

Epidemiological Transition of End-Stage Kidney Disease in Oman

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Introduction: The number of persons receiving renal replacement therapy (RRT) is estimated at more than 2.5 million worldwide, and is growing by 8% annually. Registries in the developing world are not up to standards compared to the United States Renal Data System (USRDS). Herein we examine the causes, progression, and magnitude of end-stage kidney disease (ESKD) over 3 decades in Oman.

Methods: We examined ESKD data from 1983 to 2013. Data from 1998 to 2013 were obtained through an Information Management System. Data before 2008 were collected from patients' files. A questionnaire based on USRDS form 2728 was completed by nephrologists once a citizen reached ESKD.

Results: A total of 4066 forms were completed, with a response rate of 90% (52% male). The mean (standard deviation) age was 50.1 (14.0) years. By 31 December 2013, there were 2386 patients alive on RRT, of whom 1206 were on hemodialysis (50.5%), 1080 were living with a functioning kidney transplant (45.3%), and 100 were receiving peritoneal dialysis (4.2%). The incidence of ESKD on RRT was 21, 75, and 120 per million population in 1983, 2001, and 2013, respectively. Similarly, the prevalence of ESKD was 49, 916, and 2386 in 1983, 2001, and 2013 respectively. Among patients with ESKD on RRT, a progressive rise was seen in diabetic nephropathy, with 5.8%, 32.1%, and 46% in 1983, 2001, and 2013 respectively.

Discussion: The incidence and prevalence of ESKD has increased progressively over last 30 years. This is anticipated to continue at an even higher rate in view of the progressive rise in noncommunicable diseases. Continuous improvement in registries is required to improve capturing of ESKD patients for providing accurate data to health authorities, and enhancing public awareness of the magnitude, future trends, treatments, and outcomes regarding ESKD.

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Worldwide, the number of persons receiving renal replacement therapy (RRT) is estimated at more than 2.5 million, with the incidence growing by approximately 8.0% annually.^{1,2}

Hypertension and diabetes are considered key risk factors for developing end-stage kidney disease (ESKD) in the developed world, and necessitate eventual management with RRT.³ The number of diabetic persons worldwide among adults ≥20 years of age was estimated to be ~171 million in the year 2000 and is expected to reach 366 million by 2030.^{4,5}

In the Eastern Mediterranean Region including the Gulf Cooperation Council (GCC) countries, the number

of persons with diabetes has increased substantially, from approximately 15 million in 2000 to around 26 million in 2010, with an expectation of exceeding 42 million by 2030.^{4,6} In the GCC, according to the 2014 update to the International Diabetes Federation (IDF) Diabetes Atlas, the comparative diabetes prevalence (i.e., calculated using the age profile of the world population) was 21.9% in Bahrain, 23.1% in Kuwait, 14.5% in Oman, 19.8% in Qatar, 23.9% in Saudi Arabia, and 19.0% in the United Arab Emirates.⁷

Similar to Diabetes Globally, the overall prevalence of elevated blood pressure (prehypertension and hypertension) in adults aged 25 years and more was approximately 40% in 2008, with the number of persons with uncontrolled hypertension rising from 600 million in 1980 to nearly 1 billion in 2008.^{8,9}

These recent figures are very alarming. They have significant implications for future medical services requiring RRT care, and associated burdens on many

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aspects of the health care system related to providing the necessary care for persons with various complications of noncommunicable chronic diseases such as ESKD. Registries that report data relating to complications, as well as the incidence and prevalence of noncommunicable diseases, are of great importance for health providers. The United States Renal Data System (USRDS) is 1 of the leading registries that collects, analyzes, and distributes information about ESKD, and provides an international comparison through collaboration with registries around the world, including the registry from Oman.

Many of the developing countries lack complete and accurate information about ESKD and the different perspectives related to it, including Oman. This paper examines ESKD status and provides future perspectives related to ESKD in Oman for its citizens through analysis of trends during these past 3 decades.

