Kidney health in Colombian indigenous communities: are we doing enough?

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Resumen: Objetivo: Caracterizar los factores asociados a la salud renal en las comunidades indígenas colombianas. **Materiales y Métodos**: En el marco del día mundial del riñón, se realizó un estudio observacional en la población indígena colombiana, se tomaron datos de 16 etnias. Mayores de 18 años. Se realizó una encuesta de salud renal y se midieron los valores de tensión arterial, glucosa en sangre, hematuria y proteinuria. Se realizó un sumario estadístico y se evaluó la asociación entre variables mediante χ^2. **Resultados**: La población estudiada fue de 1.177 indígenas (figura 1). El 49.8% fueron

hombres con edad de 43±17 años. En cuanto a la educación, 34,5% manifestaron no tener estudios. El 39% de la población tenía sobrepeso y 16% obesidad, asociándose a las mujeres (p=0,0003). 1,4% había sido diagnosticado con diabetes; 1,7% no recordó. Referente a la hipertensión arterial (HTA) 10,4% tenía diagnóstico, de estos 35% no tenía tratamiento; 40% de quienes no tenían HTA, tuvo cifras tensionales >130/85mmHg. Se encontró proteinuria en 8,8% y hematuria en 4,2%. Aunque 94,1% pertenecían al SGSSS, sin embargo, el 52,6% considero *difícil* o *muy difícil* acceder al servicio, y un tercio no había tenido revisión médica en los dos últimos años. Se encontró una asociación multivariada entre el sexo, factores de riesgo y el acceso a salud. Siendo “Difícil” o “Muy difícil” acceder a servicio médico para las mujeres que vivían en zonas rurales e hipertensas se asociaron significativamente a zonas rurales, sexo femenino e hipertensión. **Conclusión**: La incidencia de ERC es 1,5 veces mayor en minorías étnicas de países desarrollados, cuyos principales factores de riesgo son HTA y diabetes, en nuestra población se suma la pobreza que influye al acceso de servicios de salud.

Abstract: Objective: Characterize the factors associated to renal health in Colombian indigenous communities**. Materials and methods:** within the framework of World Kidney Day, an observational study was conducted in the Colombian indigenous population. 16 ethnicities were evaluated, with population over 18 years. A renal health survey was conducted and blood pressure, blood glucose, hematuria and proteinuria values were measured. A statistical summary was made and the association between variables was evaluated using χ^2. **Results**: The population studied was made up of 1,177 people (Figure 1). 49.8% were men aged between 43±17 years. As for education, 34.5% said they had no studies. 39% of the population was overweight and 16% obese, associated to women (p=0.0003). 1.4% had been diagnosed with diabetes; 1.7% did not remember. Regarding hypertension 10.4% had been diagnosed, of these 35% had no treatment, 40% of those who said they had no hypertension had blood pressure >130/85 mmHg. Proteinuria was found in 8.8% and hematuria in 4.2%. Although 94.1% belonged to the SGSSS 52.2% considered it was difficult or very difficult to access the health service, and a third had not had medical check-up in the last two years. A multivariate association was found between sex, risk factors and access to health. Being “difficult” or “very difficult” to access medical service for women living in rural areas and hypertensive, they were significantly associated with rural areas, female sex and hypertension. **Conclusion:** the CKD incidence is 1.5 times higher in ethnic minorities in developed countries, whose main risk factors are hypertension and diabetes, in our population the poverty that influences access to health services is added.

Palabras clave: Enfermedad renal, comunidades indígenas, salud renal, prevención.

Keywords: Kidney disease, Indigenous communities, renal health, prevention.

