



## ESTIMATION OF DIRECT AND INDIRECT COST OF DIABETIC NEPHROPATHY PATIENTS UNDERGOING DIALYSIS AND CONSTRUCTION OF COST DIARY - A CROSS SECTIONAL STUDY

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### ABSTRACT

The economic burden resulting from Diabetic Nephropathy (DN) involves or consumes a major portion of resources allocated for health-care services. The objective of this study is to estimate the direct and indirect cost of diabetic nephropathy patients undergoing dialysis. A cross sectional study was conducted among 200 patients who have undergone dialysis in a respected dialysis center in five different states, Kedah, Kuala Lumpur, Penang, Perak, and Selangor, Malaysia from November 2010 until August 2011. All the data collected is analyzed using SPSS version 19.0. Percentage of DN patient is found to be higher in Malays (36%) with males having higher percentage of 61.0% compared to females with 39.0%. There is a growing trend with an age group of 51 to 60 (42.0%) and 61 to 70 (46.5). The results showed that 3.8% of patients spend approximately below RM 200/month, 26.0% patient spend RM 200 to RM 400/month, 41.8% of patients spend RM 400 to RM 800/month and 28.4% patient spend RM 800 to RM 1200/month. As for medical checkup expenses, 5.5% of patient spend approximately RM 1 to RM 50/month, 61% of patient spend RM 51 to RM 100, 28% of patient around RM 101 to RM 150 and 5.5 % of them spend RM 151 to RM 200/month. As the trend and number of patients those undergo dialysis are increasing and currently most of the patients are covered by particular organizations including government for their cost but in future it will burden the countries' expenses. A cost diary will be constructed in order to find measures to reduce these expenses and manage the patients' cost effectively with the help of pharmacists.

**KEYWORDS:** Direct and indirect cost in diabetic nephropathy patient, Estimation.

### INTRODUCTION

Diabetes is a major health problem. Health care and related costs for treatment, as well as the cost of lost productivity, run nearly \$92 billion annually in the United States and. Ten percent of all people with diabetes develop kidney disease. Diabetic nephropathy is the most common cause of end-stage renal disease, a condition where the patient requires dialysis or a kidney transplant

in order to live (Judith A O'Brien *et al.*, 2003). Uncontrolled or poorly controlled diabetes affect the kidneys and leads to the condition called diabetic nephropathy, which is a leading cause of chronic renal failure in many countries, and Malaysia is no exception (Samira Habibet *al.*, 2010). This condition also leads to significant long-term morbidity and mortality. The condition is characterized by protein in the urine (albuminuria) on two or more occasions three to six months apart, decline in the kidneys' glomerular filtration rate (GFR), and raised blood pressure (MacIsaac *et al.*, 2006; Nicole *et al.*, 2000; ). The exact cause of diabetic nephropathy is unknown. It is believed that uncontrolled

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high blood sugar leads to kidney damage, especially when there is also high blood pressure (hypertension) (O'Brien JA *et al.*, 2003; Williams R *et al.*, 2002). As not all diabetics develop this condition, it is believed that the individual's genetic or family history may play a role as well. When the blood sugar is too high, it damages the filtering units of the kidneys (nephron) and the blood vessels within (glomerulus). These structures thicken and form scar tissue. In the course of time, more and more of these structures are damaged and destroyed, resulting in the leakage of protein into the urine (albuminuria). The peak incidence of diabetic nephropathy in diabetics is in their second decade of the condition. It is uncommon for it to develop in patients who have had diabetes for less than 10 years (Johan *et al.*, 2000; Koster *et al.*, 2006; Laupacis *et al.*, 1996). The likelihood of diabetic nephropathy is increased in those with risk factors, i.e. poor control of blood sugar, poor control of blood pressure, family history of kidney disease or hypertension, type I diabetes before the age of 30 years, and smokers (Michael Brandle *et al.*, 2003). The main aim of this research is to estimate the direct and indirect cost of diabetic nephropathy patient who are undergoing dialysis in Malaysia and subsequently reduce the cost of the patient by using patient friendly cost diary. The direct and indirect cost has been estimated by using survey forms. The results that are analyzed using SPSS version 19.0 and the results were tabulated.

## OBJECTIVE

### General Objective

General objective of this research is to estimate the direct and indirect cost of diabetic nephropathy patient in managing cost effectiveness.

### Specific Objective

- To estimate the direct and indirect cost in diabetic nephropathy patient.
- To construct cost diary for the patient in managing their cost for the treatment and other expenses.

## DESIGN AND METHODS

A cross sectional study was conducted among 200 patients in five different states in Malaysia who are undergoing dialysis in a respected dialysis center. Data collection and analysis been done for 10 months starting November 2010 until August 2011 All the data needed is

collected by using survey form distributed to the patients and the data is analyzed by using SPSS version 19.0 (Eastman *et al.*, 1997; Gold *et al.*, 1996).

