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Detection of Pre-Diabetes/Diabetes mellitus type 2 in police servers of the National Directorate of Education

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Abstract---Introduction: Non-communicable diseases (NCDs) are the main cause of mortality worldwide as well as representing a public health problem. The objective is to identify early patients with Type 2 Diabetes Mellitus, in police officers who work in the National Directorate of Education (DNE) through a medical glucose test by capillary puncture, to prevent the increase in non-communicable diseases. Methodology: a survey was carried out on the police officers of the institution, whose capillary glucose was measured with a glucometer, through lancets and reactive strips for said teams. Of the one hundred police officers who provide their services in the institution, ninety of them participated in the virtual survey, where it was found that 48.9% have had or have relatives directly related to a diagnosis of type 1 and 2 diabetes; Similarly, 78.9% indicate that they have not had, do not remember, or have never had a blood glucose test. The result was that 8 police officers presented a value greater than 100 mg/dL in the capillary puncture glucose test and that

1.11%, representing 1 police officer, presented a value greater than 100 mg/dL in the capillary puncture glucose test. value less than 60 mg/dL.

Keywords---Prevention, Pre-diabetes, Type 2 Diabetes Mellitus, Police Officers

Introduction

Non-communicable diseases (NCDs) are the main cause of mortality worldwide as well as representing a public health problem due to the suffering of the people who suffer from them together with with an important economic prejudice. According to macroeconomic calculations, in the next 20 years, world production will show cumulative losses of US\$46 billion because of cardiovascular diseases, chronic respiratory diseases, cancer, diabetes and mental health disorders. (WHO, 2014)

It is estimated that of the 56 million deaths recorded in 2012, 38 million were due to NCDs, of which 28 million occurred in low- and middle-income countries. The four main risk factors identified are tobacco use, unhealthy diets, physical inactivity, and the harmful use of alcohol. (MSP, 2017)

In 2015, according to the International Diabetes Federation, 415 million adults between 20 and 79 years of age diagnosed with diabetes worldwide, 193 million who are not yet diagnosed and 318 million adults with impaired tolerance oral glucose presented a high risk of developing diabetes in the coming years, thus it is estimated that in the year 2040 there will be 642 million people living with this disease in the world. In Ecuador, the prevalence of the disease in adults between 20 and 79 years of age is 8.5%. (MSP, 2017)

A study carried out that refers to the: "Prevalence of type 2 diabetes mellitus and associated chronic complications in the National Police Hospital from January 2011 to December 2013", where it concludes that (Cedeño, 2014). Type 2 diabetes mellitus is a prevalent pathology in the male gender mainly, constituting an epidemiological risk factor. Both adults and older adults are affected. Among the chronic complications, diabetic nephropathy is the most frequent, followed by neuropathy and diabetic retinopathy. The presence of a family history of type 2 diabetes mellitus prevailed in half of the cases.

That is why it is essential to work with a view to improving the lifestyle of police officers, understanding that most of them come from a "sedentary state" and, in addition, incorrect nutrition, would be an oxidizer to acquire in the short, medium or long term, a "epidemic" type health problem, as pointed out (Valdés, 2007) to type II diabetes, which: "It is classified as the epidemic of the 21st century due to the increase in its incidence and its impact on cardiovascular disease, the first cause of mortality in developed societies"

Over time, especially in our country, the necessary studies have not been generated towards the police conglomerate, and the prevention of diseases that

threaten psychological and mental health has been neglected to a certain extent. physical of the police servers, which in functions of the service have been acquiring.

Due to the impact, it has on the evolution of the disease, the identification of the population at risk in the preclinical stage and its metabolic control, efforts have been made to identify the disease in asymptomatic states, as well as specify criteria for early diagnosis.

For the development of the research, it was necessary to know the definitions of some topics that are going to be addressed, such as: Diabetes is a chronic disease, characterized by the inability of the pancreas to produce insulin in sufficient quantities or by the inefficient use of it. Considering the importance of this hormone for the control of blood sugar, a failure in its production and regulation progressively produces serious damage to organs and systems. It is estimated that there are at least 284 million diabetic people in the world, which is projected at 436 million by the year 2030 (Meza, 2017).

With type 2 diabetes, the body does not make enough insulin, or the cells do not use insulin. This is known as insulin resistance. At first, the pancreas produces more insulin than it should to cover the lack of insulin. But over time, the pancreas can't keep up and can't produce enough insulin to keep your glucose levels normal (diabetes.org, 2016). Type 2 is treated with lifestyle changes, oral medications (pills), and insulin.

When glucose builds up in your blood instead of going into your cells, it can cause two problems: Right away, your cells can run out of energy; Over time, high glucose levels can cause damage to your eyes, kidneys, nerves, and heart.

Some people with type 2 diabetes can control their blood glucose through eating well and living an active life; but your doctor may need to prescribe an oral medication or insulin to reach your target glucose level. Type 2 diabetes usually gets worse over time, so even if you don't need medicine at first, you may need it later.

