RISK FACTORS AND COMPLICATIONS AMONG PATIENTS REGISTERED IN THE HIPERDIA IN SÃO JOSÉ DO RIO PRETO[1]

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ABSTRACT

Chronic conditions stand out among public health problems, representing the primary cause of hospitalizations and mortality. This study's objective was to identify sociodemographic variables, risk factors and complications among patients enrolled in the HIPERDIA (Registration and Monitoring System of Hypertensive and Diabetic Patients) in São José do Rio Preto, SP, Brazil. A descriptive and cross-sectional study was conducted including 45,723 patients enrolled in the HIPERDIA between 2002 and 2012: 31,547 (69%) were hypertensive, 2,867 (6.27%) were diabetic, and the remaining 11,309 (24.73%) had hypertension and diabetes. Most were women aged 59 ± 13.8 years old on average, had incomplete primary education, were Caucasians and lived with a partner and children. Statistically significant associations were observed between clinical conditions and risk factors: smoking (p<0.0001) and diabetes, and hypertension with diabetes; being overweight (p<0.0001) in the three clinical conditions; and family history and sedentariness (p<0.0001) with hypertension and diabetes and with the following complications: other heart diseases, Acute Myocardial Infarction and Kidney Disease (p < 0.01) with the three clinical conditions; and stroke (p<0.0001) with diabetes, and diabetes with hypertension. Among the patients, 59.57% presented a risk factor and 16.58% experienced complications. The study's results support interventions intended to decrease risk factors among hypertensive and diabetic patients, consequently preventing complications.

Keywords: Hypertension. Diabetes Mellitus. Risk factors.

INTRODUCTION

Chronic conditions became prominent among public health problems worldwide and increased rates of noncommunicable diseases (NCDs) are the leading causes of hospitalizations and mortality[1].

NCDs include hypertension and diabetes and the Brazilian Ministry of Health established, through Decree No. 371/GM on March 4th 2002, that the National Pharmaceutical Assistance Program for Hypertension and *Diabetes Mellitus* would integrate the National Reorganization Plan of Care Provided to Hypertension (HA) and *Diabetes Mellitus* (DM). Additionally, the joint decree No. 44 from March 6th 2002, implemented a tool (SISHIPERDIA) within the primary health care system to register and monitor HA and DM patients in the municipalities[2-3]. So that, HIPERDIA is a system created to Register and Monitor Hypertensive and Diabetic Patients within the National Reorganization Plan of Care Provided to HA and DM in all the outpatient units of the Brazilian Health System (SUS) intended to generate information to be used by the units, municipal and state managers, and by the Ministry of Health. An important aspect of this system is that it enables monitoring, ensures medication prescribed is provided to patients, and also facilitates the identification of the epidemiological profile of this population, which can support the adoption of public health strategies, improve the quality of life of these patients, and decrease social costs[3].

Sedentariness and physical inactivity are important risk factors for NCDs and affect life expectancy, being considered one of the main indirect causes of death worldwide. The government can promote physical activities by establishing inter-sector actions and implementing areas intended to promote healthy activities, bike paths, disseminating information and education, and discussing issues related to urban mobility. To meet these objectives, the Ministry of Health created the "*Academia da Saúde*" [Health Club] program, in which, fitness centers located near primary health care units are included and provide fitness instructors to guide physical activities[4].

According to a study conducted by the Ministry of Health "The most frequent complications caused by Hypertension and DM include Acute Myocardial infarction (AMI), Stroke, Kidney Disease, Heart Failure, amputations of legs and feet, definitive blindness, abortions, and perinatal deaths"[5].

Assessing SISHIPERDIA indicators is key to monitor the users of health services within SUS in each municipality. It presents sociodemographic indicators, modifiable risk factors (overweight, smoking, physical inactivity) and complications such as AMI, other coronary heart diseases, stroke, and chronic kidney disease[6].

Given the preceding discussion, this study's objective was to identify the sociodemographic variables, risk factors and complications presented by patients enrolled in the HIPERDIA (Registering and Monitoring of Hypertensive and Diabetic Patients) in São José do Rio Preto, SP, Brazil.

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted in the epidemiological surveillance of São José do Rio Preto, SP, Brazil. The population included in the study was composed of those enrolled in the HIPERDIA from 2002 to 2012. This interval of time was chosen because the Ministry of Health discontinued HIPERDIA mid-2013 so that 2012 was the last full year in which the system was active. The database provided by SISHIPERDIA (Registering and Monitoring System of Hypertensive and Diabetic Patients) from the City Health Department was used. In 2012, the city's population comprised 415,679 inhabitants: 52% of which were women and 77% were Caucasian. The population enrolled in the SISHIPERDIA in the period under study included 45,723 hipertensive, or diabetic, or hypertensive and diabetic individuals.

