Epidemiology of Type 2 Diabetes Mellitus in Venezuela, 2010-2020

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SUMMARY

Diabetes mellitus (DM) is a non-communicable clinical entity, is a risk factor for cardiovascular disease pathogenesis, the leading cause of mortality worldwide. Furthermore, obesity and classic risk factors (tobacco consumption, alcohol, unhealthy diet, and insufficient physical activity) coexist with DM, representing a complex challenge in terms of public health, and a serious threat to the economic and social development of the individual and society. In the present study, the researchers stated: What is the prevalence of diabetes mellitus in Venezuela? A critical review of the literature evidence that there are

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no nationwide population studies sponsored by the Venezuelan state. For 2010, the population prevalence of DMT2 in Venezuela range from 5.1 to 6.0 %. López et al (2014) evidence a prevalence of DMT2 of 14.25 %. In Venezuela, according to IDF-2019, the comparative prevalence adjusted for age in adults between 20 to 79 years was 7 % and the proportion of DM without a diagnosis in the same age group was 51.8 %; that is, 1 in 15 adults between 20 and 79 years old has undiagnosed DM. Undoubtedly, there is a divergence between the information from national surveys published in the IDF Atlas. **Conclusions:** *DM constitutes a serious, common, growing public health problem with an economic, social, and quality of life impact for Venezuelans, which deserves national epidemiological research.*

Key words: *Diabetes mellitus, epidemiology, comorbidity, economic impact, public policies in Venezuela.*

RESUMEN

La diabetes mellitus (DM) es una entidad clínica no trasmisible considerada factor de riesgo en la patogénesis de las enfermedades cardiovasculares, principal causa de mortalidad en el mundo. Adicional, la obesidad y los factores de riesgo clásicos (consumo de tabaco, alcohol, dieta poco saludable y actividad física insuficiente), coexisten con la DM, representando un reto complejo en términos de salud pública, además de una seria amenaza para el desarrollo económico y social del individuo y de la sociedad. En el presente estudio los investigadores se plantean ¿Cuál es la prevalencia de la diabetes mellitus en Venezuela?

La revisión crítica de la li teratura evidencia que no existen estudios poblacionales a escala nacional auspiciados por el estado venezolano. Para el año 2010, las cifras de prevalencia poblacional de DMT2 en Venezuela oscilaron entre 5,1 a 6,0 %. López y col. (2014), evidenció una prevalencia de DMT2 de 14,25 %. En Venezuela, según IDF-2019 la prevalencia comparada ajustada por edad en adultos entre 20 a 79 años fue de 7 % y la proporción de DM sin diagnosticar en el mismo grupo etario fue de 51,8 %; es decir, 1 de cada 15 adultos de 20 a 79 años de edad, tiene DM sin diagnosticar. Sin dudas existen divergencia entre la información de encuestas nacionales con lo publicado en el Atlas de la IDF. **Conclusiones.** *La DM constituye un problema de salud pública serio, común, creciente y con impacto económico, social y sobre la calidad de vida del venezolano, que amerita investigación epidemiológica nacional.*

Palabras clave: *Diabetes mellitus, epidemiología, comorbilidad, impacto económico, políticas públicas en Venezuela.*

INTRODUCTION

Diabetes mellitus (DM) is a non-communicable disease that occurs when the pancreas does not produce enough insulin (a hormone that regulates blood glucose) or when the body cannot effectively use the insulin it produces (1). Hyperglycemia in type 2 diabetes mellitus (DMT2) is the result of the inability of the body's cells to respond fully to insulin -insulin resistance - an event that plays a leading role in the genesis of this entity. DMT2 is most commonly seen in older adults and has been linked to an aging population, economic development, and increased urbanization; however, it is increasingly evident in children and young adults by rising levels of obesity, physical inactivity, and inappropriate diet.

