ORIGINAL ARTICLE

Clinical Profile of Haemodialysis Patients with Diabetic Nephropathy Leading to End Stage Renal Disease

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Abstract

Background: *The incidence of patients with end-stage renal failure and type 2 diabetes mellitus as a comorbid condition has increased progressively in the past decades. Causes of renal disease might vary from one population to another.*

The aim of this study was to know the characteristics of the diabetic patients on regular dialysis at Al-noor Specialist Hospital, Makkah, Saudi Arabia.

Methodology: *The data had been collected retrospectively in the month of Shawal 1425 corresponding to 13-11-2004----12-12-2004 from the diabetic patients directly that were on dialysis due to end stage renal disease (ESRD) and from their files.*

Results*: The mean age of Diabetics was (55.2years) showing male predominance 31(60.8%). All were Saudies. The mean duration of Diabetes mellitus & dialysis were (16.8years) and (22months), respectively. The mean age of start of Diabetes mellitus & dialysis was (37.4 years) & (53.5 years). The mean duration of onset of diabetes to dialysis was (16.1 years). Out of the total, 29(56.9%) were non-smoker. Patients with family H/O diabetes with other associated illnesses were 23(45%) followed by 15(29.4%) had family H/O only diabetes. Type II diabetics were 40(78.4%). Regarding metabolic profile, patients with high blood glucose level were 10(19.6%) while 3(5.9%), 50(98%) & 18(35.3%) patients had high cholesterol, low density lipoprotein & triglyceride levels, respectively.*

Conclusion: *Maximum patients were in sixth decade of life. Up to three fourth patients had family H/O diabetes. Most of the subjects had only diabetic nephropathy. Maximum patients had high low density lipoprotein level. Dialysis was main treatment to control diabetes.*

Key words: *Diabetes mellitus, dialysis, ESRD, diabetic nephropathy.*

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Introduction

The incidence of patients with end-stage renal failure and type 2 diabetes mellitus as a comorbid condition has increased progressively in the past decades, first in the United States and Japan, but subsequently in all countries with a western lifestyle.[1] Causes of renal disease might vary from one population to another.e.g. in Saudi Arabia, renal disease had been reported to be relatively high and was thought probably to be due to a cultural practice that might increase the incidence of genetic renal disease, that was, the intermarriage among cousins and other close relatives similarly other factors of renal disease include hypertension, chronic glomerulonephritis, diabetes, and kidney stones.[2] The prevalence of diabetes mellitus (DM) caused heavy economical burden to health-care providers, the annual mortality among dialysis patients remained high, reaching 22% in USA, 14.4% in Europe, and 11% in Saudi Arabia.[3] There was no data available on the incidence of diabetic renal disease in Saudi diabetics. It was known that vast majority of Saudi diabetics entering dialysis (96%) were of Type II.[4] In Saudi Arabia DM increased from 4.9% in 1985 to 7.4% in 1995,[5] there were 700 patients on hemodialysis at the end of 2001, the annual rate of increase in number of these patients was 9.7% and it was projected that by the year of 2015 there will be more than 13,000 patients on dialysis in Kingdom.[6]

In this article we have studied the clinical profile of diabetic patients with ESRD undergoing hemodialysis at the Al-noor Specialist Hospital, Makkah, with a view of identifying common clinical factors.

Materials and Methods

This descriptive study was done in the nephrology unit of Al-noor specialist hospital; it is a teaching tertiary care referral hospital in the Makkah region, Saudi Arabia. Its dialysis unit had been established on 1409hijra (1989), and started with only seven dialysis machines but now has eighty-one. The data had been collected in the month of Shawal of 1425hijra (corresponding to 13-11-2004----12-12-2004), from patients' files, dialysis charts and also from diabetic patients directly, who were on regular dialysis treatment.