The epidemiological variables included: sociodemographic (sex, age, education, race, and marital status), risk factors for chronic diseases reported by the literature (sedentariness, smoking, overweight, and family history) and complications (acute myocardial infarction, other coronary heart diseases, stroke, and kidney disease). In regard to education, the following classification was used: low education (illiterate and incomplete primary school), medium education (complete primary school up to incomplete high school), and high education (complete high school up to bachelor's degree or more).

Excel, bioestat 5.0, and Epi Info7 were used in the analysis. The Chi-square test was performed to verify whether there was statistically significant associations among the variables (when $p<0.05$) from the universe of patients enrolled in SISHIPERDIA. The project was approved by the Institutional Review Board at FAMERP (Protocol No. 05855012.5.0000.5415/2012 and referee report No. 73762/2012).

RESULTS AND DISCUSSION

Of the 45,723 users enrolled in the SISHIPERDIA of São José do Rio Preto, 31,547(69%) users covered by the Brazilian Health System (SUS) presented hypertension; 2,867(6.27%) presented DM; and 11,309 (24.73%) presented both hypertension and DM. According to the sociodemographic characteristics, most patients were women aged 59 ± 13.8 years old on average, had incomplete primary school and were Caucasian, while 19,090 (41.75%) had a stable relationship with a partner and had children (Table 1).

Our results concerning epidemiological aspects and the clinical impact of hypertension on elderly individuals are corroborated by the prevalence of factors, such as hypertension and diabetes, which increase with aging and are conditions the health system need to observe in order to adopt public policies[7]. A study conducted in Paraíba, Brazil analyzed the impact of diabetes on the quality of life of the elderly population and found that diabetes was not a burden for these individuals and they enjoyed good quality of life. Elderly individuals, however, reported they experienced difficulties in adapting their lifestyle in regarding to exercise, diet and the use of medication[8].

The low educational level found in this study is one of the factors that determine chronic diseases. In general, the lower the education, the greater the prevalence of these diseases and complications that result from them[9].

Table 2 presents the risk factors associated with hypertension and/or DM among individuals enrolled in the SISHIPERDIA.

Table 1. Sociodemographic characteristics of individuals enrolled in the HIPERDIA, São José do Rio Preto, SP, Brazil 2002-2012.

Sociodemographic variables	n	%
Sex		
Female	27,684	60.55
Male	18,039	39.45
Age		
Up to 19 years old	241	0.53
20 to 29 years old	809	1.76
30 to 39 years old	2,444	5.35
40 to 49 years old	7,163	15.67
50 to 59 years old	12,163	26.60
60 to 69 years old	12,085	26.43
70 years old or older	10,818	23.66
Education		
Low	31,165	68.16
Medium	13,223	28.92
High	1,335	2.92
Race	45,723	
Caucasian	37,214	81.39
Afro-descendant	3,620	7.92
Asian	625	1.37
Mixed	4,237	9.27
Indigenous	27	0.06
Marital status		
Lives with a partner and children	19,090	41.75
Married without children	8,406	18.38
Lives with a partner, children and/or family members	3,749	8.20
Lives with family members, has no partner	9,126	19.96
Lives with other people with no kinship or marital ties	1,465	3.20
Lives alone	3,887	8.50

Source: SISHIPERDIA/SMS - São José do Rio Preto, SP, Brazil.

Table 2. Characterization of risk factors according to clinical conditions (Diabetes, Hypertension and diabetes) among individuals enrolled in the SISHIPERDIA, São José do Rio Preto, SP, Brazil 2002 -2012.

Variables Risk Factors	Clinical Conditions of Patients Enrolled in the SISHIPERDIA (N=45.723)							
	Diabetes		Hypertension		Hypertension and Diabetes		Total	
	n	%	n	%	n	%	n	%
Smoking								
Yes	552	1.21	5,186	11.34	1,690	3.70	7,428	16.25
No	2,315	5.06	26,361	57.65	9,619	21.04	38,295	83.75
P-value	< 0.0001		0,09		< 0.0001			
Overweight								
Yes	1,336	2.92	18,323	40.07	7,445	16.28	27,104	59.28
No	1,531	3.35	13,224	28.92	3,864	8.45	18,619	40.72
P-value	< 0.0001		< 0.0001		< 0.0001			
Sedentariness								
Yes	1,524	3.33	18,917	41.37	6,795	14.86	27,236	59.57
No	1,343	2.94	12,630	27.62	4,514	9.87	18,487	40.43
P-value	< 0.0001		0.009		0.196			
Family history								
Yes	1,146	2.51	15,453	33.80	5,521	12.07	22,120	48.38
No	1,721	3.76	16,094	35.20	5,788	12.66	23,603	51.62
P-value	< 0.0001		0.0001		0.297			

Source: SISHIPERDIA/SMS - São José do Rio Preto, SP, Brazil. Chi-squrare test.

