CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.3692281

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

COMPBINED RECOGNITION OF mAlb, α1-MG AND NAG IN TIMELY DIABETIC NEPHROPATHY DIAGNOSIS

[1]Dr Nabi Ahmad Chatha, [2]Muhammad Furqan Sharif, [3]Dr Durre Shawar

[1]Akhtar Saeed Medical and Dental College Lahore

[2]House Officer, Jinnah Hospital Lahore

[3]WMO, BHU, Jabbi, Fateh Jang, Attock

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

Abstract:

Objective: *This research work aimed to assess the amounts of combined recognition of urinary mAlb (Urinary Micro Albumin), α1-MG (α1-Microglobulin) and NAG (N-acetyl-β-D-glucosaminidase) in timely diagnosis of DN (Diabetic Nephropathy).*

Methodology: *Total 94 patients with early diabetic nephropathy who got admission in Mayo Hospital, Lahore from May 2018 to May 2019, were the participant in DN group. Moreover, total 67 patients suffering from diabetes who got admission in the similar period were included in the diabetes group and we selected the 64 healthy persons in the control group. We detected the NAG, urinary mAlb and α1-MG of the all 3 groups. Furthermore, we divided the patients into a satisfactory blood glucose control group & an adverse blood glucose control group in accordance with the control condition of blood glucose of the patients. We compared the detection outcome of all the 3 groups and then we statistically analyzed the available information.*

Results: *The levels of NAG, urinary mAlb and α1-MG of group of DN were much high as compared to the patients of control and diabetes group. The differences were statistical significance with P value < 0.050. The values of detection indicator satisfactory blood glucose control group were low as compared to adverse blood glucose control group. These differences were also statistically significant with P value of < 0.050. The rate of positivity of the combined detection of levels of NAG, mAlb and α1-MG was 90.20%, which was very high as compared to of single indicator with P value of < 0.050.*

Conclusion: *Combined recognition of the NAG, urinary mAlb and α1-MG is much sensitive in the identification of the initial damages in renal function among the patients suffering from DN.*

KEYWORDS: *DN, NAG, mAlb, α1-MG, diabetic nephropathy, statistically, analysis, controls, indicator.*

Corresponding author:

Dr. Nabi Ahmad Chatha,

Akhtar Saeed Medical and Dental College Lahore

QR code

Please cite this article in press Nabi Ahmad Chatha et al, ***Compbined Recognition of mAlb, α1-MG and NAG in timely diabetic nephropathy diagnosis.,*** *Indo Am. J. P. Sci, 2020; 07(02).*

INTRODUCTION:

DN is very severe complication of diabetic micro-angiopathy. The discovery of initial renal damages is very hard because there are no clear manifestations in the initial stage and outcomes of various items remains as normal. Diabetic nephropathy can be permanent and even progress to incurable stage if there is occurrence of renal impairment & persistent proteinuria [1, 2]. So, the timely identification and delaying the incidence and the progression of nephropathy are very important issues in the recent medical research literature [3]. To increase the timely diagnostic preciseness of the diabetic nephropathy, identification of the relevant indicators is normally utilized for the assistance in diagnosis.

This research work examined the levels of combined recognition of NAG, mAlb and α1-MG in the timely diagnosis of diabetic nephropathy by evaluating ninety four patients of DN, seventy six patients of diabetes and sixty four healthy controls for the formulation of the treatment scheme in medical field.

METHODOLOGY:

Total 94 patients with early diabetic nephropathy who got admission in Mayo Hospital, Lahore from May 2018 to May 2019 were the participants of DN group. Total seventy six patients suffering from diabetes who got admission in similar period were the participants of diabetes group. All the patients fulfilled the diagnostic criteria of diabetes in accordance with the guidelines of WHO [4]. We excluded the patients suffering from other serious complications or diseases. We also excluded the patients under the impact of drugs. In DN group, the average age of the patients was 50.10 ± 5.70 years and average course of disease was 7.30 ± 2.20 years. In the diabetes group, forty three were male and thirty three were female patients with a mean age of 51.30 ± 6.10 years and the mean course of the disease was 7.10 ± 2 years. We included the 64 healthy persons in the group of controls. There were thirty five males and twenty females in the group of controls with a mean age of 50.20 ± 8.90 years. There was no statistical significant difference in the sex, age and course of disease between the patients of all 3 groups.