Introduction

Chronic noncommunicable diseases (NCDs) are defined as long evolution processes that are maintained over time and rarely achieve a complete resolution, thus generating a great social and economic burden for those who suffer from them and their families. NCDs are characterized by having multiple etiologies and associated risk factors, and among them stand out cardiovascular diseases, cancer, diabetes, chronic respiratory diseases and chronic kidney disease (CKD).[1]

Specifically, CKD is defined as the progressive and generally irreversible loss of the glomerular filtration rate, due to changes either in the renal function or structure, which results in a set of symptoms and signs called uremia, and that in its terminal stage is incompatible with life.[2] This disease is a public health problem worldwide, since the number of patients increases progressively in both developed and developing countries.[3,4]

The prevalence of CKD worldwide for the general population is estimated at 13.4%,[5] but in many vulnerable populations, such as indigenous communities, this information is unknown. One of the few investigations in this regard is that of Ferguson *et al*.,[6] where it was found that in indigenous Canadian groups the rates of kidney disease are 2 to 4 times higher than in the general population.

For the year 2010, the Economic Commission for Latin America and the Caribbean reported the existence of 45 million individuals of indigenous peoples in Latin America, which in turn indicated a population increase of 49.3% in the first decade of the 21st century with an average annual growth rate of 4.1%, above the 1.3% of the total of the American continent.[7] For its part, Colombia has 102 indigenous peoples that exceed one million members, occupying the second and fifth positions in number of ethnic groups and indigenous inhabitants, respectively.[8,9].

Indigenous peoples have their own health systems included in their lifestyles and culture, through which they provide solutions to situations that affect their health. These models of traditional health are insufficient to prevent and treat a large part of the prevalent chronic pathologies that affect the community, so it is necessary to include the Western medical system within their cosmovision.[7]

Therefore, it is essential to implement articulated healthcare programs that favor populations with difficult access and thus achieve the prevention and/or early detection of NCDs. For primary prevention of CKD, risk factors, such as hypertension and diabetes[10] must be identified, and a systematized follow-up[11] that includes etiological diagnosis, adequate control of blood pressure, albuminuria, blockade of the renin-angiotensin system, metabolic control and nutritional and lifestyle modifications must be established.[12,13] Therefore, the objective of the present study is to characterize the factors associated with renal health in Colombian indigenous communities.

Materials and methods

Observational exploratory cross-sectional study conducted in indigenous population by the Colombian Association of Nephrology and Arterial Hypertension through an interdisciplinary field team. Data were gathered in part from the indigenous reservations of Colombia, which are recognized as socio-political legal institutions of a special nature and are constituted by one or more indigenous communities; they also have a collective property title that gives them guarantees of private property and are governed according to their own regulatory system

Sample

The population was selected in the field and was made up of indigenous people of 16 ethnic groups distributed throughout Colombia. According to the 2018 census,[14] the country currently has an indigenous population of 1,905,617 inhabitants, and 6 sub-regions that host 102 indigenous peoples.

The research was conducted *in situ* in an exploratory manner and all individuals over 18 years of age who were present when the information was collected and who were available for blood pressure measurement and laboratory tests were included. Those who did not belong to an indigenous community were excluded.

Procedure

The data were collected during the month of March 2019 through an individual interview that lasted 30 minutes. All participants signed the informed consent.

Instrument

An instrument for data collection was constructed based on the study conducted by García-Trabanino *et al*.[15] in Mexico, and whose validity was verified by a panel of experts that reviewed and determined the pertinent questions, debugging those that caused confusion. The questionnaire used was the one approved by the Scientific Committee of the Colombian Association of Nephrology for the national campaign entitled Indigenous Kidney Health - World Kidney Day 2019.

