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SOCIODEMOGRAPHIC AND CLINIC FACTORS ASSOCIATED WITH BODY MASS INDEX IN PATIENTS WITH CHRONIC KIDNEY DISEASE ON HEMODIALYSIS

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ABSTRACT

Objective: To verify the factors associated with the Body Mass Index (BMI) in patients with chronic kidney disease on hemodialysis. Materials and methods: Cross-sectional analytical study conducted at a Hemodialysis Clinic in Belém-PA, Brazil. Socioeconomic data and physical activity practice were obtained through interviews with the application of a semi-structured questionnaire and biochemical and anthropometric data through consultation of patients' medical records. To identify the factors associated with BMI bivariate and multivariate analyses were performed with a hierarchical model. Results: Among the 91 patients evaluated 67.03% exhibited BMI < 24.9 kg/m^2. The variables of occupation, physical activity and number of medications were significantly associated with BMI 25 kg/m^2. Student patients were more likely not to have BMI 25 kg/m^2 (PR=1.45; CI:4.87-4.34, p<0.001). On the other hand, patients who did not practice physical activity and who used 3 to 4 medications had a lower chance of not having BMI 25 kg/m^2 (PR=0.48; CI:0.30-0.77, p=0.002; PR=0.23; CI: 0.77-0.70, p=0.009), respectively. Conclusion: Most patients did not have a BMI of 25 kg/m^2 and it remained associated with occupation, physical activity and the number of drugs consumed by patients with chronic kidney disease on hemodialysis.

Key words: Chronic renal insufficiency. Renal dialysis. Body mass index.

RESUMEN

Factores sociodemográficos y clínicos asociados al índice de masa corporal en pacientes con enfermedad renal crónica en hemodiálisis

Introducción: Verificar los factores asociados al Índice de Masa Corporal (IMC) en pacientes con enfermedad renal crónica en hemodiálisis. Material y Métodos: Estudio transversal analítico, realizado en una Clínica de Hemodiálisis en Belém-PA, Brasil. Los datos socioeconómicos y práctica de actividad física fueron obtenidos a través de entrevista con aplicación de cuestionario semiestructurado y los datos bioquímicos y antropométricos a través de consulta a los prontuarios de los pacientes. Para identificar los factores asociados al IMC se realizaron análisis bivariado y multivariado con modelo jerarquizado. Resultados: Entre los 91 pacientes evaluados 67,03% tenía un IMC < 24,9 kg/m^2. Las variables de ocupación, práctica de actividad física y número de medicamentos se asociaron significativamente con el IMC 25 kg/m^2. Los pacientes estudiantes tuvieron mayor probabilidad de no tener IMC 25 kg/m^2 (RP=1,45; IC:4,87-4,34, p<0,001). Ya los pacientes que no practicaban actividad física y que hacían uso de 3 a 4 medicamentos tuvieron menor probabilidad de no tener IMC 25 kg/m^2 (RP=0,48; IC:0,30-0,77, p=0,002; RP=0,23; IC: 0,77-0,70, p=0,009), respectivamente. Conclusiones: La mayoría de los pacientes no presentaron IMC 25 kg/m^2 y lo mismo se mantuvo asociado con la ocupación, la práctica de actividad física y con el número de medicamentos consumidos por los pacientes con enfermedad renal crónica en hemodiálisis.

Palabras Clave: Insuficiencia renal crónica. Diálisis renal. Índice de masa corporal.

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INTRODUCTION

Chronic kidney disease (CKD) is considered a public health problem. The number of individuals affected worldwide by CKD, loss of renal function and renal replacement therapy was 752.7 million in 2016, with 417 million women and 335.7 million men (Bikbov, Perico, Remuzzi, 2018).

This disease entails high social and economic costs, longer hospital stays and health problems.

Among the numerous risk factors such as smoking, obesity, systemic arterial hypertension (SAH) and diabetes mellitus (DM), they often lead to the need for renal replacement therapy, with hemodialysis (HD) being the most instituted therapy and may imply significant lifestyle and food restrictions (Hooi e colaboradores, 2013; Almeida e colaboradores, 2020).

It is known that the patient's nutritional status directly interferes in the recovery of diseases or injuries; therefore, a better nutritional status reflects better survival rates (Mikolašević e colaboradores, 2014).

One of the indicators widely used in the nutritional assessment of chronic renal patients is the body mass index (BMI) (Kidney disease improving global outcomes, 2013).