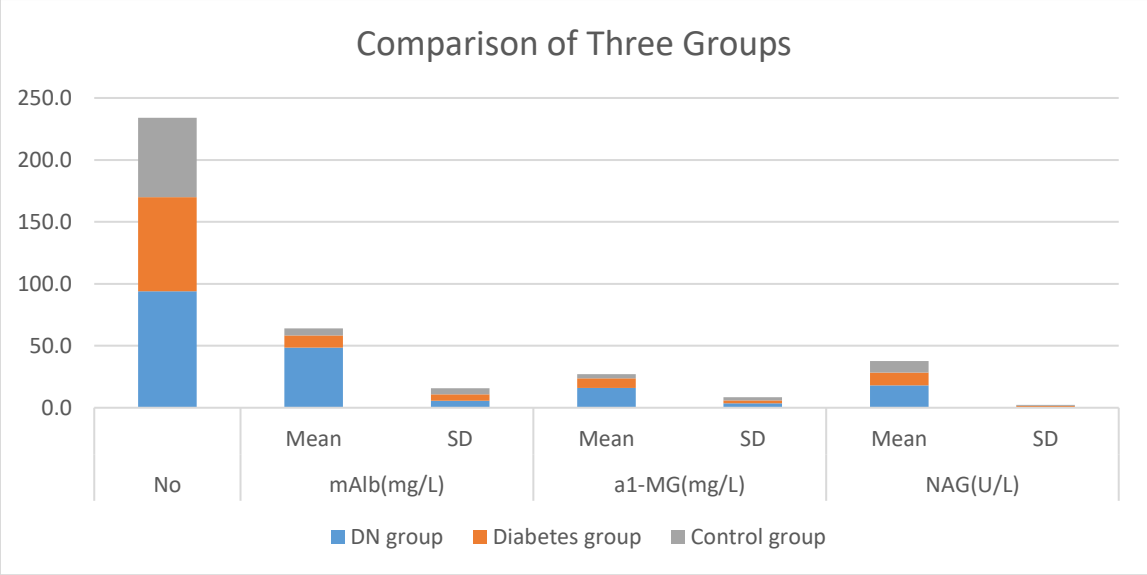
The ethical committee of the institute gave the permission to conduct this research work. We took the written consent from the participants of this research work. We collected the ten milliliters fresh urine from every subject and then we carried out the centrifugation at 3000.0 r/min at a radius of 12.0 centimeters for ten minutes. We also collected three milliliters blood on the same day and separated the serum and then detection of the HbAlc level carried out. We analyzed the urinary mAlb with the utilization of the ELISA. We used the e=radiation & scattering turbidimetry for the detection of urinary α1-MG. The determination of the urinary NAG carried out with the utilization of endpoint method. SPSS V. 23 was in use for the statistical analysis of the collected information. We expressed the calculated data in averages and standard deviations. Chi square method was in use for the comparison of the findings in groups. P value of less than 0.050 was the significant one.

RESULTS:

The levels of NAG, urinary mAlb and α1-MG in the patients of DN group were much high as compared to the diabetes and control group showing a significant difference statistically (P < 0.050; Table-1).

Table-I: Comparison of mAlb, a1-MG and NAG levels between the three groups.

