The Brazilian Peritoneal Dialysis Multicenter Study (BRAZPD): Characterization of the cohort

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The Brazilian Peritoneal Dialysis Multicenter Study (BRAZPD) was launched in December 2004 aiming to collect data monthly and continuously from a representative cohort, allowing for a continuous snapshot of the peritoneal dialysis (PD) reality in the country. This is an observational study of PD patients comprising follow-up from December 2004 to February 2007 (mean follow-up of 13.6 months—ranging from 1 to 26 months) in 114 Brazilian centers. All centers report data through a central web-based database. After an initial baseline retrospective data collection, all patients are followed prospectively every month until they drop out from the PD program. Total number of patients recruited until February 2007 was 3226 (2094 incident patients). Mean age was 54 ± 19 years (37% above 65 years old), with 55% females and 64% Caucasians. The more frequent causes of renal failure were diabetic nephropathy (34%), renal vascular disease associated with hypertension (26%), and glomerulopathies (13%). The most common comorbidities were hypertension (76%), diabetes (36%), and ischemic heart disease (23%). Automated PD (APD) was the modality utilized in 53%. The estimated overall peritonitis rate was 1 episode per 30 patient-months (most frequently due to *Staphylococcus aureus*). The total dropout rate was 33%, mainly due to deaths, whereas 20% of dropouts were due to renal transplant. The gross mortality was 17.6% and the main causes of mortality were cardiovascular diseases (40%) and infections (15%). The initial results of this first Brazilian PD registry provide a unique opportunity to develop future clinical studies addressing specific PD questions in the Brazilian reality and context.

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Brazil is the largest country in Latin America, with an area of over 8 million m^2 and a population of 180 million inhabitants.[1] The country is considered to be among the 15 largest economies of the world,[2,3] and regarding healthcare, provides its population with universal coverage. There is a paucity of epidemiological data on chronic kidney disease in Brazil,[4] but concerning renal replacement therapy, there are over 70 000 patients on dialysis, making Brazil the third largest in number of dialysis patients, after the United States and Japan.[5] The vast majority of patients are on hemodialysis (HD), and peritoneal dialysis (PD) is used at the present in approximately 10% of the patients. From the historical perspective, it is important to mention that continuous ambulatory PD (CAPD) was initiated in Brazil in 1980;[6] however, there have been only a few publications on the epidemiology and clinical experience with PD.[7–10]

Observational studies, which can be exploratory or confirmatory in nature, serve as the important substrate for generating interesting ideas to be tested in the appropriate clinical studies to generate medical evidence. Several observational studies have been important in shifting paradigms in the field of PD, such as the multicenter studies in the United States and Canada (CANUSA):[11] COOR,[12] USRDS;[13] Europe: NECOSAD,[14] EAPOS;[15] Asia: ASPD;[16] and Australasia: ANZDATA.[17] So far, the data on clinical practice and long-term results on PD in Latin America are restricted to the REDTJAL study in Mexico.[18]

The absence of a national PD database in Brazil, the limited research about the treatment done in last 10 years,

and the relative lack of motivation to treat patients with the method motivated the development of an observational multicenter prospective study covering a significant and representative proportion of Brazilian PD patients. Thus, the aim of this study was to collect data on prevalent and incident CAPD and automated PD (APD) patients recruited in a significant number of centers in Brazil, searching for clinical, biochemical, nutritional, educational, social, psychological and quality of life information. In addition, the Brazilian Peritoneal Dialysis Multicenter Study (BRAZPD) will serve as the basis for a continuous national database that will provide information for future decision making in both preventive and corrective actions for PD programs in Brazil.

RESULTS

During the period from December 2004 to February 2007, 3226 enrolled patients were followed for a mean time of 13.6 months (range 1–26 months). Most patients were Caucasians (64%), with a predominance of females (55%). The mean age was 54 ± 19 years, with a higher number of elderly patients among the 2094 incident patients included in the study (Table 1). As observed in other cohorts, the main cause of chronic kidney disease was diabetic nephropathy, and there was a widespread use of APD (53%). Regarding educational profile, there was a large proportion of illiterate patients. The minimum monthly individual wage in Brazil is approximately US$190, and in our study, 42% of the patients (together with their families) had a monthly income of less than US$380.