## RESULTS

Percentage of Diabetic nephropathy in Malays, Chinese, Indians and others are 36.0%, 32.0%, 18.0% and 14.0% respectively. Males have higher percentage of diabetic nephropathy (undergoing dialysis), 61.0% compared to females with 39.0%. There is a growing trend of older age group people having diabetic nephropathy and undergoing dialysis was noted whereby the age group 51 to 60 and 61 to 70 were having a percentage of 42.0% and 46.5 % respectively. The geriatric group age range between 71- 80 shows 3% of people having diabetic nephropathy and undergoing dialysis. Direct costs that are estimated in this research are cost of dialysis, medical checkup and medication, where else estimation of indirect cost for the patient's are personal maid and other expenses that indirectly influenced the cost. The results showed that 3.8% of patients spending below RM 200 per month, 26.0% patient spending approximately RM 200.00 to RM 400.00 per month, 41.8% of patients spending approximately RM 400 to RM 800 per month and 28.4% patient spending approximately RM 800 to RM 1200 per month. As for medical checkup expenses, 5.5% of patient spending approximately RM 1 to RM 50 per month, 61% of patient spending around RM 51 to RM 100, 28% of patient spending around RM 101 to RM 150 and 5.5 % of them spending approximately RM 151 to RM 200 per month. Medication expenses shows that 28.5 % spending between RM 0 to RM 100 per month, 49.0% of them paying approximately RM 101 to RM 200 and 22.5% are spending around RM 201 to RM 300 per month. Indirect cost that involves payment for maid or personal helper shows that 42.0% are paying approximately RM 500 to 600 per month, 45.0% of them paying around RM 601 to RM 700, 9% are paying between RM 701 to RM 800 and finally 4.0% are paying approximately RM 801 to RM 900 per month. As for other expenses survey that indirectly cost the patients showed that 19.0% are spending approximately RM 100 to 200 per month, 26.0% paying RM 201 to RM 300, 30.0% are spending around RM 301 to RM 400, 11.5 % are spending between RM 401 to RM 500 and finally 13.5% of them are spending approximately RM 501 to RM 600 per month.

**Table 1. Gender**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	122	58.7	61.0	61.0
	female	78	37.5	39.0	100.0
	Total	200	96.2	100.0	
Missing	System	8	3.8		
	Total	208	100.0		

**Table 2. Race**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Malay	72	34.6	36.0	36.0
	Indian	36	17.3	18.0	54.0
	Cina	64	30.8	32.0	86.0
	Others	28	13.5	14.0	100.0
	Total	200	96.2	100.0	
Missing	System	8	3.8		
Total		208	100.0		

**Table 3. Age**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	40 - 50	17	8.2	8.5	8.5
	51 - 60	84	40.4	42.0	50.5
	61 - 70	93	44.7	46.5	97.0
	71 - 80	6	2.9	3.0	100.0
	Total	200	96.2	100.0	
Missing	System	8	3.8		
Total		208	100.0		

**Table 4. Age on First Symptoms**

Frequency	Percent	Valid Percent	Cumulative Percent
45	21.6	22.5	22.5
140	67.3	70.0	92.5
12	5.8	6.0	98.5
3	1.4	1.5	100.0
200	96.2	100.0	
8	3.8		
208	100.0		

**Table 5. Fees on Medical Check-up**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	RM1 - RM 50	11	5.3	5.5	5.5
	RM 51 - RM 100	122	58.7	61.0	66.5
	RM 101 - RM 150	56	26.9	28.0	94.5
	RM 151 - RM 200	11	5.3	5.5	100.0
	Total	200	96.2	100.0	
Missing	System	8	3.8		
Total		208	100.0		

**Table 6. Dialysis Requirement Per Week**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	3.8	3.8	3.8
	1	14	6.7	6.7	10.6
	2	109	52.4	52.4	63.0
	3	77	37.0	37.0	100.0
	Total	208	100.0	100.0	

**Table 7. Dialysis Costs Per Week**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		8	3.8	3.8	3.8
	RM 50 - RM100	54	26.0	26.0	29.8
	RM 101 - RM 200	87	41.8	41.8	71.6
	RM 201 - RM 300	59	28.4	28.4	100.0
	Total	208	100.0	100.0	

**Table 8. Overall Cost Of Diabetic Nephropathy Patients**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< RM 500	1	.5	5.0	5.0
	RM 1001 - RM 1500	1	.5	5.0	10.0
	RM 1501- RM 2000	7	3.4	35.0	45.0
	RM 2001 - RM 2500	8	3.8	40.0	85.0
	RM 2501 - RM 3000	3	1.4	15.0	100.0
	Total	20	9.6	100.0	
Missing	System	188	90.4		
	Total	208	100.0		

**Table 9. Maid**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	RM 500 - RM 600	84	40.4	42.0	42.0
	RM 601 - RM 700	90	43.3	45.0	87.0
	RM 700 - RM 800	18	8.7	9.0	96.0
	RM 800 - RM 900	8	3.8	4.0	100.0
	Total	200	96.2	100.0	
Missing	System	8	3.8		
	Total	208	100.0		

**Table 10. Others**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	RM 100 - RM 200	38	18.3	19.0	19.0
	RM 201- RM 300	52	25.0	26.0	45.0
	RM 301 - RM 400	60	28.8	30.0	75.0
	RM 401 - RM 500	23	11.1	11.5	86.5
	RM 501 - RM 600	27	13.0	13.5	100.0
	Total	200	96.2	100.0	
Missing	System	8	3.8		
	Total	208	100.0		

**Table 11. Medication**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	RM 0 - RM 100	57	27.4	28.5	28.5
	RM 101 - RM 200	98	47.1	49.0	77.5
	RM 201 - RM 300	45	21.6	22.5	100.0
	Total	200	96.2	100.0	
Missing	System	8	3.8		
	Total	208	100.0		

