

Comparison of baseline data between chronic kidney disease patients starting hemodialysis who live near and far from the dialysis center

Comparação dos dados de base entre pacientes com doença renal crônica que iniciam hemodiálise que moram perto e longe da unidade de diálise

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ABSTRACT

Introduction: The treatment offered to chronic kidney disease (CKD) patients before starting hemodialysis (HD) impacts prognosis. **Objective:** We seek differences among incident HD patients according to the distance between home and the dialysis center. **Methods:** We included 179 CKD patients undergoing HD. Patients were stratified in two groups: "living near the dialysis center" (patients whose hometown was in cities up to 100 km from the dialysis center) or as "living far from the dialysis center" (patients whose hometown was more than 100 km from the dialysis center). Socioeconomic status, laboratory results, awareness of CKD before starting HD, consultation with nephrologist before the first HD session, and type of vascular access when starting HD were compared between the two groups. Comparisons of continuous and categorical variables were performed using Student's *t*-test and the Chi-square test, respectively. **Results:** Ninety (50.3%) patients were classified as "living near the dialysis center" and 89 (49.7%) as "living far from the dialysis center". Patients living near the dialysis center were more likely to know about their condition of CKD than those living far from the dialysis center, respectively 46.6% *versus* 28.0% ($p = 0.015$). Although without statistical significance, patients living near the dialysis center had more frequent previous consultation with nephrologists (55.5% *versus* 42.6%; $p = 0.116$) and first HD by fistula (30.0% *versus* 19.1%; $p = 0.128$) than those living far from the dialysis center. **Conclusion:** There are potential advantages of CKD awareness, referral to nephrologists and starting HD through fistula among patients living near the dialysis center.

Keywords: arteriovenous fistula; catheters; referral and consultation; renal dialysis; renal insufficiency, chronic.

RESUMO

Introdução: O tratamento da doença renal crônica (DRC) anterior ao início da hemodiálise (HD) tem impacto sobre o prognóstico. **Objetivo:** Comparar diferenças entre pacientes incidentes em HD de acordo com a distância entre moradia e a unidade de diálise. **Métodos:** Foram incluídos 179 pacientes com DRC em HD. Os pacientes foram divididos em dois grupos: "residentes perto da unidade de diálise" (moradia até 100 km da unidade de diálise) e "residentes longe da unidade de diálise" (moradia a mais de 100 km da unidade de diálise). Nível socioeconômico, resultados laboratoriais, conhecimento sobre DRC antes de iniciar HD, consulta com nefrologista antes da primeira sessão de HD e tipo de acesso vascular ao iniciar HD foram comparados entre os dois grupos. As comparações entre variáveis contínuas e categóricas foram feitas pelos testes *t* de Student e qui-quadrado, respectivamente. **Resultados:** Noventa (50,3%) pacientes foram classificados como "morando perto" e 89 (49,7%) "morando longe". Havia mais pacientes morando perto da unidade de diálise com conhecimento sobre DRC do que os pacientes morando longe, respectivamente, 46,6% *versus* 28,0% ($p = 0,015$). Mesmo sem significado estatístico, havia mais pacientes morando perto da unidade de diálise que se consultaram previamente com nefrologista (55,5% *versus* 42,6%; $p = 0,116$) e que iniciaram HD por fístula (30,0% *versus* 19,1%; $p = 0,128$) do que os pacientes morando longe. **Conclusão:** Existem vantagens potenciais em relação ao conhecimento da DRC, encaminhamento ao nefrologista e início de HD por fístula entre os pacientes que moram perto da unidade de diálise.

Palavras-chave: cateteres; diálise renal; fístula arteriovenosa; insuficiência renal crônica; referência e consulta.

INTRODUCTION

Chronic kidney disease (CKD) is a silent disease. CKD patients can discover their condition only in advanced stages, when renal replacement therapy is necessary. Screening of renal function, especially in groups at risk to develop end-stage renal disease (ESRD), is recommended to diagnose CKD in the early stages. To perform this, undoubtedly the best approach is a close relationship between primary assistance care givers to diagnose renal dysfunction and the nephrologists to whom they can be referred.¹ Early CKD stage patients (stages 0 through 3) can be treated by non-specialists, but stages 4 and 5 need nephrologists' support. Stage 4 is critical in two aspects: treatment to prevent the advance to stage 5 and preparation for renal replacement: fistula for HD candidates, or preemptive transplants when indicated.

