

The Epidemiology of End Stage Renal Disease at a Centre in Trinidad

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ABSTRACT

Objective: The aim of this study is to estimate the trends in prevalence of end stage renal disease (ESRD) during the period 1999–2007 at one site in Trinidad, the Eric Williams Medical Sciences Complex (EWMSC), and to describe the epidemiological features, age, gender, ethnicity and co-morbidities associated with ESRD.

Design and Methods: A retrospective cohort study design was used. There was a count of patients on haemodialysis at the EWMSC centre from 1999 – 2007 in order to demonstrate trends in prevalence but more detailed data were collected and analysed for patients with ESRD attending the nephrology clinic between January 2002 and December 2007. The data that were collected from the patients' records included: demographic data (age, gender and ethnicity), medical history (diabetes mellitus, hypertension, end stage renal disease and autoimmune disorders), history of dialysis (type of vascular access, frequency of dialysis), mortality and its cause.

Results: Records of 81 patients were retrieved. Their age range was 10–79 years. The survey showed that patients most affected in the study population were: males, aged 50–59 years, who were hypertensive and/or diabetic and of African descent.

Conclusions: In conclusion, we provide epidemiological evidence of ESRD and the associated contributing factors at one hospital in Trinidad.

Keywords: Dialysis, end stage renal failure

Epidemiología de la Fase Terminal de la Enfermedad Renal en un Centro de Trinidad

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RESUMEN

Objetivo: El objetivo de este estudio es estimar las tendencias de la prevalencia de la enfermedad renal en fase terminal (ERFT) durante el periodo 1999–2007 en el Complejo de Ciencias Médicas Eric Williams, en Trinidad, y describir los rasgos epidemiológicos – edad, género, etnicidad – y comorbilidades asociadas con la ERFT.

Diseño y Métodos: Se usó un diseño de estudio de cohorte retrospectivo. Se llevó a cabo un análisis de todos los pacientes que asistieron a las clínicas de nefrología de EWMSC, de enero de 2002 a diciembre de 2007. Los datos recogidos de las historias clínicas de los pacientes al final del periodo de estudio incluyeron: datos demográficos (edad, género y etnicidad), historia médica (diabetes mellitus, hipertensión, enfermedad renal en fase terminal, trastornos autoinmunes), historia de diálisis (tipo de acceso vascular; frecuencia de diálisis), mortalidad y causa.

Resultados: Se obtuvieron las historias clínicas de 81 pacientes, cuya edad fluctuaba de 10 a 79 años. La encuesta mostró que los pacientes más afectados en la población del estudio fueron varones, de 50–59 años de edad, que eran hipertensos y/o diabéticos, de ascendencia africana.

Conclusiones: En conclusión, se ofrece evidencia epidemiológica de la ERFT en un hospital en Trinidad y se señalan los factores asociados que contribuyen a la enfermedad.

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Palabras claves: Enfermedad renal en fase terminal, diálisis

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INTRODUCTION

Chronic kidney disease (CKD) is a progressive loss of renal function for which dialysis is a key component of its management. Stage 5 CKD, also referred to as end stage renal disease (ESRD), requires some form of renal replacement therapy [dialysis or renal transplant] (1). On a global scale, the prevalence of ESRD varies, being highest in France where there are 513 patients per million population [PMP] (2). In the Caribbean, Trinidad and Tobago ranks highest in the number of patients ($n = 436$, 335/PMP) with ESRD receiving haemodialysis in comparison with Jamaica ($n = 366$), Bahamas ($n = 211$), Barbados ($n = 185$), Cayman Islands ($n = 41$), and the British Virgins Islands [$n = 27$] (3).

In Jamaica, diabetes and hypertension are the two most common causes of ESRD (4). Similarly in Trinidad, the commonest causes of ESRD are diabetes mellitus (28.9%), hypertension (25.3%) and polycystic kidney disease [3.9%] (3). Soyibo and Barton in 2007 showed that there was a higher male to female ratio of patients suffering from ESRD. Reikes reported in the United States of America (USA) that the highest incidence rate of ESRD occurred in patients older than 64 years (5). However, in the Caribbean, Barton reported in 2004 that Jamaican patients who had ESRD were found to have a mean age of 56.7 years (6).

