International Journal of Food Science and Nutrition
ISSN: 2455-4898, Impact Factor: RJIF 5.14
www.foodsciencejournal.com
Volume 2; Issue 4; July 2017; Page No. 136-139

Assessment of risk factors of diabetic nephropathy in Swaroop Rani Nehru hospital, Allahabad, Utter Pradesh

[1] Singh Pallavi, [2] Paul Virginiaand, [3] Singh Shikha

[1, 3] Research Scholar, Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad, Utter Pradesh, India

[2] Associate Professor, Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad, Utter Pradesh, India

Abstract

Diabetic nephropathy is the leading cause of End Stage Renal Disease (ESRD) worldwide and it is estimated that more than 20% type 2 diabetic patients reach ESRD during their lifetime.

Objectives: To find out nutritional and other risk factors associated with the prevalence of diabetic nephropathy**.**

Research Design: In this study the risk factors associated with the diabetic nephropathy was identified among the known diabetic subjects. Type 2 diabetic subjects (n=60), inclusive of known diabetic subjects with condition of either microalbuminuria (UAE >20 µg/min and ≤199 µg/min) or macroalbuminuria (UAE ≥200 µg/min) were purposively selected from the nephrology department of Swaroop Rani Medical Collage, Allahabad.

Results: Microalbuminuria was present in 47% of respondent. Percent analysis showed that older age (60%), longer duration of diabetes (67%), high BMI (60%), HbAlc (80%), serum creatinine (70%), and triglyceride level (60%), high blood pressure (73%), low hemoglobin level (60%), high plasma glucose (83%) and lower HDL cholesterol level (67%) were directly associated with albuminuria. But albuminuria was not associated with the gender, smoking (23%), total cholesterol (10%), LDL cholesterol (13%) or family history of diabetes (27%). Faulty food habits due to the lack of nutritional awareness were also measured as a major risk factor associated with development of diabetic nephropathy.

Keywords: ESRD, microalbuminuria, diabetic nephropathy, macroalbuminuria

1. Introduction

Diabetic nephropathy is the leading cause of kidney disease in patients starting renal replacement therapy and affects 40% of type 1 and type 2 diabetic patients. It increases the risk of death, mainly from cardiovascular causes, and is defined by increased urinary albumin excretion (UAE) in the absence of other renal diseases (USRDS, 2003) [25]. Diabetic nephropathy is categorized into stages: Microalbuminuria (UAE >20 µg/min and ≤199 µg/min) and Macroalbuminuria (UAE ≥200 µg/min). According to the most recent estimates published in the Diabetes Atlas 2006 (Sicree R *et al.* 2006), India has the largest number of diabetic patients in the world, estimated to be ≥40.9 million in the year 2007 and expected to increase to ≥69.9 million by the year 2025. Type 2 diabetes in Asian Indians differs from that in Europeans in several aspects: the onset is at a younger age, obesity is less common, and genetic factors appear to be more common (Mohan V *et al.* 1997) [17]. Some studies (Samanta A *et al.* 1986) conducted in migrant Asian Indians in the U.K. and Europe has reported increased prevalence of diabetic nephropathy compared with white Caucasians. The few studies published on the prevalence of diabetic nephropathy in India have all been clinic based (Vijay V *et al.* 1994) [26]. Indeed, the Diabetes Atlas 2006 (Sicree R *et al.* 2006) does not list a single population-based study on diabetic nephropathy from South Asia. This article reports on the first population based data on the prevalence of diabetic nephropathy in India.

2. Materials and Methods

This study was a cross sectional and descriptive study based on prevalent condition of the population. The newly diagnosed patients of Diabetic Nephropathy were choosen as unit of study and Out-Patient Department of Swaroop Rani Nehru Hospital, Allahabad, India were selected as area of the study. The sample size of the study was 60 and samples were selected purposively among the population. A pre-tested questionaire was used to record the socio-demographic detail like age, sex, literacy and income. The biochemical parameters like plasma glucose level, lipid profile, hemoglobin level, HbAlc, serum albumin level and clinical assessment such as systolic and diastolic blood pressure were recorded from the recent medical reports of selected patients. The anthropometric such as height and weight were measured to find out BMI of the patients. Some other factors such as presence of smoking, duration of diabetes and genetic factor were also recorded. The dietary risk facotrs like high intake (4-5 times in a week) of milk & milk product, whole pulses, sprouts, egg, non-vegetarian items, GLV, salt, canned food, fruits, fruit juice and dry fruits were measured with the help of 24 hour dietary recall and food freequency methods. The data obtained was subjected to statistical analysis by using Arithmetic Mean technique.