A study conducted in the Philippines addressing the prevalence of chronic diseases risk factors reports the following prevalence: 24.6% of hypertension, 3.9% of diabetes, 31% of smoking, 0.9% stroke, and 1.1% of other coronary heart diseases[10]. Results that differ from this study's findings indicate that 69% of SUS patients had hypertension and 6.27% had DM. An epidemiological study, also conducted in São José do Rio Preto, estimated that the prevalence of hypertension among adults was 25.2%[11]. The cross-sectional population-based study conducted by the Brazilian Ministry of Health, together with the Surveillance System of risk and protection factors for chronic diseases, identified the following prevalence using a telephone survey: 24.3% of hypertension and 7.4% of diabetes[12].

Therefore, the rate of hypertension presented in this study is well above that reported in the literature. This finding may be explained by the fact that these are secondary data and suggest changes in the health system, which in addition to the need to register the patient in the HIPERDIA, also needs to ensure monitoring because the process of providing individual and collective healthcare to hypertensive patients is complex.

Even though enrollment in the HIPERDIA predominantly refers to the population using SUS and records only those individuals who present one of the three health conditions aforementioned, an analysis of the individuals enrolled in the system shows that the system includes 30.10% of the estimated prevalence of hypertensive patients and 46.08% of the estimated population with diabetes in the city registered in the SISHIPERDIA. Since 2002, the World Health Organization (WHO) is involved in a worldwide effort to prioritize surveillance of chronic diseases, focusing on risk factors such as sedentariness, smoking, inadequate diet, and obesity, among others, based on successful experiences with decreasing morbidity and mortality caused by cardiovascular diseases in several countries[13].

Smoking was the risk factor most frequently found in the group with diagnosis of diabetes, or with hypertension and diabetes; statistically significant association (p <0.0001) was found between these conditions and smoking. The cross-sectional population-based study conducted by the Ministry of Health through the Surveillance System of risk and protection factors for chronic diseases using a telephone survey reports the prevalence of smoking: 12.1% in the total population, though smoking is greater among men (15.5%) than among women (9.2%)[14]. This same study conducted in 2013 reported that the prevalence of smoking dropped to 11.3%[15]. Brazil has implemented measures to control smoking and the consumption of cigarettes has dropped since the 1990s. Smoking experimentation among young individuals, however, still occurs and in some regions smoking is more frequent among girls than among boys[16].

Association between overweight and the three clinical conditions (diabetes or hypertension, or hypertension and diabetes) was statistically significant. Vigitel (2012) reports that excess weight ranged from 45.3% in São Luís do Maranhão, to 56.3% in Campo Grande; in the state of São Paulo it was 52.1%[11].

Another important risk factor, sedentariness, was observed in 59.57% of the patients, while sedentariness was more frequently observed among hypertensive patients (41.37%) with statistically significant association (p=0.009) and diabetic patients (p<0.0001). Family history of cardiovascular disease was identified in 48.38% of the cases (33.80% in patients with hypertension and 12.07% of those with hypertension and diabetes). This risk factor was statistically significant associated with hypertension (p = 0.0001) and diabetes (p <0.0001). In a study conducted with Anglo-Danish and Dutch individuals with recent diagnosis of diabetes reports that overall physical activity, even among individuals with low cardiorespiratory fitness, has positive effects on the disease decreasing cardiovascular risk[16].

Sedentariness and physical inactivity have various definitions and there is currently a proposition to adopt distinct terms since various authors suggest that a sedentary behavior is when the individual spends long periods in a sitting position or watching TV while physical inactivity refers to insufficient moderate to vigorous physical activity. A sedentary behavior, in which individuals spend many hours watching TV daily, increases the risk of obesity, type 2

diabetes, and cardiovascular diseases[17]. The study by Vigitel 2012 identified that 26.4% of the interviewees frequently watched TV for three or more hours[11]. In the SISHIPERDIA assessment, however, sedentariness is also considered physical inactivity, regardless of its intensity. A study also addressing risk factors in the population enrolled in the HIPERDIA of a Northern region identified high rates of sedentariness (56.6%)[18].

