

# Incidence of End-Stage Renal Disease in Guilan Province, Iran, 2005 to 2007

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We reviewed records of patients with ESRD in all dialysis and kidney transplant centers of Guilan province to determine the incidence and modalities for treatment of ESRD from 2005 to 2007. Records of 759 patients were reviewed during the 3-year period of the study. The male-female ratio was 1.34:1 and the mean age at the time of diagnosis was  $56.3 \pm 16.8$  years. The most frequent age group was 60 years and older (45.8%). The incidence ESRD during 2005, 2006, and 2007 were 100.36 pmp, 100.60 pmp, and 110.66 pmp, respectively. The most common causes of ESRD were hypertension (29.4%), unknown (26.6%), and diabetes mellitus (17.9%). The most common modality at initiation of renal replacement therapy was hemodialysis (96.0%). The entrance rate of hemodialysis in 2005, 2006, and 2007 were 29.6%, 35.0%, and 35.4%, and the discontinuing rate of hemodialysis in these years were 29.5%, 32.1%, and 38.4%, respectively.

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The epidemiology of end-stage renal disease (ESRD) and renal replacement therapy is under continuous evolution. With the improvement of renal replacement therapy, the known prevalence of ESRD continues to increase in most countries; it is currently higher than 2000 per million population (pmp) in Japan, about 1500 (pmp) in the United States, and about 800 pmp in the European Union.<sup>1,2</sup> There was an increasing trend in the incidence of ESRD in Iran from 38.5 pmp in 1998 to 49.9 pmp in 2000. The prevalence and incidence of ESRD has been increasing in Iran from 238 pmp and 49.9 pmp in 2000 to 357 pmp and 63.8 pmp in 2006, respectively.<sup>3</sup> There are now more than 24 000 people with ESRD in Iran, and their number has drastically increased over the recent years.<sup>4</sup> The projecting future numbers of patients who will require dialysis and transplantation is important to healthcare planners, in order to forecast equipment, facility, and other resource requirements. In this study, we estimated the ESRD incidence and modality of treatment in Guilan province, Iran, from 2005 to 2007.

We reviewed the clinical records of all patients

referred to 12 dialysis centers with 101 machines of Guilan province, the kidney transplantation center at Razi Hospital, and the offices of 3 nephrologists at the start of renal replacement therapy, between from 2005 and 2007. The following data were collected: sociodemographic characteristics, past medical history, family history, ESRD history, physical examination, laboratory data, radiographic studies, and kidney biopsy results. We included all patients with irreversible kidney failure who required treatment with dialysis during the studied period. End-stage renal disease was defined as a glomerular filtration rate less than  $15 \text{ mL/min/1.73 m}^2$  body surface area, estimated by the Schwartz formula, necessitating regular hemodialysis for longer than 3 months. The incidence and prevalence of ESRD were expressed as the number of new cases and the overall number of patients with ESRD pmp, respectively, for each year.

A total of 759 patients (435 men, 324 women) were enrolled in this study. The male-female ratio was 1.34:1, and the mean age of the patients at the time of diagnosis was  $56.3 \pm 16.8$  years (range, 2

to 90 years). The patients' age distribution was as follows: 1.0%, younger than 15 years; 8.9%, 15 to 29 years; 10.3%, 30 to 44 years; 33.9%, 45 to 59 years; and 45.8%, 60 years or older. The incidence of ESRD in dialysis centers of Guilan province was 100.36 pmp, 100.60 pmp, and 110.66 pmp in 2005, 2006, and 2007, respectively, and the prevalence of ESRD in 2007 was 309.7 pmp. The major causes of ESRD were hypertension (29.4%), diabetes mellitus (17.9%), and unknown (26.6%; Table).

The most common causes of ESRD were diabetes mellitus (59.6%), hypertension (49.3%), and unknown (36.6%) in patients aged 60 years or more, while those were unknown (39.7%), hypertension (16.2%), and glomerulonephritis (13.2%) in patients aged between 15 and 29 years. In the age group of 30 to 44 years, the most common causes were urinary calculi (14.3%), unknown (13.4%), and polycystic kidney disease (13.3%). In men, the most common causes of ESRD were hypertension (16.0%), unknown (13.7%), and diabetes mellitus (10.3%), and in women, those were hypertension (13.3%), unknown (12.9%), and diabetes mellitus (7.6%).

Ninety-six percent of the patients started renal replacement therapy with hemodialysis, while 1.2% underwent peritoneal dialysis and 2.8% underwent preemptive kidney transplantation. The entrance rate of hemodialysis modality in 2005, 2006, and 2007 were 29.6%, 35%, and 35.4%, respectively and discontinuing rate of hemodialysis units in these years were 138 (29.5%), 150 (32.1%), and 179 (38.4%), respectively. In this period, the causes of discontinuing from hemodialysis were mortality due to complications of ESRD (79.4%), kidney transplantation (20.2%), and switching to peritoneal dialysis (0.4%).