3. Results and Discussion

Table 1: Socio-demographic data of the respondents suffering with Diabetic Nephropathy

Factors	Categories	Frequency	Percentage
Age	51-55 Years	6	10%
	56-60 Years	18	30%
	61-65 Years	24	40%
	Above 65 Years	12	20%
Gender	Male	32	53%
	Female	28	47%
Education	Illiterate	2	3%
	Upto Primary	18	30%
	Intermediate	24	40%
	Graduation	10	17%
	Post-Graduation	6	10%
Family Income	Low Income (≤5000Rs/month)	24	40%
	Middle Income(10000-15000Rs/month)	28	47%
	High Income(≥15000Rs/month)	8	13%

The present study was conducted on 60 diabetic nephropathy patients. Among all the respondents 53% were male and 47% were female. 3% respondents were illiterate and 40% were completed their school education. Among diabetic nephropathy patients 40% were belongs to 61-65 year age group and 47% were belongs to middle income group. This data reveal that older age was directly associated with the diabetic nephropathy while gender, education and family income were having no significant relationship with occurrence of diabetic nephropathy (Minshawy *et al*. 2014) [10]. Also reported that older age is responsible for the occurrence of diabetic nephropathy.

Table 2: Anthropometric and clinical observation of the respondents suffering with Diabetic Nephropathy

	BMI	Range	Frequency	Percentage
Body mass Index	Underweight	Below 18	4	7%
	Normal	18-24.9	12	20%
	Overweight	25-29.9	36	60%
	Obese	More than 30	8	13%
Blood Pressur*e*	Normal	Systolic-120/Diastolic-80	16	27%
	Hypertension	Systolic-140/Diastolic-90	44	73%

In this study BMI was normal in 20% respondents while 60% respondents were in obese category (Unnikrishnan *et al*, 2007) [24]. Among studied population 27% were having normal blood pressure and 73% were in hypertensive category (Pasko *et al*. 2013) [19]. This data reveals that high BMI and high blood pressure directly associated with the occurrence of diabetic nephropathy**.**

Table 3: Biochemical Parameters Observation of the Respondents Suffering with Diabetic Nephropathy

	Categories	Range	Frequency	Percentage
Serum Albumin Level	Microalbuminuria	30 and 299 µg/mg of creatinine	34	57%
	Macroalbuminuria	≥300 µg/mg of creatinine	26	43%
Glycated hemoglobin	Normal	≤*7.0DCCT%*	12	20%
	High Level	≥*7.0DCCT%*	48	80%
Serum Creatinine Level	Normal condition	1.4 mg/100ml	18	30%
	Severe Condition	≥1.4 mg/100ml	42	70%
Total Cholesterol Level	Normal	≤ 200 mg/dl	32	53%
	High	≥ 200 mg/dl	6	10%
HDL Cholesterol Level	Normal	≥ 40 mg/dl	20	33%
	Low	≤ 40 mg/dl	40	67%
LDL Cholesterol Level	Normal	≤140 mg/dl	28	47%
	High	>150 mg/dl	8	13%
Serum Trigycerides level	Normal	≤ 499 mg/dl	6	10%
	High	≥ 499 mg/dl	36	60%
Fasting Plasma Glucose	Impaired Glucose Tolerance	100-140 mmol/l	10	17%
	Diabetes Mellitus	≥140 mmol/l	50	83%
Blood Haemoglobin Level	Normal	13.5-17.5 gm/dl	10	17%
	Low	≤ 10 gm/dl	36	60%

In biochemical parameter assessment of selected respondents 57% were having microalbuminuria and 43% were belongs to macroalbuminuria. High level of HbAlc was found in 80% respondents while 70% were having high level of serum

creatinine. In lipid profile 53% were having normal total cholesterol level, 67% were having low HDL cholesterol level, 47% were having normal LDL cholesterol level and 60% were having high level of serum triglycerides. Among selected respondents 63% were in diabetes mellitus category while 60% were having low level of blood hemoglobin (Sosale *et al*. 2014, Unnikrishnan *et al*, 2007) [23, 24].

Table 4: Non-modifiable Risk Factors Associated with Patients of Diabetic Nephropathy

	Categories	Frequency	Percentage
Duration of Diabetes	<5 years	8	13%
	6-10 years	40	67%
	>10 years	12	20%
Genetic Factor	Yes	16	27%
	No	44	73%

The duration of diabetes was 6-10 years in 67%, absence of smoking in 77% and no effect of genetic factor in 73% of the selected population. So the data shows that long duration of diabetes is directly associated with the disease while smoking and genetic factor having no effect on the prevalence of diabetic nephropathy. (Unnikrishnan *et al*. 2007) [24].