Fig 1. Gender



Fig 2. Race

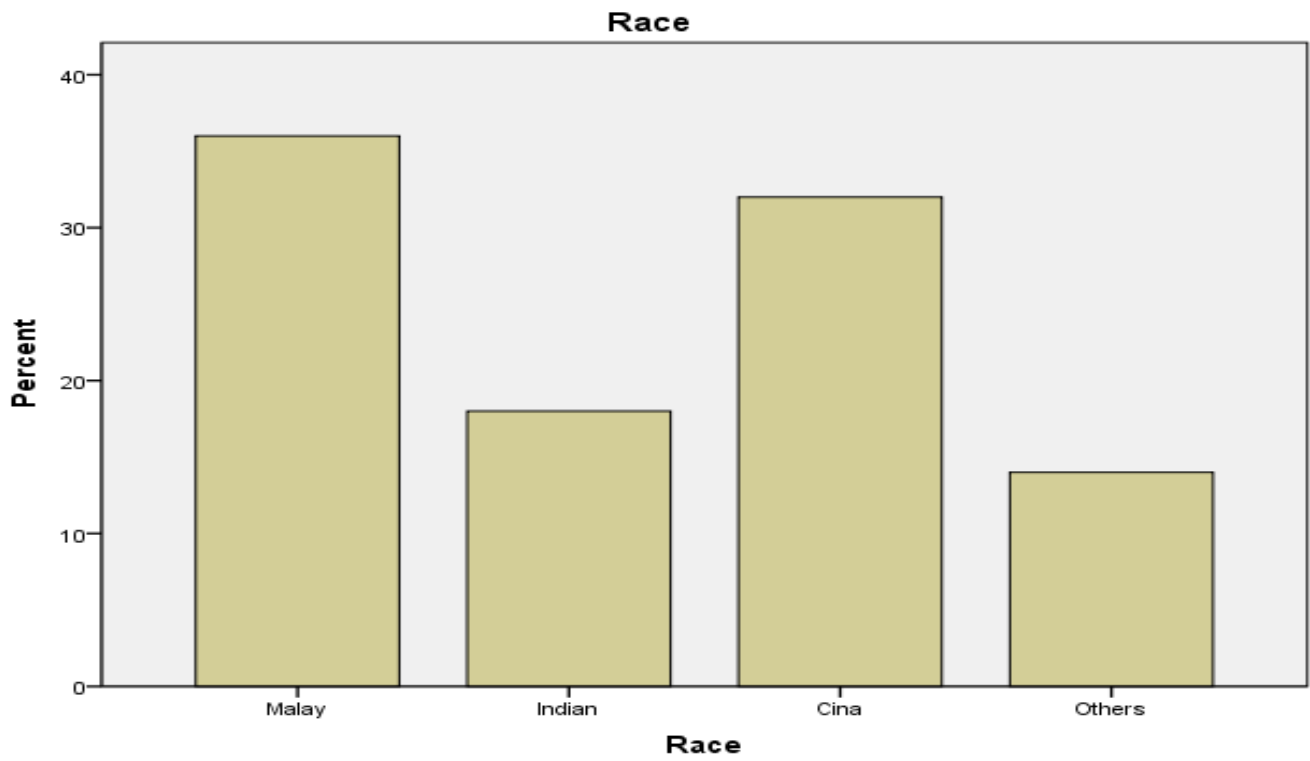


Fig 3. Age

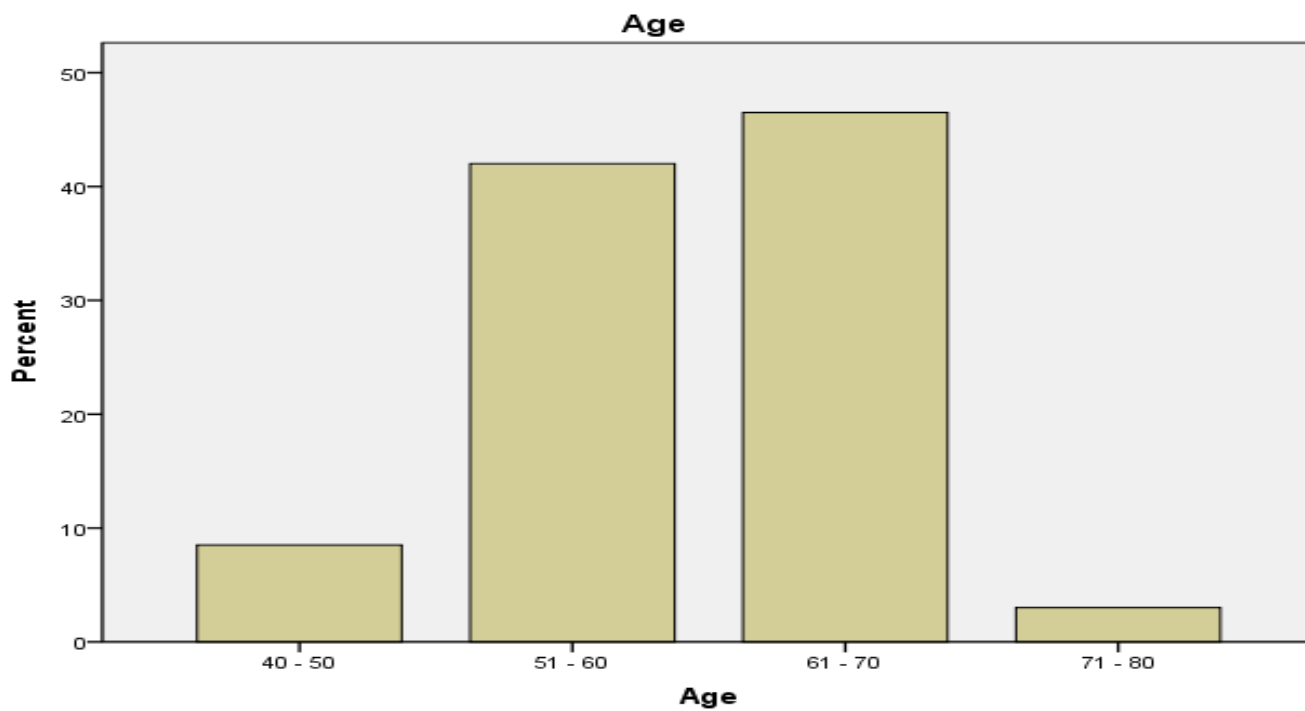


