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SURVIVAL RATES AND CAUSES OF DEATH IN VIETNAMESE CHRONIC HEMODIALYSIS PATIENTS

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Abstract

There has not been a published study on the survival rate and causes of death of chronic hemodialysis (CHD) in Vietnam. We retrospectively collected data of CHD patients in Thong Nhat hospital, Ho Chi Minh City to investigate survival rate and identify causes of death.

In this study, 349 adult chronic hemodialysis patients in Thong Nhat Hospital, Ho Chi Minh city were included during the period 4/1997-12/2014.

We use the methods of retrospective, observational study and SPSS 22.0 was used for analysis. Also, Kaplan-Meier method was used. Log rank tests were used to explore the relationship with categorical independent variables. To further investigate mortality, Cox proportional hazards modelling was used, with time to death or last follow-up as dependent variable, and a range of categorical and continuous variables included in the model.

1. Introduction

There is no national data available for the survival rate and cause of death in hemodialysis patients in Vietnam. While this data is only for a single hospital, we hope to gain an understanding of the situation regarding hemodialysis patients in Vietnam and we started with this investigation. There are aspects

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Key words: survival rate, chronic hemodialysis, Vietnamese adults.

with the hemodialysis patients in Vietnam that are different from other countries. First, the starting point for hemodialysis therapy is delayed. There is a tendency to prolong the starting point of hemodialysis as long as possible. The economic situation also plays a role in this tendency. The cost of one session of hemodialysis is 20 USD, which is cheap when compared to other countries. Note that the government's health insurance generally covers the reuse of a dialyzer for up to six times. There is also an insurance system that provides assistance for the poor, however there is not enough money to introduce hemodialysis. hemodialysis is only used when a patient's circumstances take a turn for the worse including increased risk and the situation calls for it.

Annual report of United States data showed that mean survival time of male and female dialysis patients was 7.2 and 7.1 years [12]. In Japan, 5, 10, 15 and 20 year survival rates for hemodialysis patient were 60.4%; 36.6%; 23% and 15.8% respectively [10]. Five year survival rate in male and female Korea was 65.4% and 67.4% respectively [3]. Various previous studies showed that several factors correlated with survival time of CHD patients were age at the start of HD, gender, duration of HD, renal disease etiology, dialysis mode, form of vascular access and co-morbidities. The most common causes of death in dialysis patients were cardiovascular complications, infection and malnutrition [5].

Based on this medical data and the conditions in Vietnam, we shall perform an analysis on the survival rate and cause of death in hemodialysis patients.

2. Patients and Methods

349 adult CHD patients (aged $>$ 18 years old, 225 males, 124 females) in Thong Nhat Hospital, HCM City, were included during the period 4/1997- 12/2014.

Criteria of inclusion: 1) Patients who started and continued to undergo hemodialysis therapy at Thong Nhat Hospital, and 2) patients who received the appropriate hemodialysis prescription. The standard for hemodialysis was kt/v $>$ 1.2. 3) Patients who underwent hemodialysis for more than one month. 4) Patients that have all patient data available. The following patients were excluded: 1) Cases in which the patient could have suffered from acute renal failure or could have withdrawn from hemodialysis therapy. 2) Patients who are undergoing or underwent hemodialysis at another hospital besides Thong Nhat Hospital.

Methods: retrospective, observational study.

The standard for introducing hemodialysis therapy to patients was: a creatinine clearance that is less than 10 ml/min for non-diabetic patients and a creatinine clearance of 15 ml/min for diabetic patients. In terms of the hemodialysis conditions, a bicarbonate dialysate was used and the dialysate flow rate was 500 ml/min. The blood flow rate was 5 ml/min X (dry weight) and 250-300

mL/min. A standard heparin was used as an anticoagulant. The dialyzer was selected based on the financial status of the patient. The dialyzer was reused on average up to 6 times. The target hemoglobin level for anemia treatment was 10 g/dl or greater. Coexisting conditions included: Cardiovascular diseases (myocardial infarction, congestive heart failure, atherosclerosis, cerebrovascular accident, cardiac arrhythmia and thoractic or abdominal artery aneurysm), cirrhosis, malignant tumors, tuberculosis, gastric ulcers, malnutrition, cognitive disorders, hematologic diseases and chronic obstructive pulmonary disease. The causes of death were divided into 5 categories. 1) Cardiovascular diseases, 2) Infections, 3) Nutritional disorders, 4) Other diseases and 5) Unknown cause of death.

Data analysis:

IBM's statistical analysis software SPSS Statistics 22.0 was used. The Kaplan-Meier estimator was used to calculate the cumulative survival rate, and the log-rank test, for extracting the factors that impacted the survival rate, was used to examine the data. In addition, the Cox proportional hazards model or regression analysis was used to calculate the hazard rate. For univariate analysis, a cross tabulation was created for one factor/variable and a chi-squared (x2) test was performed. Any factor that was determined significant in the univariate analysis was used in the multivariate analysis. In the two-tailed test, the statistical significance was computed as $p < 0.05$.

