Use the Cox - Regression Model for Survival Times Patients with Renal Failure Disease Case Study - Sinnar Center for Renal Diseases

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Abstract: Introduction: This study was conducted because the disease of failure has become a rapidly spreading disease the social and economic impacts have become evident and it is therefore possible to reduce these effects. Survival analysis is essential and the child variable is the time until a particular event and the application of these models help to identify the characteristics lead to increase or decrease probability of survival. Objectives: to find the appropriate model to describe the difference in the risk of death for patients with renal failure and patients who are not infected with renal failure. Methods: The study sample size is 73 respondents infected by Kidney failure 52 males and 21 females in Sinnar Center for Renal Diseases and using the Cox Regression model and measuring the average survival time after the disease. The study her used the Statistical Package for Social Sciences program (SPSS) to analyzed. Result: cases of failure with diabetes and hypertension are over 40 years old. The average probability of survival of people with diabetes is 17.5 months and 19.2 the average probability of survival of people with blood pressure and the highest average probability of survival for people without diabetes or hypertension. Recommendation: renal failure is one of the disease require awareness. The ministry of health should make period campaigns for awareness. The need for a psychologist and a social worker in dialysis center to support the psychological condition of patient.

Keyword: Renal failure- survival times- Sinnar Center

الملخص:

المقدمة: اجريت هذه الدراسة لان مرض الفشل أصبح من الامراض الواسعة وسريعة الانتشار واصبحت تأثيراته الاجتماعية والاقتصادية واضحة و بالتالي صار من الممكن الحد من هذه التأثيرات ويعتبر تحليل البقاء على قيد الحياة امر ضروري والتي يكون فيها المتغير التابع هو الوقت حتى حدوث حدث معين ومن خلال تقدير دالة البقاء يمكن تقدير الوسط لوقت البقاء. وتطبيق هذه النماذج يساعد في التعرف على الخصائص التي تؤدي إلى زيادة أو نقصان احتمال البقاء. **هدفت ه**ذه الدراسة الي ايجاد النموذج المناسب لوصف الفرق في خطر الوفاة للمرضي الذين يعانون من الفشل الكلوي والمرضى الغير مصابين بالفشل . **المنهجية** : حجم عينية الدراسة هو 73 مصاب بالفشل International Journal of Academic and Applied Research (IJAAR) ISSN: 2643-9603 Vol. 4, Issue 7, July – 2020, Pages: 26-31

الكلوي 52 ذكور و 21 أناث بمركز سنار لأمراض الكلى واستخدام نموذج كوكس لقياس متوسط وقت البقاء على قيد الحياة بعد المرض. تم تحليل هذه البيانات احصائياً بواسطة برنامج الحزم الإحصائية للعلوم الاجتماعية (SPSS). النتائج : حالات الفشل الكلوي مع مرض السكري وارتفاع ضغط الدم في الفئات الاكثر من 40 سنة ومتوسط احتمال بقاء المصابين بالسكري علي قيد الحياة 17.5 شهر و19.2 شهر متوسط احتمال بقاء المصابين بالضغط علي قيد الحياة واعلي متوسط لاحتمال البقاء على قيد الحياة الاكثر من 40 سنة ومتوسط احتمال بقاء المصابين بالسكري علي قيد الحياة لاحتمال البقاء علي قيد الحياة للأشخاص الغير مصابين بالسكري أو الضغط . التوصيات: اوصت الدر اسة بضرورة وجود اختصاصي نفسي واجتماعي بمراكز الغسيل الكلوي لدعم الحالة النفسية المريض. مرض الفشل الكلوي من الامراض التي تحتاج الي وعي ،يجب علي وزارة الصحة أن تعمل حملات التوعية بمرض الفشل الكلوي . وقات البقاء على قيد الحياة مركز سنار د مجدي عبد الاله مجد عباس (بكالوليوس – ماجستير – دكنوراه) جامعة السودان لنعلوم والتكنولوجيا – استاذ مساعد جامعة د. مجدي عبد الاله مجد عباس (بكالوريوس – ماجستير – دكنوراه) جامعة السودان لنعلوم والتكنولوجيا – استاذ مساعد جامعة د. خنساء عمر إدريس أحمد (ربكالوريوس – ماجستير – دكنوراه) جامعة المودان لنعلوم والتكنولوجيا – استاذ مساعد جامعة د. خنساء عمر إدريس أحمد (ربكالوريوس – ماجستير – دكنوراه) جامعة الجزيرة – استاذ مساعد جامعة سنار – قسم د. خنساء عمر إدريس أحمد (ربكالوريوس – ماجستير – دكنوراه) جامعة الجزيرة – استاذ مساعد جامعة سنار – قسم د. خلساء عمر إدريس أحمد (ربكالوريوس – ماجستير – دكنوراه) جامعة الجزيرة – استاذ مساعد جامعة ساعد جامعة د. خلساء عمر إدريس أحمد (ربكالوريوس – ماجستير – دكنوراه) جامعة الجزيرة – استاذ مساعد جامعة ساعد مراحيا

