 (33%)	46 (67%)	69 (91%)
Department of origin	**Men % Men % Men % Men % Men % Men % Men % Men % Men % Men**	**Women % Women**	**Total**
Guatemala	21 (30%)	48 (70%)	69 (91%)
Another	3 (43%)	4 (57%)	7 (9%)
Municipality of residence	**Men % Men % Men % Men % Men % Men % Men % Men % Men % Men**	**Women % Women**	**Total**
Amatitlán	0 (0%)	8 (100%)	8 (11%)
Guatemala	11 (28%)	28 (72%)	3 (51%)
Mixco	5 (56%)	4 (44%)	9 (12%)
Palencia	1 (33%)	2 (67%)	3 (4%)
San José Pinula	0 (0%)	1 (100%)	1 (1%)
San Juan Sacatepéquez	1 (25%)	3 (75%)	4 (5%)
San Miguel Petapa	2 (40%)	3 (60%)	5 (7%)
Villa Nueva	4 (57%)	3 (43%)	7 (9%)
Education level	**Men % Men % Men % Men % Men % Men % Men % Men % Men % Men**	**Women % Women**	**Total**

Basic	2 (67%)	1 (33%)	3 (4%)
Diversified	5 (17%)	24 (83%)	29 (38%)
University	13 (38%)	21 (62%)	34 (45%)
Master's degree or Ph	4 (44%)	5 (56%)	9 (12%)
Occupation	**Men % Men % Men % Men % Men % Men % Men % Men % Men % Men**	**Women % Women**	**Total**
Housewife	0 (0%)	7 (100%)	7 (9%)
Technicians	9 (30%)	21 (70%)	30 (39%)
Professionals	9 (30%)	21 (70%)	30 (39%)
Students	4 (57%)	3 (43%)	7 (9%)
Unemployed	1 (100%)	0 (0%)	1 (1%)
Military	1 (100%)	0 (0%)	1 (1%)

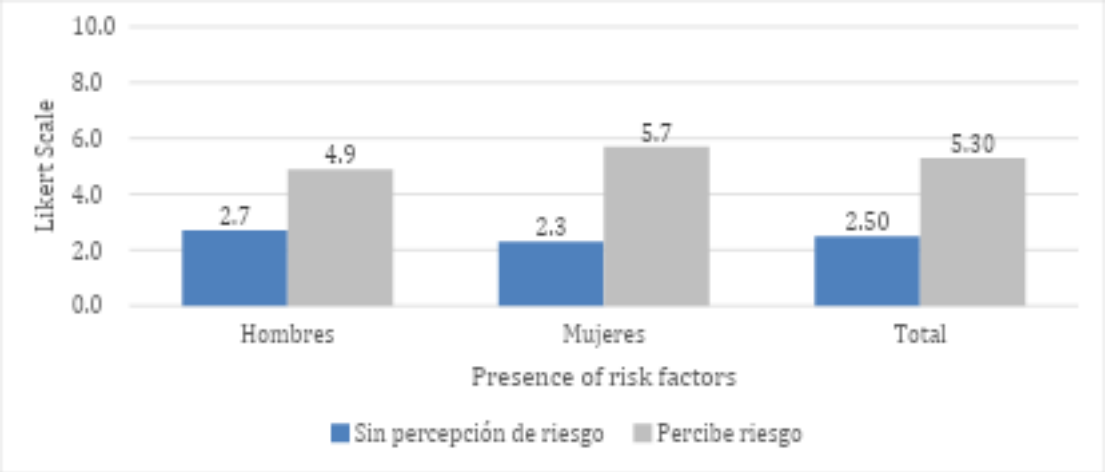
Perceived risk of diabetes mellitus:

People's perceptions were obtained through responses to the question: are you considered at risk for diabetes mellitus? To this question, 55% (42/76) of people responded that they did not consider themselves to be at risk. When comparing the perception of risk by sex, it was identified that 58% (14/24) of all men and 54% (28/52) of women indicated that they were not at risk for diabetes.

A Likert scale was used to determine the degree of perceived risk of suffering from diabetes mellitus in the persons surveyed, where 0 presented no risk and 10 as high risk. With the data obtained, a comparison was made by sex, as shown in Figure 1, with a higher average risk perception in the case of women compared to men.

Figure 1.