3. Results

Table 1. Baseline characteristics of the chronic hemodialysis patients (n=349)

Baseline characteristics of the patients	Number of patient (%)
Age at the initiation of hemodialysis ($\overline{X}$ ±SD, years)	65.24±12.56 (22-96)
Age group at the start of hemodialysis	
< 60	85(24.4)
60-69	129(37)
70-79	97(27.8)
≥80	38(77.55)
Male	225(64.5)

Primary causes of end-stage renal disease	
Diabetes	153(43.8)
Hypertension	109(31.2)
Chronic glomerulonephritis	35(10)
Unknown	52(14.9)
Coexisting conditions	180(51.6)
Cardiovascular diseases*	109(31.2)
Tuberculosis	10(3.72)
Liver cirrhosis	20(5.73)
Dementia	19(5.44)
Malignancy	15(4.29)
Chronic obstructive pulmonary disease	7(2.01)
Serum Albumin ≥ 35g/dL	279(79.94)
Erythopoetin use (subcutaneous route)	349(100)
Hb ≥ 10g/dL	198(56.73)
The initiation of CHD with acute complications	330(94.56)
Hemodialyzed by high-flux dialyzer	192(55.01)
Reuse of dialyzer	324(92.84)
Follow- up period of patients (month)	
Median (25% -75%)	25(10-51.5)
Minimum- maximum	1-172

*Cardiovascular diseases (myocardial infarction, congestive heart failure, cerebrovascular accident, arrythmia, thoractic or abdominal artery aneurysm, coronary artery diseases).

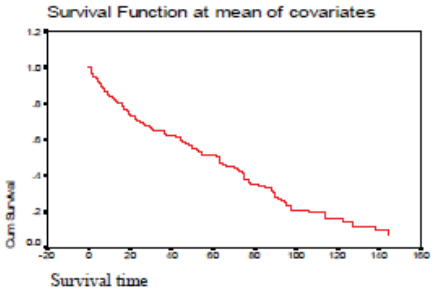

Figure 1. Kaplain - Meier survival curves of CHD

Table 2. Factors affecting survival time

Factors	Mean survival time (year)	$\chi 2$*	p
Age group at the initiation of hemodialysis			
≥ 60	3.64	11.496	0.0007
< 60	8.27		
ESRD caused by diabetes			
Yes	3.53	2.754	0.097
No	4.62		
Sex			
Male	3.74	4.821	0.028
Female	5.07		
Coexisting conditions			
Yes	3.37	13.896	0.0002
No	6.01		
Vascular access			
AV Fistula	4.47	87.10	0.0032
AV Graft, Tunnel permanent catheter.	2.82		

* Log-Rank test

Table 3. Multivariate Analysis: Cox Proportional Hazards Model including factors predicting mortality

Factors	B	SE	$\chi 2$	P	Hazard Ratio	CI 95% for HR
Age group at the initiation of hemodialysis ≥ 60	-0,701	0.210	11.080	0.001	0.496	0.423-0.793
Male	-0,545	0.176	9.626	0.002	0.580	0.411-0.818
Coexisting conditions	-0,546	0.161	11.578	0.001	0.579	0.423-0.793
Vascular access via AV Graft, Tunnel permanent catheter	-0,772	0.204	14.374	0.000	0.462	0.310-0.689

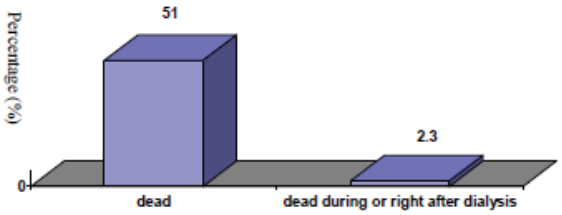

Figure 2. Mortality rate for all causes and sudden death during and after hemodialysis

Table 4. Causes of death (n=178)

Causes of death	Number of patient	Percentage (%)
Cardiovascular diseases	82	46.1
Cardiac diseases	39	
Cerebrovascular accident	43	
Infections with etiologies from	33	18.5
Respiratory system	16	
Gastrology	6	
Urology	3	
Others	8	
Severe malnutrition	33	18.5
Other causes*	21	11.8
Unknown causes	9	5.1

* liver cirrhosis, malignancy, tuberculosis, transportation accident

Table 5. Univariate comparison of factors between patients alive and dead

Factors	Alive (n=171)	Dead (n=178)	p
Male, n(%)	98(57.31)	127(71.35)	0.004
ESRD caused by diabetes, n(%)	74(43.27)	79(44.38)	0.460
Age at the initiation of hemodialysis ($\overline{X}$ ±SD)	61.74±13.68	68.61±10.12	0.000
Age group at the initiation of hemodialysis			
<60	55(32.16)	30(23.62)	
60-69	64(37.43)	65(36.52)	0.002
70-79	39(22.81)	58(32.58)	
≥80	13(7.6)	27(15.16)	
Coexisting conditions, n(%)	62(36.26)	118(66.29)	0.000

Table 6. Multinomial logistic regression of factor predicting mortality

Factors	B	SE	$\chi 2$	p	Hazard Ratio	CI 95% for HR
Age ≥ 60 years old	-0.337	0.124	7.390	0.007	0.714	0.560-0.910
Male	-0.536	0.240	5.498	0.019	0.570	0.356-0.912
Coexisting conditions	-1.142	0.230	24.554	0.000	0.319	0.230-0.510

4. Discussion

Our data in Figure 1 showed that the survival time of the patients was relatively short, just 4.05 years and 1, 5, 10 year survival rates for the patient were 85%, 58%, 20% respectively. We speculate that four factors affecting survival time of our CHD patients were age at the initiation of HD, gender, coexisting conditions and vascular access. The most common, the second and the third causes of death of the CHD patients were cardiovascular diseases, infection and malnutrition. The factors associated with mortality also were old age at the initiation of HD ($\geq$ 60), male gender and having coexisting conditions.