Table 5: Food Consumption Pattern of the respondents suffering with Diabetic Nephropathy

	Consumption Pattern	Frequency	Percentage
Milk and Milk Products	Once in a week	6	10%
	2-3 times in a week	8	13%
	Daily	46	77%
Whole pulses, Sprouts	Once in a week	4	7%
	2-3 times in a week	18	30%
	Daily	38	63%
Egg and Non-veg items	Once in a week	6	10%
	2-3 times in a week	30	50%
	Daily	24	40%
GLV, other vegetables	Once in a week	6	10%
	2-3 times in a week	6	10%
	Daily	48	80%
Salt intake, canned food	Once in a week	36	60%
	2-3 times in a week	6	10%
	Daily	18	30%
Fruit and Fruit Juice	Once in a week	2	4%
	2-3 times in a week	6	10%
	Daily	52	86%
Dry Fruits	Once in a week	4	7%
	2-3 times in a week	12	20%
	Daily	44	73%

The above data illustrate that High consumption of milk and milk products among the respondents were 77% followed by whole pulses and sprouts (63%), egg and non- vegetarian items (40%), GLV and other vegetables (80%), salt and canned food intake (30%), fruit and fruit juice (86%) and dry fruits (73%) of the selected respondents. This data was collected through 24 hour dietary recall method in which diet history of the respondents were taken for 3 days. It shows that maximum respondents having faulty food habits which is positively associated with the high intake of protein in the diet which results in the high creatinine level in the blood and it worsen the diseased condition i.e. Diabetic Nephropathy.

4. Conclusion

In this study various modifiable and non-modifiable risk factors of the diabetic nephropathy were examined among the selected respondents and the characteristics present in the respondents shows that diseased condtion (Diabetic Nephropathy) was significantly associated with the older age, longer duration of diabetes, presence of retinopathy, high BMI, HbAlc, serum creatinine, and triglyceride level and lower HDL cholesterol level. But it is not associated with the gender, smoking, total cholesterol, LDL cholesterol or family history of diabetes. Nutritional factors are also play a very important role in the occurrence of diabetic nephropathy in the respondents as many patients follow faulty food consumption pattern due to the lack of nutritional awareness. By creating nutritional awareness among them we can reduce the severity of the disease.

5. References-

1. Ayodele OE, Alebiosu CO, Salako BL. Diabetic nephropathy: a review of the natural history, burden, risk factors and treatment. J Natl Med Assoc, 2004; 96:1445-1454.
2. Appel GB, Radhakrishnan J, Avram MM, DeFronzo RA, Escobar-Jimenez F, Campos MM *et al.* Analysis of metabolic parameters as predictors of risk in the RENAAL study. Diabetes Care. 2003; 26:1402-1407.
3. Adler AI, Stevens RJ, Manley SE, Bilous RE, Cull CA, Holman RR. Development and progression of nephropathy in type 2 diabetes: the United Kingdom Prospective Diabetes Study (UKPDS 64). *Kidney Int.* 2003; 63:225-232.

