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RELATIONSHIP BETWEEN PRESSORIC LEVELS AND GLOMERULAR FILTRATION RATE: ASSESSMENT IN PRIMARY CARE

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ABSTRACT

Systemic arterial hypertension affects more than 30% of the adult population and one of its complications is the reduction of renal function. The present study aimed to: Evaluate the glomerular filtration rate in hypertensive patients treated at a basic health unit in the city of Lages - SC. This is an observational, cross-sectional, descriptive and retrospective study conducted from the collection and analysis of data from medical records. There were 158 medical records, 115 (72.78%) female and 43 (27.22%) male, with a mean age of 67.3 years, mean weight of 73.3 kg, and mean glomerular filtration rate of 67.93. ml / min / 1.73^2.Statistically significant and directly proportional correlation was observed between age and creatinine, weight and creatinine, weight and systolic BP, weight and diastolic BP, weight and GFR, systolic BP and diastolic BP. Statistically significant but inversely proportional correlations were evidenced between weight and age, age and GFR, creatinine and GFR. This study presents the profile of a small proportion of individuals with hypertension, highlighting the importance of performing renal function tests, with a view to investigating the occurrence of comorbidities and early establishing health promotion and protection actions.

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INTRODUCTION

In Brazil, systemic arterial hypertension (SAH) affects 32.5% (36 million) of adult individuals, more than 60% of the elderly, contributing directly or indirectly to 50% of deaths from cardiovascular disease (CVD). The loss of work productivity and family income, estimated at US $ 4.18 billion between 2006 and 2015, is a consequence of its cardiac, renal and neurovascular complications (SBC, 2016). One of the complications of hypertensive disease is the reduction in renal function, which over time may progress to chronic kidney disease (CKD) requiring renal replacement therapy (RRT). Today, in Brazil, hypertension is the leading cause of end-stage chronic kidney disease (Passigatti; Molina; Cade, 2014).

CKD can be defined as progressive and irreversible loss of renal function, whether or not associated with decreased glomerular filtration rate (GFR) <60 ml / min / 1.732 for three months (National Kidney Fundation, 2002; National Kidney Fundation, 2013). It is characterized by the deterioration of the biochemical and physiological functions of all systems of the organism, secondary to the accumulation of catabolites (uremic toxins), alterations of hydro-electrolytic and acid-base balance. Its evolution is progressive, being asymptomatic in the early stages of the disease (Peres *et al*., 2011). Early identification and proper management of CKD have been recognized as important measures to slow its progression. In clinical practice, the initial assessment of renal function is performed by measuring plasma creatinine and its application

in formulas that allow indirect measurement of GFR (Santos *et al*., 2011; Brasil, 2006). Pequenas elevações da creatinina sérica (CrS) podem significar perda significativa da função renal (Bortolloto, 2008). In contrast, the use of isolated serum creatinine as an early marker of renal injury has not been advised (Alves *et al*., 2017). This estimation of renal function is very important as it may aid in early diagnosis and therapeutic decisions for patients at risk, considering that progressive and irreversible losses in organ functionality may occur (Alves *et al*., 2017). All patients with hypertension, even if asymptomatic, should be evaluated annually with a urine test (reagent strip or type 1 urine), serum creatinine and estimated creatinine and microalbuminuria clearance (Passigatti, Molina, Cade, 2014; Brasil, 2006). There are different formulas that are used to estimate creatinine clearance. The Cockcroft-Gault formula is the method of choice of the Brazilian Ministry of Health, due to its ease of application and accuracy, to estimate GFR by creatinine clearance without the need for 24-hour urine collection (Brasil, 2006). In addition, because of patient weight, the Cockcroft-Gault formula is linked to greater accuracy in GFR results (Drion *et al*, 2011). This study aimed to: Evaluate the glomerular filtration rate in hypertensive patients treated at a basic health unit in the city of Lages - SC.

