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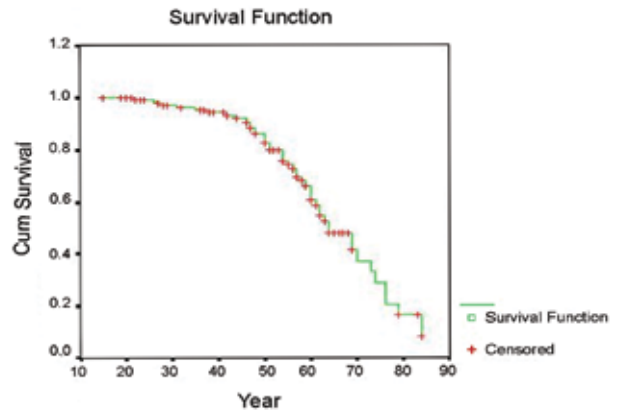
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## Survival analysis of dialysis patients and its associated factors in Zahedan, Iran

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Chronic renal disease is a pathologic process induced by multiple etiologies, which cause unstoppable reduction of the number and function of nephrons, which leads to end stage renal disease (ESRD). This disease results in dependence of the patients to replacement therapies or permanent dialysis.<sup>1</sup> The kidney transplantation is a multi-dimensional treatment due to its high cost which the government does not pay, finding an appropriate donor and having the necessary indication for transplantation, therefore, many ESRD patients prefer hemodialysis.

The prevalence of the disease in the world was 20 per million (PM) in 1970's and it is 750 PM now, which is almost 40 folds.<sup>2</sup> The incidence of ESRD patients in the United States is 260 PM which increases by 6% per year. In 1992, there were more than 6000 dialysis patients in Iran and it is estimated there will be almost 40000 patients in 2010 with a 22.6% or 4000 patient growth each year,<sup>2</sup> which need new dialysis units and centers each year. The WHO estimated an expense of 1.1 billion dollars for dialysis patient in the first decade of the third century.<sup>3</sup> In Iran, the major causes of kidney failure are diabetes mellitus (DM), hypertension (HTN), glomerulonephritis (GN), and urologic problems (UP); and the survival of ESRD patients is normally lower than common people.<sup>4</sup> There are many new established dialysis centers in Iran, and which are mostly state centers. The number of dialysis units in 1988 which was 123, and the number of patients have both increased considerably.<sup>4</sup> Some of the dialysis patients are living in Zahedan, South-East of Iran and over 100 of them are using the treatment for free (the government or the insurance paid for their charges). Most of these patients use the facility regularly, and some have no regular dialysis due to the shortage of facilities; the distance between patients and the dialysis center, which is difficult for patients; the traveling cost; did not having enough knowledge on the disease; and the complication of dialysis (vomiting, ache, dizziness, and so forth). If hemodialysis was used regularly (3 times a week) at their optimum condition, providing ESRD patients the essential knowledge needed, and arranging follow up, then the result will be a better life quality and greatly increased life-span for the patients. The objective of this study is to estimate the life expectancy of dialysis patients and the associated factors affecting the period of their life.



**Figure 1** - The survival function of hemodialysis patients at Zahedan, Iran in 2008.

The study was a cross-sectional performed in Khatam-ol-Anbia Hospital, Zahedan, Iran in December 2007 to October 2008. One hundred and thirty-six hemodialysis patients who had been referred to the hospital dialysis center during 2001 to 2008 were considered. Patients who underwent kidney transplantation and lost their follow up were not included in this study. Of 136 patients, 49 died during the study period.

Five percent have missing values such as birth year, gender, cause of ESRD (DM, HTN), co-morbidities (hepatitis, AIDS, heart diseases), the period of dialysis, the monthly number of dialysis, type of used membrane (polysulfon- hemophan), dialysis solution (bicarbonate, acetate), the patient situation (alive or dead), and the date of starting dialysis (before 2005, 2005, and after 2005). The Kaplan-Meier survival analysis and the Log rank test, which is univariate analysis, were applied to the data using SPSS Version 15. The study was carried out under the approval of Zahedan University of Medical Sciences Ethical Committee. There were 74 males and 62 females (death: 26 males and 23 females). The causes of ESRD were DM (49 cases and 16 deaths), HTN (22 cases and 7 deaths), GN (17 cases and 4 deaths) and polycystic kidney disease (7 cases and 3 deaths). One hundred and fifteen patients used polysulfon (Table 1). The patients' type of membranes and solution, number of monthly dialysis together with the number of death is summarized in Table 1. Some patients were affected by hepatitis A (8 patients) and hepatitis C (9 patients) during the treatment (active disease).