Meta-analysis studies have already indicated that high BMI values can be related to lower mortality and lower BMI values have already been considered as predictors of higher mortality, but the mortality risk related to higher BMI levels are not entirely clear (Li e colaboradores, 2014; Ikizler e colaboradores, 2020).

Whereas it is the most widely used parameter in clinical practice simple and low-cost the BMI indicator is expected to help in understanding the nutritional profile of HD patients and whereas such data foster a basis for public policy for the prevention and proper management of CKD treatment.

Therefore, the objective of this study was to verify the sociodemographic and clinic factors associated with BMI in patients with CKD in HD.

MATERIALS AND METHODS

A cross-sectional study with non-probabilistic sampling was conducted consisting of patients with CKD (n=91) who attended a hemodialysis center located in the city of Belém, Pará, Brazil.

Each patient was evaluated once in a total time interval of seven consecutive months. This research included patients of both genders, aged 18 years or older, who were able to communicate normally, with a minimum dialysis treatment time of six months, without previous history of kidney transplantation and who agreed and signed the Informed Consent Form.

Patients with difficulty in understanding the questions, hospitalized or who were not undergoing the hemodialysis procedure were not included in the study.

Socioeconomic data, practice of physical activity, clinical data and related to CKD were collected through interviews using a semi-structured form.

The biochemical data were obtained through the consultation of the medical records with collection of the most current information of periodic control.

Socioeconomic variables were: gender (female and male), age group (< 60 years and ≥ 60 years), per capita income (<1 minimum wage, 1 to 2 minimum wages, 2 to 3 minimum wages, 3 to 4 minimum wages, > 4 minimum wages), marital status (single, married, divorced, widowed and stable union) and occupation (retired, student, other); physical activity (physical activity or not); clinics data (presence of diabetes, hypertension, dyslipidemia, cardiopathy and number of medications used); biochemistry data (classification of serum levels of leukocytes, hemoglobin, albumin, creatinine, total proteins, pre-hemodialysis urea, ferritin, potassium and parathormone) and CKD related variables (time of hemodialysis, number of weekly hemodialysis dialysis, presence of comorbidities, causes of CKD - diabetic nephropathy, hypertensive nephropathy, diabetic nephropathy and hypertensive nephrolerosis, other causes, presence of nausea and vomiting, family history of CKD and K.t/V index - K: Urea scrubber mL/min; t: Time in min; V: Urea distribution volume/mL).

The evaluation of the adequacy of dialysis was made through Kt/V single pool (serum urea pre and post-dialysis) (Daugirdas, 1993).

Blood levels of biochemical data were classified based on specific references for patients with CKD (Martins, Cardoso, 2000; Cuppari, Avesani, Kamimura, 2013).

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After the hemodialysis sessions the nutrition team of the Hemodialysis Center collected the anthropometric data by measuring the weight and height of the patients and they were recorded in their medical records.

The BMI was calculated by the ratio of body weight in kilograms to the square of height in meters which was classified according to the World Health Organization (World Health Organization, 1995).

Patients were classified as less than or equal to ≤24.9 kg/m^2 for adults and ≤27 kg/m^2 for the elderly - BMI classification for thinness and eutrophic - and BMI ≥25 and > 27 kg/m^2 whose BMI is overweight/obesity for adults and the elderly, respectively (Lipschitz, 1994; WHO, 2000).

Nutritional status was used as the dependent variable and the other variables were considered independent. Categorical variables were presented in absolute and relative frequencies.

To identify the factors associated with overweight according to the patients' BMI, bivariate analysis was performed using the Poisson regression model in which variables with a p<0.20 value was selected for inclusion in hierarchical multivariate models.

Subsequently the independent variables associated in the bivariate Poisson regression (p<0.20) were analyzed within the blocks of characteristics previously established in the hierarchical model. Model A was composed of socioeconomic variables: sex, age group, income and occupation (block 1).

The significant variables in this analytical stage were retained in the model and entered the adjustment of the next block. In model B, the clinical and biochemical variables were included: dyslipidemia, ferritin, hemoglobin, potassium, parathormone and creatinine (block 2) and only those that presented association in model A remained in this model.

On the other hand, the lifestyle variables and those directly related to CKD were included in model C: physical activity, number of medications, number of weekly sessions of hemodialysis and family history of CKD (block 3) and variables that showed association in model B remained in the same block. We considered as independent variables associated with overweight according to BMI those with a value of p<0,05. The data were analyzed in Stata version 14.0.