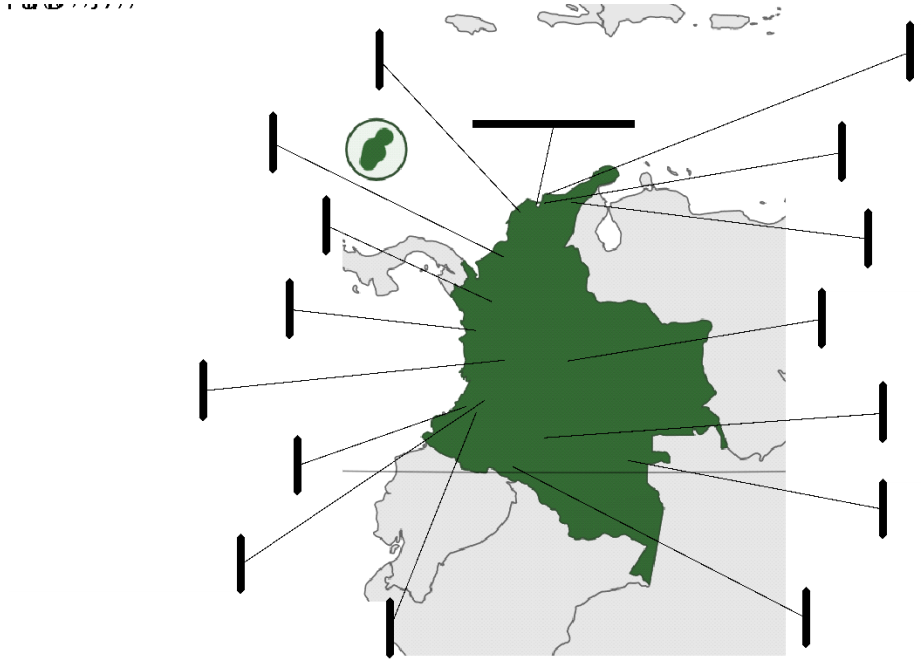
Analysis

Once the records were obtained, a database was constructed, a statistical summary was made with the measures of central tendency and the association between variables was evaluated using the Chi-square test (χ^2). The data were analyzed using the SPSS V.25 software.

Results

Sociodemographic characterization

The total studied population was 1177 indigenous people belonging to 16 ethnic groups distributed throughout Colombia. The ethnic groups were: Zenú (25.83%), Emberas-Chami (10.71%), Mokana (10.28%), Kankuamos (9.86%), Wayuu (9.6%), Arhuacos (6.8%), Tules (4.93%), Yanaconas (4.25%), Koreguaje (3.74%), Muiscas (2.72%), Emberas (2.63%), Uitotos (2.29%), Coconuco (2.21%), Eperara Siapidar (1.78%), Kogi (1.36%) and Tatuyo (1.02%). As for the housing location, 73% of the population lived in rural areas (Figure 1).



Nota: en los porcentajes de la Figura 1 favor cambiar las comas por puntos.

Figure 1 Distribution of the indigenous peoples who participated in the study

Source: Own elaboration.

49.8% of the participants were men and the overall average age was 43 ± 17 years (45 ± 18 for men and 41 ± 16 for women); the minimum age was 18 years and the maximum was 95. According to the life cycle, the most representative age range was between 27 and 59 years, with 59.8% of the total of interviewees. The relationship between sex and age range was significant (χ^2=9.927; p=0.0070), which demonstrated that women were mostly represented in the ranges under 60 years.

Regarding education, 34.5% of the interviewees, without distinction of sex, said they had no studies (p = 0.062), 26.3% had completed primary basic education; 24.8% had finished high school, 9% had tertiary studies, 4.3% had university

studies and 1% had completed postgraduate studies. A significant difference between the sexes was found for higher education (technician, technologist, university and postgraduate) in favor of women ($p = 0.0000$).

17 groups of work activities were identified, but 50% of these were concentrated in two groups with a marked difference between sexes by activity: household (33.39%) and farming and agriculture (16.4%). 94% of the people devoted to household chores were women and 88% of those who worked in farming activities and agriculture were men. In decreasing order, other activities identified were: construction labor (4.5%), manufacturing and sale of handcrafts (4.33%), general services (3.57%) and healthcare (3.14%); this allowed us to observe that the activities that had to do with the management of personnel were carried out by women and those that required the use of force, handling of weapons and transportation were carried out by men. It is important to highlight that 15% of the interviewed population said they were unemployed.

Sanitary characterization

94.1% of the indigenous participants in the study were affiliated to the General System of Social Security in Health (SGSSS, by its acronym in Spanish) in one of its regimes (contributory or subsidized). Having studied the association between the housing location (rural or near the urban area) and the regime of the SGSSS, it was determined that people who lived in the rural area were affiliated to the SGSSS through the subsidized regime in a significant proportion ($\chi^2=6.54$; $p= 0.010545$).