Medical files and dialysis charts were reviewed for Socio-demographic data, duration of illnesses and clinical profile of subjects with associated macro-vascular (coronary artery disease, cerebrovascular &

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peripheral vascular disease, gastrointestinal i.e. gastropareses and diarrhoea, dermatological and genitourinary dysfunctions i.e. uropathy and sexual dysfunction and micro-vascular (eye i.e. retinopathy, macular edema, cataract, glaucoma, and neuropathy and nephropathy) complications.[7] Subjects' age groups were divided into decades. At the time of study, latest values of glucose level, lipid profile were collected from record. Blood sugar (random) level, total cholesterol level,[8] low density lipoprotein level and triglyceride level, ≥200mg/dl, ≥200mg/dl, ≥130mg/dl and ≥165mg/dl respectively were considered as high.[7] The information about History of smoking, family history and anti diabetic treatment had been collected from patients directly.

Similarly type of diabetes had also been confirmed by inquiring from patients the age of diagnosis of diabetes as well as mode of treatment started at the time of diagnosis and current medication at the time of data collection. The whole data had been analyzed manually to show the age of onset of diabetes as well as dialysis, duration of diabetes as well as dialysis, and the time spent from start of diabetes to dialysis.

Simple Chi-squared test was applied to nominal, ordinal and binary categorical data. Measurement data was subjected to descriptive analysis as well as two sample t-Test assuming equal variance to find significance of difference in mean values of metabolic profile between two sexes. P-value ≤0.05 was considered significant.

Results

Total of 253 patients with ESRD was on regular dialysis in the study period. Out of them 57(22.5%) were diabetic *(X^2=75.2, p<0.001)*. Six diabetics were pulled out from study because four had lack of follow up, one was expired and one had lack of required data. Males were 31(60.8%) and all were Saudis. Maximum patients 23(45.1%) were in 6th decade of life. Non-smokers were 29(56.9%). Almost 38(74.5%) patients had family H/O diabetes.

In Table I, most of the subjects 23(45.1%) developed diabetes mellitus in 4th decade of life (mean=37.4±SD1.6). Thirty six (70.6%) were belonged to 11-20 years of duration of diabetes mellitus (mean=16.8±SD0.83). Mostly patients 22(43.1%) developed ESRD requiring dialysis in 6th decade of life (mean=53.5±SD1.7). More than half of subjects 36(70.6%) had duration of dialysis ≤24 months (mean=22±SD2.4). Eighteen (35.3%) patients developed dialysis after 16-20 years of diabetes (mean=16.1±SD1.5). No patient was on dialysis more than six years. In table II, IV, clinical profile showed that 27(52.9%) subjects had only diabetic nephropathy without any other complications. Patients of Type 11 DM were (78.4%). Only one male patient had low density lipoprotein (LDL) level <130mg/dl while 41(80%) had glucose level <200mg/dl. Dialysis was the only management of diabetic control in 30(58.8%) patients.

Table I: - Socio - demographic Data (n = 51)

Variables		no	%	Significance
Age	21-30	3	5.9	*Mean=55.2 ±SD1.6*
	31-40	2	3.9	
	41-50	10	19.6	
	51-60	23	45.1	
	61-70	10	19.6	
	71-80	3	5.9	
Sex	Male	31	60.8	X^2=2 (0.5>p>0.1)
	Female	20	39.2	
Nationality	Saudi	51	100	X^2=51 (p<0.001)
	Non-Saudi	0	0	
Smoking	Non smoker	29	56.9	X^2=22.2 (p<0.001)
	Ex-Smoker	20	39.2	
	Smoker	2	3.9	
Family illness	DM & associated illnesses	23	45	X^2=16.7 (p<0.001)
	Family with DM Only	15	29.4	
	No significant family History	8	15.7	
	Family with hypertension Only	5	9.8	

Table II: - Illnesses duration profile (n = 51)