Some groups of people are at higher risk for type 2 diabetes. This type is more common in African Americans, Latinos/Hispanics, American Indians, Asian Americans, Native Hawaiians, and other Pacific Islanders, as well as older adults. Diabetic nephropathy is a complication caused by diabetes at the level of the renal microvasculature (Meza, 2017). Individuals with diabetes have a higher rate of glomerular filtration or hyperfiltration, mediated by greater relaxation of the afferent arterioles compared to the efferent ones. In turn, this leads to increased blood flow through the glomerular capillary, raising the pressure. When these conditions are maintained over time, they produce both glomerular hypertrophy and an increase in the surface area of the glomerular capillary. This causes hemodynamic alterations that contribute to the development and/or progression of the disease.

The type of neurological damage that can occur because of diabetes is most frequently in the legs and feet. For some people, the symptoms are mild; but for

others, they can be painful, debilitating, and even deadly. Symptoms include pain and numbness in the legs (Mayoclinic, 2020). In the most severe cases, there are problems related to digestion, bladder, and heart rate control. Treatment consists of controlling blood sugar levels and using medication to control symptoms.

People with diabetes may have an eye disease called diabetic retinopathy. This disease occurs because high blood sugar levels cause damage to blood vessels in the retina (Boyd, 2020). These blood vessels can swell and leak fluid, they can also close up and prevent blood from flowing, sometimes new abnormal blood vessels grow in the retina, any of these changes can cause you to lose your vision. The effect of uncontrolled diabetes is hyperglycemia or high blood glucose levels), this disease seriously damages many organs of the human body, mainly the nervous system and blood vessels, to eradicate it a healthy body and mind are needed (Suryasa, Rodriguez & Koldoris, 2021).

It should also be understood that in the police ranks there is no mandatory institutional policy in order to carry out physical activity or, in turn, preventive medicine, despite the fact that in the professional career regulations for police officers proposed by the Ministry of government (2020), precisely typified in **Article 306.-Mandatory physical activity.-** The national directorate of social welfare, safety and occupational health in coordination with the national directorate of education of the national police, prepare and implement an annual plan for the physical conditioning of police officers, in order to preserve the physical health of the police officer, without affecting the days and hours of mandatory rest, which will be mandatory for all police units; However, there is a transition that has not yet been fully completed, that is, the absence of physical activity in an adequate and continuous manner has an enormous responsibility in this health problem, as mentioned (Flores, 2021), in relation to " Insufficient exercise, its incidence in the performance in the physical tests of the National Police"

Materials and methods

A bibliographic search was carried out that helped to know fundamental elements of diabetes and its types, in addition to the inductive-deductive method, in addition to the qualitative and quantitative.

Male and female patients older than 22 years without a diagnosis of type 2 diabetes or prediabetes, police officers who perform administrative functions in the national directorate of education; considering that the total number of police officers is one hundred elements (100), in all grades, positions and functions. A sample was taken to carry out a stratified type of study, which the University of the Armed Forces (ESPE, 2019), mentions that they are the members that are divided by groups or strata and the sample is chosen by taking out a number of highly represented individuals. in each stratum.

Analysis and discussion of the results

Diabetes mellitus is among the 10 leading causes of disability in the world, decreasing productivity and human development. In Ecuador, in 2014 the

National Institute of Statistics and Census reported diabetes mellitus as the second cause of general mortality, being the main cause of female mortality and third in the male population (MSP, 2017).

In 2011, a survey was applied in the country that found a prevalence of 12.3% for adults over 60 years of age and 15.2% for the group between 60 and 64 years of age (Freire, 2013).

Urbanized and industrialized lifestyles that lead to a sedentary lifestyle, unhealthy diets and even the increase in the older adult population are determinants for the increase in the prevalence of NCDs.

The various personalities, which are based on the characteristics of each police officer that at the end of the day are enclosed in a single meaning "Police", considering that the behavior, image and health of each one influences the institution itself, this criterion It is not only for the Preventive, Investigative or Intelligence Axis, but also for the police officers of administrative management; Therefore, it is considered necessary to implement preventive health measures, including physical activity, proper nutrition, rest, and preventive medicine for these targeted groups.

Type II Diabetes Mellitus is a chronic disease with a global impact that represents a major public health problem as it is among the leading causes of disability and high mortality, slow return to work and psycho-emotional impact. The number of police officers from the National Directorate of Education who have been detected with suspicion of Pre-Diabetes or Diabetes mellitus type 2 was determined and evaluated.

Several police officers who perform administrative functions in the National Directorate of Education, submitted to the medical test of glucose by capillary puncture, prediabetes or type II diabetes mellitus were detected.

Patients were selected men and women over 22 years of age, who agreed to be in the study, in addition to patients with risk factors, patients under 18 years of age were not included, nor were those already diagnosed with type 2 diabetes mellitus or prediabetes. In table 1, the selection criteria are shown.