39% of the population had overweight and 16%, obesity. The latter was mostly associated with women ($\chi^2=19.146$; $p=0.0003$) and the age range was between

27 and 59 years for both sexes, corresponding to the adult life cycle. (χ^2=98.040; p=0.0000). No association was found between housing location and body mass index (χ^2=2.447; p=0.4849).

Regarding diabetes, 1.4% of the respondents said they had been diagnosed at some time and 1.7% did not remember if they had been told they had this disease. Of those diagnosed, only 5 individuals were under treatment and, of them, 1 was insulinized. In 29 individuals, a postprandial glucometry >140 mg/dL was determined, which, according to the guidelines of the American Diabetes Association, would be diagnosed as diabetes and would increase the percentage of diabetic respondents to 4.18%.

As for arterial hypertension (AHT), 10.4% stated that they had a confirmed diagnosis and 6.46% did not know if they suffered from this condition. Among those who had a confirmed diagnosis, 35% had no schematized treatment. In addition, of the total population studied, 38.5% had a hypertensive relative in the first degree of consanguinity. When the measurement *in situ* was performed, 40% of those who said they did not suffer from AHT had blood pressure levels >130/85 mmHg.

Characterization of kidney health

3.2% of the individuals studied said they were patients with CKD, 0.17% was on hemodialysis renal replacement therapy and 15.9% said they had recurrent urinary tract infections. Likewise, 9.6% had been diagnosed with lithiasis, 0.17% with polycystic kidney disease and 0.08% with lupus nephritis. Of the total population, 6.2% had relatives with CKD, and, when the results of proteinuria and hematuria were evaluated, 8.8% had the first one and 4.2%, the second.

Studying other risk factors, 45.1% consumed alcohol frequently (≥2 times per month) and about 14.4% smoked. Among those who had activities related to farming and agriculture, 45.4% ($p < 0.039$) had direct contact with chemicals.

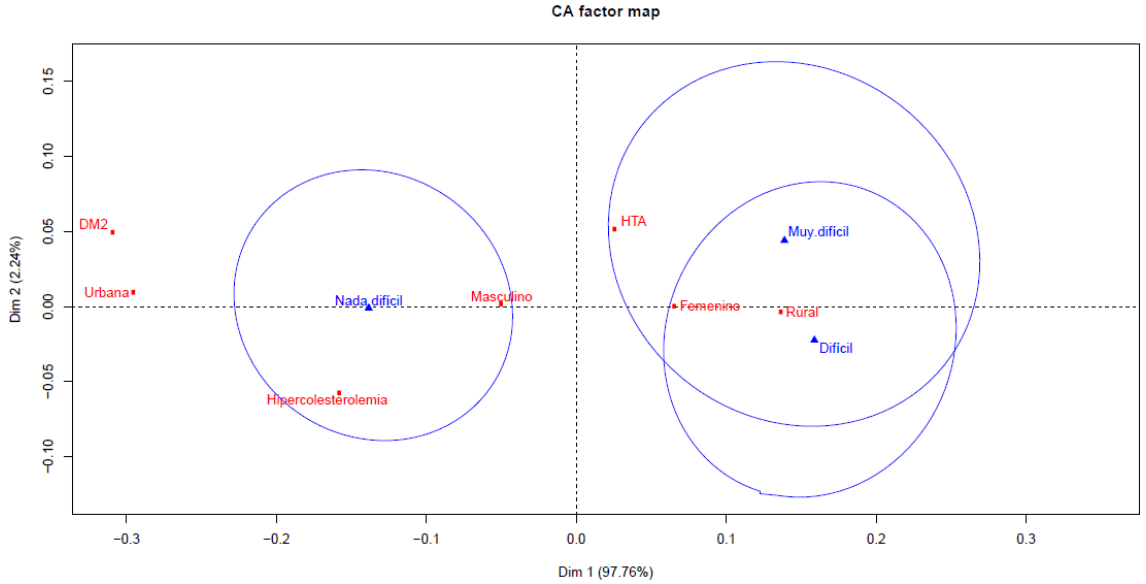
When inquiring on hydration habits, 63.6% drank only water, 12% some type of infusion (coffee, sugar cane (*panela*) or rice or corn water) or beverages derived mainly from the non-distilled fermentation of cereals or tubers (Corn, rice, millet and cassava chicha) and 24.4% water and carbonated drinks, synthetic soft drinks, processed juices, chichas and/or infusions.

