



EFFECT OF SMOKING ON DIABETIC NEPHROPATHY

Sara Elfatih*¹, Tawfeeg Wahbi² and Liza Hamdi³

^{1,2,3}Department of Chemical Pathology, Faculty of Medical Laboratory Sciences, University of Khartoum-Sudan.

*Corresponding Author: Sara Elfatih

Department of Chemical Pathology, Faculty of Medical Laboratory Sciences, University of Khartoum-Sudan.

Article Received on 03/02/2017

Article Revised on 23/02/2017

Article Accepted on 16/03/2017

ABSTRACT

Background: Diabetic nephropathy is considered to be one of the major complications of diabetes mellitus, and its prevalence is continuously progressing worldwide. Its associated with increase cardiovascular mortality. **Methodology:** urine from 100 diabetic male patients (50 smokers, 50 nonsmokers) were analyzed for albumin: creatinine ratio. Albumin measured using immunoturbidimetric method albc2 using Copas analyzer and creatinine measured by jaffe reaction. **Results:** the result of this study showed an association between smoking cigarette and prevalence of diabetic nephropathy (p-value 0.000). And no significant association between age with albumin creatinine ratio (p-value 0.459). **Conclusion:** smoking cigarette has a significant relationship with prevalence of diabetic nephropathy.

KEYWORDS: diabetic nephropathy, smoking.

INTRODUCTION

Diabetic nephropathy is considered to be one of the major complication of diabetes mellitus and its prevalence is continuously progressing worldwide. Its associated with increased cardiovascular mortality. Progression of this disease is accelerated by various factors such as hypertension, chewing tobacco, alcoholism and smoking.^[1,2] The pathophysiological mechanism underlying health effects of smoking are complex, smoking was demonstrated to increase plasma endothelin levels and its associated with formation of free radicals.

Diabetic smokers are usually associated with glomerular hypertrophy followed by albuminuria.^[3,4] Albuminuria is commonly used for early detection of diabetic nephropathy and it's the first sign of the disease.^[5,6] Patients considered to have albuminuria when (urine albumin creatinine ratio >30mg/g). Diabetic nephropathy has been categorized into microalbuminuria and macroalbuminuria based on the amount of albumin excreted.^[7] Smoking has been reported to be associated with the progression of diabetic nephropathy, In prospective studies progression to diabetic nephropathy was more frequent in smokers than non-smokers.^[8,9] Many studies have also evaluated the association between smoking cessation and diabetic nephropathy. A recent decline in complications of diabetes including renal disease was linked to management and improvement of various risk factors including smoking cessation.^[10] Other prospective studies showed that smoking cessation slowed the development of diabetic

nephropathy.^[11,12] Smoking had also been to be associated with nephropathy in non-diabetic population. Subjects classified as smokers had higher prevalence of albuminuria and abnormal renal function.^[13,14]

Our study was aimed to investigate the association between cigarette smoking and diabetic nephropathy.

MATERIALS AND METHOD

This study was conducted as case control study on 100 normotensive, nonalcoholic males patients diagnosed with diabetes (50 diabetic smoker as cases and 50 diabetic non-smoker as control). The study was conducted in AL Khartoum state in Soba and Alribat teaching hospitals. Spot urine samples were collected from participants and analyzed immediately for albumin and creatinine. albumin was measured by immunoturbidimetric method albc2 using Copas Integra analyzer and creatinine measured by jaffe reaction and ratio was Obtained. Diabetic nephropathy defined by the presence of albuminuria (spot urine albumin/creatinine ratio >30mg/g). female patients were excluded from the study because of the small proportion of female in the community who smoked.

RESULTS

This study showed a significant association between smoking cigarette and albumin/creatinine ratio (ACR) with a mean diabetic smoker (41.42±12.020) and diabetic nonsmoker mean (26.91±4.91) (p- value 0.00) as reported in table(1). Our study was conducted on 50 diabetic smoker male with mean age of (53.68±9.204).

and 50 diabetic nonsmokers with mean age of (48.56±10.190), there was no significant association between mean age and albumin creatinine ratio see table(1).

Table 1: show comparison between ACR and age among study group.

		Diabetic Smoker	Diabetic non smoker	P value
Age	Mean	53.68	48.56	.459
	SD	9.20	10.19	
Albumin /creatinine	mean	41.42	26.91	0.000
	SD	12.020	4.91	

DISCUSSION

Diabetic nephropathy is one of the major complication of diabetes mellitus, it's progression was also associated with many factors such as hypertension, alcoholism and cigarette smoking. Smoking effect on the basement membrane of the nephrons causing glomerular hypertrophy. Smoking promotes the progression of all stages of diabetic nephropathy to a similar extent, both in type 1 and type 2 diabetes, it increases the risk for development of microalbuminuria and accelerates progression from the stage of microalbuminuria to macroalbuminuria and accelerates progression from early stages of diabetic nephropathy to ESRD. In this study significant association between smoking and progression of diabetic nephropathy was seen(p -value 0.000), this is agreed with other studies that showed smoking can change the structure and function of glomerular basement membrane and increase albuminuria.^[15] Epidemiological studies have shown that cigarette smoke, an oxidant agent, is a risk factor for the development of diabetic nephropathy (DN). Some studies have suggested smoking cessation can delay progression of diabetic nephropathy, Lower progression to diabetic nephropathy or improvement of the ACR observed in prospective studies of diabetic subjects who exhibited microalbuminuria.^[16,17,18] No significant association between mean age of each group and albumin creatinine ratio (p- value .459).