Introduction:

Kidney failure, also called end-stage renal disease (ESRD), is the last stage of chronic kidney disease. And kidneys filter extra water and wastes out of your blood and make urine. When your kidneys fail, it means they have stopped working well enough for you to survive without dialysis or a kidney transplant Kidney failure is a world is a worldwide public health problem , with increasing incidence and prevalence ,high cost and poor outcomes (1). greater risk for kidney disease if you have diabetes or high blood pressure. If you experience kidney failure, treatments include kidney transplant or dialysis. Other kidney problems include acute kidney injury, kidney cysts, kidney stones, and kidney infections.(2)

OBJECTIVE: Building a Cox Regression model for the survival times of patients with Renal Failure in the state of Sinnar, and their relationship to age, gender and chronic diseases

Materials and Methods:

Data Sources:

The study will depend on secondary data, collected from patients' records at Sinnar; Center for Renal Diseases state

Sample Size: The study sample size is 73 respondents infected by Kidney failure 52 male and 21 female in Center for Renal Diseases, the sample size is small because it was taken from a center not hospital. The study her used the Statistical Package for Social Sciences program (SPSS) to analyzed.

SURVIVAL ANALYSIS

Survival analysis, this is a set of statistical techniques used when the primary outcome of interest is the time between patients entry into a study and a subsequent outcome. In medical applications this outcome is usually death, but not always. For example, the outcome may be time to recurrence.(3)

Survivor function: 1

The probability that the random survival time variable T is greater than or equal to a specific t. Assuming F(t) is the cumulative Distribution function of t, the survivor function is the right tail probability, and So is defined as

 $S(t) = P(T \ge t) = 1 - F(t) \dots (4)$

Hazard function:2

The probability that an individual dies at or just after time t, Conditional that having survived to that time. It represents the Instantaneous death rate for an individual surviving to time t or the probability that a case will terminate at time (t), and is defined as

$$\begin{split} h(t) &= P(t \leq T < t + \Delta t) / p(T \geq t) \\ &= [F(t + \Delta t) - F(t)] / S(t) \dots (5) \\ (\Delta t \to 0) \end{split}$$
The term Δt represents a very small unit increment of time.

Kaplan-Meier Method

Kaplan-Meier estimate of survivor and hazard functions Given n individuals with observed survival times, some of the observations may be censored and there may also be more than one individual who fails at the same observed time We count the total number of individuals alive at the start of the interval (ni, i =1,2... g) and the number of individuals who died (di) in the time interval.

Cox Proportional Hazard Model

A Cox model is a well-recognized statistical technique for exploring the relationship between the survival of a patient and several explanatory variables. Survival analysis is concerned with studying the time between entry to a study and a subsequent event (such as death) [1].

The regression method introduced by Cox as h(t) = hO(t). exp (bkXk)

 $h (t) = [h0 (t)] e^{(b1X1+b2X2+\dots+bkXk)} (6)$ Log-Relative Hazard $Ln \frac{h (t)}{h0 (t)} = b1X1 + b2X2 + \dots + bkXk$ (7)

Results: Table (1) illustrated the From the table and the chart it is clear that number of males with both failure and Hypertension together was 25 by 34.2% While the number of females with failure and Hypertension was 12 by 16.4% but The number of males with failure and non-Hypertension was 27 by 37.0%. The number of females with failure and non-Hypertension editing numbered 9 by 12.3%.

Gender	Hypertension		No hypertension	
	Frequency	Percent	Frequency	Percent
Male	25	34.2%	27	37.0%
Female	12	16.4%	9	12.3%
Total	37	50.7%	36	49.3%

Table (1) Gender(Hypertension and No hypertension)



Table (2) showed that there are 7 injured respondents Kidney failure and diabetes combined at 9.6% are male and female. The number of males with failure and non-diabetes was 45 by 61.6%. While the number of females with failure and non-diabetes was 14 at 19.2%

Table (2)	Type for	people with	failure and	diabetics
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Gender	Diabetes		No Diabetes	
	Frequency	Percent	Frequency	Percent
Male	7	9.6%	45	61.6%
Female	7	9.6%	14	19.2%
Total	14	19.2%	59	80.8%

It is clear from table (3) most of respondents with failure and Hypertension (38.4%) in more than 40 years, with a mean 47.6 Std. Deviation 19.6 Std. Error of Mean 2.2, was The number of patients with failure and non in the age group (over 40) was 20 by 27.4%, and equal percent in (20-40) year.

