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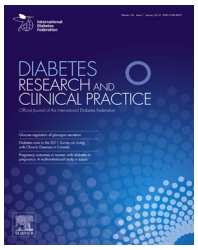

Association between socioeconomic status, type 2 diabetes and its chronic complications in Argentina

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ABSTRACT

Aim: To compare the socioeconomic status (SES) of people with type 2 diabetes (T2DM) in Argentina (Córdoba) with and without major chronic complications of diabetes, with that recorded in persons without diabetes matched by age and gender.

Methods: For this descriptive and analytic case–control study, potential candidates were identified from the electronic records of one institution of the Social Security System of the city of Córdoba. We identified and recruited 387 persons each with T2DM with or without chronic complications and 774 gender- and age-matched persons without T2DM (recruitment rate, 83%). Data were obtained by telephone interviews and supplemented with data from the institution's records. Group comparisons were performed with parametric or non-parametric tests as appropriate. We used ordinary least squares to regress household income and the difference between income and household expenses on diabetes status, age, sex, education and body mass index.

Results: Persons with T2DM, particularly those with complications, reported fewer years of general education (13.6 ± 4.2 years *vs.* 12.2 ± 4.4 years), a lower percentage of full time jobs (43.0% *vs.* 26.9%), lower salaries and monthly household income among those with full-time jobs (> 5000 ARG$: 52.6% *vs.* 24.5%), and a higher propensity to spend more money than they earned (expenditure/income ratio ≥ 1: 10.2% *vs.* 16.0%). The percentage of unmarried people was also higher among people with type 2 diabetes (7.0% *vs.* 10.9%).

Conclusion: T2DM and the development of its complications are each positively associated with lower SES and greater economic distress in Argentina.

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1. Introduction

Type 2 diabetes (T2DM) is a serious public health problem worldwide due to its progressively increasing prevalence and the frequent development of its chronic complications, which increase treatment costs and impose a heavy burden for the patient and society [1–4].

Although it has been clearly established that the development and progression of such chronic complications can be effectively prevented or delayed through tight glycemic and associated cardiovascular risk factor (CVRF) control [5–9], many people with diabetes worldwide have poor control and Latin America is no exception [10,11].

Sedentary behavior and obesity are important risk factors for these various scenarios [12], but there is also evidence that socioeconomic status (SES) increases the risk of diabetes through mechanisms such as multigenerational epigenetic programming triggered by famine [13], the stress of economic inequality [14], and inability to purchase healthy foods, get regular exercise, manage blood sugar and other risk factors, and access medicines and preventive medical care [15,16]. In a detailed meta-analysis of 23 selected references out of 5120 citations published in the period 1966–2010, Agardh et al. concluded that the risk of developing T2DM was significantly associated with low SES in high-, middle- and low-income countries and overall [17]. Supporting this concept, a study from the US showed that the increase in the prevalence of diabetes (both type 1 and type 2) between 1971 and 2002 was most prominent among individuals with low SES [18]. The higher incidence of diabetes in the group of low SES is also associated with a major risk of developing chronic complications [19–22]. However, in some countries such as China and India, higher SES predicts diabetes prevalence [23,24]. The situation in Argentina, and in many other Latin American countries, has not yet been described.

Latin America is a region expected to have a large increase of diabetes prevalence in the near future [1]. The aim of this study was to ascertain the relationships between variables describing SES and the diagnosis and complications of T2DM in Argentina. For that purpose, we performed a cross-sectional study examining SES of people with T2DM with and without complications, and compared the data with those recorded in people without diabetes paired by age and gender in Cordoba, a major city in Argentina.

2. Research design and methods

2.1. Ethical issue

The study protocol was analyzed and approved by a local independent and accredited Ethical Committee. The study was developed according to the Good Practice Recommendations (International Harmonisation Conference) and the ethical guidelines of the Helsinki Declaration. Likewise, this procedure ensured compliance with the National Personal Data Protection Law No. 25.326. This protocol was read to each participant and thereafter they were incorporated into the study, only after the provision of oral informed consent.

2.2. Study design

This is a descriptive and analytic research study carried out as a case–control study, comparing people with T2DM with or without chronic micro- and macrovascular complications (verified by clinical evaluation, laboratory and special tests) and people without the disease (non diabetic group, NDG) from similar social contexts matched by gender and age (±3 years).

We selected one institution of our Social Security System (SSS), the Hospital Privado de Córdoba (HPC). The HPC includes all medical specialties and provides health coverage to nearly 40000 people in the city of Córdoba through its health insurance plan; it also provides health care to people from other institutions that belong to the social security sector. The HPC has more than a million outpatient visits a year and approximately 900000 electronic medical records (EMR) in its database. These EMRs include personal information and diagnosis (age, gender, type of diabetes, disease duration), clinical, biochemical and therapeutic data, diagnostic procedures and treatment prescriptions. According to our National Risk Factors Survey [25], diabetes prevalence in the province of Córdoba is within the average country range and the HPC has comparable characteristics with other health care institutions located all over the country.

In the HPC records, we started identifying people with T2DM – American Diabetes Association criteria [26] – between 20 and 75 years of age on treatment for at least two years. In this population, we ranked: (i) people without chronic micro- and macrovascular complications (T2DM w/o C), and (ii) people with any chronic microvascular (retinopathy, neuropathy and nephropathy) and macrovascular (myocardium infarct, cerebrovascular accident and amputations) complications (T2DM w/C), being diagnosed using clinical, laboratory and specific tests (International Classification of Diseases [ICD-10] criteria). In a second step, we identified people without diabetes (NDG) to use as controls.

We estimated that a sample size of 275 persons in each T2DM group was necessary to assure an approximate 80% power, at an alpha and beta error of 0.05 and 20%, respectively. We increased this sample size by 25% assuming that there would be a 20% of non-responses. Accordingly, we decided to include 344 persons per T2DM group (matched one-to-one by age and gender), and 688 people without diabetes paired by age and gender to use as control.

To ensure the appropriate number of people needed for each group, we identified and randomly selected 1000 records of persons with T2DM from the HPC EMR database, 500 w/o C and 500 w/C. Using the same procedure, we thereafter selected from the database 1500 people without diabetes matched by age and gender (3:1 ratio). Age and disease duration were verified in patient records. Entire pairs were discarded if data were missing for one person in the pair of the T2DM groups or for more than two persons in the NDG.

2.3. Data collection

People from every group were telephonically invited to participate in the study (March to April 2011); a similar proportion of contacted subjects agreed to participate in each subgroup (mean, 83%). In order to understand this relatively