Fig 4. Age on First Symptoms

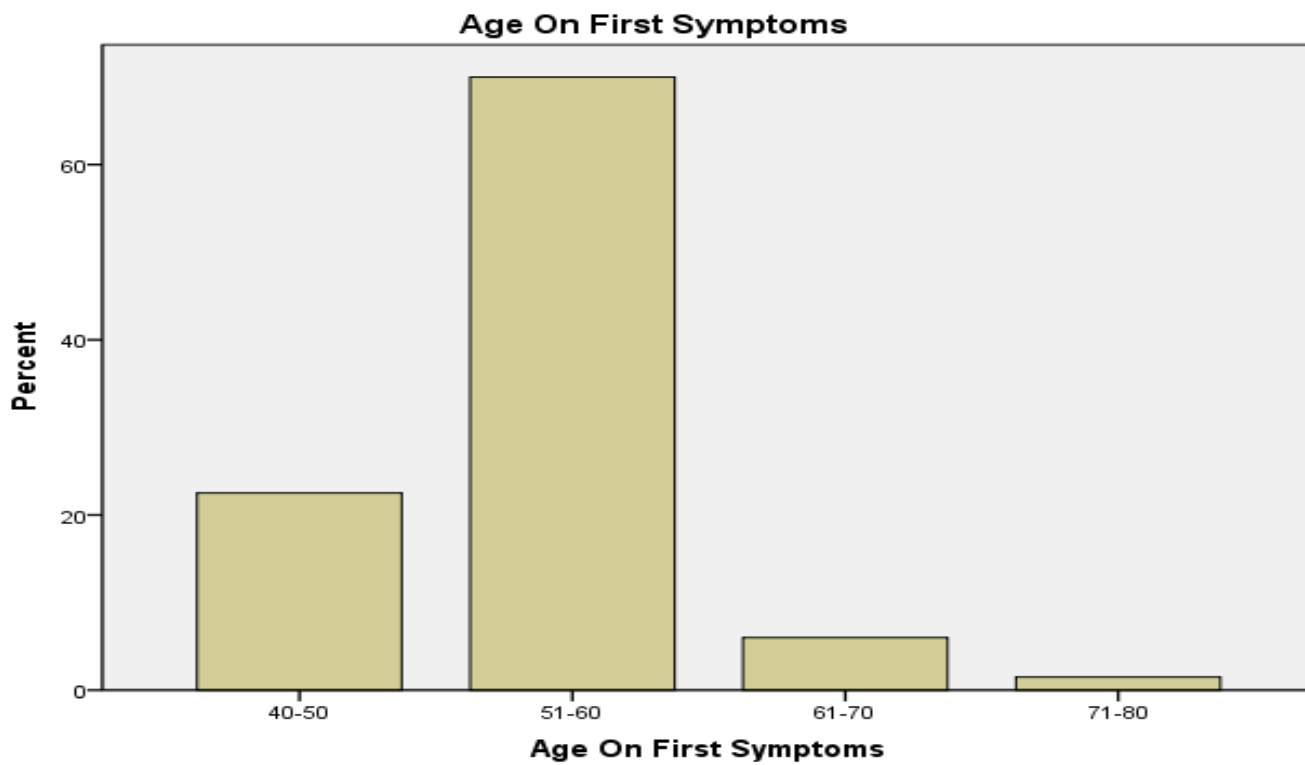


Fig 5. Fees On Medical Check-up