Perceived risk of diabetes mellitus within the study population by sex.



In order to stratify the risk obtained with the Likert scale, it was divided into 4 sections, where people who indicated 0 were classified as no risk, 1 to 3 as low risk, 4 to 6 as medium risk and 7 to 10 as high risk. Sixteen percent (12/76) indicated no risk of diabetes, 30% (23/76) low risk, 39% (30/76) medium risk, and 14% (11/76) high risk of diabetes. (See Figure 2). The average stratification score was 3.79 or at low risk for diabetes.

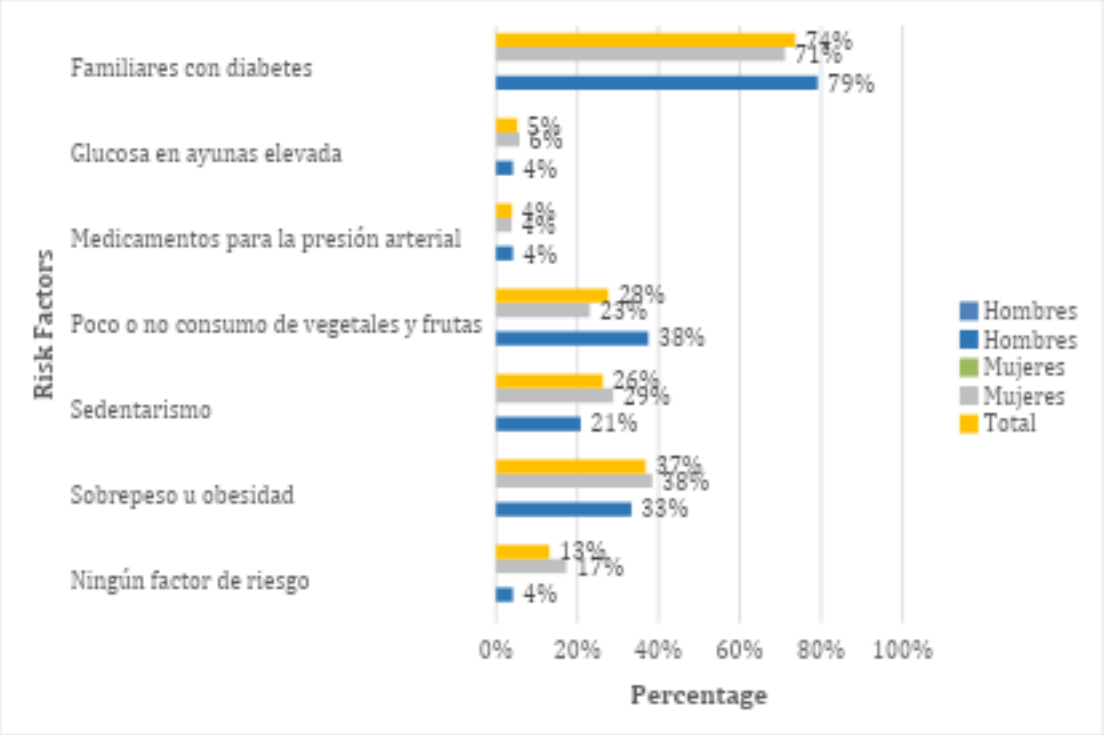
Figure 2.

Perception of the level of risk of diabetes mellitus within the study population.

The main risk factor identified by the study population was having family members with diabetes, equivalent to 74% of the total number of people. The second factor identified was overweight or obesity in 37%. In third place was the little or no consumption of vegetables and fruits with 28%, followed by a sedentary lifestyle with 26%. (See Figure 3).

Figure 3.

Risk factors for diabetes identified by the study population.



A comparison of the results obtained for risk factors by sex showed that men acknowledged having family members with diabetes and little or no consumption of vegetables and fruits, exceeding the mean of the total responses obtained. In the case of women, they identified higher risk related to sedentary lifestyle and overweight or obesity and elevated glucose levels compared to men.

Of the total study population, 64% (49/76) had one or two risk factors, including 79% (19/24) of men and 58% (30/52) of women. Eighteen percent (14/76) reported 3 to 4 risk factors and 4% (3/76) more than 5 risk factors.