The management of ESRD in Trinidad and Tobago is mainly by dialysis. The Ministry of Health (MOH) provided haemodialysis at two sites on the island, the Mount Hope Medical Sciences Complex in the north, and the San Fernando General Hospital in the south at the time of this study. There was an acute haemodialysis service at the Port-of-Spain General Hospital. Admission to these services requires that patients be hepatitis B surface antigen negative. The programme does not exclude patients infected with the human immunodeficiency virus (HIV) or being hepatitis C virus (HCV) seropositive, however, these patients are monitored and are restricted to designated haemodialysis machines.

The majority of patients with ESRD requiring dialysis utilize the MOH services, without any cost to patients; in the private sector, the cost is approximately 200 dollars (US) per session (7). The high prevalence of renal failure and the greater need for dialysis is impacting adversely on the delivery of this service in the public sector (8). The increasing prevalence of both diabetes and hypertension in Trinidad and Tobago is expected to contribute further to the development of ESRD (3, 9, 10).

The aim of this study is to estimate the trends in prevalence of ESRD during the period 1999–2007 at one site, the EWMSC, and to describe the epidemiological features, age, gender, ethnicity and co-morbidities associated with ESRD.

SUBJECTS AND METHODS

A retrospective cohort study design was used in which ESRD was the entry point. There was a count of patients on haemodialysis at the EWMSC centre from 1999 – 2007 in order to demonstrate trends in prevalence but more detailed data were collected and analysed for patients with ESRD attending the nephrology clinic between January 2002 and December 2007. The inclusion criteria therefore were that all patients must have a definitive diagnosis of ESRD. The exclusion criteria included patients primarily receiving continuous ambulatory peritoneal dialysis (CAPD), incomplete data sets and incomplete follow-up.

Thus, we reviewed all admissions to the EWMSC, and patients who met the entry criteria were selected. Data in regard to age, gender, ethnicity, medical history (diabetes mellitus, hypertension, autoimmune disorders), social history (smoking, alcohol use), history of dialysis (type of vascular access, frequency of dialysis), survival and cause of death were collected.

A structured, pre-tested questionnaire was designed to collect the data which was validated using the patient medical records. Hypertension was defined using the Joint National Committee (JNC) VII criteria, as a blood pressure $> 140/90$ mm Hg, and $> 130/80$ mm Hg in patients with diabetes or renal disease (11). For diabetes mellitus (both Types 1 and 2), the World Health Organization definition was used *ie* fasting plasma glucose of ≥ 7.0 mmol/L (126 mg/dL) or 2 hour post 75 g glucose load of ≥ 11.1 (200 mg/dL) or whole blood glucose of ≥ 6.1 mmol/L (110 mg/dL) or ≥ 10.0 mmol/L (180 mg/dL) 2 hours after a 75 g glucose load (12).

All statistical tests were two-sided with a *p*-value (unequal variances) < 0.05 being statistically significant. The data were analysed using the Statistical Package for Social Sciences (SPSS) version 12.0.

RESULTS

One hundred and seven patients were identified who met the entry criteria of which 81 patients were eligible for analysis. Thus 26 were excluded from analysis because they were either lost to follow-up or the data were incomplete. In addition, we identified three ($n = 3$) patients who were classified as having acute renal failure (ARF) and were also excluded. There were 44 (54.3%) males and 37 (45.7%) females, m:f ratio of 1.2:1

The largest proportion of patients ($n = 27$, 0.33) was in the age group 50–59 years, while the smallest proportion ($n = 3$, 0.04) was in the age group 10–19 years. The age distribution is shown in Fig. 1.

The mean age among men was 52 (SD \pm 13.9) years as compared to women 46.8 (SD \pm 14.9) years.