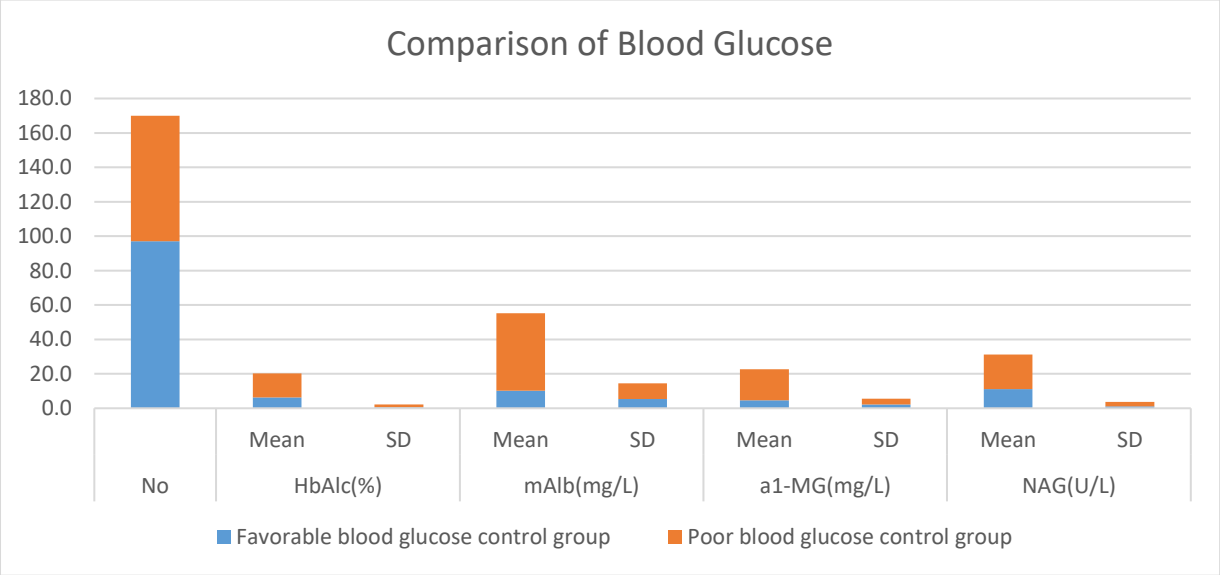
Group	No	mAlb(mg/L)		a1-MG(mg/L)		NAG(U/L)	
		Mean	SD	Mean	SD	Mean	SD
DN group	94.0	48.540	5.680	16.030	3.640	18.080	0.520
Diabetes group	76.0	9.720	5.030	7.670	2.210	10.230	1.080
Control group	64.0	5.690	4.930	3.430	2.750	9.410	0.770



The discovery of HbAlc showed that ninety seven patients were present with satisfactory control of the blood glucose and seventy three patients with adverse control. The levels of HbAlc, NAG, mAlb & α1-MG of the group with adverse blood glucose control were high as compared to the levels in satisfactory control group with significant differences statistically (Table-2). The rate of positivity of the identification depending on NAG, urinary mAlb and α1-MG was much high as compared to the positive rate on the base of single indicator with significant differences statistically ($P < 0.050$)

Table-II: Comparison of levels of indicators between groups with different blood glucose control.

Group	No	HbAlc (%)		mAlb(mg/L)		a1-MG(mg/L)		NAG(U/L)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Favorable blood glucose control group	97.0	6.220	0.560	10.140	5.300	4.580	2.130	11.090	1.020
Poor blood glucose control group	73.0	14.070	1.730	45.110	9.220	18.140	3.370	20.140	2.680



DISCUSSION:

According to the reports, the rate of prevalence of DN is 10.0% in patients who are suffering from DM for greater than 5 years and 20.0% to 30.0% in the patients who are suffering from this disease for more than ten years [5]. In initial DN stage, the components of decreased negative charge on glomerular membrane and enhanced filtration pores diameter on glomerular filtration membrane rises the excretion proteins volumes with reasonable molecular weight [6]. The presentation of the albuminuria and enhanced albuminuria level has