Risk factors for diabetes:

When analyzing the results of the survey with the FINDRISK LA test on the risk of developing diabetes mellitus in the next 10 years, an average of 7.82 points was obtained, which places the surveyed population in the low risk range. Twelve percent (9/76) of the total population had a risk above 12 points for the FINDRISK LA scale, which places them at moderate or high risk. With the self-perception scale, we were able to locate 14% (11/76) of the population at high or very high risk.

When comparing the average obtained with the FINDRISK-LA questionnaire with the result of self-perception, with an average of 3.79 points, both results coincide in the range of low risk for diabetes.

When going deeper into the questions for the correct filling of the FINDRISK-LA scale, 3% (2/76) of people without risk factors were identified, compared to 16%

(12/76) obtained with the self-perception of risk, being the Body Mass Index measurement the one that confirmed the detail of overweight that was not self-perceived.

Table 2 shows the main risk factors identified in the population that predispose to type 2 diabetes mellitus. In this study, we were able to identify a higher percentage of family members with diabetes mellitus (75%), being higher in those who were identified as having risk factors, for a RR of 1.28 (95%CI 0.95-1.73). Sixty-three percent of the population did not exercise, with an RR of 0.88 (95%CI 0.52-1.50). Overweight and obesity together account for 63%, with a greater presence in those who identified themselves as being at risk.

Ignorance of blood pressure was present in 42% with a RR of 0.42 (95%CI 0.23-0.75), being mostly in the population that did not identify themselves as being at risk for diabetes. A similar situation occurred with the lack of knowledge of blood glucose measurement, with 37%, being higher in the population that was not identified as being at risk.

Table 2.

Risk factors for diabetes mellitus identified by number, percentage and relative risk.

Risk Factors	Quantity	%	OR	Relative risk	RR Range 95% CI		P
					Menor	Mayor	
Family members with diabetes	57	75%	2.90	1.28	0.95	1.73	0.5
No exercise	48	63%	0.71	0.88	0.52	1.50	0.8
You do not know your blood pressure	36	47%	**0.19**	**0.42**	**0.23**	**0.75**	**0.5**
Fruit consumption less than twice a week	35	46%	2.06	1.47	0.83	2.60	0.7
Overweight	31	41%	1.6	1.32	0.65	2.68	0.5
Unknown glucose levels	28	37%	4.03	0.49	0.24	1.01	0.5
Less than 6 hours of sleep	27	36%	1.24	1.15	0.29	4.52	0.7

Consumption of refined sugar more than 3 times per week	25	33%	0.96	0.97	0.67	1.41	0.5
Consumption of vegetables less than twice a week	21	28%	1.17	1.12	0.01	95	0.7
Obesity	17	22%	**4.03**	**2.97**	**1.11**	**7.98**	**0.5**
Consumption of junk food more than 3 times per week	17	22%	2.87	2.26	0.83	6.14	0.6
More than 8 hours sitting	16	21%	3.54	2.72	0.96	7.68	0.5
He suffers from hypertension	8	11%	4.29	3.71	0.62	22.1	0.6
Fasting glucose elevated or greater than 110 mg/dl	6	8%	9.76	6.18	0.62	61.83	0.5

Acronyms: %: Percentage: OR: Odds Ratio; RR: Relative risk; 95% CI: 95% confidence interval; P: P value.

The consumption of refined sugar was higher than three times per week in 33% of the surveyed population. The consumption of futas was less than twice a week in 46% and was lower in people with risk factors with an RR of 1.47 (95%CI 0.83-2.60) compared to those who were not identified with risk factors. Vegetables were consumed less than twice a week in 28% of the population (see Table 2).

The factors documented with lower presence in the population were hypertension and glucose levels higher than 110mg/dl, with 11% and 8%, respectively. Both factors were present in people with risk factors for an RR of 3.71 and 6.18 respectively.