Variables		no	%
Onset of DM in different age groups (years)	11-20	3	5.9
	21-30	8	15.7
	31-40	23	45.1
	41-50	9	17.6
	51-60	7	13.7
	61-70	1	2
Duration of DM (years)	0-10	4	7.8
	11-20	36	70.6
	≥20	11	21.6
Onset of Dialysis in different age groups (years)	21-30	3	5.9
	31-40	3	5.9
	41-50	12	23.5
	51-60	22	43.1
	61-70	8	15.7
	71-80	3	5.9
Duration of Dialysis (months)	<12	18	35.3
	13-24	18	35.3
	25-36	8	15.7
	37-48	4	7.8
	49-60	1	2
	61-72	2	3.9
Duration spent from start of DM to start of Dialysis (years)	0-5	3	5.9
	6-10	12	23.5
	11-15	11	21.6
	16-20	18	35.3
	>20	7	13.7

Table III: - Subjects clinical profile (n = 51)

Variables				no	%	Significance
*DM complications	Only diabetic nephropathy without other complications			27	52.9	X^2=29.8 (p<0.001)
	Diabetic nephropathy with other macro vascular complications			16	31.4	
	Diabetic nephropathy with other micro vascular complications			6	11.8	
	Diabetic nephropathy with both other micro & macro vascular complications			2	3.9	
Type of DM	Type I			11	21.6	X^2=15.4 (p<0.001)
	Type II			40	78.4	
**Metabolic profile (Mean±SD)	Glucose	Male (146±12)	≥200	5	9.8	t-Test (P=0.04)
			<200	26	51	
		Female (189±17.8)	≥200	5	9.8	
			<200	15	29.4	
	Cholesterol	Male (144.5±8.2)	≥200	1	2	t-Test (P=0.4)
			<200	30	58.8	
		Female (155.3±8.3)	≥200	2	4	
			<200	18	35.3	
	LDL	Male (378±21.4)	≥130	30	58.8	t-Test (P=0.9)
			<130	1	2	
		Female (391±22.3)	≥130	20	39.2	
			<130	0	0	
	Triglycerides	Male (151±12.5)	≥165	9	17.6	t-Test (P=0.2)
			<165	22	43.1	
		Female (181±22.6)	≥165	9	17.6	
			<165	11	21.6	
Diabetic treatment	Controlled on dialysis only			30	58.8	X^2=46 (p<0.001)
	Insulin			18	35.3	
	Oral			3	5.9	
	Both			0	0	

*See methodology
**Cutoff values are in mg/dl, t-Test applied to find out mean difference of values in gender

Table IV, Different parameters of Diabetics with end stage renal disease

Variables	Male Mean(Range)	Female Mean(Range)
Age of start of diabetes (years)	36.1(14-58)	39.4(16-66)
Diabetes mellitus duration (years)	16(3-30)	18.2(7-30)
Age of start of dialysis (years)	52.4(21-74)	55.2(33-76)
Dialysis duration (months)	22(3-72)	21.9(3-60)
Duration of start from diabetes to start of dialysis (years)	16.3(0-43)	15.9(1-30)

Discussion

End-stage renal failure requiring dialysis is one of the most serious complications of diabetes mellitus, and diabetes is the most common cause of end-stage renal failure. The average annual incidence rate of dialysis was 12 times greater in persons with diabetes than without diabetes. By 1999-2000, diabetic patients comprised 51% of the incident dialysis population. The average annual prevalence rate was 10 times greater in the diabetic cohort. Patients with diabetes had more co-morbidity at the start of dialysis and poorer three year survival (55 vs. 68%; $P < 0.0001$). The incident and prevalent rates of dialysis for patients with diabetes mellitus are many times the rates of those without diabetes. Patients with diabetes mellitus often start dialysis with significant co-morbidities, which may contribute to the relatively high rate of mortality on dialysis.[9] A number of cross-sectional studies have confirmed that the susceptibility to ESRD due to non-diabetic renal disease is increased in subjects of African and Indo-Asian descent.[10]

