CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.3611685

Available online at: http://www.iajps.com Research Article

ASSOCIATION BETWEEN MICRO-ALBUMINURIA AND LEVEL OF SERUM URIC ACID IN PATIENTS OF T-2 DIABETIC NEPHROPATHY

Dr Ayesha Aleem
Allied and DHQ hospital Faisalabad

Article Received: November 2019 **Accepted:** December 2019 **Published:** January 2020

Abstract:

Objective: *The aim of this research work is to calculate the association among level of serum uric acid and micro-albuminuria in the patients suffering from Type-2 DN (Diabetic Nephropathy).*

Methodology: *This transverse research work carried out in Allied / DHQ Hospital Faisalabad from September 2018 to March 2019. Total two hundred patients from Type-2 DN were the part of this research work. We gathered the data about their demography and contacts. We measured the level of serum uric acid and micro-albuminuria by ACR (Albumin to Creatinine Ratio) from samples of urine at the time of patient's inclusion. We collected all the information on a Performa. We used the Pearson correlation coefficient and T-test for the evaluation of the correlation & significance correspondingly.*

Results: *Out of total two hundred patients, 29.0% (n: 58) were having 16 to 40 years of age whereas 71.0% (n: 142) were present with 41 to 65 years of age. The average age of the patients was 48.10 ± 10.260 years. Total 48.50% (n: 97) patients were male and 51.50% (n: 103) patients were females. The average level of serum uric acid was 6.990 ± 1.010 mg/dL whereas the average level of micro-albuminuria was 5.630 ± 1.080 mg/mmol; r-value was 0.08380 which is present with a positive association.*

Conclusion: *The findings of this research work showed that serum uric acid level and micro-albuminuria are present with positive correlation in the patients present with Type-2 diabetic nephropathy.*

KEYWORDS: *Uric Acid, Type-2 DN, Oxidants, Micro-Albuminuria, Impairment, Albumin to Creatinine Ratio, Pearson, Coefficient.*

Corresponding author:
Dr Ayesha Aleem,
Allied and DHQ hospital Faisalabad

QR code

Please cite this article in press Ayesha Aleem et al., ***Association Between Micro-Albuminuria And Level Of Serum Uric Acid In Patients Of T-2 Diabetic Nephropathy.,*** *Indo Am. J. P. Sci, 2020; 07(01).*

INTRODUCTION:

Type-2 DM is very common health issue in whole world. There is a continuous increase in the prevalence of this complication and it is supposition that it will affect more than 366 million persons until 2030 in whole world. Type-2 DM has correlation with the high risk of cardiovascular complications and atherosclerotic burden. In our country Pakistan, the cumulative incidence of Type-2 DM is 13.140%. The activity of the enzyme xanthine oxidase produces the uric acid it is the final outcome of the purine metabolism. Xanthine oxidase can produce the oxidants in this procedure that may play an important role in various cardiovascular complications and kidney abnormality. Kidneys discrete 2/3rd uric acid and 1/3rd is normally degraded in gut. In the duration of the production of uric acid, there is generation of oxygen free radicals and therefore, uric acid is very simple and reliable marker for high oxidative stress. Albuminuria is the availability of the surplus amount of serum proteins in urine. This high amount is the cause to make urine frothy. Albuminuria is a marker of injury in kidneys.

The high amount of protein in the patients of DM leads to impairment of nephrons which can lead to the complication of albuminuria. DN (Diabetic Nephropathy) is very common reason of the ESRD (End-Stage Renal Disease). The development of nephropathy in patients of Type-2 DM is the outcome of many factors as cigarette smoking, hypertension, age and adverse glycemic control. Inflammation is the main contributing factor in DN's progression. HMGB-1 causes endothelial abnormality which can induce oxidative stress. Zoppini discovered in his research work that hyperuricemia is the most important risk factor for the progression of CKD (Chronic Kidney Disease) in patients suffering from Type-2 DM. We found a similar research work conducted in KPK, Pakistan but the size of samples was very small in that research work to measure the association among level of serum uric acid and micro-albuminuria.

METHODOLOGY:

This transverse research work carried out in Allied / DHQ Hospital Faisalabad from September 2018 to March 2019. Total 200 patients suffering from Type-2 diabetes mellitus were the part of this research work. We included the patients having 16 to 65 years of age from both sex and present with Type-2 DN (having ACR from 2.0 to 20.0 mg/mmol in males and from 2.80 to 28.0 mg/mmol among females were the participants of this research work. We excluded all the patients suffering from other serious complications other than DN. We took the written consent from all the patients. Ethical committee of our institute gave the permission to conduct this very research. We collected the blood samples for the calculation of level of serum creatinine, uric acid and serum albumin.