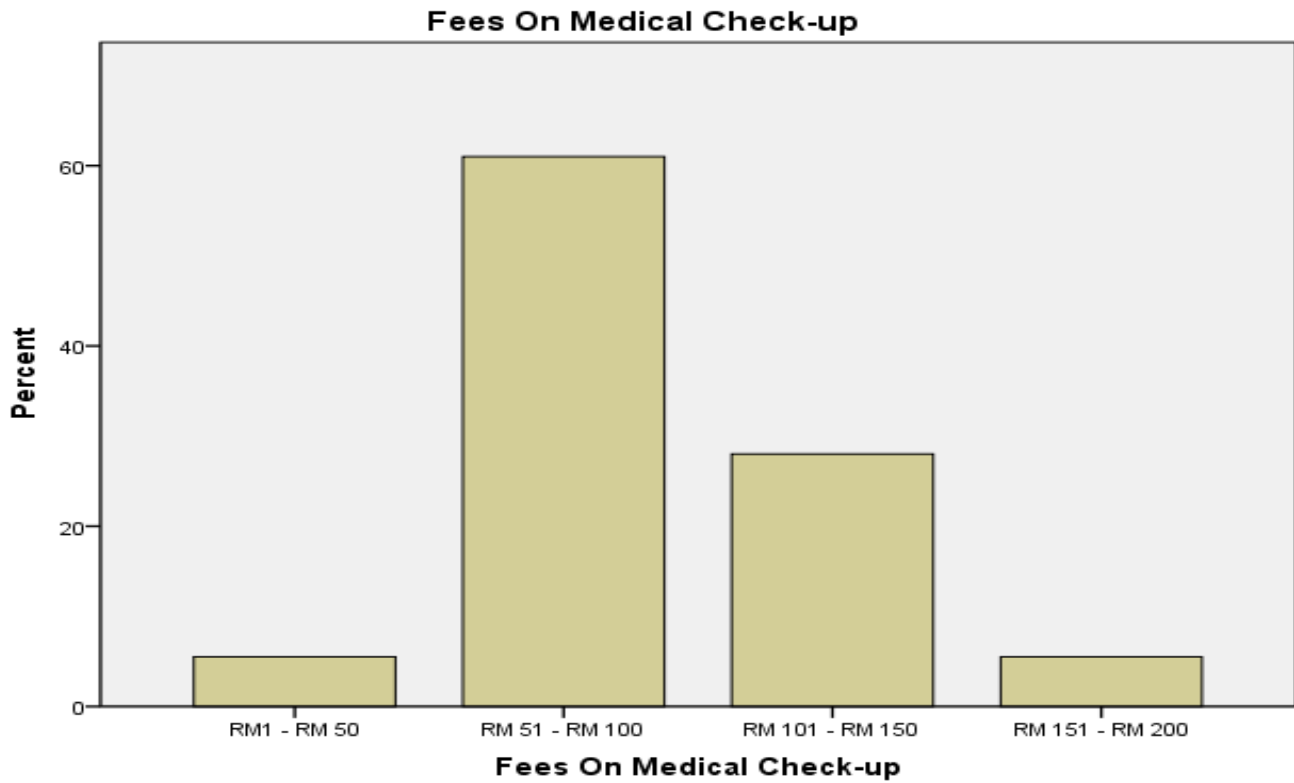
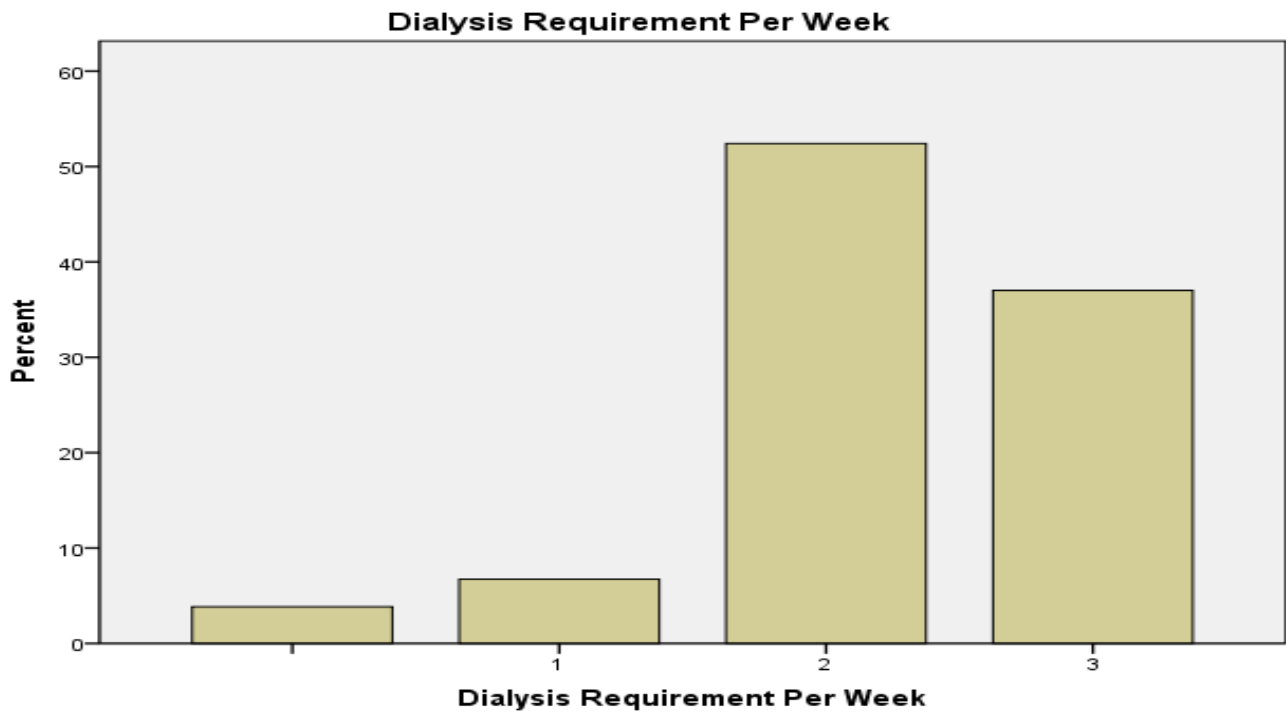
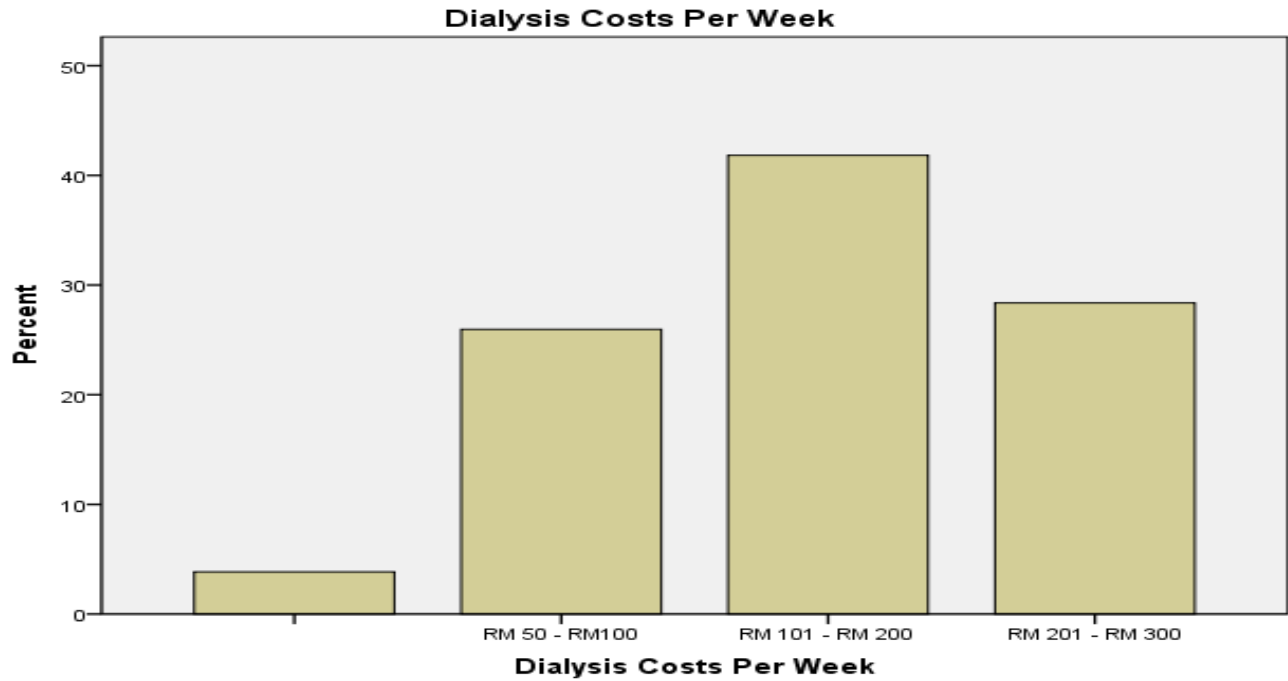