Reflecting late patient referral, almost half of the patients (47%) analyzed were not followed by a nephrologist until the time of the initiation of dialysis. Interestingly, 15% of patients were referred to the nephrology clinic from the emergency room. Also relevant to patient selection, 39% of patients either transferred from HD or had a failing transplant. Indeed, PD was considered the only alternative of renal replacement therapy in 51% of cases, although it represented the patient's choice in 46% of the evaluations. Patients were mainly referred to nephrologists from internists (28%), cardiologists (15%), general practitioners (10%), and endocrinologists (7%).

The most common comorbidity observed was hypertension (76%), followed by diabetes (36%), ischemic heart disease (23%), peripheral vascular disease (11%), and malignancies (2%). Davies comorbidity score was 0 in 30% of patients, lower than 2 in 32% and higher than 2 in 32% of the patients. In addition, 38% of patients were considered obese (body mass index >30) and 28% were overweight (body mass index >25). The Karnofsky index was higher than 70 in 85% of patients.

When medications prescribed was analyzed, we observed that 80% of patients were utilizing erythropoietin and 42% received iron. Most patients (61%) were using phosphate binders, mainly calcium based (46%). Among hypertensive patients, 47% used angiotensin-converting enzyme inhibitors and 13% were treated with angiotensin receptor blockers.

Table 1 | Demographic data of the CAPD and APD populations at baseline

	Total population	Patients	
		Incident	Prevalent
Number of patients (*n*)	3226	2094	1132
CAPD/APD	47%/53%	42%/58%	56%/44%
Age (years)	54 ± 19	56 ± 20	52 ± 18
Patients >65 years old	34%	37%	27%
Female	55%	54%	56%
Caucasians	64%	68%	58%
Primary kidney disease			
Diabetic nephropathy	34%	38%	29%
Hypertensive renal disease	36%	24%	28%
Chronic glomerulonephritis	13%	11%	16%
Miscellaneous	9%	9%	9%
Chronic pielonephritis	4%	4%	5%
Unknown	14%	14%	13%

APD, automated peritoneal dialysis; CAPD, continuous ambulatory peritoneal dialysis.

Regarding the dialysis prescription, approximately 95% of CAPD patients were prescribed four exchanges of 2 l, many times utilizing at least one hypertonic exchange (in the case of 4.25% of glucose: 14% of the morning exchanges, 4% of the second, 9% of the third, and in 13% of cases in the overnight exchange; in the case of 2.5%: 9% of the morning exchanges, 9% of the second, 9% of the third, and in 36% of cases in the overnight exchange). Patients on APD received a mean of 12.1 ± 3.2 l during a total treatment time of 9 ± 1 h. At least one-third of patients utilized one or more hypertonic solutions in the cycler. A wet day was prescribed in 56% of patients.

Laboratory data were collected continuously in the study, and the main baseline data for prevalent and incident patients is presented in Table 2. On average, values for hemoglobin, calcium, and phosphorus met the recommendations of international guidelines. Interestingly, the mean serum fasting glucose levels could be considered higher (118 mg per 100 ml) than recommended.

The incidence of peritonitis was 1 episode/30 patient-months experience, and the overall exit-site infection rate was 1 episode/54 patient-months. The most prevalent agent identified in culture was *Staphylococcus aureus* (28%), whereas a high prevalence of negative culture (40%) was identified. Despite of that, the centers achieved a mean cure rate of 87%.

Thirty-three percent of patients dropped out during the follow-up period, mostly due to fatal events, which were due to vascular causes in the majority of cases. The main causes of mortality in the patient population are described in Figure 1. If death is not included in the analysis, peritonitis becomes the most important cause of dropout (23% of cases). In addition, there was a high rate of renal transplantation (20%) and recovery of renal function (5%) in this study population. Finally, the survival rate at 26 months was 75% for prevalent patients and 72% in the group of incident patients (Figure 2).