Most ESRD patients worldwide are treated by conventional HD, which means being treated outside the home, in dialysis units. Conventional HD consists of three sessions a week, each session lasting four hours. In developed areas, there are usually sufficient dialysis centers, so patients are allocated to a center near their home. This is not the case in underdeveloped regions. For instance, in most large Brazilian cities, such dialysis centers are near patients residences. However, in underdeveloped regions of our country, mainly in the North and Northeast, small towns are distributed far apart and there are not enough dialysis centers, so patients need to travel long distances for dialysis sessions.²

In the north of Ceará state there is only a single dialysis center, located in Sobral, serving a population of 1,800,000 inhabitants. This population is spread over several small municipalities within a radius of 250 km (around 150 miles). Only 20% of patients undergoing HD in this center reside in Sobral. The remaining patients reside far from Sobral and some of them spend hours to get to the renal unit. We have already studied the distance effects on self-perceived outcomes among prevalent patients,³ but we have not yet addressed the impact on the profile of patients who start HD, so called incident patients. Many characteristics of incident patients may influence outcomes, particularly mortality during the first year of treatment. The kind of initial vascular access, previous assistance by a nephrologist and knowledge of being a CKD patient are variables influencing morbidity and mortality.^{4,5}

For these reasons, we aimed to compare clinical characteristics (type of vascular access, awareness of being a CKD patient, nephrologist consultation before the first HD session) and laboratory results among patients starting regular HD according to the distance between their hometown and the dialysis center.

METHODS

We included ESRD patients undergoing HD during June 2012 in the only dialysis center in northern Ceará state, northeast Brazil, serving a population of 1,800,000 inhabitants. This population is spread over several small municipalities within a radius of 250 km (around 150 miles). All 179 patients were undergoing conventional HD with polysulfone dialyzers, three times a week, in sessions lasting four hours. The study protocol and informed consent form were approved by the ethics committee of Vale do Acaraú University, which is the only ethics committee in our region.

Data were obtained from dialysis unit records. When patients start regular HD, forms are routinely filled out with the following: demographic data; socioeconomic status according to the criteria of the Brazilian Association of Research Institutes⁶ (these criteria include educational level of the head of household and ownership of appliances, classifying socioeconomic status into five groups: A [highest] through E [lowest]); underlying kidney disease (by clinical criteria rather than histopathology), knowledge of CKD condition before the first HD session (yes or no), consultation with nephrologist before the first HD session (yes or no), and type of vascular access when starting HD (fistula or catheter). All catheters were non-tunneled. All arteriovenous fistulas (AVF) were native fistulas. The laboratory results were those from samples collected immediately prior to the first HD session, comprising creatinine, albumin, hemoglobin, calcium and phosphorus. Thus, laboratory values were baseline data. The distance between patients' hometown and the dialysis center was based on the database of the Brazilian Institute of Geography and Statistics and refers to the shortest road lengths between towns, not to a linear distance between them.⁷ We classified patients whose hometown was Sobral (city where the dialysis center is located) or in cities up to 100 km from Sobral as "living near the dialysis center", and others as "living far from the dialysis center".

Comparisons of continuous and categorical variables were performed using Student's *t*-test and the Chi-square test, respectively. Statistical significance was considered as $p < 0.05$.

RESULTS

The patients were predominantly male (62.5%), with mean age of the sample of 48.0 ± 16.8 years. Glomerulonephritis (39.1%) and hypertension (30.2%) were the main causes of ESRD, followed by diabetes (14.5%), polycystic kidney (5.0%), others (5.6%) and undetermined (5.6%). Thirty-one (17.3%) patients hometowns were Sobral, 59 (33.0%) lived in cities up to 100 km from Sobral and 89 (49.7%) in cities more than 100 km from Sobral. Thus, according to our method, 90 (50.3%) were classified as "living near the dialysis center" and 89 (49.7%) as "living far from the dialysis center".

Patients living near the dialysis center were more likely to know about their condition of being CKD patient than those living far from the center, respectively 46.6% *versus* 28.0% ($p = 0.015$). There were no differences regarding other variables (Table 1).

DISCUSSION

Our expectation was that the chance of having consulted a nephrologist before starting HD would be greater for patients living near the dialysis center than for those living far away. In the region of our study, there are no nephrologists in towns except Sobral, where the dialysis center is located. Patients having consulted a nephrologist in advance would be more likely to know about their CKD and probably would start HD through AVF rather than catheterization. Our hypothesis was partially confirmed.