The preparation of this study if in the guidelines and regulated norms of research with human beings according to Resolution 466/2012 of the National Health Council and was approved by the Research Ethics Committee of the Tropical Medicine Nucleus/NMT - Federal University of Pará under protocol n° 505.937/16.

RESULTS

There was a higher prevalence of patients to BMI ≤24.9 kg/m² for adults and ≤27 kg/m² (67.03%) for the elderly. Of these, the majority were males (55.74%), adults (50.82%), with a monthly income of 1 to 2 minimum wages (65.57%), married (54.10%), retired (80.33%), no physical activity (93.44%), nondiabetic (50.82%), hypertensive (81.97%), no cardiac diseases (75.41%) and used 3 to 4 medications per day (50.82%).

There was a statistically significant difference between the presence of BMI ≥ 25 and > 27 Kg/m2 according to BMI and the variables: sex, age group, occupation, physical activity, dyslipidemia and number of medications used by patients (p<0.05) (Table 1).

Table 1 - Bivariate analysis of the association between BMI ≥ 25 and > 27 Kg/m² and the socioeconomic, clinical and lifestyle characteristics of CKD patients in HD.

Variables	BMI ≥ 25 and > 27 Kg/m² No n (%)	Yes n (%)	PR ($IC_{95\%}$)	p- value
Sex				
Female	27 (44,26)	8 (26,67)	1,00	
Male	34 (55,74)	22 (73,33)	1,72 (0,85-3,44)	0,126
Age group (years)				
< 60	31 (50,82)	24 (80,00)	1,00	
≥ 60	30 (49,18)	6 (20,00)	0,38 (0,17-0,84)	0,018*
Income				
< 1 MW	15 (24,59)	6 (20,00)	1,00	
1 a 2 MW	40 (65,57)	16 (53,33)	1,00 (0,45-2,22)	1,000
2 a 3 MW	3 (4,92)	4 (13,33)	2,00 (0,78-5,10)	0,147
3 a 4 MW	2 (3,28)	2 (6,67)	1,75 (0,53-5,80)	0,360
> 4 MW	1 (1,64)	2 (6,67)	2,33 (0,81-6,70)	0,115
Marital status				
Single	18 (29,51)	10 (33,33)	1,00	
Married	33 (54,10)	17 (56,67)	0,95 (0,50-1,80)	0,879
Divorced	3 (4,92)	1 (3,33)	0,70 (0,12-4,14)	0,694
Widower	2 (3,28)	1 (3,33)	0, 93 (0,17-5,03)	0,936
Stable union	5 (8,20)	1 (3,33)	0,46 (0,72-3,02)	0,424
Occupation				
Retired	49 (80,33)	19 (63,33)	1,00	
Student	5 (8,20)	0 (0,00)	1,56 (6,00-4,10)	<0,001*
Other	7 (11,48)	11 (36,67)	2,18 (1,28-3,73)	0,004*
Physical activity				
Yes	4 (6,56)	6 (20,00)	1,00	
No	57 (93,44)	24 (80,00)	0,49 (0,27-0,90)	0,024*
Diabetes mellitus 2				
Yes	30 (49,18)	11 (36,67)	1,00	
No	31 (50,82)	19 (63,33)	1,41 (0,76-2,63)	0,272
Systemic arterial hypertension				
Yes	50 (81,97)	22 (73,33)	1,00	
No	11 (18,03)	8 (26,67)	1,37 (0,73-2,60)	0,323
Dyslipidemia				
Yes	16 (26,23)	3 (10,34)	1,00	
No	45 (73,77)	26 (89,66)	2,31 (0,78-6,88)	0,130
Heart disease				
Yes	15 (24,59)	6 (20,00)	1,00	
No	46 (75,41)	24 (80,00)	1,20 (0,56-2,55)	0,636
Number of medicines				
0 to 2	18 (29,51)	19 (63,33)	1,00	
3 to 4	31 (50,82)	3 (10,00)	0,17 (0,55-0,53)	0,002*
5 or more	12 (19,67)	8 (26,67)	0,78 (0,42-1,45)	0,433

Legenda: PR: prevalence ratio. $CI_{95\%}$; confidence interval; MW – minimum wage; *p<0,05.

Regarding routine biochemical evaluation, most patients BMI ≥ 25 and > 27 Kg/m² presented normal levels for the serum parameters evaluated, except for hemoglobin (83.21%), creatinine (100.00%), pre-hemodialysis urea (100.00%) and ferritin (88.52%).

