

Study of Some Demographic Characteristics for Diabetic Nephropathy Patients: Case-Control Study

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ABSTRACT

Background: A case-control study conducted on (90) persons of both sexes and ages participated in the case-control study, including (45) Diabetic nephropathy (DN) patients and (45) healthy people. The patients ranged in age from 30 to 82 years old. Whole blood samples were gathered from DN patients at: the Laboratory of kidney disease center at Al-Sadr Medical City , the Laboratory of kidney disease center Al-Najaf Al-Ashraf Teaching Hospital , the Laboratory of Najaf Center for Dialysis and Hematology, and the kidney disease center Laboratory of Al-Hakeem General Hospital in Najaf Governorate, Iraq during the period from November 2022 to January 2023. All patients with Diabetic nephropathy (DN) were under go hemodialysis and were diagnosed with diabetes. An Individuals in the healthy group had no history or clinical symptoms of diabetes or kidney diseases.

Keywords: Hypertension, Nephropathy, Diabetic Mellitus, Dialysis.

Article Information

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INTRODUCTION

Diabetic kidney disease and diabetic nephropathy are the leading cause of end-stage kidney disease (Umanath, K., & Lewis, J. B., 2018). Diabetic kidney disease occurs in patients with diabetes mellitus (DM) and reduced kidney function that can be from many diverse causes, including hypertensive nephrosclerosis and unresolved acute kidney failure. Diabetic nephropathy is a diagnosis that refers to specific pathologic structural and functional changes seen in the kidneys of patients with DM (both type 1 and type 2 [T1/T2DM]) that result from the effects of DM on the kidney. These changes result in a clinical presentation that is characterized by proteinuria, hypertension, and progressive reductions in kidney function(kidney failure). DN is a chronic, progressive disease of the kidney that develops over time, with a peak incidence after 10–20 years of diabetes (Samsu, N., 2021).

Renal failure: The term renal failure denotes inability of the kidneys to perform excretory function leading to retention of nitrogenous waste products from the blood. Acute and chronic renal failure are the two kinds of kidney failure. When a patient needs renal replacement therapy, the condition is called end-stage renal disease (ESRD). (Mills, K., & He, J., 2016). Acute Renal Failure (ARF) is the syndrome in which glomerular filtration declines abruptly (hours to days) and is

usually reversible. Chronic Renal Failure (CRF) or chronic kidney disease (CKD) is defined as a persistent impairment of kidney function, in other words, abnormally elevated serum creatinine for more than 3 months or calculated glomerular filtration rate (GFR) less than 60 ml per minute / 1.73m². It often involves a progressive loss of kidney function necessitating renal replacement therapy (dialysis or transplantation). When a patient needs renal replacement therapy, the

condition is called end-stage renal disease (ESRD). (Soragna, et al., 2018).

MATERIALS AND METHODS

The research was a case-control study with a total of 90 individuals, who attended to: Alsader Medical City, Al-Najaf Al-Ashraf Teaching Hospital, Najaf Center for Dialysis and Hematology and Al-Hakeem General Hospital, this research covered the period from November 2022 to January 2023. The participants were divided into two groups, group 1(cases) Patients who undergo hemodialysis (Renal Failure) suffering from diabetes, group 2(controls) apparently healthy subjects were included as a control group, the case-control groups were further divided into male and female sex groups, also the case-control groups were divided into three age groups were (30-45), (46-60), (> 60) age groups,

BMI (Body Mass Index) measurement Body mass index values was counted from the following equation (American Cancer Society, 2020)

$$\text{BMI} = \text{Weigh (Kg)} / \text{Height (m}^2\text{)}$$

It was measured by electronic balance and height apparatus. The BMI of normal weight ranges (18.5- 24.9) Kg/m² and for overweight ranges (25-29.9) Kg/m², When BMI is larger than (30) Kg/m², the person is definitely obese (Kim *et al.*, 2021).

Hypertension measurement: Arterial blood pressure was measured via electronic sphygmomanometer and the Blood pressure values were generally reported in millimetres of mercury (mmHg) (Rader, F., & Victor, R. G., 2017).