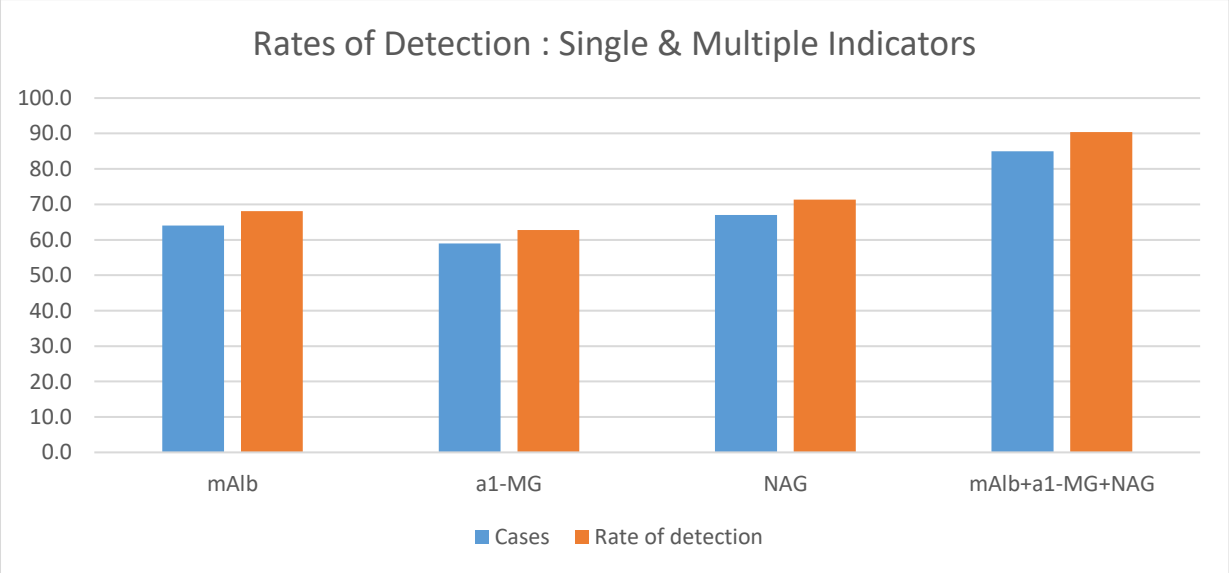
association with the extension of damage to glomeruli [7, 8].

Lymphocytes and liver synthesized the α1-MG which is a type of glycoprotein. The α1-MG having a molecular weight of 3.30 kD can pass from the glomeruli easily and 99.0% among them is metabolized & reabsorbed by the renal tubules. When there is failure in the reabsorption function of the renal tubules, there will be increase in the volume α1-MG [9, 10]. In the initial DN stage, tubular epithelial cells of kidneys fail to act as hinderer because there is damage in its structural integrity because of ischemia, toxic substances and inflammation which results in the failure of the reabsorption function, which lead to the significant rise in the excretion volume [11]. The results of this research work stated that excretion volume of α1-MG of the patients with early stage of DN was much high as compared to diabetes and control group describing the damage of renal tubules in the initial stage of diabetic retinopathy. NAG as a type of hydrolase has extensive distribution in organs. NAG level with a molecular weight of 130000 is very hard to be filtered with the help of glomeruli. But when there is damage in the convoluted tubules of kidneys, a large amount of NAG is release of the lysosome, resulting to the clear rise in the level of NAG in urine [12, 13]. So it can be demonstrated that we can regard the NAG as sensitive indicators for damage of tubules [14].

In the initial stage of the diabetic nephropathy, the rise in the pressure of glomeruli filtration, the decrease of the negative charges on the filtration membrane & alterations of the filtration of proteins, lysosome's activation and enhancement in the urinary NAG [15, 16]. In this research work, the levels of NAG, mAlb & α1-MG were detected in the patients of satisfactory blood glucose control and adverse blood glucose control group. The findings showed that levels of 3 indicators of latter group were high as compared to former group. Table-3 shows that the rate of positivity of the combined detection of all these 3 indicators was 90.40%, which was present with much difference with the rate of positivity with single indicator. So the combined detection of the multiple 3 indicators is much superior to the identification of the only single indicator.

Table-III: Comparison of positive rates of detection based on single & multiple indicators in the DN group.

Indicators	Cases	Rate of detection
mAlb	64.0	68.10
a1-MG	59.0	62.80
NAG	67.0	71.30
mAlb+a1-MG+NAG	85.0	90.40



CONCLUSION:

The levels of NAG, urinary mAlb and α1-MG are very sensitive indicators for the timely identification of diabetic nephropathy. Combined identification of 3 indicators before the occurrence of proteinuria in the patients of DN can improve the rate of positivity in the diagnosis of DN is very advantageous in the timely identification of the renal injury. The levels of these three indicators can be in use for the discovery of the severity and early treatment impact.