METHODS

This descriptive study examined the data that have been obtained through a well-recognized, internationally awarded Omani comprehensive electronic Hospital Information Management System, between 1983 and 2013, in Oman. In addition, a questionnaire based on the USRDS 2728 data collection form was used in all renal dialysis units (RDU) across Oman and have been obligatorily completed by nephrologists once a citizen reached ESKD (Figure S1 online). These completed forms were sent to a centralized data collection system in the main RDU in Muscat.

The Information received from each RDU was checked and entered by nephrologists into a database located in the central RDU in Muscat, using the computer software program Microsoft Access (Microsoft Corporation, Redmond, WA). The data entered are rechecked by 2 other team members. The data collected include the following: name of the RDU, name of the patient, civil identity number, hospital number, phone number, sex, date of birth, residency, marital status, education level, dry weight and height, primary cause of ESKD, comorbid conditions, type of dialysis at ESKD initiation, dialysis start date, complete blood count, bone profile, liver function test profile, intact parathyroid hormone level, iron profile, and glucose and lipid profiles at the start of RRT. In addition, data were collected regarding the virology profile including HIV, and hepatitis B and C.

The complete data have been collected appropriately for the registry throughout each year since 1998. Data before that were collected and added to the registry retrospectively from patient files from the only single

dialysis center that existed in the country from 1983 to 1997. Data were analyzed using STATA software (Stata Corporation, College Station, TX).

RESULTS

Over a period of 30 years, 4066 completed data forms were received by the centralized data collection unit in Muscat, with a response rate of 90%. Of the patients represented, 2104 were male (52%) and 1962 were female (48%). As shown in Figure 1, age ranged from 1 to 90 years in the last 30 years, with an overall mean age (SD) of 50.1 (14.0) years whereas it was 53.1 (15.2) years in 2013. About two-thirds of the population were married and 100% were living with a spouse, family, or friends. Only one-tenth had a college education, one-fourth had a secondary school education, and almost two-thirds had less than 12 years of education. Less than one-fifth of them were employed, less than one-fifth were retired, almost one-half were unemployed, and the remaining individuals were either disabled or of unknown status.

Figure 1 also shows that the percentage of persons aged 65 to 75 years has increased from 10.9% to 17.0%; conversely, the percentage of persons aged 20 to 44 years in 2013 has declined to 25.0% from 33.6% over the last 30 years. By 31 December 2013, there were 2386 patients alive and on RRT, of whom 1206 were receiving hemodialysis (50.5%), 1080 were living with a functioning kidney transplant (45.3%), and 100 were undergoing peritoneal dialysis (4.2%). In terms of comorbidities, 87% of the RRT patients had hypertension, 58% had diabetes, 27% had IHD, 3% had cerebrovascular disease, and 0.8% had respiratory disease. Also, 2.0% had right below-knee amputation, and 1.0% had bilateral below-knee amputation. Similarly, 2.0% of the RRT population had bilateral blindness, 1% had unilateral blindness, and 10.0% had weak

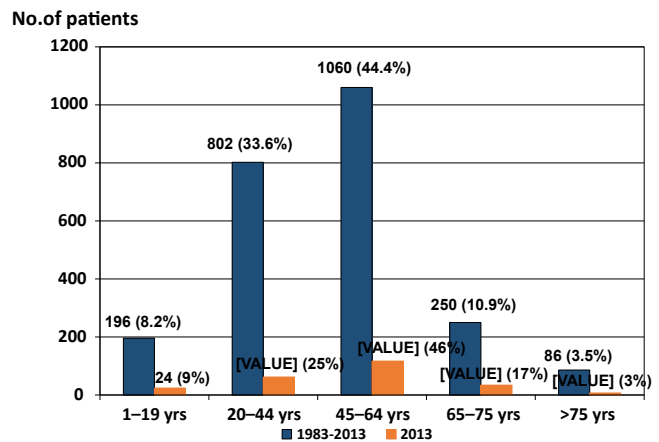


Figure 1. Age distribution of end-stage kidney disease (ESKD) patients over 30 years and in 2013.

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