Based on statistical difference, we found that patients living near the dialysis center were more likely to know about their CKD condition. On the hand, there was no statistical difference regarding previous consultation with a nephrologist and first HD by fistula. However, we firmly believe that practitioners should be cautious about taking into consideration only statistical differences and not clinical differences, especially in a study comprising the entire population of patients from a dialysis center instead of a sample. Although without statistical difference, clinical significance cannot be forgotten and is discussed below.

The beneficial effects of previous consultation and starting HD through AV are well-known. Catheterization as initial vascular access is associated with higher state of inflammation and higher mortality when compared to

TABLE 1 COMPARISON BETWEEN CHRONIC KIDNEY DISEASE PATIENTS LIVING NEAR AND FAR FROM THE DIALYSIS CENTER AT THE TIME THEY START HEMODIALYSIS

Variable	Near the dialysis center	Far from the dialysis center	<i>p</i>
Socioeconomic status*			
A	0	0	0.892
B	2 (2.2)	1 (1.1)	
C	36 (40.0)	32 (36.0)	
D	44 (48.9)	46 (51.7)	
E	8 (8.9)	10 (11.2)	
Previous knowledge about being a chronic kidney disease patient	42 (46.6)	25 (28.0)	0.015
Previous consultation with nephrologist	50 (55.5)	38 (42.6)	0.116
First hemodialysis by fistula	27 (30.0)	17 (19.1)	0.128
Laboratory			
Creatinine (mg/dL)	10.5 ± 5.1	11.2 ± 4.9	0.412
Hemoglobin (g/dL)	8.1 ± 2.2	8.1 ± 2.2	0.827
Albumin (g/dL)	3.9 ± 0.7	3.8 ± 0.7	0.237
Ca x P** (mg ² /dL ²)	51.1 ± 20.5	52.3 ± 16.6	0.681

Data are means \pm SD and percentages (in parentheses). * Brazilian Association of Research Institutes, A (best) and E (worst). ** Calcium-phosphorus product.

starting HD with AVF.^{4,8} Previous consultation with a nephrologist is associated with lower cost of dialysis therapy and lower mortality during the first 12 months.^{5,9,10} On the other hand, there is a lack of data on the effects of awareness of CKD status before starting HD. We can only speculate that patients who are aware of their condition before starting HD would have less emotional impact when starting, less emergency occurrences in the period before starting HD, and more chance of making arrangements concerning social and family aspects.

Fifty-five percent of patients living near the dialysis center versus 42% of patients living far have seen a nephrologist beforehand. In comparison with United States, where 44% of patients were followed by the nephrologist before starting HD,¹¹ our result is emblematic (despite lacking statistical significance): the percentage of patients living near who had consulted a nephrologist is higher than 44% and the percentage of patients living far who had consulted a nephrologist is lower than 44%. The same is true as regards AVF utilization at the first HD, in which case the difference between the 30% of patients living near and 19% of patients living far cannot be ignored.

The low level of hemoglobin in CKD patients starting HD is alarming. Moreover, the level was the same between the two groups. Unfortunately, we did not have data on the time between consultation and the time HD had started. A short time between consultation and initiation of HD could explain the lack of difference.

Peritoneal dialysis can usually be an alternative to HD for patients living far from the dialysis center. However, our peritoneal dialysis program is limited and comprises very few patients. Our previous bad experiences preclude expansion of peritoneal dialysis. These include high rate of technical failure and peritonitis and lack of family support and reasonable housing conditions.

As an exploratory study, the main limitation is the retrospective design, precluding data about the effects of knowledge of CKD status on outcomes in a prospective way. Our study was based on baseline data instead of outcomes. Also, we do not know if AVF had already been carried out among those starting HD through catheterization. Knowing the length of time between consultation with the nephrologist and first HD would be useful, since earlier consultation would have more effects on AVF utilization than more recent consultation. Late referral or barriers for referral to a nephrologist among patients living far from the dialysis center are attractive hypotheses, however cannot be proved because we did not obtain data from primary care records.

CONCLUSION

In conclusion, our result shows that patients living near the dialysis center are more often aware of their CKD condition than patients living far away. Even though the difference was not statistically significant, we practitioners should not disregard the clinical importance of referral to a nephrologist and starting HD through AVF among patients living near dialysis centers. The study leads us to reflect on the central role of the relationships between primary care and specialized medical attention, since the main outcomes among incident HD patients depend on the treatment provided before the start of maintenance HD.

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