MATERIALS AND METHODS

This is an observational, cross-sectional, descriptive and retrospective study, conducted from the collection and analysis of data from medical records of patients with systemic arterial hypertension registered at a Basic Health Unit (BHU) in a district of Lages, located in the Catarinense Plateau / Brazil. The choice of medical records was made from a list of hypertensive patients, available in this basic health unit. A total of 545 medical records were analyzed regarding the consultations that took place between November 2017 and November 2018. At the end, 159 medical records fulfilling the following inclusion criteria were obtained: medical records of patients registered at the BHU, with diagnosed hypertension, who had recorded information about the dosage of serum creatinine, body weight and blood pressure values recorded in the last 12 months. Of the 159 records, one was excluded due to insufficient records. Thus, the final sample was 158 medical records. From the data collection, it was possible to estimate the glomerular filtration rate using the Cockcroft-Gault formula = [(140-age) x weight / (72 x creatinine) x 0.85 (female only)] (Cockcroft, Gault, 1976). This study was approved by the Research Ethics Committee of the University of PlanaltoCatarinense under opinion No. 2.904.096. For data analysis, descriptive statistics (percentages, mean, median, standard deviation, minimum and maximum) and Spermann correlation test between quantitative variables were performed, considering that they did not present normal distribution. To assess statistical significance, the p-value ≤ 0.05 was adopted.

RESULTS

There were 158 medical records of patients treated at the Primary Health Care of a Basic Health Unit of the Municipality of Lages, 115 (72.78%) female and 43 (27.22%) male, with a mean age of 67.3 years, mean weight of 73.3 kg, and mean value of glomerular filtration rate of 67.93 ml / min / 1.732, and the other health information are described in table 1. Then, two groups were created according to GFR results, group 1 consisting of medical records of patients with GFR ≥ 60ml / min / 1.73² and group 2 with GFR <60ml / min / 1.73². In group 1, we observed that 92 patients had GFR with values greater than or equal to 60 ml (ml / min / 1.732), being 60 (65.22%) females and 32 (34.78%) males.

Table 1. Health information of the study participants. Lages, 2019

Variable(n=158)	Average	SD	Median	Minimum	Maximum
Age (years)	67.3	11.2	67.5	36	91
Weight (Kg)	73.3	16.7	71.7	33.2	129.00
Creatinine(mg/dL)	1.03	0.27	1,0	0.48	2.64
Systolic BP (mmHg)	134.37	24.08	130.00	80.00	220.00
Diastolic BP (mg/dL)	79.43	15.01	80.00	40,00	140.00
GFR (ml/min/1,73^2)	67.93	26.31	63.56	18.84	156.10

Source: primary data.

Table 2. Health information of patients with GFR values greater than or equal to 60 ml (ml / min / 1.732). Lages, 2019

Variable(n=92)	Average	SD	Median	Minimum	Maximum
Age(years)	62.16	9.84	62	36	87
Weight (Kg)	79.65	16.53	78	43.5	129
Creatinine (mg/dL)	0.93	0.19	0.91	0.48	1.45
Systolic BP (mmHg)	135.56	24.09	130	80	220
Diastolic BP (mg/dL)	81.08	15.27	80	40	140
GFR (ml/min/1,73^2)	84.67	21.30	79.22	60.12	156.10

Source: primary data.

Table 3. Health information of patients with GFR values less than 60 ml (ml / min / 1.732). Lages, 2019

Variable(n=66)	Average	SD	Median	Minimum	Maximum
Age (years)	74.4	8.8	75	53	91
Weight (Kg)	64.56	12.7	63.55	33	112
Creatinine (mg/dL)	01.18	0.29	1.14	0.80	2.64
Systolic BP (mmHg)	132.72	24.14	130.00	90.00	220.00
Diastolic BP (mg/dL)	77.12	14.43	80.00	40.00	110.00
GFR (ml/min/1,73^2)	44.61	9.42	45.21	18.84	59.15

Source: Primary Data.

Table 4. Correlation matrix between variables. Lages, 2019

	Age	Weight	Creatinine	Systolic BP	Diastolic BP	GFR (ml/min/1,732)
Age (years)	-	Spearman's coefficient r-0.185152 p.value 0.0099292*	Spearman'scoefficient 0.216488 p.value 0.0031466*	Spearman'scoefficient -0.001998 p.value 0.4900628	Spearman'scoefficient -0.024952 p.value 0.4900628	Spearman'scoefficient -0.640167 p.value <0.000001*
Weight (Kg)		-	Spearman'scoefficient 0.163611 p-value 0.0199834*	Spearman'scoefficient 0.174800 p.value 0.0140210*	Spearman'scoefficient 0.202589 p.value 0.0053428*	Spearman'scoefficient 0.596500 p.value < 0.000001*
Creatinine (mg/dL)			-	Spearman'scoefficient 0.104086 p.value 0.0965449	Spearman'scoefficient 0.034670 p.value 0.3327002	Spearman'scoefficient -0.520138 p.value < 0.000001*
Systolic BP (mmHg)				-	Spearman'scoefficient 0.720382 p.value < 0.000001*	Spearman'scoefficient 0.088826 p.value 0.1335304
Diastolic BP (mg/dL)					-	Spearman'scoefficient 0.159688 p.value 0.0225251

*statistically significant
Source: Primary Data.