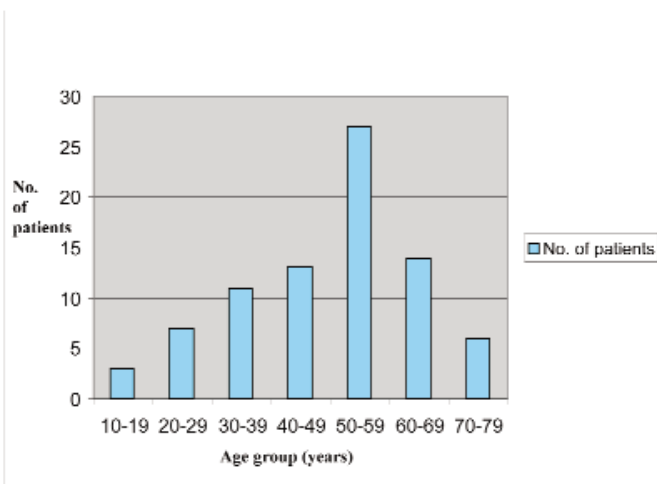


Fig. 1: Age distribution of patients with ESRD on haemodialysis at the EWMSC for the period January 2002 – December 2007.

There was no significant difference in the occurrence of ESRD in the two major ethnic groups on the island *ie* Africans (n = 32, 39.5%) and East Indians (n = 37, 45.7%). The Table lists the causes associated with ESRD: 31 patients

Table: The epidemiological features of patients with ESRD at one hospital in Trinidad during the period January 2002 – December 2007

| Epidemiological feature | n | (%) |
|--------------------------------|------|--------|
| Gender | | |
| Male | 44 | (55.3) |
| Female | 37 | (40.7) |
| Total | 81 | (100) |
| Mean age (years) | 49.5 | |
| Mean no. of dialyses per month | 9.25 | |
| Co-morbidities | | |
| Hypertension (only) | 31 | (38.3) |
| Male (with hypertension) | 30 | (52.6) |
| Female (with hypertension) | 27 | (47.4) |
| Diabetes mellitus (only) | 7 | (8.6) |
| Males (with diabetes) | 16 | (48.5) |
| Females (with diabetes) | 17 | (51.5) |
| Hypertension and diabetes | 26 | (32.1) |
| Systemic lupus erythematosus | 11 | (13.6) |
| Male | 1 | (9.1) |
| Female | 10 | (90.9) |
| Other | 6 | (7.4) |

had hypertension only, 26 had hypertension and diabetes and seven had diabetes only, thus hypertension was most commonly associated with ESRD (n = 57, 70.4%). There was approximately equal distribution of females (n = 17, 51.5%) and males (n = 16, 48.5%) with diabetes, however there was marginally more males (n = 30, 52.6%) than females (n = 27, 47.4%) with hypertension. There was a statistically significant difference (p = 0.001) in the occurrence of systemic lupus erythematosus (SLE) among females (n = 10, 90.9%) compared to males (n = 1, 9.1%). Other co-morbidities which accounted for 7.4% (n = 7) of the

sample included polycystic kidney disease, congenital kidney disease and epilepsy. In those patients who had diabetes and hypertension, ESRD occurred predominantly in the age-group 50–59 years, however, in those patients with SLE (n = 11), ESRD occurred significantly (p = 0.017) earlier in the age group 20–49 years.

There were 77 patients who survived to the end of the study (12/31/07), of the four deaths recorded only one was attributable to chronic renal failure.

The trends in the number of new patients starting dialysis treatment between the period 1999–2007 is shown in Fig. 2; while there has been moderate increases between 1999–2003, since 2004 the number has tripled.