Fig 6. Dialysis Requirement per Week



**Fig 7. Dialysis Costs per Week**



**Fig 8. Overall Cost Of Diabetic Nephropathy Patients**

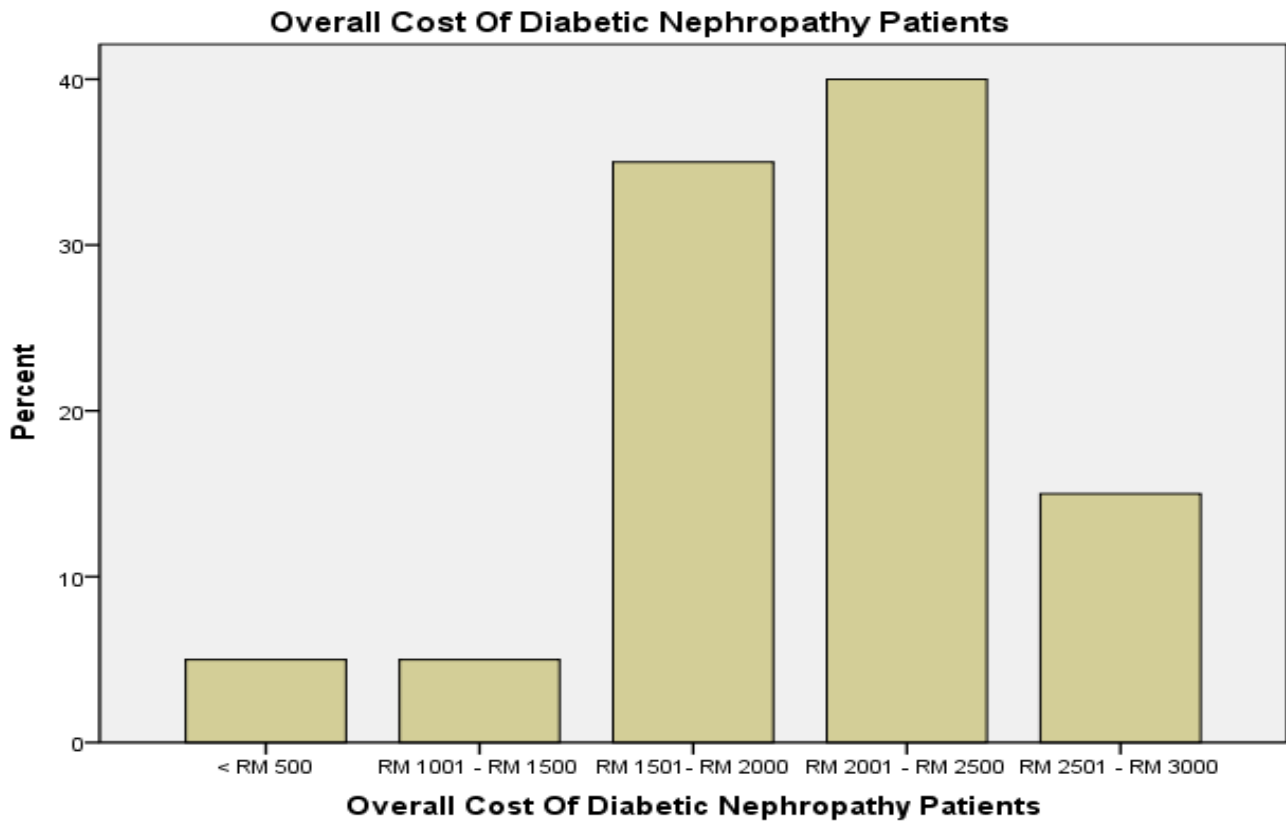




Fig 9. Maid

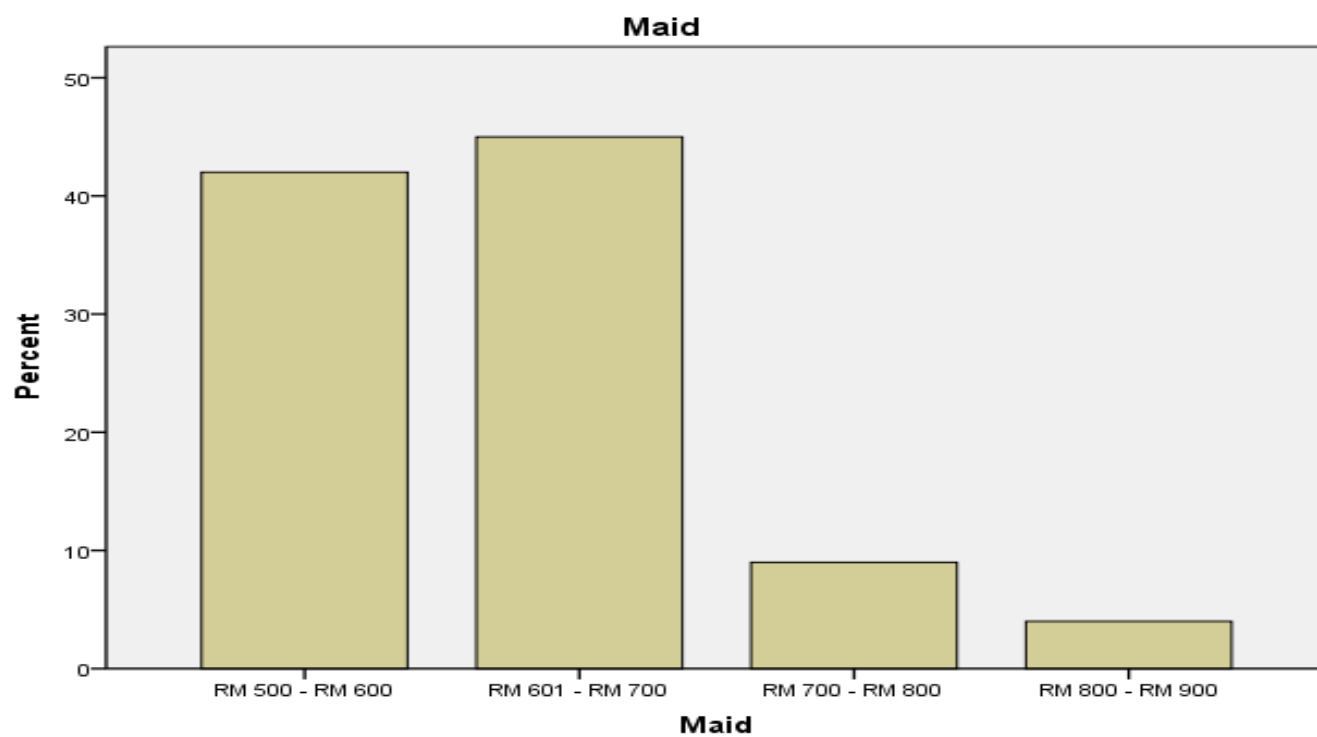


Fig 10. Others

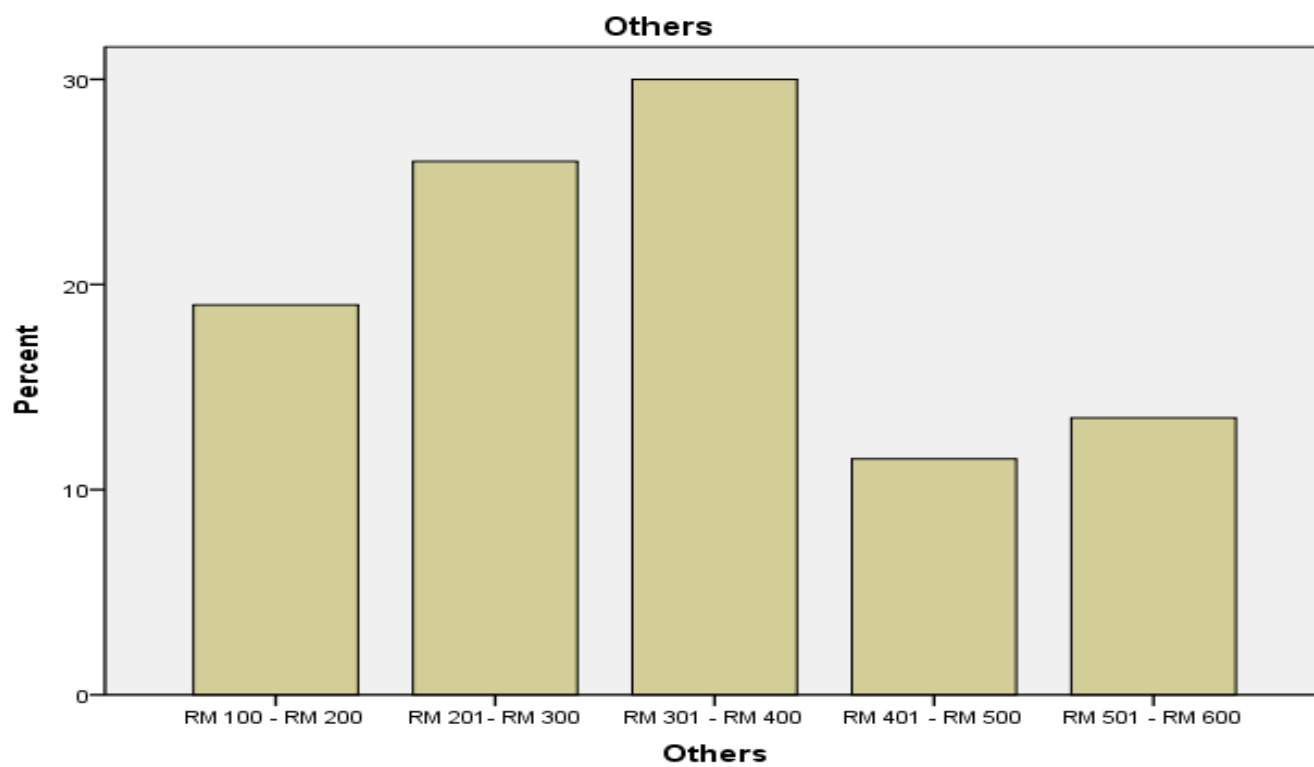
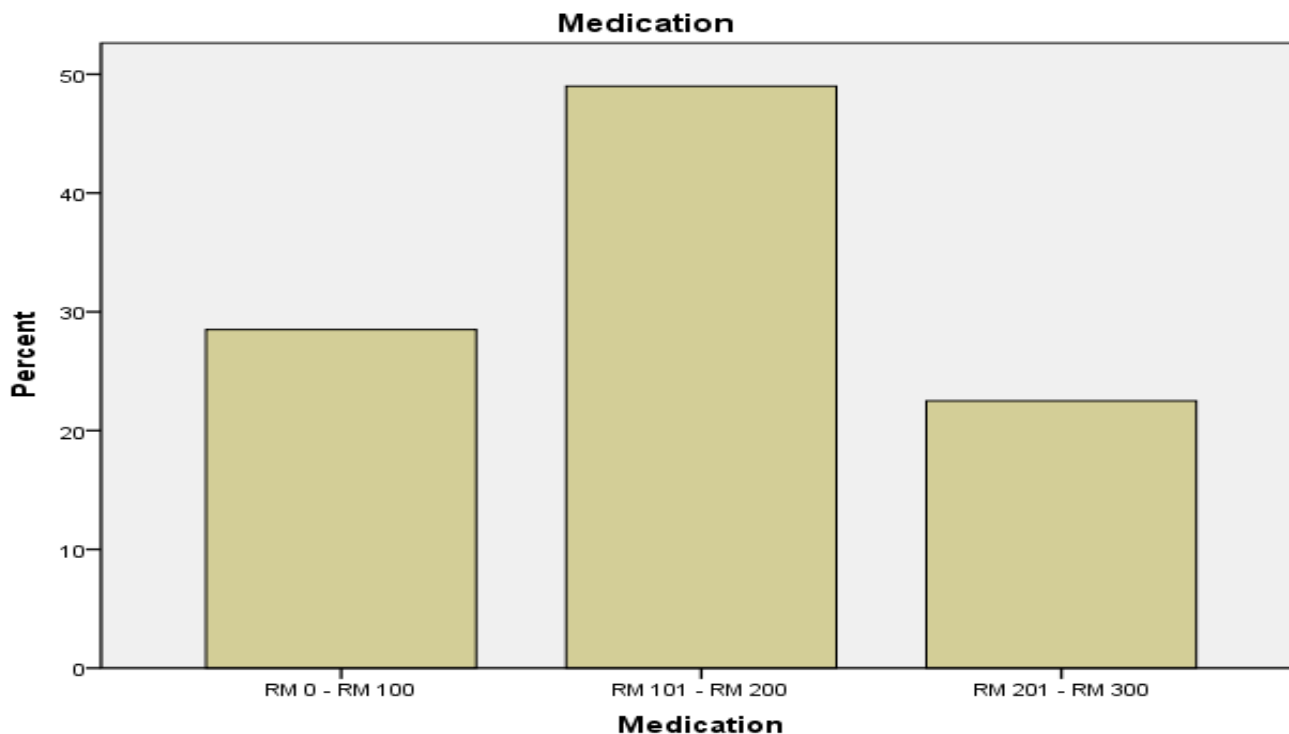


Fig 11. Medication



## CONCLUSION

Our results illustrate the expenses that every single Diabetic Nephropathy patient had been undergoing dialysis is averaged approximately RM 950/month and RM1120/month for direct cost and for indirect cost respectively. As the trend and number of patient that are will undergo dialysis will increase in coming years due to internal and external factors, managing their cost effectively would be one of the main responsibility of a pharmacist. Even though currently most of patients are sponsored or covered by particular organization including government for their diabetic cost but in future the burden of the country will be increase dramatically.

Findings of our study results in construction of cost diary in order to reduce these expenses and manage the patients cost effectiveness with the help of pharmacist. The use of cost diary by diabetic nephropathy patient will provide significant savings in their health care costs; in addition, later on results in savings of direct or indirect

cost, which reflects the broader societal benefit.

Further studies are required in determination of compliance, efficacy and effectiveness in order to minimize the diabetic nephropathy patients' cost. Studies such as ours are needed in order to continue revealing to the nephrological community about the cost effectiveness through cost diary implementations.

## DISCLOSURE

There is no conflict of interest or financial involvement in this study.

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