Table 3 presents the characterization of complications according to clinical conditions. A percentage of 16.58% of the cases presented at least one complication associated with hypertension and/or diabetes as recorded on the SISHIPERDIA registration form. A greater prevalence of other coronary heart diseases was observed in the forms of hypertensive patients and hypertensive patients with diabetes (6.68% and 2.55%, respectively), and results show statistically significant association in the three clinical conditions. History of AMI was identified in 7.11% of the patients and the statistical test showed association with all the clinical conditions under study. Stroke was the third most frequent complication identified among the patients (5.19%), with prevalence among hypertensive ones (3.56%). Statistically significant association, however, was found only among those with diabetes and with both hypertension and diabetes. Kidney disease was the least frequent complication (4.61%), statistically significant in the three clinical conditions.

Table 3. Characterization of complications according to clinical conditions (Diabetes, Hypertension, and Hypertension and diabetes) in patients registered in the SISHIPERDIA, São José do Rio Preto, SP, Brazil 2002 - 2012.

Clinical Condition of Patients Registered in the SISHIPERDIA (N=45,723)							
Variables Complications	**Diabetes**		**Hypertension**		**Hypertension and Diabetes**		**Total**	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Other coronary artery diseases								
Yes	107	0.23	3,056	6.68	1,166	2.55	4,329	9.47
No	2,760	6.04	28,491	62.31	10,143	22.18	41,394	90.53
P-value	< 0.0001		0.017		0.0004			
Stroke								
Yes	54	0.12	1,630	3.56	687	1.50	2,371	5.19
No	2,813	6.15	29,917	65.43	10,622	23.23	43,352	94.81
P-value	< 0.0001		0.788		< 0.0001			
Acute myocardial infarction								
Yes	70	0.15	2,140	4.68	1,043	2.28	3,253	7.11
No	2,797	6.12	29,407	64.32	10,266	22.45	42,470	92.89
P-value	< 0.0001		< 0.0001		< 0.0001			
Kidney disease								
Yes	95	0.21	1,263	2.76	748	1.64	2,106	4.61
No	2,772	6.06	30,284	66.23	10,561	23.10	43,617	95.39
P-value	0.0006		< 0.0001		< 0.0001			

Source: SISHIPERDIA/SMS - São José do Rio Preto, SP, Brazil. Chi-square test.

This study shows association between stroke and hypertension and between stroke and hypertension and diabetes. A meta-analysis study addressing more than 800,000 participants corroborates that a sedentary lifestyle is currently acknowledged as an important risk factor for cardiovascular diseases and exercise as a leisure activity decreases general mortality by 22% to 34% and mortality due to cardiovascular disease by 27% to 35%[19]. A German study corroborates that physical exercise decreases the risk of cardiovascular diseases in healthy people and in those with chronic diseases and should be promoted by all healthcare providers[20].

Patients with diabetes or with hypertension and diabetes presented important statistically significant association with the four complications under study: other coronary heart disease, stroke, AMI, and kidney disease. The international study, INTERHEART, conducted in the Latin America and designed to assess the importance of risk factors, identified that these

factors explained more than 90% of the risk attributable to AMI, while the presence of family history of cardiovascular diseases is among these factors. Abdominal obesity and smoking were highly associated with the risk for AMI, with a prevalence of 48.5% and 38.4%, respectively[21].

The multicenter study CARDIA reports that maintaining a low risk profile in middle age, which includes not smoking, exercising, and good eating habits to avoid obesity, results in lower rates of mortality caused by cardiovascular causes[22]. Adults aged 55 years old or older are at the risk of developing cardiovascular diseases. This condition more frequently occurs in individuals aged from 65 to 74 years old and diabetes is the primary risk factor[23].

The limitations of this study are related with data extracted from databases produced by the SUS primary health care units in each municipality and information recorded in the forms of the HIPERDIA System. This system records only part of the phenomenon because it is a system implemented in the SUS[2-3]. Additionally, the quality of the information provided by SISHIPERDIA may have been compromised by faulty or incomplete forms. Nonetheless, even if only part of the context was analyzed, this is the information available for the agencies responsible for monitoring chronic conditions and supports decision-making. Hence, the analysis presented here can contribute to a better understanding of the dynamics of chronic diseases such as Hypertension and/or Diabetes in the city and support increased effectiveness of measures aimed to promote health, prevent diseases, and raise hypotheses in future studies.