From a physiological point of view, the average plasma glucose concentration increases with age in most populations worldwide, especially after the age of 50. Women have experienced significantly higher average plasma glucose concentration than men, particularly after the age of 70. The specific prevalence of diabetes increases with age to the seventh and eighth decade, both in men and women. Under these premises it is logical to foresee a sustained increase in the prevalence of DM over time; if

we add to this the impact of clinical entities such as high blood pressure, dyslipoproteinemia, and obesity that coexist with diabetes, and classic risk factors such as tobacco use, harmful use of alcohol, unhealthy diet, and insufficient physical activity, the prevalence of diabetes will continue to increase sharply, constituting the main cause of morbidity, mortality, and disability in the world, representing a complex challenge in terms of public health, in addition to a serious threat to the economic and social development of the individual and society.

In this sense, preventing diabetes mellitus (DM) means that it is necessary to recognize the natural history of the disease and prevalence, including the preclinical phase and the risk factors that can trigger it to develop risk/benefit effective prevention alternatives, it´s of the utmost importance to know what is the prevalence of diabetes mellitus in Venezuela? To answer this question the authors proposed to analyze the epidemiology of type 2 DM in Venezuela in the period 2010-2020.

Diabetes mellitus in the World

The International Diabetes Federation (IDF) estimated that the prevalence would increase worldwide from 285 million people in 2010 (6.4 % of the adult population) to 438 million by 2030, which translates to an increase of 54 % (2). Since the year 2000, when there were 151 million people in the world with DM, the number increased to 463 million in 2019 (Figure 1). The prevalence of diabetes has increased more rapidly in low- and middle-income countries than in high-income countries.

The World Health Organization (WHO) (3) estimated that globally, 422 million people over the age of 18 had diabetes in 2014; which equates to an 8.5 % prevalence in the adult population. The Americas region had a prevalence of 8.3 % in 2014.

Between 2000 and 2016, there was a 5 % increase in premature mortality from diabetes (2), and according to WHO in 2012, 1.5 million deaths occurred worldwide as a direct result of diabetes (3); the entity that ranked eighth among the leading causes of death in both sexes and

fifth in women. Blood glucose above normal values caused another 2.2 million deaths due to an increased risk of cardiovascular disorders and other conditions; this accounted for a total of 3.7 million hyperglycemia-related deaths in 2012. Many of these deaths (43 %) occur before the age of 70.

IDF estimated in 2017 that the adjusted prevalence of diabetes in the South and Central America region (SACA) was 9.2 % among adults aged 20 to 79; i.e. 34 million (9 %) people with DM resided in the region (4). The expected number of cases growth (62 %) by 2045 is higher in our countries than predicted for other geographic regions. The growth expectation is based on the high prevalence of conditions leading up to diabetes such as obesity and glucose intolerance. Even more serious is that 40 % of patients with diabetes are unaware of their condition. Type 2 Diabetes Mellitus (DMT2) accounts for 85-95 % of all diabetes in high-income countries. The percentage is highest in low-to-medium-income countries (5).

In this same order of ideas, it is estimated that diabetes caused during 2019, 243,2000 deaths in adults between 20 and 79 years of age in the Americas region (6). Additionally, 1 in 11 adults have diabetes, 32 million people live with diabetes in the region; 1 in 3 people with DM is undiagnosed, 1 in 10 adults have abnormal glucose tolerance; 1 in 7 live births are affected by pregnancy hyperglycemia and nearly half of deaths attributable to diabetes occurred in people under 60 years of age (6).

Figure 1.
Source: FID Atlas, 9th edition, 2019.

Diabetes in Venezuela

The first review of the DM in Venezuela was made by Dr. José María Vargas on May 5, 1829, 191 years ago (7): "patient as of thirty years... secretions and excretions indicated the following disorders: the appearance of the natural and wet tongue, dry eye, copious urine, honey color, not ammoniacal but acid after 24 hours, this is a considerable degree of diabetes".

There are no national population studies sponsored by the Venezuelan state. The data offered by the Ministry of People's Power for Health are generally extemporaneous publications and do not correspond to a national diabetes detection plan in the country.