Interventions to reduce the risk of diabetes mellitus:

Within the main interventions raised by the respondents and with the aim of preventing diabetes were ordered as follows:

a. Improve access to information:

- Massive campaigns or educational days on Diabetes Prevention measures
- Raise awareness of the importance of healthy eating habits and lifestyles in accordance with the population
- Talks on healthy eating in the community and in educational centers, aimed at children and young people
- Sending personalized prevention messages

- Tools to know the risk of diseases, in a clear and understandable way
- Conduct surveys targeting the general population and segmented by age groups to raise awareness
- Education programs in educational centers for children regarding diabetes, including parenting schools

b. Healthy spaces:

- Public spaces to practice and encourage exercise.
- To develop healthy eating habits that meet the requirements and possibilities of each family.
- Nutrition education focused on local and easily accessible foods.

c. Health services with a focus on prevention:

- Provide talks in public spaces on self-care.
- Training for caregivers of people with diabetes to reduce the risk of complications.
- Education on healthy eating for people with diabetes and their families.

d. State policies aimed at prevention:

- State policies related to the restriction of the consumption of refined sugar and trans fats.
- Implement taxes on fast food and use them in campaigns to prevent diabetes and other chronic diseases.
- The country's health budget is oriented to the prevention of chronic diseases.
- Design strategies with a preventive approach for adults and the elderly.

The surveyed population recommended using social networks to share information related to diabetes prevention in 72% (55/76), through email with 39% (30/76), in third place, in public health services with 38% (29/76) and in private health services with 22% (17/76). In last place and with 4% (3/76), they recommended the use of communication by other mass media.

Discussion and conclusions

The present study was developed through the completion of a voluntary, virtual survey, shared access by electronic means, which is why it is oriented to a population with access to a mobile electronic device, with access to internet and definitely able to read and write. This explains the behavior of the population's educational level and occupation. In addition, the interview did not focus on the causes of the habits, the amounts of portions, the quality of sleep or the behavior adopted by the population, as this was not the focus of the present study, these being some of the limitations.

Studies in Guatemala associated with the risk of diabetes using the FINDRISK-LA scale did not include the population's perception of risk and were conducted in hospital settings (15). It was also approached in a community setting to people already diagnosed with diabetes (16). This is an advantage gained from the study, given that the subjects were not in clinical settings and were able to answer questions in a private setting. The main limitation of this action is that anthropometric measurements cannot be corroborated.

The population surveyed self-identified 45% at risk for diabetes, with the main risk factors being: having a family member with diabetes mellitus, being overweight, obesity and infrequent consumption of vegetables and fruits.

Seventy-five percent of the total population confirmed having family members with diabetes, as evidenced in previous studies (3,15-19) (3,15-19). This confirms that the experience previously presented with relatives implies a higher perceived risk of suffering from diabetes in the future. Genetics is a predisposing factor for diabetes that cannot be modified, however, with a healthy lifestyle, the development or onset of diabetes can be delayed and possible complications prevented. This is why it is important to provide tools and knowledge to the families of people with diabetes and to provide guidance on the need for early and periodic evaluation.

The mean Body Mass Index in the study population is 26.9, placing the population in overweight. Forty-one percent (31/76) of the total population was overweight, with a higher percentage in men (50%) and 22% obese, especially in those identified as having risk factors. This finding is similar to that reported by other authors for the country (10,20) (10,20)where there is a greater tendency of overweight in men and obesity in women. Knowledge of the BMI of the population can establish the possibility of risk of suffering from diabetes. With the surveyed population, it was confirmed that it was not taken into consideration in the perception by 13% of the population. Overweight and obesity are considered to be one of the main predisposing factors in insulin resistance and as such favor the development of type 2 diabetes, as well as cardiovascular conditions (24).

Daily fruit consumption was 14% (11/76) and daily vegetable consumption was 30% (23/76), comparable with the results presented by other authors (10,20) (10,20)is one of the situations that should be improved with the different public health interventions in the country. In addition, the consumption of fruits and vegetables is lower in men than in women, indicating an average of 32% for fruit and vegetable consumption (10). Diet is one of the main risk factors that can be modified and targeted for the prevention of diabetes. In this case the increase in natural fiber delays the absorption of sugar and as such the decrease of sugar in the bloodstream (25).

The consumption of junk food is present daily in 5% of the surveyed population, 17% consume it three to five times a week and 54% consume it once or twice a week. The consumption of refined sugar is higher than that of junk food with 8% of the total population consuming it daily, 25% three to five times per week and 46% once or twice per week. This habit should be reduced by offering different options to the population, with the availability of spaces for healthy eating, especially in the workplace. The type of food consumed, both for breakfast and dinner, is based on eggs, beans, sausages, bread or tortillas and coffee, as cited by other authors (20) (20). This is an area that needs to be worked on in the country, reorienting diets with higher vegetable and fruit content and avoiding processed foods can have a greater impact on diabetes prevention (25).