REFERENCES:

1. Qian RL. New diagnostic criteria and classification of diabetes. Chin J Diabet. 2000;8(1):5-6. doi: 10.3321/j.issn:1006-6187.2000.01.001.
2. Yang SH, Dou KF, Song WJ. Prevalence of diabetes among men and women in China. N Engl J Med. 2010;362(25):2425- 2426.
3. Vaidya VS, Niewczas MA, Ficociello LH. Regression of microalbuminuria in type 1diabetes is associated with lower levels of urinary tubular injury biomarkers, kidney injury molecule-1, and N-acetyl-β-D-glucosaminidase. Kidney Int. 2011;79(4):464-470.
4. Chen T, Wang H, Ma J, Yuan J, Chen LL. Correlation between joint detection of cystatin C, homocysteine, glycosylated hemoglobin and urine microalbumin. Chin J Clin Res. 2014;27(2):151-152. doi: 10.13429/j.cnki.cjcr.2014.02.023.
5. Wu GR, Yang XJ, Zhao Q, Wang CX. Clinical significance of urine micro-protein in diagnosis of early hypertensive nephropathy. Chin J Microcircul. 2007;17(2):33-34. doi: 10.3969/j.issn.1005-1740.2007.02.013.
6. Liakos CI, Vyssoulis GP, Markou MI, Kafkas NV, Toutouzas KP, Tousoulis D. Twenty-four-hour urine α1-microglobulin as a marker of hypertension-induced renal impairment and its response on different blood pressure-lowering drugs. J Clin Hypertens (Greenwich). 2016;18(10):1000-1006. doi:
7. 10.1111/jch.12811.
8. Saif A, Soliman N. Urinary α1-microglobulin and albumin excretion in children and adolescents with type 1 diabetes. J Diabetes. 2017;9(1):61-64. doi: 10.1111/1753-0407.12383.
9. Li XD. Significance of urinary HCY, mAlb and α1-MG in early diabetic nephropathy. Zhejiang Clin Med J. 2012;14(1):3-5. doi: 10.3969/j.issn.1008-7664.2012.01.002.
10. Zhou J, Song Z, Zhang R, Liu R, Wu Q, Li J, et al. Distinctive molecular and biochemical characteristics of a glycoside hydrolase family 20 β-N-acetylglucosaminidase and salt tolerance. BMC Biotechnol. 2017;17(1):37. doi: 10.1186/ s12896-017-0358-1.
11. Mise K, Hoshino J, Ueno T, Hazue R, Hasegawa J, Sekine A, et al. Prognostic value of tubulointerstitial lesions, urinary n-acetyl-β-d-glucosaminidase, and urinary β2-microglobulin in patients with type 2 diabetes and biopsyproven diabetic nephropathy. Clin J Am Soc Nephrol. 2016;11(4):593-601. doi: 10.2215/CJN.04980515.
12. Wei YP, Song Xiaodong D, Zhu HY, Kong FJ. Clinical application of detection of urinary mAlb and NAG in diabetic nephropathy and hypertensive nephropathy. Chin J Laborat Diag. 2006;10(6):675-676. doi: 10.3969/j.issn.1007-4287.2006.06.044.
13. Guo XJ, Wu T. Clinical significance of urinary NAG in the early diagnosis of diabetic nephropathy. Hebei Med J. 2009;31(4):481. doi: 10.3969/j.issn.1002-7386.2009.04.048.
14. Kim SR, Lee YH, Lee SG, Kang ES, Cha BS, Kim JH, et al. Urinary N-acetyl-β-D-glucosaminidase, an early marker of diabetic kidney disease, might reflect glucose excursion in patients with type 2 diabetes. Medicine (Baltimore). 2016;95(27):e4114. doi: 10.1097/MD.0000000000004114.
15. Sharma D, Bhattacharya P, Kalia K, Tiwari V. Diabetic nephropathy: New insights into established therapeutic paradigms and novel molecular targets. Diabet Res Clin Pract. 2017;13(128):91-108. doi: 10.1016/j.diabres.2017.04.010.
16. Zhu H, Liu M, Yu H, Liu X, Zhong Y, Shu J, et al. Glycopatterns of urinary protein as new potential diagnosis indicators for diabetic nephropathy. J Diabetes Res. 2017;2017:5728087. doi: 10.1155/2017/5728087.
17. Feigerlová E, Battaglia-Hsu SF. IL-6 signaling in diabetic nephropathy: From pathophysiology to therapeutic perspectives. Cytokine Growth Factor Rev. 2017:S1359- 6101(17)30030-8. doi:10.1016/j.cytogfr.2017.03.003.