Survival time were very variant among different countries and hemodialysis centers. Survival time of our patients was better than of Sawhney S et al. in British Columbia and Scotland [8] and Seyed Seifollah Beladi Mousavi et al in Iran [9]. On the contrary, comparing other developed countries, we found survival time of our patients was obviously low. In United State, mean survival time of male and female dialysis patients reached 7.2 and 7.1 years [12]. Mean survival time of dialysis patients in United Kingdom was ¡ 6 years [5].

Data in figure 1 also showed that 5, 10 years survival rates in our patients were 58%, 20% respectively. Meanwhile, data of Japanese dialysis patients reported that 5, 10, 15 and 20 year survival rates for hemodialysis patient were 60.4%; 36.6%; 23% and 15.8% respectively [10]. Similarly, in other study in the year of 2002 of Iseki K et al in the large population of 229.538 dialysis patients, one, five and ten year survival rates were 87.4%, 60.9% and 39.1% respectively [4]. In Korea, one and five year survival rates of dialysis patients were 94% and 66% respectively [3]. One year survival rate in United Kingdom was raised from 85.9% in 1997 to 91.5% in 2006 and for the elderly dialysis patients ($\geq$ 65 years old), one year survival rate was 63.8% (1997) and 72.9% (2006) [2]. Comparing these data, we realize that the survival rate of one and five years in our study was comparable with that reported by developed countries. However, ten year survival rate in our patient was extremely low. Therefore, on the basis of the results of our analysis, we can speculate that it is important to offer better management for the patients dialyzed more than 5 years in older to improve the survival time. We also supposed that there were 4 factors affecting short survival time in our patients. First, significant enhancement of the age at the initiation of hemodialysis of the population in our study, 65.24$\pm$12.56 (22-96) and average 80% our patient was $\geq$ 60 years old, higher than other studies [6], [7]. Data in United Kingdom also confirmed that age at the initiation of hemodialysis was the most important factor predicting mortality. Five year survival rate in the groups of age at the initiation of hemodialysis of 18-34, 45-54, 65-74 and >75 were > 90%, 70%, 30% and < 20% respectively [5]. K. Uchida et al. reported 3 year survival rate was only 65% in the patients with high mean age at the initiation of dialysis (61.7$\pm$14.4 years old). Multivariate Cox regression with our cohort revealed that age at the

initiation of hemodialysis ($\geq$ 60 years old) was the most important factor among the factors tended to be associated with mortality rate (table 2 and 3). The second, coexisting conditions in the elderly patients, espectively cardiovascular diseases, chronic liver diseases (table 2 and 3). This factor was also noted in the previous studies listed above. The third, late initiation of dialysis in our patients with several cardiovascular and metabolic complications. Finally, extremely low cost of a hemodialysis section, just average 20 USD per section. In addition, exhausted vascular access for AVF that related to old age, diabetes was a risk factor affecting survival time in our study (table 2 and 3). Table 2 also showed that patients had significantly shorter survival time in the group of ESRD caused by diabetes compared with the group of ESRD caused by other causes but not significant difference (p=0,097). But the low number of patients included in our data do not allow us to address this point. To this purpose, additional studies with larger sample are needed.

Mortality rate for all causes of death in this study was 51% (figure 2), comparable with that reported by Oliver T Browne (60%) [7]. We saw that cardiovascular complications was the most common cause of death (46.1%). Infectious complication was the second one (18.5%) in which pneumonia was the leading cause of death, so that vaccination for hemodialysis in our center should be considered in the future and environmental hygiene condition should be improved. The third was malnutrition affecting our elderly dialysis patients. Therefore, beside traditional risk of cardiovascular factor, infection and malnutrition were two factors that must be impressed and concentrated to manage the CHD to improve morbidity and mortality. Our findings were in accordance with several other international studies [1], [2], [5], [6], [7], [11].

5. Conclusions

Our data from this observational study showed that mean survival time was short. Five year survival rate was similar with other countries. However, 10 year survival rate was very low. Old age at the initiation of hemodialysis, exhausted vascular access for AVF were factors associated with short survival time. Death rate for all causes was high (51%). The most common cause of death was cardiovascular complications, infection and severe malnutrition.

Limitations to the study: This study has several limitations, the lack of longitudinal data on all the risk factors such as serum calcium, phosphate, serum albumin, glucose control, lipid profile, dialyzers. Causes of death might be incorrect, especially in dialysis patients died at home.

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