In our unit during the study period 253 patients were on dialysis while in 1982, according to Jondeby, there were 370 patients receiving dialysis in KSA, in 1999 the number increased to 5706, with 2084 new patients entering dialysis in 1999 alone. The mean age increased from 37.9 to 51.3 years, respectively. In the early 1980s, Jondeby reported DM as a cause of end-stage renal disease in only (4%) of the patients[11] but in our unit (22.5%) patients developed ESRD due to DM also contrary to Qari,[5] Brazda12 and al-Muhanna[13] but Foucan showed it (22%)[14] and El-Rashaid had shown (21.1%).[15]

Of all diabetics entering dialysis, non-insulin dependent DM accounted for (78.4%) in our unit compared to (96%) in the study of Ismail[16] and Sunagawa[17] while Brazda had shown (28.6%).[12] Our study showed male predominance similar to the studies of Qari[5], Sunagawa[17] and Whorra[18], but contrary to the study of Foucani.[14]

Hypertension was a most common comorbid stat in our study like in studies of Choi[19] & Perneger.[20] Type 2 diabetes and hypertension are commonly associated conditions, both of which carry an increased risk of cardiovascular and renal disease. The prevalence of hypertension in type 2 diabetes is higher than that in the general population, especially in younger patients. Hypertension increases the already high risk of cardiovascular disease associated with type 2 diabetes.[21] Another factor was that there is diminishing mortality from hypertension and cardiovascular causes, so that patients survive long enough to develop nephropathy and end-stage renal failure.[1]

The mean age of diabetic patients in our study is more than those of Qari[5] and Ma[22]. Similarly mean duration of dialysis in our study was (22.1 months) which was higher than those of Ma[22], Qari[5] and Whorra.[18] The mean age of start of dialysis in our study was lesser than that of Qari[5](46.5yrs) and Foucan[14](60.6yrs). Our study also had shown prominent dyslipidemia. It is noted that out of the study group, (71.2%) had been started on heamodialysis within sixteen to twenty years of being diagnosed to have diabetes, suggesting either a delay in the diagnosis of disease or the presence of other factors leading to acceleration of diabetic nephropathy like dyslipidemia, hypertension.

The prevalence of both acute and chronic renal failure is high in the Arab world. Data available on the exact prevalence of various renal diseases are very limited. Nevertheless, the reported prevalence of chronic renal failure is 80 to 120 per million populations (pmp) in the Kingdom of Saudi Arabia and 225 pmp in Egypt. This is in comparison with the reported prevalence of 283 pmp in Europe, 975 pmp in the United States, and 1149 pmp in Japan. Lower prevalence rates reported in this region could be due to underreporting. Paradoxically, in the Arab world, we have a good opportunity to reduce the incidence of kidney failure (chronic and acute) because many of the causes of renal failure are eminently preventable. It is worthy of mention that, in the Arab world, the budget for research is about 0.15% of the national domestic product compared with the international average of (1.5%).[23]

This study was limited to hospital based and had the data of only diabetic patients who were on regular haemodialysis since last three months of start of study. Subjects who developed ESRD due to other reasons were excluded. Other "umra" visitor patients who were admitted for dialysis not on regular bases were also excluded. Study duration is limited to only one month which did not give picture of new cases. HbA1c which is a good reflector of diabetes control could not be measured. Latest glucose and lipid profile was collected rather than to calculate the mean values of last three months of these investigations Similarly

outcome of subjects were not followed as more complications occurred due to catheterization which could worse the condition.

Conclusion

In conclusion, diabetes is an important cause of ESRD in Saudi patients undergoing chronic HD at al-noor hospital. This may be attributed to poor control of diabetes, hypertension as well as inadequate early screening.

Improved care of diabetes and aggressive management of hypertension with good follow up on out patient bases can reduce or delay prevalence and improve good prognosis of diabetic nephropathy.

This report confirms the association of DM with ESRD and other micro & macro vascular complications, and also the enhancing factors, which are responsible for ESRD due to diabetic nephropathy.

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