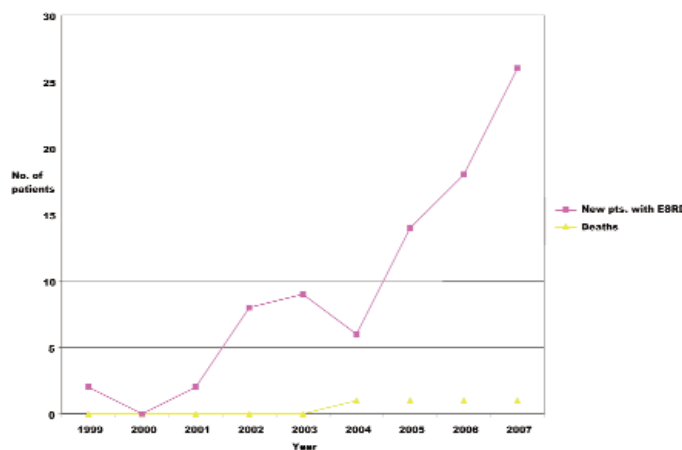


Fig. 2: The distribution of the number of new patients and number of deaths by year during the period 1999–2007.

In 2002, the number of dialysis machines in operation at EWMSC was six; by 2007 the number doubled to 12. The dialysers were not re-used. The following types of vascular accesses were employed: radiocephalic and brachio-cephalic fistulae internal jugular vein Permcaths®, or polytetrafluoroethylene (PTFE) grafts inserted in the upper or lower limbs.

DISCUSSION

Of patients receiving haemodialysis at the EWMSC during the period January 2002–December 2007, 33.3% were between the ages 50–59 years. In 2006, Soyibo and Barton in the Caribbean Renal Registry showed similar results with the mean age for ESRD patients being treated with dialysis as 52.3 years (3). This implies that in the Caribbean population, the age group in which ESRD is most prevalent appears to be 50 years and over, while in the USA, the highest incidence rate of ESRD occurs in patients 64 years and older (5). The difference between these two populations could be explained by the lack of early detection and management of predisposing conditions to renal failure in the Caribbean as well as there may be more access to dialysis for older patients in the USA. Thus the major implication of this finding is that all

patients at risk of ESRD should be screened and monitored at an early stage to arrest or delay the progression to ESRD. Further, we found that the highest proportion of patients with diabetes (45.5%) and hypertension (31.6%) was also in the age group 50–59 years. These results may imply that patients presenting with symptoms of renal disease are simultaneously screened for and diagnosed with diabetes or hypertension. However, in regard to SLE, the fact that the majority of patients with ESRD were in the age-group 20–49 years (81.8%, $p = 0.017$) may be attributed to the early onset and the pathogenesis of this disease (13).

The distribution of patients by gender (m:f = 1.2:1) was similar to the findings of Soyibo and Barton, in 2006, who reported a male to female ratio of 1.3:1 (3). Further, we found that there were more patients of African origin (45.7%) compared to East Indians (39.5%). In 2003, Brown *et al* in the USA showed that a higher proportion of patients on dialysis were Afro-Americans [53.2%] (14). Our finding may in part be attributed to the greater occurrence of hypertension in the African diaspora (70.3%), a similar finding reported by Lane *et al* (15), than in the East Indian diaspora (62.5%), although the difference was not statistically significant ($p = 0.169$). In comparison, SLE was three times more prevalent in Africans than in East Indians ($p = 0.029$).

Hypertension (70.4%) and diabetes (40.7%) were the commonest co-morbid conditions among patients with ESRD. Barton *et al* between 1998 and 1999 in Jamaica showed a prevalence of 60.8% and 31.4% for hypertension and diabetes respectively (6). Baton *et al* did point out that there was a tendency for patients to present late and thus the diagnosis of hypertension by healthcare providers might have been secondary rather than primary (6). Despite this, hypertension is a leading cause of ESRD in the Caribbean and aggressive strategies should be implemented to arrest the current epidemic of ESRD.

The major limitation was poor record keeping and therefore the unavailability of all the data which also in part contributed to restricting the study to only one site. We reported only four deaths for the period under review and therefore abandoned survival analyses because of the small numbers.

In conclusion, we provide epidemiological evidence of ESRD at a centre in Trinidad and the associated contributing factors.

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