CONCLUSIONS

The study identified that the patients enrolled in the SISHIPERDIA in São José do Rio Preto, SP, Brazil were mostly elderly women with low educational level, Caucasian, living with a partner and children. Risk factors were identified according to the following descending order: sedentariness, overweight, family history, and smoking. Complications included: other coronary artery disease, AMI, stroke, and kidney disease. Statistically significant association was found between smoking and DM and HA and DM; overweight in the three clinical conditions and family history; and sedentariness with HA and DM. Statistically significant associations were found between complication and clinical conditions: other coronary heart diseases, AMI and kidney disease with the three clinical conditions; and stroke and DM, and stroke and DM and HA.

Data obtained in this study show there is a need to reformulate public policies directed to health promotion and the early diagnosis of hypertension and diabetes because most patients enrolled in SISHIPERDIA presented some risk factor and some complication associated with these chronic conditions. This study's results can support interventions to improve actions aimed to decrease risk factors among hypertensive and diabetic patients and prevent complications.

FATORES DE RISCO E COMPLICAÇÕES EM USUÁRIOS CADASTRADOS NO HIPERDIA DE SÃO JOSÉ DO RIO PRETO

RESUMO

As condições crônicas ocupam lugar de destaque entre os problemas de saúde pública, representando as principais causas de internações e mortalidade. O objetivo deste estudo foi identificar variáveis sociodemográficas, fatores de risco e complicações dos usuários cadastrados no Sistema de Cadastramento e Acompanhamento de Hipertensos e Diabéticos (HIPERDIA) de São José do Rio Preto. Trata-se de estudo descritivo transversal que utilizou dados secundários, no qual foram estudados 45.723 cadastrados no HIPERDIA de 2002 a 2012. A análise estatística foi realizada de forma univariada (teste qui quadrado). Destes, 31.547(69%) eram hipertensos, 2867(6,27%) diabéticos e 11.309 (24,73%) hipertensos e diabéticos. A maioria era feminina, idade média 59 ± 13,8 anos, ensino fundamental incompleto, branca, e conviviam com companheiro(a) e filhos. Observou-se associação estatisticamente significante das condições clinicas com: fatores de risco; tabagismo e Sedentarismo (p<0,0001) com Diabetes e Hipertensão com diabetes; Sobrepeso (p<0,0001) nas três condições clínicas e antecedentes Familiares (p<0,0001) com hipertensão e diabetes; com as complicações: Outras coronariopatias, Infarto Agudo do Miocárdio e Doença Renal (p < 0,01) com as três condições clínicas; e Acidente Vascular Cerebral (p<0,0001) na diabetes e diabetes com hipertensão. 59,57% apresentavam fator de risco e 16,58% complicações. Os dados deste estudo darão subsídios para elaborar estratégias de intervenções na melhoria do atendimento aos hipertensos e diabeticos prevenindo assim as complicações.

Palavras-chave: Hipertensão. Diabetes mellitus. Fatores de risco.

FACTORES DE RIESGO Y COMPLICACIONES EN USUARIOS REGISTRADOS EN EL HIPERDIA DE SÃO JOSÉ DO RIO PRETO

RESUMEN

Las condiciones crónicas se destacan entre los problemas de salud pública, representando las principales causas de internaciones y mortalidad. El objetivo fue identificar variables sociodemográficas, factores de riesgo y complicaciones de los usuarios registrados en el Sistema de Registro y Seguimiento de Hipertensivos y Diabéticos (HIPERDIA) de São José do Rio Preto. En este estudio descriptivo y trasversal que utilizó datos secundarios de 45.723 registrados en el HIPERDIA entre 2002 y 2012. El análisis estadístico fue desarrollado de forma univariada (pruebas ji cuadrado). 31.547 (69%) eran hipertensivos, 2867 (6,27%) diabéticos y 11.309 (24,73%) hipertensivos y diabéticos. La mayoría ere femenina, edad media 59 ± 13,8 años, educación fundamental incompleta, blanca, con compañero(a) y hijos. Se observó asociación estadísticamente significante de las condiciones clínicas con: factores de riesgo; tabaquismo y Sedentarismo (p<0,0001) con Diabetes e Hipertensión• con diabetes; Sobrepeso (p<0,0001) en las tres condiciones clínicas y antecedentes Familiares (p<0,0001) con hipertensión y diabetes; con las complicaciones: Otras coronariopatías, Infarto Agudo del Miocardio y Enfermedad Renal (p < 0,01) con las tres condiciones clínicas; y Accidente Vascular Cerebral (p<0,0001) con la diabetes y diabetes con hipertensión. 59,57% reveló factor de riesgo y 16,58% complicaciones. Los datos apoyarán la elaboración de intervenciones en la mejora de la atención a los hipertensivos y diabéticos, previniendo así las complicaciones.

Palabras clave: Hipertensión. Diabetes Mellitus. Factores de riesgo.

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