CONCLUSION

From literature and result of the study we conclude that there was a significant association between smoking tobacco and prevalence of diabetic nephropathy. So, we recommend patients to change their habit and stop smoking to decrease its effect and slow progression of diabetic nephropathy. This study has some limitations, first female was not included in the study because of the difficulty in sampling so we can't generalize the result to entire diabetic population. Also dose of cigarettes and duration of smoking were not included in the study, So we recommend to include these factors in other studies.

ACKNOWLEDGMENT

I thanks Allah for all his blessing. Thanks my lovely family for the support, I appreciate chemical department, faculty of Medical Laboratory Sciences, University of

Khartoum for the encouragement.

REFERENCES

- Christiansen JS. Cigarette smoking and prevalence of microangiopathy in juvenile- onset insulin-dependent diabetes mellitus. *Diabetes Care*. 1978; 1: 146-149.
- Valmadrid CT, Klein R, Moss SE, Klein BE. The risk of cardiovascular disease mortality associated with microalbuminuria and gross proteinuria in persons with older-onset diabetes mellitus. *Arch Intern Med*. 2000; 160: 1093-1100.
- Rask-Madsen C, King GL. Mechanisms of Disease: endothelial dysfunction in insulin resistance and diabetes. *Nat Clin Pract Endocrinol Metab*. 2007; 3: 46-56.
- Hua P, Feng W, Ji S, Raji L, Jaimes EA. Nicotine worsens the severity of nephropathy in diabetic mice: implications for the progression of kidney disease in smokers. *Am J Physiol Renal Physiol*. 2010; 299: 732-739.
- Molitch ME, DeFronzo RA, Franz MJ, Keane WF, Mogensen CE, Parving HH, et al. Nephropathy in diabetes. *Diabetes Care*. 2004; 27: 79-83.
- Raptis AE, Viberti G. Pathogenesis of diabetic nephropathy. *Exp Clin Endocrinol Diabetes*. 2001; 109 2: 424-437.
- American Diabetes Association: Nephropathy in diabetes (Position Statement). *Diabetes Care*. 2004; 27: 79-83.
- Chuahirun T, Khanna A, Kimball K, Wesson DE. Cigarette smoking and increased urine albumin excretion are interrelated predictors of nephropathy progression in type 2 diabetes. *Am J Kidney Dis*. 2003; 41: 13-21.
- Sawicki PT, Didjurgeit U, Mühlhauser I, Bender R, Heinemann L, Berger M. Smoking is associated with progression of diabetic nephropathy. *Diabetes Care*. 1994; 17: 126-131.
- Gregg EW, Li Y, Wang J, Burrows NR, Ali MK, Rolka D, et al. Changes in diabetes-related complications in the United States, 1990-2010. *N Engl J Med*. 2014; 370:1514-1523.
- Chuahirun T, Simoni J, Hudson C, Seipel T, Khanna A, Harrist RB, et al. Cigarette smoking exacerbates and its cessation ameliorates renal injury in type 2 diabetes. *Am J Med Sci*. 2004; 327: 57-67.

12. Phisitkul K, Hegazy K, Chuahirun T, Hudson C, Simoni J, Rajab H, et al. Continued smoking exacerbates but cessation ameliorates progression of early type 2 diabetic nephropathy. *Am J Med Sci.* 2008; 335: 284–291.
13. Pinto-Sietsma SJ, Mulder J, Janssen WM, Hillege HL, de Zeeuw D, de Jong PE. Smoking is related to albuminuria and abnormal renal function in nondiabetic persons. *Ann Intern Med.* 2000; 133: 585–591.
14. Gupta RK, Gupta R, Maheshwari VD, Mawliya M. Impact of smoking on microalbuminuria and urinary albumin creatinine ratio in non-diabetic normotensive smokers. *Indian J Nephrol.* 2014; 24: 92–96.
15. Baggio B, Budakovic A, Dalla Vestra M, Saller A, Bruseghin M, Fioretto P. Effects of cigarette smoking on glomerular structure and function in type 2 diabetic patients. *J Am Soc Nephrol.* 2002; 13: 2730–2736.
16. Coresh J, Astor BC, Greene T, Eknoyan G, Levey AS. Prevalence of chronic kidney disease and decreased kidney function in the adult US population. Third National Health and Nutrition Examination Survey. *Am J Kidney Dis.* 2003; 41: 1–12 Medline.
17. Hallan SI et al. International comparison of the relationship of chronic kidney disease prevalence and ESRD risk. *J Am Soc Nephrol* 2006; 17: 2275–2284.
18. Chadban SJ, Briganti EM, Kerr PG, Dunstan DW, Welborn TA, Zimmet PZ, Atkins RC: Prevalence of kidney damage in Australian adults. The Aus Diab kidney study. *J Am Soc Nephrol.* 2003; 14: 131–138.
19. Sara elfatih |Department OF Chemical Pathology, Faculty of Medical Laboratory Sciences, Al Khartoum University –Sudan| Email: saraelfatih89@hotmail.com.