With regard to sedentary lifestyle, 42% of the population studied spent between 4 to 6 hours a day sitting and 21% spent more than 8 hours a day. In this sense, the implementation of safe spaces for physical activity and occupational health and safety strategies should ensure that active breaks are included in the workplace (6, 12, 24, 25).

Fifty-four percent of the surveyed population sleeps between 6 to 8 hours a day and 34% sleeps between 4 to 6 hours a day. The study did not include analysis of sleep quality and may be considered a topic of interest for further studies.

With regard to physical exercise, 37% of the total population studied indicated that they exercised, 42% more men than 35% women, 3% exercised daily and 17% 4 to 5 times a week. These results are similar to those of other authors who reported that 29.3% of the total population practiced exercise (3,10) (3,10).

Eleven percent of the total population surveyed suffers from hypertension, of which 75% are women. This information is striking, since 51% of the total number of people do not know their blood pressure figures and possibly among them there could be people with high blood pressure or undiagnosed hypertension, taking into consideration previous studies where it is stated that 23.8% of the population suffering from hypertension (10) (10). Furthermore, in Guatemala, mortality due to diseases associated with the circulatory system corresponds to 18% in women and 16% in men, according to the National Health Diagnosis for the year 2020 (21).

Of the total population, 63% (48/63) have had at least one glucose measurement, 65% of which corresponds to a medical check-up. Of the total number of people surveyed who have had their glucose measured, 13% (6/48) of the total population had elevated fasting glucose levels or higher than 110mg/dl, 83% of whom were women, a finding twice as high as that identified in the hospital in Jutiapa, Guatemala (10) (10). According to the Ministry of Public Health and Social Assistance, endocrine, nutritional and metabolic diseases are the second leading cause of death in women (15%) and 10% in men (21) (21).

54% of the total population surveyed presented low risk for developing Diabetes Mellitus according to the FINDRISK scale, a situation similar to that identified in other studies conducted in Guatemala in hospital settings with a score of 10.1 (10). When comparing this result with self-perceived risk, we identified that 39% of the population considered themselves to be at moderate risk and 30% at low risk of diabetes mellitus. This finding allowed us to identify a relationship between the self-perceived risk assessment and the FINDRISK scale for diabetes in a population between 20 and 40 years of age. This information can be used as part of strategies to raise awareness among the population in non-clinical settings (work, education or recreation) or in community spaces. Given that the survey was conducted within the population of the capital city and its municipalities, it is recommended that the opportunity be expanded to include the perception of the population in other departments of the country in future studies or analyses.

When analyzing the factors that predispose to diabetes, we identified the presence of high blood glucose levels, arterial hypertension, obesity and sitting for more than 8 hours as the highest relative risk factors in the surveyed population that indicated that they considered themselves at risk. In the case of people who did not identify themselves as being at risk, the factors associated with greater risk are not knowing their blood glucose levels, not knowing their blood pressure, not exercising, and the consumption of refined sugar.

With a p value of 0.5 for most of the risk factors, we can conclude that the sample population presents characteristics that can be identified within the general population, without being able to be conclusive with the result, which leads us to expand this type of study in different sectors and departments of the country and make comparisons with the behavior of the population.

Among the main actions oriented to improve the population's knowledge or measures to prevent diabetes mellitus, different actions have been proposed, which have been contained in proposals made by other authors (3,5,6,22,23)these actions include: improving access to information; healthy spaces or environments; health services with a preventive approach and state policies oriented to prevention.

In addition, it is considered that in work environments, actions associated with Occupational Health and Safety should be increased with the implementation of active breaks that allow workers to perform physical activity during working hours, health activities that include periodic measurements of weight, waist circumference, height, blood pressure and glucose levels. These actions also apply to training environments (schools, colleges, universities) and not only to those oriented to the health area.

In community settings, spaces should be provided where the population can come and take their weight, height, blood pressure or glucose levels in an accessible way and not limited to health services, as well as having information related to food, healthy diets and exercise for the population according to their age.

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Conflict of interest

I do not have any conflict of interest with the realization of the present study, it has been developed within the training process to obtain the Master's Degree in Public Health.

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