We measured the micro-albuminuria by ACR (Albumin to Creatinine Ratio). We used the SPSS V.23 for the statistical analysis of the collected information. We presented the continuous data in averages and standard deviations. We used the Pearson correlation method for the presentation of the correlation among level of serum uric acid and albuminuria.

RESULTS:

Patient's age distribution displayed that 29.0% (n: 58) patients were present with 16 to 40 years of age whereas 71.0% (n: 142) were present with 41 to 65 years of age. The average age of the patients was 48.10 ± 10.260 years. There were total 48.50% (n: 97) male patients and 51.50% (n: 103) patients were females. The duration of Type-2 DM showed that 58.0% (n: 116) patients were present with ≤ 5.0 years' duration whereas 42.0% (n: 84) patients were present with > 5.0 years' duration of Type-2 DM. The findings about various variables present in the patients of Typ-2 DN are present in Table-1. The association between micro-albuminuria level and level of serum uric acid in the patients of Type-2 DN was much determined.

Table-I: The results of Variables in Type 2 Diabetic Nephropathy Patients.

Variables	Minimum	Maximum	Mean	± SD
Age (years)	32.0	65.0	48.1000	10.2600
Serum Creatinine (mg/dL)	0.6	1.4	0.8431	0.1910
Height (cm)	160.0	187.0	173.9600	7.2610
Weight (kg)	52.0	88.0	69.3500	8.1610
GFR (mL/min/1.73 m^2)	61.0	118.0	98.1500	11.0680
BMI (Kg/m^2)	17.2	30.1	22.8660	2.0197
HbA1c (%)	6.5	8.9	7.6190	0.4774
Systolic BP (mm Hg)	105.0	150.0	128.9900	10.6650
Diastolic BP (mm Hg)	50.0	100.0	74.4800	9.0000

The average level of serum uric acid level was 6.990 ± 1.010 mg/dL whereas the average level of micro-albuminuria was 5.630 ± 1.080 mg/mmol; r-value was 0.08380 describing a strong correlation. We calculated the P-value as 0.00010 (Table-2).

Table- II: Serum Uric Acid level and Microalbuminuria in Type-2 Diabetic (N=200).

Parameters	Mean	SD
Serum uric acid (mg/dL)	6.990	1.010
Microalbuminuria (mg/mmol)	5.630	1.080

We performed the stratification for the age, sex and duration of the disease. Among patients having age from 16 to 40 years, the average level of uric acid & micro-albuminuria were 6.950 ± 1.020 mg/dL and 5.670 ± 1.110 mg/mmol respectively (r-value: 0.06) whereas among patients having age from 41 to 65 years, these values were 7.050 ± 0.890 mg/dL and 5.570 ± 1.090 respectively (r-value: 0.06). Among male patients, average level of uric acid and micro-albuminuria were 6.920 ± 1.120 mg/dL and 5.690 ± 1.060 mg/mmol respectively (r-value: 0.1430) whereas in female patients these values were 7.050 ± 0.890 mg/dL and 5.570 ± 1.090 respectively (r-value: 0.0250). Among patients having diabetes duration of lower than five years, the average level of uric acid and micro-albuminuria were 7.070 ± 0.980 mg/dL and 5.660 ± 1.070 mg/mmol respectively (r-value: 0.1640) whereas among patients present with diabetes greater than five year of duration, these values were 6.870 ± 1.050 mg/dL and 5.580 ± 1.090 respectively
(r-value: 0.06) as presented in Table-3.

Table- III: Stratification for Age, Gender and Duration of Diabetes Mellitus (n=200).

Variables		Serum Uric Acid (mg/dL)		Microalbuminuria (mg/mmol)		r-value
		Mean	± SD	Mean	± SD	
Age (years)	16-40	6.950	1.020	5.670	1.110	0.0600
	41-65	7.050	0.890	5.570	1.090	0.0600
Gender	Male	6.920	1.120	5.690	1.060	0.1430
	Female	7.050	0.890	5.570	1.090	0.0250
Duration of diabetes (years)	<5	7.070	0.980	5.660	1.070	0.1640
	>5	6.870	1.050	5.580	1.090	0.0600

DISCUSSION:

Regardless of the modernity in the administration of diabetes, nephropathy is still a cause of ESRD. The level of serum uric acid can play a vital role in the endothelial abnormality. We found a positive correlation in this research work between two variables. Behradmanesh discovered in his research work that serum uric acid has a strong association with the diabetic nephropathy (average ± SE & median of proteinuria was 388.0 ± 28.70 mg/day and 303.50 mg/day correspondingly, whereas average ± SE of level of serum uric acid was present as 4.50 ± 0.150 mg/dL) in the patients suffering from Type-2 DM. He found that the uric acid level in the patients of Type-2 DM perform the major role in resulting nephropathy. Research work conducted by Sunita Neupane displayed that the concentration of serum uric acid corresponds conclusively with UAE (Urinary Albumin Excretion) with an r-value of 0.3230 & P-value of lower than 0.050. They found a strong correlation with age and total diabetes duration. Suryawanshi & his associates concluded a strong correlation among urine micro-albumin and serum uric acid levels (P<0.0010), hence found that these two levels are the markers for various complications which are serious in nature related to kidneys and cardiovascular issues.

Different research work showed that hyperuricemia plays a pathogenic role in progression of renal failure. In patients suffering from DM, the level of serum uric acid in initial stage has correlation with the later development and progression of macro-albuminuria. Beena Unnikrishnan concluded that the most important pathological factor in the development of nephropathy is the level of serum uric acid among Ttp-2 DM patients. There can be a decrease in the levels of uric acids with the utilization of the allopurinol, which is a xanthine oxidase inhibitor. Allopurinol prevents the transformation of inhibits of hypoxanthine into the xanthine and at final stage into the uric acid. At a mean dose of 300.0 mg/day, allopurinol can cause a reduction in serum uric acid levels up to 30.0% to 40.0%; a decrease up to 60.0% can be achievable

with the administration of maximum dosage of 600.0 mg/day. David M. Maahs provided the same findings in his research work. Bose B showed that treatment for uric acid lowering along with the allopurinol may stop the development of the renal diseases. Goicoechea in his research work incorporated a sum of one hundred and thirteen patients, among them 37.0% patients were suffering from diabetes and they were present with GFR (Glomerular Filtration Rate) of lower than 60.0 ml a minute with a normal functioning of kidneys. He administered the patients with 100.0 mg/day of allopurinol for complete two years and they observed an enhanced GFR.

CONCLUSION:

The findings of this research work displayed that the serum uric acid level and micro-albuminuria are present with strong correlation in nephropathy in the patients suffering from Type-2 diabetes mellitus. The level of serum uric can be used as early diagnostic identifier as well as prognostic monitoring of the Type-2 DN. There is also need of further research works for the consolidation of the finding of this research work.

REFERENCES:

1. Al-Khawaldeh OA, Al-Hassan MA, Froelicher ES. Self-efficacy, selfmanagement, and glycemic control in adults with type 2 diabetes mellitus. J Diabetes Complications. 2012;26(1):10-16. doi: 10.1016/j.jdiacomp.2011.11.002.
2. Kozakova M, Palombo C. Diabetes Mellitus, Arterial Wall, and Cardiovascular Risk Assessment. Int J Environ Res Public Health. 2016;13(2):201. doi: 10.3390/ijerph13020201
3. Zafar J, Nadeem D, Khan SA, Jawad Abbasi MM, Aziz F, Saeed S. Prevalence of diabetes & its correlates in urban population of Pakistan: A Cross-sectional survey. J Pak Med Assoc. 2016;66(8):922-927.
4. Maiuolo J, Oppedisano F, Gratteri S, Muscoli C, Mollace V. Regulation of uric acid metabolism and excretion. Int J Cardiol. 2016;213:8-14. doi: 10.1016/j.ijcard.2015.08.109.
5. Muiesan ML, Agabiti-Rosei C, Paini A, Salvetti M. Uric Acid and Cardiovascular Disease: An Update. Eur Cardiol. 2016;11(1):54-59.
6. Giordano C, Karasik O, King-Morris K, Asmar A. Uric Acid as a Marker of Kidney Disease: Review of the Current Literature. Dis Markers. 2015;2015:382918. doi: 10.1155/2015/382918.
7. Neves JA, Neves JA, Meneses Oliveira RC. Biomarkers of endothelial function in cardiovascular diseases: hypertension. J Vasc Bras. 2016;15(3):224-233.
8. Hong DS, Oh IH, Park JS, Lee CH, Kang CM, Kim GH. Evaluation of Urinary Indices for Albuminuria and Proteinuria in Patients with Chronic Kidney Disease. Kidney Blood Press Res. 2016;41(3):258-266. doi: 10.1159/000443429.
9. Gonzalez Suarez ML, Thomas DB, Barisoni L, Fornoni A. Diabetic nephropathy: Is it time yet for routine kidney biopsy? World J Diabetes. 2013;4(6):245-255. doi: 10.4239/wjd.v4.i6.245.
10. Viswanathan V, Tilak P, Kumpatla S. Risk factors associated with the development of overt nephropathy in type 2 diabetes patients: A 12 years observational study. Indian J Med Res. 2012;136(1):46-53.
11. Leung WK, Gao L, Siu PM, Lai CW. Diabetic nephropathy and endothelial dysfunction: Current and future therapies, and emerging of vascular imaging for preclinical renal-kinetic study. Life Sci. 2016;166:121-130. doi: 10.1016/j.lfs.2016.10.015.
12. Cai W, Duan XM, Liu Y, Yu J, Tang YL, Liu Z, et al. Uric Acid Induces Endothelial Dysfunction by Activating the HMGB1/RAGE Signaling Pathway. Biomed Res Int. 2017;2017:4391920. doi: 10.1155/2017/4391920.
13. Zoppini G, Targher G, Chonchol M, Ortalda V, Abaterusso C, Pichiri I, et al. Serum uric acid levels and incident chronic kidney disease in patients with type 2 diabetes and preserved kidney function. Diabetes Care. 2012;35(1):99-104.
14. Shah N, Amanullah, Jamal S, Marwat MA. Association of Hyperuricemia with Diabetic Nephropathy in type 2 Diabetes Mellitus. KJMS. 2014;2(7):267-270.
15. Behradmanesh S, Horestani MK, Baradaran A, Nasri H. Association of serum uric acid with proteinuria in type 2 diabetic patients. J Res Med Sci. 2013;18(1):44-46.
16. Neupane S, Dubey RK, Gautam N, Agrawal KK, Jayan A, Shrestha S, et al. Association between serum uric acid, urinary albumin excretion, and glycated hemoglobin in Type 2 diabetic patient. Niger Med J. 2016;57(2):119-123. doi: 10.4103/0300-1652.182074.
17. Suryawanshi KS, Jagtap PE, Belwalkar GJ, Dhonde SP, Nagane NS, Joshi VS. To study serum uric acid and urine microalbumin in type-2 diabetes mellitus. Int J Med Sci. 2015;2(3): 24-29.
18. Johnson RJ, Nakagawa T, Jalal D, Sánchez-Lozada LG, Kang DH, Ritz E. Uric acid and chronic kidney disease: which is chasing which? Nephrol Dial Transplant. 2013;28(9):2221-2228. doi: 10.1093/ndt/gft029.

19. Kushiyama A, Tanaka K, Hara S, Kawazu S. Linking uric acid metabolism to diabetic complications. World J Diabetes. 2014;5(6):787-795. doi: 10.4239/wjd.v5.i6.787.
20. Unnikrishnan B, Mookambika RV, Ashok VG. A Study on Serum Uric Acid and Proteinuria in Association with Diabetic Nephropathy among Type 2 Diabetic Patients in a Teritary Care Centre. J Med Sci Clin Res. 2017;(5)19820-19824.
21. Doria A, Niewczas MA, Fiorina P. Can existing drugs approved for other indications retard renal function decline in patients with type 1 diabetes and nephropathy? Semin Nephrol. 2012;32(5):437-444. doi: 10.1016/j.semnephrol.2012.07.006.
22. Noman A, Ang DS, Ogston S, Lang CC, Struthers AD. Effect of high-dose allopurinol on exercise in patients with chronic stable angina: a randomised, placebo controlled crossover trial. Lancet. 2010;375(9732):2161-2167. doi: 10.1016/S0140-6736(10)60391-1.
23. Maahs DM, Caramori L, Cherney DZ, Galecki AT, Gao C, Jalal D, et al. Uric acid lowering to prevent kidney function loss in diabetes: the preventing early renal function loss (PERL) allopurinol study. Curr Diab Rep. 2013;13(4):550-559. doi: 10.1007/s11892-013-0381-0.
24. Bose B, Badve SV, Hiremath SS, Boudville N, Brown FG, Cass A, et al. Effects of uric acid-lowering therapy on renal outcomes: a systematic review and meta-analysis. 2014;29(2):406-413. doi: 10.1093/ndt/gft378.
25. Goicoechea M, de Vinuesa SG, Verdalles U, Ruiz-Caro C, Ampuero J, Rincón A, et al. Effect of allopurinol in chronic kidney disease progression and cardiovascular risk. Clin J Am Soc Nephrol. 2010;5(8):1388-1393. doi: 10.2215/CJN.01580210.