Figure 1 shows the Kaplan-Meier model of ESRD patients. The survival proportion in 20, 40, 50, and 60 years old patients was 99.2%, 93.2%, 82.3% and 60.6%. This proportion for  $\geq 70$  year old patients was  $< 37.1\%$ . The mean survival was 64.5 (SE=1.76) years

**Table 1** - The frequency of total and dead patients together with the mean, SE and the result of Log rank test on the factors associated with survival time in 136 hemodialysis patients in Zahedan, Iran.

Variables	Frequency	Number of death	Mean $\pm$ SE of survival (years)	Log rank test <i>p</i> -value
Number of monthly dialysis*			7.9 $\pm$ 15.33	0.001
1-4	13	8	57.8 $\pm$ 4.75	
5-8	56	28	58 $\pm$ 2.11	
9-12	59	11	71.9 $\pm$ 2.78	
<i>Kind of membranes*</i>				0.002
Polysulfon	115	29	67.2 $\pm$ 2.13	
Hemophan	13	13	55.3 $\pm$ 3.42	
Both	4	4	62.7 $\pm$ 7.2	
<i>Type of solution*</i>				0.024
Bicarbonate	37	17	56.9 $\pm$ 2.47	
Acetate	55	14	68.6 $\pm$ 2.67	
Both	36	10	64.4 $\pm$ 3.1	
<i>Age*</i>			50 $\pm$ 2.36	0.000
$\leq$ 29	19	4	27.8 $\pm$ 0.54	
30-39	14	3	37.9 $\pm$ 0.61	
40-49	27	8	47.3 $\pm$ 0.31	
50-59	36	14	56.5 $\pm$ 0.58	
60-69	26	11	66.2 $\pm$ 0.78	
70-79	10	7	78.4 $\pm$ 1.73	

\*There were some missing values, SE - standard error

(Figure 1). Using Log rank test, no significant relationship was found between survival and gender (male 66.1 and female 62.3 years,  $p=0.284$ ), the causes of ESRD ( $p=0.922$ ), DM or other causes of ESRD ( $p=0.367$ ), the existence co-morbidities ( $p=0.577$ ), date of starting dialysis ( $p=0.4$ ), and HTN ( $p=0.08$ ). There is a significant relationship between the monthly dialysis and survival, and the survival of those who have more dialysis was more than the others. Also, the survival of those who use polysulfan membrane or bicarbonate solution is significantly more than the others. There were also significant relationship between age groups and survival, and patients who had started dialysis at older ages, had lower survival (Table 1). The result shows that the most important cause of ESRD was DM, which is similar to another study in Saudi Arabia,<sup>5</sup> while no significant relationship between the different causes of ESRD and the patients' survival ( $p=0.367$ ).<sup>6</sup> Also, in a study in Syria,<sup>7</sup> they found that the causes of ESRD are HTN (21.1%), GN (20.5%), and DM (19.4%). However, the results shows that the least survival belongs to the DM and higher to GN patients.<sup>8</sup> Hence, DM patient should be screened and referred for complete and fast medical diagnosis. There was no significant relationship between survival and gender, which was the same as a study in Iran ( $p=0.89$ ),<sup>8</sup> and in contrast with Lorenzo

et al,<sup>9</sup> which proved that female patients had a lower survival than males. In this study, there was no significant relationship between co-morbidities and survival, but in a previous study in Tehran it was shown that the one-year survival is the same with the positive and negative HBSAg.<sup>8</sup> The results of the study also showed that the survival rate of patients who started the treatment at a higher age were significantly lower than others, which are similar to other study.<sup>8</sup> Furthermore, the death rate of the patients with higher age was significantly more than the others ( $p=0.000$ ), which is similar to Lorenzo et al,<sup>9</sup> study that showed higher age in patients is one of the risk factors of survival ( $p=0.007$ ). Furthermore, there was a significant relationship between the survival and the dialysis membrane and solution. It was also shown in another study in Shahrood<sup>6</sup> that unsuitable membrane leads to an inefficient dialysis. Therefore, in choosing the solution and membrane for dialysis, the patients' situation should be considered not the availability of these facilities. The patient's number of dialysis has a significant relationship with the survival, which is similar to Einollahi et al,<sup>8</sup> which proved that the survival of patients with one time dialysis per week is significantly lower than others.<sup>5</sup> Therefore, patients need to learn the importance of completing treatment, and the necessary facilities to visit the center regularly

should be provided for them. Previous studies,<sup>5,6</sup> showed that there is a significant relationship between dialysis and its duration with survival. Therefore, those who have dialysis with incomplete duration <3 times weekly have a higher death risk compared to others. The study suggests that a suitable protocol of dialysis is needed to reduce the complications of the disease and increase patients' survival. In this protocol, the increase of the dialysis units, introducing suitable education for the patients and their family regarding the disease, its treatment, and complications to increase their knowledge, preparing required facilities for the patients to use the center regularly and completely, and finally screening the patients for hepatitis B and C, HIV and other communicable diseases should be considered.

Received 4th August 2009. Accepted 6th October 2009.

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