Table 1. Selection criteria

Variable	Conceptual	Indicator operational definition
Age	Period from the date of birth to adulthood	Over 22 years of age
Gender	Organic phenotypic condition that distinguishes men from women	Female Male
Weight	Measurement of the total body mass of an individual	Fraction with decimals
Height	Measurement of the height of an individual	Fraction with decimals
Body mass index (BMI)	It is a method used to estimate the amount of body fat that a person has,	Low weight (BMI <18.5). Normal (BMI = 18.5-24.9).

	and therefore determine if the weight is within the range normal, or, on the contrary, you are overweight or thin.	Overweight (BMI = 24.9-29.9). Obesity grade 1 (BMI: 30-34.9 Kg/m ²) Obesity 2 (BMI 35-39.9 Kg/m ²) Obesity 3 (BMI ≥40 Kg/m ²)
Abdominal perimeter	Measurement taken from the midpoint of the last rib and the crest iliac in expiration.	Men: greater than 90 cm Women: greater than 94 cm
Random	blood glucose measured in plasma taken after 8 hours of fasting	Greater than 100 mg/dL

Data collection

A virtual survey was carried out in order to obtain information that will allow the group to be sifted of police officers, who may meet several risk factors for acquiring diabetes II disease.

Consequently, the body mass index (BMI) was obtained, with the data provided by the police servers in the virtual survey, thus being able to know another important piece of information that served to obtain the sample due to risk factors for this disease.

Freely and voluntarily, of the one hundred police officers who provide their services in the National Directorate of Education, ninety of them participated in the virtual survey, obtaining the following information:

Variables	Quantity	Percentage (%)
Women	35	38.9
Men	55	61.1
They took antihypertensive medications	5	5.6
Relatives related to a diagnosis of type 1 and 2 diabetes	44	48.9
They do not have a balanced diet	45	50
Physically inactive	36	40
They are not at their ideal weight	60	66.7
know their glucose level blood	80	88.9
glucose test	12	13.3
Do not remember their last blood glucose test	33	36.7
a blood glucose test more than a year ago	26	28.9
They do not remember or have never had a blood glucose test	71	78.9

As can be seen, there are more men than women in the sector studied, of the total investigated, 66.7 are not at their ideal weight, 88.9% do not know their blood glucose level, another interesting factor is that most of the participants in the sample do not remember or never had a blood glucose test. These aspects are identifiers that there has been no control of the behavior of the disease in the police institution, in some cases running the risk that they may be sick and do not know their health status in relation to diabetes.

Different analyzes were carried out, finding that despite the fact that a policewoman does not have an inheritance diagnosed with type 1 or 2 diabetes,

she has a BMI of: 16.64%, which according to the BMI classification of the World Health Organization (2019), refers to: "Insufficient weight" to: "low weight for age, which reflects a state resulting from insufficient nutrition, previous cases of malnutrition or delicate health (WHO, 2019), therefore it has been considered within the group of risk factor.

To measure capillary glucose, glucometers, lancets, and reactive strips were used for said equipment, the classification of fasting capillary glycemia was determined according to the criteria established by the American Diabetes Association (ADA), where the subjects were classified as positive or suspicious, when fasting capillary blood glucose was greater than 100 mg/dL, if it was less than this cut-off, the test was considered negative.

Once the assessment of capillary blood glucose by puncture was carried out, addressed to the ninety police officers surveyed, nine of them presented parameters outside the permitted range, the same ones that were immediately referred to the Hospital of the National Police, in order that they be carried out. an assessment and, if appropriate, a treatment are carried out.

It was valued that the results that trigger the medical glucose test by capillary puncture, in order to prevent the increase of non-communicable diseases, in police officers of the National Directorate of Education have affected that of the one hundred police officers who provide their services in the DNE., ninety of them responded to the virtual survey, thus being able to obtain a series of data that to a certain extent are alarming, considering that approximately half of the respondents do not have adequate nutrition, are sedentary, half have inheritance type 1 and 2 diabetic; most have not had a blood glucose test, thus determining various risk factors.

It is recommended to carry out an awareness campaign, through seminars, research, publications, among others, of the risk factors for contracting or developing type 2 diabetes, as well as leading a healthy life that implies continuous physical activity, a balanced diet, rest adequate and preventive medicine, it will be possible to reduce and even avoid diagnosis of type 2 diabetes, in police servers.

8.89%, representing 8 police officers, presented a value greater than 100 mg/dL in the capillary puncture glucose test, and 1.11%, representing 1 police officer, presented a value greater than 100 mg/dL in the glucose test by capillary puncture a value less than 60 mg/dL.

The police officers diagnosed with suspected type 2 diabetes, through the medical glucose test by capillary puncture, were immediately directed to the different health houses of the National Police Health System, to carry out a glucose test. more thorough blood to prevent or at the same time detect early a possible picture of type 2 diabetes, and if they share the same result, medical treatment is immediately provided according to the needs.

Conclusions

The analyzed data showed that 97% of the respondents agreed that physical inactivity had a negative influence on their physical performance, and as part of this, the additional percentages studied showed difficulties in the process of directing the police force.

There is a need to establish intervention strategies with specialized physical activity for the police force studied, it is necessary to make senior officers aware of the need to use adequate time within working hours to practice various contents of the preparation that improve physical condition. of the police force.

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