For the year 2010, the population prevalence figures for DMT2 in Venezuela ranged from 5.1 to 6.0 %, representing an absolute value of between 1 470 500 and 1 730 000 cases/year (8). Whiting, et al (9) in 2011, noted that the number of DMT2 cases aged between 20 and 79 years in Venezuela was 1 764 900, for a prevalence consistent with WHO criteria of 10.39 % and attributable deaths in the same age group of 13.38 %, it should be noted that these data correspond to population estimates.

In the study, an approach to understanding the prevalence of high blood pressure, cardiovascular risk factors, and lifestyle in Venezuela fasting dysglycaemia represented 38.95 %, diabetes mellitus 14.25 %, and prediabetes using glycosylated Hb 40.7 % (10). Also, the prevalence of high blood pressure, hypercholesterolemia, dysgyghoemia, and diabetes mellitus was higher in women.

According to the WHO in its first global report on diabetes, in Venezuela with a total population of 31 108 000, an estimated prevalence of 8.8 % was recorded in 2014 with 9.1 % for men and 8.5 % for women (11). While IDF in its 2016 report estimates a total DM prevalence of 11.1 % in Venezuela (12).

Nieto et al (13) reported that 12.4 % of Venezuelans over the age of 20 have diabetes, and the prevalence has increased from 6.0 % in 2010 to 12.4 % in 2017. On the other hand, people at risk prediabetes went about 34.3 %, which generates a very high potential to continue increasing prevalence in the country.
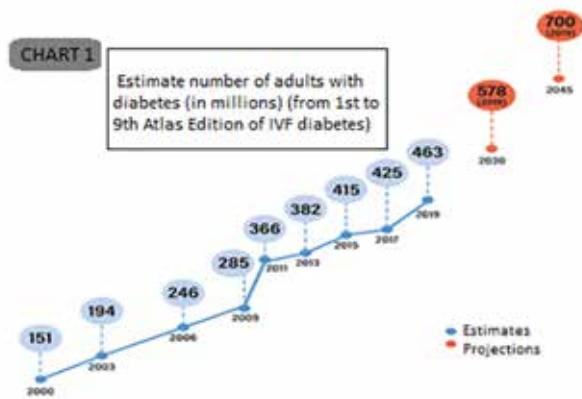
The situation that can be aggravated because knowledge about the condition, its complications, pharmacological, nutritional treatment, exercise, metabolic control goals, and lifestyle changes that are part of the bulk of their integral management are unknown by a very high number of patients and their family environment.

However, in Venezuela, according to IDF (6), the age-adjusted comparative prevalence in adults aged 20 to 79 by 2019 was 7 % and the proportion of undiagnosed DM in the same age group was 51.8 %; that is, 1 in 15 adults aged 20 to 79 have undiagnosed DM. There is a divergence between the information of national surveys with what is published in the IDF Atlas, as in the case of Argentina and Venezuela (5).

Diabetes and comorbidities

The DM accounts for 12.3 % of total deaths in adults. 58 % of death occurred in people under 60 years of age. In most countries in the region of Central and South America, diabetes is among the top five causes of death. The most common causes of death among people with diabetes are ischemic heart disease and strokes. In addition, diabetes is the leading cause of blindness, kidney failure, non-trauma amputations, and premature disability and is among the top ten causes of hospitalization and request for medical care (5).

A number of systematic reviews indicate that the relative risk of cardiovascular disease (CVD) namely arterial hypertension, coronary artery disease, heart failure, and stroke, ranges from 1.6 to 2.6, but this risk is higher among young people and even reaches a higher value in women (14-16). Across the spectrum of fasting glucose, glycosylated hemoglobin (HbA1c), or two-hour glucose tolerance test results, each standard deviation (SD) is associated with an increased risk of CVD events of 6 and 20 %. It should be noted that the prevalence of any cardiovascular disease ranges from around 32 %, and the prevalence increases with the coexistence of DM, a condition that raises the risk by up to 160 % (Table 1) (6).

Additionally, considering the prevalence, magnitude, and severity of chronic complications described in DM and that these increases with age and vary depending on the time of exposure it is peremptory to prevent DM. The coexistence of comorbility among the population with DM is associated with a higher number of hospitalizations, a higher rate of re-entry, and increased length of hospital stay compared to the non-diabetic population, with cardiovascular complications that are the main responsible for the increase in morbidity.