Table (3) Age (infected and without blood pressure):

Age	Hypertension		No hypertension	
	Frequency	Percent	Frequency	Percent
less than 20	0	0.0%	7	9.6%
20 - 40	9	12.3%	9	12.3%
more than 40	28	38.4%	20	27.4%
Total	37	50.7%	36	49.3%

From the table (4) that is number of people with failure and diabetes in the age group (over 40) was 13% by 17.8% .And non-diabetes was 35% at 47.9%.

Table (4) Age (infected and without Dia

Age	Diabetes		No Diabetes	
	Frequency	Percent	Frequency	Percent
less than 20	0	0.0%	7	9.6%
20 - 40	1	1.4%	17	23.3%
more than 40	13	17.8%	35	47.9%
Total	14	19.2%	59	80.8%

From the table (5) The number of people with both failure and pressure has reached 32 by 43.8% are alive and The number of deaths was 4 by 5.5%. Also 32 people with failure and non were 43.8% alive and deaths was 4 by 5.5%.

Status	Hypertension		No hypertension	
	Frequency	Percent	Frequency	Percent
Censored	32	43.8%	32	43.8%
Event	5	6.8%	4	5.5%
Total	37	50.7%	36	49.3%

Table (5) status (sick and without hypertension)

The number of people with both failure and diabetes was 13% by 17.8% alive. And deaths 1.4%. Also the non 69.9% alive. But deaths 11.0%.

Table (6) status (Diabetes and without Diabetes)

Status	Diabetes		No Diabetes	
	Frequency	Percent	Frequency	Percent
Censored	13	17.8%	51	69.9%
Event	1	1.4%	8	11.0%
Total	14	19.2%	59	80.8%

Table (7) shows The total number of people with Renal failure disease and no diabetes or pressure 21 cases, including 3 deaths and 18 cases lost follow-up with them by 85.7 and 15 cases of people with kidney disease and diabetes, including one death, while 37 cases of patients with kidney disease and pressure 5 deaths.

The most important table on which the study relied on, clear the case of patients without diabetes or blood pressure , for example, patient 22 disappeared after two months, so he was not assessed for survival and for any patient who disappears. Patient 33 died three months later and was 95. In the case of patients with diabetes patient 18 disappeared after 3 months so he was not assessed for survival and patient 56 was more likely to survive after 4 months 90. Patients with blood pressure find that patient 8 disappeared after 9 months and patient 64 died after 12 months and the probability of survival was 83.

Note: Any case number didn't show up is it Censored .

Table (7) survival table

Cause	ID	Time	Status	Cumulative Proportion		N of	N of
				Surviving a	t the Time	Cumulative	Remaining
						Events	Cases
				Estimate	Std.		
					Error		
	22	2.000	Censored			0	20
Nothing	33	3.000	Event	.950	.049	1	19
	40	5.000	Event	.844	.083	3	16
	18	3.000	Censored			0	10
	56	4.000	Event	.900	.095	1	9
Diabetes	28	.000	Event	.946	.037	2	35
	15	2.000	Event	.916	.046	3	31
	19	3.000	Censored			3	30
Hypertension	38	4.000	Event	.886	.054	4	29
	64	12.000	Event	.839	.068	5	18

Table Means for Survival Time The average probability of survival of people with diabetes is 17.5 months and 19.2 the average probability of survival of people with blood pressure and the highest average probability of survival for people without diabetes or hypertension.

Table (8) Means for Survival Time

Cause	Mean					
	Estimate	Std. Error	95% Confidence Interval			
			Lower Bound	Upper Bound		
Nothing	19.256	1.458	16.397	22.114		
Diabetes	17.500	1.423	14.711	20.289		
Hypertension	19.204	1.163	16.924	21.483		
Overall	19.406	.806	17.825	20.986		

a. Estimation is limited to the largest survival time if it is censored.

The three-way table shows that there are no moral differences between diseases in survival because the significant value (sig) bigger than 0.05

Table (9) Overall Comparisons

	Chi-Square	Df	Sig.
Log Rank (Mantel-Cox)	.277	2	.871
Breslow (Generalized Wilcoxon)	.340	2	.844
Tarone-Ware	.302	2	.860

Test of equality of survival distributions for the different levels of cause.

Conclusion:

the kidneys play an important role in the human body and one of the most important function to purify human blood continuously as long as it is alive. The objective of this study was enhancing methodology of renal disease and add new flow data. Assist decision maker in develop policies to reduce the disease

Recommendation:

It was recommended as:

Renal failure is one of the disease require awareness .The ministry of health should make period campaigns for awareness.

The need for a psychologist and a social worker in dialysis center to support the psychological condition of patient

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