Of the patients analyzed, most underwent hemodialysis from 1 to 5 years (70.49%) - 3 dialysis sessions per week and had some associated comorbidity (90.16%). Of these, 37.70% had hypertensive nephrolerosis as the most frequent diagnosis of CKD, had no symptoms of nausea and vomiting (72.13%), did not report family history of CKD (93.44%) and had a normal Kt/v level (80.33%).

The bivariate analysis also showed a statistical difference between overweight with the variables: creatinine, pre-hemodialysis urea, ferritin, number of weekly hemodialysis sessions and family history of CKD (p<0,05) (Table 2).

Table 2 - Bivariate analysis of the association between BMI ≥ 25 and > 27 Kg/m² and biochemical parameters of HD CKD carriers.

Variables	BMI ≥ 25 and > 27 Kg/m² No n (%)	Yes n (%)	PR ($IC_{95\%}$)	p-value
Leukocyte				
(4000-10000mm3)	52 (85,25)	28 (93,33)	1,00	
Changed	9 (14,75)	2 (6,67)	0,52 (0,14-1,90)	0,322
Hemoglobin				
(≥12g/dl)	10 (16,39)	8 (26,67)	1,00	
Changed	51 (83,21)	22 (73,33)	0,68 (0,36-1,27)	0,225
Albumin				
(≥3,5g/dl)	57 (93,44)	28 (93,33)	1,00	
Changed	4 (6,56)	2 (6,67)	1,01 (0,31-3,28)	0,984
Creatinine				
(≤1,4mg/dl)	0 (0,00)	0 (0,00)	1,00	
Changed	61 (100,00)	30 (100,00)	0,33 (0,24-0,44)	<0,001
Total protein				
(6-8,5g/dl)	53 (86,89)	27 (90,00)	1,00	
Changed	8 (13,11)	3 (10,00)	0,80 (0,29-2,23)	0,682
Urea pre hemodialysis				
(10-50mg/dl)	0 (0,00)	0 (0,00)	1,00	
Changed	61 (100,00)	30 (100,00)	0,33 (0,24-0,44)	
Ferritin				<0,001
(≤100ng/ml)	7 (11,48)	8 (26,27)	1,00	
Changed	54 (88,52)	22 (73,33)	0,54 (0,30-0,98)	0,044
Potassium				
(≤5,5mEq/l)	34 (55,74)	19 (63,33)	1,00	
Changed	1 (1,64)	0 (0,00)	0,84 (0,45-1,56)	0,592
Parathyroid hormone				
(≤300pg/ml)	35 (57,38)	19 (63,33)	1,00	
Changed	26 (42,62)	11 (36,67)	1,43 (0,77-2,63)	0,254
Hemodialysis time				
<1 year	13 (21,31)	6 (20,00)	1,00	
1-5 years	43 (70,49)	21 (70,00)	1,04 (0,49-2,20)	0,921
5-10 years	3 (4,92)	2 (6,67)	1,26 (0,35-4,50)	0,715
>10 years	2 (3,28)	1 (3,33)	1,05 (0,18-6,02)	0,951
Number of weekly sessions				
2 sessions	0 (0,00)	1 (3,33)	1,00	
3 sessions	61 (100,00)	28 (93,33)	0,31 (0,23-0,43)	<0,001
4 sessions	0 (0,00)	1 (3,33)	1,00 (1,00-1,00)	1,000
Comorbidities				
Yes	55 (90,16)	26 (86,67)	1,00	
No	6 (9,84)	4 (13,33)	1,24 (0,54-2,85)	0,602
Causes of CKD				
diabetic nephropathy	18 (29,51)	6 (20,00)	1,00	
Nephrosclerosis hypertensive	23 (37,70)	15 (50,00)	1,58 (0,71-3,52)	0,264
Diabetic nephropathy and hypertensive nephropathy	5 (8,20)	3 (10,00)	1,50 (0,48-4,68)	0,485

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Outras causas	15 (24,59)	6 (20,00)	1,14 (0,43-3,02)	0,788
Nausea and vomiting				
Yes	17 (27,87)	6 (20,00)	1,00	
No	44 (72,13)	24 (80,00)	1,35 (0,63-2,90)	0,438
Family history of CKD				
Yes	4 (6,56)	5 (16,67)	1,00	
No	57 (93,44)	25 (83,33)	0,55 (0,28-1,07)	0,081
Kt/V				
Normal	49 (80,33)	21 (70,00)	1,00	
Changed	12 (19,67)	9 (30,00)	0,87 (0,45-1,68)	0,694

Legenda: PR: prevalence ratio. $CI_{95\%}$; confidence interval CKD: Chronic Kidney Disease; Kt/v: K= purification of urea from dialyzer in use, t=time in hours, v=total body water volume; BMI: body mass index; *statistically significant in p<0,05.