Table 1
Chart Global calculations of the Association and the impact of diabetes on cardiovascular diseases

Consequence	Impact		Data System/Studies	References
Prevalence of cardiovascular disease	Any cardiovascular disease: 32 % Coronary heart disease 21 % Miocardial infarction 10 % Stroke 7,6 %		57 Cross-cutting studies	Einarson et al, 2018[14]
Coronary cardiopathy	Increased risk of	160 %	102 Prospective studies	Emerging risk Factors Collaboration, 2010[12]
Ischemic cardiopathy	Increased risk of	127 %	102 Prospective studies	Emerging Risk Factors Collaboration, 2011[13]
Hemorrhagic stroke	Increased risk of	56 %	102 Prospective studies	
Death from cardiovascular disease	Increased risk of	132 %	97 Prospective studies	
Years of life lost	5,8 years in men whit 50 years 6,4 years in women whit 50 years		97 Prospective studies	

Source: FID Atlas. 9th. Edition, 2019.

DM and economic impact

In the United States, the estimated total cost attributable to diagnosed diabetes in the year 2017, was $327 billion, including $237 billion in direct medical costs and $90 billion in reduced productivity (17). When analyzing the cost by category, care for people with diagnosed diabetes accounts for $1 in $4 in the U.S., and more than half of that spending is directly attributable to diabetes. People diagnosed with diabetes incur average medical expenses of $16,750 per year, of which approximately $9,600 is attributed to diabetes directly. Additionally, people diagnosed with DM, on average, have medical expenses of about 2.3 times the expense of a person without diabetes.

Indirect costs include increased absenteeism ($3.3 billion) and lower productivity at work ($26.9 billion) for the employed population, reduced productivity for those who are not in the workforce ($2.3 billion), disability to work due to a disease-related disability ($37.5 billion), and loss of productivity due to 277 000 premature deaths attributed to diabetes ($19.9 billion) (17).

In contrast to its high social cost, the spending on disease care in the region of Central America and South America is one of the lowest ($20.8 billion per year, representing 4.5 % of world spending). 13 % of the region's total health expenditure is allocated to diabetes care (5).

In line with the report of the WHO Independent High-Level Commission on Noncommunicable Diseases (NCDs) (2018), under the auspices of the World Health Organization (WHO), which examined the prevention and control of NCDs, governments expressed that the global burden and threat of non-communicable diseases are part of the main obstacles to development in the 21st century (18).

In the view of researchers, the concerted adequacy of the public system and public health policies in the country together with Universities as training bodies of health professionals and patients grouped in institutions (associations, foundations, etc.) that guarantee individual and collective health through national guidelines/ protocols/standards based on the evidence against diabetes should be needed; standardized criteria for referral of patients from primary care to a higher level; national survey on risk factors and diabetes; diagnostic procedures measuring blood glucose (strips for measuring glucose and ketones in urine) oral glucose tolerance test, HbA1c test, dilated ophthalmoscopy, perception of foot vibration with the fretboard, Doppler test to determine vascular foot condition and retinal photocoagulation; the availability of medicines in primary and reference care facilities to positively impact the increasing prevalence of this clinical entity.

The DM has direct and indirect involvement in public health, increased absenteeism and lower productivity at work for the employed population, reduced productivity for those who are not in the workforce, inability to work due to disease-related disability, and loss of productivity due to premature deaths attributed to diabetes.

CONCLUSIONS

1. Diabetes must be recognized as a serious, common, growing, and economic, social, and economic-impacting public health problem on the quality of life of the Venezuelan, which is why it is essential to promote research in the epidemiology of diabetes in Venezuela.

2. It is imperative to promote national diabetes strategies that include specific targets and results from assessment mechanisms and to implement national diabetes programs aimed at optimizing appropriate, appropriate, and sustainable professional, technological, and health inputs aimed at the prevention and management of DM.

3. Develop and implement a comprehensive diabetes care model that includes national diabetes therapeutic education to ensure that the person with diabetes can acquire the knowledge, skills, and skills necessary to ensure self-care.

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