Accessibility to healthcare services

Although 94.1% of the studied population was affiliated to the SGSSS, 52.6% mentioned that it was difficult or very difficult to access the service and attributed to this that more than one third of the population (386 individuals) had not had a medical check-up in the past two years and that 17.1% had not consulted in a longer period. Of those who consulted in the last 12 months (3.9%), only 1.6% (n=19) had at least one specialized consultation, 1.1% (n=13) had a consultation with a nephrologist and 2.6% (n=31) with a specialist in cardiology.

When exploring the correspondence analysis with a 95% confidence ellipse (Figure 2), the possible association between the perception of access to healthcare and sex and risk factors, it was observed that the “Nothing difficult” factor was related to the male gender and the hypercholesterolemia comorbidity; in addition, although diabetes and nearness to urban areas were not within the confidence interval, they were in the same dispersion plane, which shows that there is proximity between these two variables. On the

contrary, the “Difficult” or “Very difficult” factors were significantly associated with rural areas, female sex and hypertension comorbidity.



DM2. Urban* Nothing difficult Male	*AHT Very difficult Female
Hypercholesterolemia	Rural Difficult

Nota: en la figura traduje lo que estaba en español. Lo demás se deja tal como está (el encabezado y los números)

Figure 2. Correspondence analysis with 95% confidence ellipse of sociodemographic factors, access to health care and comorbidities in the indigenous populations of Colombia.

Source: Own elaboration.

Discussion

Traditionally, the attention, promotion, prevention and access to health care for the indigenous groups have been inadequate and deficient, leading to the progression of the diseases and the appearance of complications associated with them, particularly when it comes to pathologies that are not characteristic of these populations.[16] Similarly, migration and intervention in these communities have led them to change their traditions and opt for urbanized lifestyles, with sedentary lifestyle and unhealthy eating habits that in turn condition the occurrence of the so called chronic noncommunicable diseases, such as: hypertension, diabetes, obesity, psychosocial disorders (including behavioral disorders associated with excessive alcohol and drug use), among others.[17,18]

In the present study, although 94.1% of the population was included in some health coverage regime, it was evidenced that the indigenous people lost diagnostic opportunities; at this point it is important to note that 52.6% of the participants considered that access to health control was difficult or very difficult, which is reflected in the fact that 32.7% had not visited a doctor in the past two years, 17.1% had not attended a medical check-up in more than two years and that only 1.6% had managed to access to specialized medicine. The main justification heard was the distance of the consultation sites and, therefore, it was difficult for them to have the exams on time. These findings have also been documented in the literature and have been linked to the management of diseases with multiple etiologies, such as oncological,[19] psychiatric, [20] chronic noncommunicable and infectious.[22]

Similar to the findings of this research, Hautecoeur *et al*.[23] found in indigenous populations from Guatemala that the main problem of access to health care also lies in the difficulty of moving to distant sites of medical care.

In terms of work activity, 33.4% of the studied population was dedicated to household chores, and of them, 94% were women, which is consistent with what was reported in the population register of the National Indigenous Organization of Colombia, where the proportion regarding the occupation is 3 women for every 2 men,[24] and with was found in other indigenous peoples of the world.[25] On the other hand, men had a greater participation in activities related to farming and agriculture. For the activities of manufacture and sale of handicrafts, both sexes had equal participation, similar to what was reported in indigenous communities in South America.[26]

Only 26.3% and 24.9% of the population had attended programs of primary basic and secondary education, respectively, while 4.3%, had access to tertiary and university studies and 1% to postgraduate studies, data that coincide with those reported for indigenous communities from Mexico between 2003 and 2006, with completion rates for basic primary education of 19.9%, high school of 17% and higher education of 4.7%.[27,28] Among the results of the present investigation, stood out that the majority of higher studies were accomplished by women.