It was observed that the variables occupation, physical activity and number of medications remained significantly associated with BMI ≥ 25 and > 27 Kg/m^2. Student patients were more likely not to have BMI ≥ 25 and > 27 Kg/m^2 (PR=1.45; CI:4.87-4.34, p<0.001).

On the other hand, patients who did not practice physical activity and who used 3 to 4 medications had a lower chance of not having BMI ≥ 25 and > 27 Kg/m^2 (PR=0.48; CI=0.30-0.77; p=0.002; PR=0.23; CI: 0.77-0.70; p=0.009), respectively (Table 3).

Table 3 - Multivariate analysis with hierarchical Poisson regression modeling between BMI ≥25 and > 27 Kg/m^2 and socioeconomic characteristics, physical activity of CKD patients in HD.

	Model A			Model B			Model C		
Variables	PR	$CI_{95\%}$	p-value	PR	$CI_{95\%}$	p-value	PR	$CI_{95\%}$	p-value
Block 1									
Sex									
Female	1,00								
Male	1,20	0,56-2,54	0,649						
Age group (years)									
< 60	1,00			1,00			1,00		
≥ 60	0,40	0,17-0,88	0,023	0,42	0,18-0,94	0,036	0,48	0,21-1,06	0,071
Income									
< 1 WM	1,00								
1 a 2 WM	1,19	0,55-2,55	0,656						
2 a 3 WM	1, 92	0,64-5,74	0,239						
3 a 4 WM	2,00	0,82-4, 90	0,128						
> 4 WM	2,51	0,95-6,60	0,061						
Occupation									
Retired	1,00			1,00			1,00		
Student	7,15	2,60-2,00	<0,001	4,60	1,70-1,24	<0,001	1,45	4,87-4,34	<0,001
Other	1,60	0,82-3,06	0,163	1,61	0,88-2,94	0,116	1,48	0,85-2,60	0,165
Block 2									
Dyslipidemia									
Yes				1,00					
No				2,22	0,75-6,54	0,148			
Creatinine									
Normal				1,00					
Changed				0,27	0,25-3,10	0,298			
Urea pre HD									
Normal				1,00					
Changed				0,27	0,25-3,10	0,298			
Ferritin									
Normal				1,00					
Changed				0,70	0,37-1,30	0,258			
Block 3									

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Physical activity			
Yes	1,00		
No	0,48	0,30-0,77	0,002
Number of medicines			
0 to 2	1,00		
3 to 4	0,23	0,77-0,70	0,009
5 or more	0,66	0,36-1,40	0,259
Number of weekly sessions			
2 sessions	1,00		
3 sessions	0,68	0,43-1,08	0,106
4 sessions	2,23	0,79-6,30	0,130
Family history of CKD			
Yes	1,00		
No	0,44	0,19-1,00	0,051

Legenda: PR: prevalence ratio. $CI_{95\%}$; confidence interval; MW – minimum wage; Model A (socioeconomic variables) - block 1). The significant variables in this analytical stage were retained in the model and entered the adjustment of the next block. Model B (clinical and biochemical variables - block 2). Model C (lifestyle variables and those related to CKD-block 3); *statistically significant in $p<0,05$.

DISCUSSION

The analyses in this study showed the prevalence of CKD patients in HD with BMI of ≤ 24.9 kg/m² and ≤ 27 kg/m² for both genders. The patients who were students were more likely not to have BMI ≥ 25 and > 27 kg/m² while the patients who did not practice physical activity and who used 3 to 4 medications were less likely to have BMI ≤ 24,9 kg/m² and ≤ 27 kg/m².

The higher prevalence of patients with BMI ≤ 24.9 kg/m² and ≤ 27 kg/m² verified in this study corroborated with cross-sectional studies conducted in Goias, Federal District and Bahia, Brazil (Bousquet-Santos, Costa, Andrade, 2019; Marini, Pimentel, 2019).