Comparisons between the United State Renal Data

Etiologies of End-Stage Renal Disease in 759 Patients in Guilan Province (2005 to 2007)\*

| Primary Kidney Disease    | Frequency  |
|---------------------------|------------|
| Hypertension              | 223 (29.4) |
| Diabetes mellitus         | 136 (17.9) |
| Diabetes and hypertension | 41 (5.4)   |
| Urological disorders      | 34 (4.4)   |
| Glomerulopathy            | 28 (3.7)   |
| Urinary calculi           | 21 (2.8)   |
| Polycystic kidney disease | 15 (2.0)   |
| Congenital disorders      | 8 (1.1)    |
| Other causes              | 51 (6.7)   |
| Unknown                   | 202 (26.6) |

\*Values in parentheses are percents.

System (USRDS) and other national reports on the epidemiology of ESRD show great variations in the incidence and prevalence of ESRD worldwide.<sup>1,3-5</sup> In our study, the prevalence of ESRD in 2005, 2006, and 2007 were considerably higher than those reported throughout Iran by Haghghi and coworkers.<sup>6</sup> In this study, the mean age of the patients at initiation of dialysis was  $56.3 \pm 16.8$  years that was relatively similar to other reported figures from Iran (mean age, 54.5 to 53.6 years).<sup>3,4,8</sup> However, studies in Guilan between 2001 and 2003 reported a higher mean age of the patients at diagnosis of ESRD, which could be attributed to better supplementary healthcare during this period of time.<sup>7,9</sup> However, the mean age of our patients was lower than those of USRDS statistics.<sup>1,5</sup>

Most of our patients were 60 years old or older (45.8%), while Haghghi and coworkers reported in 2000 that the most frequent age group was 45 to 64 years old age.<sup>6</sup> There was an obvious male predominance in our series (male-female ratio, 1.34:1). This finding was in concordance with what noticed by Mahdavi-Mazdeh and colleagues in Tehran province and Aghghi and associates.<sup>3,8</sup> It was also in agreement with the USRDS statistics (1.2:1).<sup>1,5</sup>

Our study showed that hypertension, unknown causes, and diabetes mellitus were among the most common causes of ESRD. There are several studies in Iran and Guilan with different patterns from ours. In all of the reports from Iran, the high percentage of ESRD due to unknown causes is remarkable,<sup>4,6,7</sup> and it points to the necessity of the betterment of pre-ESRD workup. These findings proved to be different from those of the USRDS statistics.<sup>1,5</sup> A change of pattern could be due to an increase in the prevalence of high blood pressure as a result of dietary habits (salted foods and genetic and environmental factors). The etiology of 26.6% of our ESRD cases was uncertain. High rates have also been reported in underdeveloped countries.<sup>8-13</sup> This could have been due to the pattern of late referrals, with failure of detection of the primary cause. Moreover, the frequency of urinary calculi and polycystic kidney disease in comparison with similar rates in Guilan province from 2002 to 2003 has been reduced, which could be attributed to the early diagnosis and providing better supportive treatments.<sup>7,9</sup> In our study, glomerulonephritis and congenital renal diseases in the age group of 15 to 29 years old had a greater role in the etiology

of ESRD than in the other age groups.

Most of our patients (96%) with presented with or reached ESRD, requiring dialysis. Similar findings have been reported in other developing countries, where most of the patients present at an advanced stage of kidney disease.<sup>11-14</sup> Concerning the treatment modality, 96% of the patients received hemodialysis, 2.8% underwent kidney transplantation, and 1.2% underwent peritoneal dialysis. These findings proved to be different from those of the compared with national statistics that show 54% receive hemodialysis and 45% undergo kidney transplantation. Our findings are relatively similar to the results obtained in Iran by Aghighi and colleagues that showed 93.5% of the patients received hemodialysis and 6.5% received peritoneal dialysis<sup>8</sup>; however, they were different from the report by Mahdavi-Mazdeh and colleagues from Tehran province, which demonstrated that 50% of patients with ESRD were on hemodialysis, 47.5% were transplanted, and 2.5% were on peritoneal dialysis.<sup>3</sup> This lower level of transplantation and peritoneal dialysis could be a result of higher costs, problems relevant to the availability of suitable kidney donors, and the less significant place of peritoneal dialysis because of the lack of knowledge about the method of treatment. Long-term peritoneal dialysis at home is being developed with increasing nursing expertise, but there are many restrictions due to socio-economic factors. Good communication with patients' families and within the multiprofessional team is essential to resolve many of the logistical and ethical issues that posed by the current restrictions on provision of care.

Our study suggests that the incidence of ESRD is high in Guilan and the main reasons could be late referral and delay in management of chronic kidney disease. It is recommended that the at-risk populations be screened thoroughly and followed up periodically with appropriate tests. Ultimately, it is rational to anticipate that the demand for renal replacement therapy will drastically increase in the future.

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#### CONFLICT OF INTEREST

None declared.

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