Of these, 30 records had diabetes mellitus (DM) presence records and two reported the occurrence of cancer. Table 2 describes the health information of this group. In Group 2, we identified 66 medical records, 55 (83.33%) female patients and 11 (16.67%) male patients. In this group 16 (24.2%) records recorded the occurrence of end-stage DM. Table 3 describes the health information of this group. Correlating the variables in all the medical records, we observed a statistically significant and directly proportional correlation between age and creatinine, weight and creatinine, weight and systolic BP, weight and diastolic BP, weight and GFR, systolic BP and diastolic BP. We also observed statistically significant but inversely proportional correlations between weight and age, age and GFR, creatinine and GFR. The correlation matrix is described in Table 4.

DISCUSSION

The relationship between kidney disease and hypertension was first suggested by Richard Bright in 1836, establishing the concept of renal origin of cardiovascular disease. The term nephrosclerosis has been used in the literature to describe chronic vascular lesions of hypertension and aging. Increased life expectancy, declining renal function with age, higher prevalence of hypertension in the elderly population, and increased mean age of patients on dialysis may contribute to the increased incidence of nephrosclerosis (Caetano; Praxedes, 1998). Different pathophysiological mechanisms explain the malignant and benign forms of nephrosclerosis, which together are called hypertensive nephrosclerosis. In malignant forms, hypertension may lead to a severe microvascular renal lesion characterized by myointimal proliferation or fibrinoid necrosis, malignant nephrosclerosis, with rapid evolution to the terminal stage. Chronic, nonmalignant arterial hypertension may also determine a microvascular renal lesion characterized by hyaline arteriosclerosis, but with a slower and less aggressive evolution, known as benign nephrosclerosis, but which may also lead to terminal CKD (Bortolotto, 2008). The average GFR was 67.93ml / min / 1.73m², showing CKD stage 2 established by K / DOQI, very close to stage 3 (<60ml / min / 1.73m²) when definitely diagnosed. CKD (K / DOQI), showing a high risk of developing CKD itself.

Data that corroborate other studies, which reveal a more advanced degree of renal failure in patients with hypertension (Pinho, Oliveira, Pierin., 2015;Moreira et al., 2008; Ribeiro *et al*., 2008). The literature indicates the relationship between blood pressure controls and the reduction in the incidence and progression of chronic kidney disease in hypertensive patients (Moreira *et al*, 2008; Almeida *et al*., 2015; Rossignol *et al*., 2015) discuss the values of blood pressure goal (Ribeiro, *et al* 2008). In a cross-sectional evaluation, our results showed no direct correlation between glomerular filtration rates and blood pressure levels in previously hypertensive patients, however, GFR was directly proportional to weight measurement and inversely proportional to age and blood pressure levels of creatinine. However, it should be noted that blood pressure was assessed in only one measurement, and was not sensitive to variations over time. According to SBC (2016), the initial assessment of a patient with systemic arterial hypertension includes confirmation of the diagnosis, suspicion and identification of secondary cause, as well as assessment of cardiovascular risk and target organ damage. This assessment includes the measurement of blood pressure in the office and / or outside, using appropriate technique and validated equipment. In addition to clinical history and clinical and laboratory research. Also according to the SBC (2016), the diagnosis of hypertension is characterized by sustained elevation of blood pressure levels ≥ 140 and / or 90 mmHg. Normotension is considered when office measurements are ≤ 120/80 mmHg. And prehypertension when SBP between 121 and 139 and / or DBP between 81 and 89 mmHg. Pre-hypertensives are more likely to become hypertensive and are at greater risk of developing cardiovascular complications. The therapeutic approach to high blood pressure includes non-drug measures and the use of antihypertensive drugs to reduce blood pressure, protect target organs, prevent cardiovascular and renal outcomes (Goldman; Schafer, 2012).

Final Considerations

This study presents the profile of a small portion of individuals with hypertension, highlighting the importance of performing renal function tests, with a view to investigating the occurrence of this comorbidity and early establishing health promotion and protection actions.

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