4. Al-Rubeaan K, Abu El-Asrar AM, Youssef AM, Subhani SN, Ahmad NA, Al-Sharqawi AH, *et al.* Diabetic retinopathy and its risk factors in a society with a type 2 diabetes epidemic: a Saudi National Diabetes Registry-based study. *Acta Ophthalmol.* 2014.
5. Bolton WK, Cattran DC, Williams ME, Adler SG, Appel GB, Cartwright K, *et al.* Randomized trial of an inhibitor of formation of advanced glycation end products in diabetic nephropathy. Am J Nephro, 2004; l24:32-40.
6. Bruno G, Cavallo-Perin P, Bargero G, Borra M, Calvi V, D'Errico N, *et al.* Prevalence and risk factors for micro- and macroalbuminuria in an Italian population-based cohort of NIDDM subjects. Diabetes Care. 1996; 19:43-47.
7. Chandie Shaw PK, Baboe F, van Es LA, van der Vijver JC, van de Ree MA, de Jonge N *et al.* South-Asian type 2 diabetic patients have higher incidence and faster progression of renal disease compared with Dutch-European diabetic patients. Diabetes Care. 2006; 29:1383-1385.
8. Chaturvedi N, Bandinelli S, Mangili R, Penno G, Rottiers RE, Fuller JH. Microalbuminuria in type 1 diabetes: rates, risk factors and glycemic threshold. Kidney Int. 2001; 60:219-227.
9. Costa LA, Canani LH, Lisboa HR, Tres GS, Gross JL. Aggregation of features of the metabolic syndrome is associated with increased prevalence of chronic complications in type 2 diabetes. Diabet Med. 2004; 21:252-255.
10. Minshawy El, Ghabrah T, Bassuoni El. Diabetic nephropathy as a cause of end-stage renal disease in Tabuk area, Saudi Arabia: a four-year study. Saudi J Kidney Dis Transpl.Sep. 2014; 25(5):1105-9.
11. Hovind P, Tarnow L, Rossing P, Jensen BR, Graae M, Torp I, *et al.* Predictors of the development of microalbuminuria and macroalbuminuria in patients with type 1 diabetes: inception cohort study. *BMJ.* 2004; 328:1105-1108.
12. Hansen KW, Mau Pedersen M, Marshall SM, Christiansen JS, Mogensen CE. Circadian variation of blood pressure in patients with diabetic nephropathy. *Diabetologia.* 1992; 35:1074-*1079.*
13. Klein R, Klein BE, Moss SE. Prevalence of microalbuminuria in older-onset diabetes. *Diabetes Care.* 1993; 16:1325-1330.
14. Lizicarova D, Krahulec B, Hirnerova E, Gaspar L, Celecova Z. Risk factors in diabetic nephropathy progression at present. Bratisl Lek Listy. 2014; 115(8):517-21.
15. Collins VR, Dowse GK, Finch CF, Zimmet PZ, Linnane AW. Prevalence and risk factors for micro- and macroalbuminuria in diabetic subjects and entire population of Nauru. Diabetes. 1989; 38:1602-1610.
16. Mauer SM, Steffes MW, Brown DM. The kidney in diabetes. Am J Med. 1981; 70:603-612.
17. Mohan V, Meera R, Premalatha G, Deepa R, Miranda P, Rema M. Frequency of Proteinuria in type 2 diabetes mellitus seen at a diabetes centre in southern India. Postgrad Med J. 2000; 76:569-573.
18. Osterby R, Gall MA, Schmitz A, Nielsen FS, Nyberg, Parving G. Glomerular structure and function in proteinuric type 2 (non-insulin-dependent) diabetic patients. *Diabetologia.* 1993; 36:1064-1070.
19. Pasko N, Toti F, Strakosha A, Thengjilli E, Shehu A, Dedej T, *et al.* Prevalence of microalbuminuria and risk factor analysis in type 2 diabetes patients in Albania: the need for accurate and early diagnosis of diabetic nephropathy. *Hippokratia.* 2014; 17(4):337-41.
20. Quinn M, Angelico MC, Warram JH, Krolewski AS. Familial factors determine the development of diabetic nephropathy in patients with IDDM. *Diabetologia.* 1996; 39:940-945.
21. Riley MD, Dweyr T. Microalbuminuria is positively associated with usual dietary saturated fat intake and negatively associated with usual dietary protein intake in people with insulin-dependent diabetes mellitus. Am J Clin Nutr. 1998; 67:50-57.
22. Svensson MK, Tyrberg M, Nyström L, Arnqvist HJ, Bolinder J, Ostman J, *et al.* The risk for diabetic nephropathy is low in young adults in a 17-year follow-up from the Diabetes Incidence Study in Sweden (DISS). Older age and higher BMI at diabetes onset can be important risk factors. Diabetes Metab Res Rev, 2014.
23. Sosale A, Prasanna Kumar KM, Sadikot SM, Nigam A, Bajaj S, Zargar AH *et al.* Chronic complications in newly diagnosed patients with Type 2 diabetes mellitus in India. Indian J Endocrinol Metab. 2014; 18(3):355-60.
24. Unnikrishnan R, Rema M, Pradeepa R, Deepa M. Prevalence and Risk Factors of Diabetic Nephropathy in an Urban South Indian Population. Diabetic Care. 2007; 30(8):2019-2024.
25. US Renal Data System: USRDS Annual Data Report: Atlas of End-Stage Renal Disease in the United States. Bethesda, MD, National Institute of Health, National Institute of Diabetes and Digestive and Kidney Diseases, 2003.
26. Vijay V, Snehalatha C, Ramachandran A, Viswanathan M. Prevalence of Proteinuria in noninsulin dependent diabetes. J Assoc Physicians India. 1994; 42:792-794.
27. Wong TY, Shankar A, Klein A, Klein BE. Retinal vessel diameters and the incidence of gross proteinuria and renal insufficiency in people with type 1 diabetes. *Diabetes.* 2004; 53:179-184.
28. Wirta OR, Pasternack AI, Oksa HH, Mustonen JT, Koivula TA, Helin HJ *et al.* Occurrence of late specific complications in type II (non-insulin-dependent) diabetes mellitus. J Diabetes Complications. 1995; 9:177-185.