Although we found a higher prevalence of classification of patients with BMI of ≤ 24.9 kg/m² and ≤ 27 kg/m² it is known that it is necessary to evaluate other changes in body composition (Martins, Cardoso, 2000).

A study evaluating changes in body composition of hemodialysis patients showed that parameters obtained with the use of bioelectric multifrequency impedance differ significantly before and after HD.

However, the use of BMI is easy to apply and low-cost and extensively used in clinical practice as a sensitive indicator of dietary restrictions, metabolic changes and nutrient losses during dialysis (Martins e colaboradores, 2017).

Similar to the findings of this study, 84 CKD patients in renal replacement therapy (RRT) were classified in their majority as insufficiently active in activities related to professional work as well as in the use of transportation and household chores (Fukushima e colaboradores, 2019).

A British study found impairment in the practice of physical activity in 68% of the chronic renal system and showed as the main concern the occurrence of arteriovenous fistula (AVF) and tiredness, as well as believing that physical exercise would intensify pain or present adverse effects (Sutherland e colaboradores, 2019).

However, a study that detected a sedentary lifestyle in 77.8% of chronic renal diseases in HD identified the importance of professional guidance on regular physical activity to this group of patients, aiming at reducing sedentary lifestyle (Araújo Filho e colaboradores, 2016).

Incentive and career guidance aimed at improving the frequency of physical activity can contribute with excellence to the preservation of muscle mass and function, which would result in obtaining potential benefits to metabolic homeostasis, improvement of depressive symptoms and quality of life of the population on dialysis (Kittiskulnam, Johansen, 2019).

Among patients who did not present BMI ≥25 and > 27 Kg/m², we identified a significant result when associated with the use of 3 to 4 medications related to renal treatment.

Dietary restrictions, medications, and other factors have the potential to benefically modify the abundance and function of microbiota in CKD patients. The use of metformin in metabolic control and antifibrobic action in patients with CKD has been questioned due to the risk of lactic acidosis. Its administration suggests good results to kidney disease associated with overweight, up to a glomerular filtration rate (GFR) of 30-ml/min/1.73 m², and it is necessary to consider that severe lactic acidosis can cause renal dysfunction, dehydration, and heart failure.

The renin-angiotensin-aldosterone system inhibitors, which are also recommended for diabetic nephropathy, such as empagliflozin, have an effect in reducing the rate of progression of CKD and preventing kidney disease in high-risk DM2 patients.

Drug therapy should be associated with the encouragement of weight loss, in addition to nutritional and behavioral changes, especially in the adolescent and young population, aiming to obtain a reduction of proteinuria and lower need for HD (Câmara e colaboradores, 2017).

Individuals with CKD use several medications, also known as polypharmacy, which combined with kidney failure expose them to the higher risk resulting from the drug metabolism itself, such as adverse reactions and possible prescription errors.

The high prevalence of drug-related problems in patients with CKD may interfere even more negatively with renal function, mainly through the use of contraindicated medicines or in inadequate doses, in addition to drug interactions and increased glomerular filtration overload, already impaired in most cases (Marquito e colaboradores, 2020).

The efficacy and safety of new drugs in general requires more in-depth studies regarding the administration of CKD patients with BMI ≥25 and > 27 Kg/m^2, associated or not with DM. Seeking to understand risks and benefits in this group.

As well as intensify awareness and implementation of strategies aimed at preventing kidney disease, as stated in the global campaign of World Kidney Day, especially in developing countries (Perkovic e colaboradores, 2016).

Among the limitations found in the present study we can mention (i) a non-probabilistic sample and (ii) the non-use of other body composition parameters. However, in the present study, we obtained data on the relationship of BMI with socioeconomic aspects and routine parameters of clinical practice in patients with CKD in HD.

It is known that the average incidence of CKD in developing countries can be up to four times higher than in developed countries (George e colaboradores, 2017).

Therefore, the impact of factors that influence the general health of these patients on public policies should be discussed.

CONCLUSION

Not having BMI ≥25 and > 27 Kg/m^2 was the BMI classification of the majority of CKD patients in HD and it remained associated with occupation, physical activity and number of medications.

Therefore, this work is expected to promote the basis of public policies and actions aimed at improving the quality of life of these patients. It is suggested that more cohort studies be conducted to estimate the validity of the use of BMI in clinical practice.

COMPETING INTERESTS

The authors declare that there is no conflict of interest when writing the manuscript.

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