RESULTS

Some Demographical characters of diabetic nephropathy (DN) patients and the healthy people (control group).

The statistical analysis in table (1) indicated to 90 samples consisted of 45 diabetic nephropathy (DN) patients, compared with 45 healthy participates as control group. No significant differences in the Sex, B.M.I, marital status, occupation, sight, and smoking of the DN patients compared to control groups, the P-value were (p = 0.517), (p = 1.000), (p = 0.074), (p = 0.055), (p = 0.180), (p = 0.141), respectively. There were significant differences in age of the DN patients compared to control groups P-value were (p= 0.028). Also, there was significant differences in the Kidney disease History of the DN patients P-value were (p= 0.0001). And there were significant differences in hypertension of the DN, P-value were (p= 0.002). There were significant differences in dialysis periods of the DN, P-value were (p= 0.0001). Moreover, there was no significant differences in diabetic mellitus history, other genetic diseases, and diabetic mellitus periods of the DN patients, P-value were (p= 0.426), (p= 0.101), (p= 0.766), respectively.

Table (1): Some Demographical characters of diabetic nephropathy (DN) patients and the healthy people (control group)

Variables	Characteristics	Patients n=45	Control n=45	Chi-Square, p-value
Sex	Male	29	26	0.421 0.517
		64.4%	57.8%	
	Female	16	19	
		35.6%	42.2%	
Age groups	30-45 year	11	23	7.123 0.028 *
		24.4%	51.1%	
	46-60 year	19	14	
		42.2%	31.1%	
	> 60 years	15	8	
		33.3%	17.8%	
BMI groups	Normal weight	17	17	0.000

		37.8%	37.8%	1.000
	Overweight	16	16	
		35.6%	35.6%	
	Obesity	12	12	
		26.7%	26.7%	
Marital Status	Married	26	34	3.200 0.074
		57.8%	75.6%	
	Single	19	11	
		42.2%	24.4%	
Occupation	Disable	15	8	5.804 0.055
		33.3%	17.8%	
	Employee	14	25	
		31.1%	55.6%	
	Worker	16	12	
		35.6%	26.7%	
Sight	Good	27	33	1.800 0.180
		60.0%	73.3%	
	Bad	18	12	
		40.0%	26.7%	
Smoking	Yes	8	14	2.166 0.141
		17.8%	31.1%	
	No	37	31	
		82.2%	68.9%	
Kidney disease History	Yes	8	0	18.689 ^a 0.0001 *
		17.8%	0.0%	
	No	37	45	
		82.2%	100.0%	
D.M. History	Yes	20	0	0.556 ^a 0.456
		44.4%	0.0%	
	No	25	45	
		55.6%	100.0%	
Other Genetic Diseases	Yes	17	0	2.689 ^a 0.101
		37.8%	0.0%	
	No	28	45	
		62.2%	100.0%	
Hypertension	Yes	33	0	9.800 ^a 0.002 *
		73.3%	0.0%	
	No	12	45	
		26.7%	100.0%	
Dialysis periods	< 5 years	40	0	27.222 ^a 0.0001 *
		88.9%	0.0%	
	> 5 years	5	0	
		11.1%	0.0%	
DM periods	< 5 years	15	0	0.533 ^a 0.766
		33.3%	0.0%	
	6-10 years	17	0	
		37.8%	0.0%	
	> 10 years	13	0	
		28.9%	0.0%	

* Significant differences at p-value <0.05. ^a statistical of only patients. Data expressed as frequencies and percentage. Chi-Square test. **BMI:** body max index; **D.M:** diabetes mellitus.

Comparison of demographic characters between DN patients and controls groups.