Regarding the risk factors for the development of CKD, it was found that 10.4% of the population studied had a diagnosis of arterial hypertension; however, high blood pressures were recorded in 40% of the remaining group. These findings exceed the percentage of hypertensive individuals reported for the general

Colombian population, estimated at 22.8%;[29] likewise, they are higher when compared with the evidence found in other indigenous populations such as the Asháninkas in Peru (14.5%),[30] the Monteverde in Honduras (3.3%)[31] and the Pehuenches in Chile (24.5%).[32]

In addition, it was found that the majority (52.2%) of those with a previous diagnosis of AHT had blood pressure levels outside the therapeutic goals and, even worse, they were not receiving medical treatment (35%); levels higher than those reported in 2019 by Essayagh *et al*.[33] whose values were found above 70%, with the causes associated with these events being the lack of medication, family history and alcohol consumption, factors that were also found in the present screening.

The prevalence of diabetes was also evaluated in the present study, finding that 1.4% of the participants had a previous diagnosis and 0.4% were under some type of treatment, in addition, 2.46% had postprandial glycemia >200 mg/dL and, therefore, were classified as diabetics, with which it could be concluded that 4.18% of the population studied was diabetic.

In relation to the above, Phipps *et al.*[34] in 2015 and Aghakhanian *et al.*[35] in 2018 studied seven indigenous communities in Malaysia and they found that those located close to urban areas had an increased risk of cardiometabolic diseases, hypertension, diabetes, hypercholesterolemia and obesity, especially those that have changed their lifestyles for more urbanized and easily accessible diets. These findings were similar to those of the present investigation, in which the communities that lived near urban areas consumed more carbonated drinks, synthetic soft drinks, processed juices, chichas and/or infusions, compared to

those located in rural areas. Aghakhanian *et al*.[35] also indicated that these factors could predispose to kidney disease or metabolic syndrome.

Other modifiable risk factors for the development of kidney disease that were detected in the present study were overweight, present in 39%, and obesity, present in 16%, with a higher tendency of occurrence in women.

In research conducted in indigenous communities of Yucatan, Mexico, Asián-Chaves *et al*.[36] found that 36.6% and 41.4% of women and 42.4% and 29.4% of men were overweight or obese, respectively; in the case of the women this was associated with a longer stay at home, which coincides with what was found in the present work.

In addition, it was found that 8.8% of the studied population presented proteinuria (a risk factor for CKD) below what is described for the general population when it is evaluated by means of urinalysis, being 17%, however, only 1.5% is associated with kidney disease.[37,38] Likewise, the presence of hematuria was studied, which was present in 4.2% of the population, figures that for the world population are between 0.5% and 2%, with variation according to age and population series, reaching up to 20% in people over 50 years; in the latter population, the presence of this condition may be associated with kidney disease.[39,40]

Conclusions

Some of the main conditions responsible for the development of CKD are hypertension and diabetes, and it has been observed that their incidence is 1.5 times higher in ethnic minorities in developed countries. To this is added

poverty, which has become an important risk factor for its onset, since it directly influences access and provision of health services, thus generating a delay in the diagnosis of the disease and, therefore, a greater progression thereof.[4,41,42].

The absence of systematic promotion and prevention programs aimed at nephroprotection in the general and at-risk population has made the real situation unknown. Likewise, the lack of access to health services, in many cases due to cultural reasons; the absence of nearby healthcare facilities, and the lack of specialized health personnel make it difficult to determine the incidence and prevalence rate of kidney disease in indigenous communities,[43] so it is necessary to conduct studies that reveal these values and thus perform intervention in health issues In these populations.

Conflict of interest

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