The statistical analysis in the (2) table indicated to 90 samples consisted of 45 diabetic nephropathy (DN) patients, compared with 45 healthy participates as control group. The table show no significant difference in the mean of age of DN patients were (52.56±1.86) compared to control groups were (48.0±1.69) year, (p=0.074). The difference was not statistically significant (p = 0.846) in mean of B.M.I of DN patients compared with the control groups were (27.23±0.85), and (27.01±0.75) kg/m²,

respectively. The difference was not statistically significant also (p=0.455) in mean of diastolic blood pressure (BP) in DN patients compared with the control groups were (82.71±1.97), and (3.57±0.455) mm/hg, respectively. Also, there was a significant difference in the mean of systolic BP of DN patients were (150.6±3.65) compared with the control groups were (126.47±0.63) mm/hg, (p=0.0001). And there was also a significant difference in the mean of dialysis period of DN patients were (2.09±0.31), (p=0.0001). Moreover, there was a significant difference in the mean of DM period of DN patients were (8.04±0.72), (p=0.0001).

Table (2): comparison of demographic characters between DN patients and controls groups.

Variables	Patients n= 45		Control n=45		p-value [#]
	Mean	SEM	Mean	SEM	
Age (Years)	52.56	1.86	48.00	1.69	0.074 ns
B.M.I (kg/m2)	27.23	0.85	27.01	0.75	0.846 ns
Systolic BP (mm/hg)	150.36	3.65	126.47	0.63	0.0001*
Diastolic BP (mm/hg)	82.71	1.97	84.24	0.53	0.455 ns
Dialysis Period	2.09	0.31	0.00	0.00	0.0001 *
D.M. period	8.04	0.72	0.00	0.00	0.0001 *

* Significant differences at p-value <0.05. ns: no significant. SEM: Standard Error mean. # Independent T-Test. **BMI**: body mass index; **BP**: blood pressure; **D.M**: diabetes mellitus.

DISCUSSION

Some Demographical characters of diabetic nephropathy (DN) patients and the healthy people (control group)

The results of the current study showed a significant differences in age of the DN patients compared to control groups P-value were (p= 0.028), the difference was in the number of control group (> 60) category. This is

because it is difficult to get healthy volunteers in this age category. Also, there was significant differences in the Kidney disease History of the DN patients P-value were (p= 0.0001). The difference was due to the rarity of the genetic predisposing factors of renal impairments. (Regele, *et al.*, 2015). And there were significant differences in hypertension of the DN patients, P-value were (p= 0.002). Because of expansion of extracellular fluid volume

is the major pathophysiologic mechanism for the development of hypertension in hemodialysis patients. (Rahman, M., & Smith, M. C., 2001). In the same regard there was significant differences in dialysis periods of the DN, P-value were ($p=0.0001$). The difference was due to the fact that the dialysis patient either dies after 5 years or undergoes a kidney transplant.

comparison of demographic characters between DN patients and controls groups

The result of the current study has shown There was a significant difference in the mean of systolic BP of DN patients were (150.6 ± 3.65) compared with the control groups were (126.47 ± 0.63) mm/hg, ($p=0.0001$). Diabetic nephropathy is a serious complication of diabetes mellitus and a leading cause of end-stage renal disease. It is characterized by progressive kidney damage, impaired kidney function, and increased risk of cardiovascular events. And also hypertension is a common comorbidity in diabetic nephropathy patients and is known to accelerate the progression of kidney damage, studies have demonstrated that diabetic nephropathy patients exhibit higher systolic blood pressure levels compared to control groups without nephropathy the elevation in SBP is believed to be multifactorial, influenced by factors such as hyperglycemia, insulin resistance, dyslipidemia, and activation of the renin-angiotensin-aldosterone system (RAAS) in response to kidney dysfunction (Bakris, *et al.*, 2000). furthermore there was a significant difference in the mean of dialysis period of DN patients were (2.09 ± 0.31), ($p=0.0001$), the difference was due to the control healthy participants. Also, a significant difference in the mean of DM period of DN patients were (8.04 ± 0.72),

($p=0.0001$), the difference was due to the control healthy participants.

CONCLUSIONS

It was concluded that the physical characters of diabetic nephropathy patients were severely altered by hemodialysis and the progression of diabetes and renal failure

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