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Original Article

The role of urinary N-acetyl-beta- D-glucosaminidase to determine the activity of lupus nephritis

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Abstract

Objective: In this study our main goal is to evaluate the role of urinary N-acetyl-beta- D-glucosaminidase to determine the activity of lupus nephritis. **Materials and Methods:** This cross-sectional prospective observational type of study was conducted among 60 diagnosed lupus nephritis patients (active and inactive) at Department of Nephrology, Dhaka Medical College Hospital, Dhaka., from January 2017 to December 2017. **Results:** In this study, 62(mIU/ml) is the best uNAG cutoff value for determination of lupus nephritis activity. Among 29 active lupus nephritis cases raised uNAG was found in 28 cases and among 31 inactive lupus nephritis cases raised uNAG was found in 2 cases. uNAG in determination of lupus nephritis activity showed accuracy, sensitivity, specificity, PPV and NPV were 0.950, 0.966, 0.935, 0.933 and 0.967 respectively. **Conclusion:** uNAG is a useful biomarker for determination of lupus nephritis activity.

Keywords: urinary N-acetyl-beta- D-glucosaminidase, Systemic lupus erythematosus (SLE), lupus nephritis.

Introduction

Systemic lupus erythematosus (SLE) is a systemic autoimmune disorder characterized by the activation of T and B lymphocytes, production of auto-antibodies and formation of immune complexes causing wide spectrum of tissue and organ damage.[1] The overall prevalence of SLE ranges from 1.4 to 21.9% cases per 100,000 people.[2] N-Acetyl-β-d-glucosaminidase (NAG) is a lysosomal brush border enzyme of proximal renal tubular cells that is normally excreted in low amounts in urine. It has been proposed as a valuable marker for renal tubular dysfunction because its relatively large molecular weight (>130kD) precludes filtration by the glomerulus.[3] The urinary excretion of NAG is increased in subjects exposed to substances that are toxic to renal tubular cells as lead, mercury and contrast media, nephrotoxic drugs as aminoglycosides, antineoplastic drugs as methotrexate and cisplatin.[4-6] It is also increased in various human glomerular diseases, including diabetic nephropathy.[7] Moreover, it has been proposed that uNAG activity is probably an indicator of the increased lysosomal turnover that occurs when increased protein is presented to the tubular cells.[3] Increased uNAG activity in patients with glomerulonephritis and proteinuria has been suggested as indicating functional changes within the kidney, rather than renal tubular damage.[6]

In this study our main goal is to evaluate role of urinary N-acetyl-beta- D-glucosaminidase to determine the activity of lupus nephritis.

Objectives

- To detect sensitivity and specificity of uNAG at different cutoff value
- To evaluate validity test of uNAG in determination of lupus nephritis activity

Materials and Methods

Type of study	Cross-sectional prospective observational type of study
Place of study	Department of Nephrology, Dhaka Medical College Hospial, Dhaka.
Study period	January 2017 to December 2017.
Study population	60 Diagnosed lupus nephritis patients (active and inactive) of indoor and outdoor of Dhaka Medical College hospital.
Sampling technique	Purposive
Inclusion criteria	SLE patients with biopsy proven lupus nephritis
Data analysis	Statistical analysis of the study was done by the Statistical Package for Social Science (SPSS-22).

Results

In figure-1 shows age distribution of the patients. Mean age of the lupus nephritis patients in active and inactive LN was 25.40 ± 8.07 years and 30.13 ± 10.81 years respectively. The following figure is given below in detail:

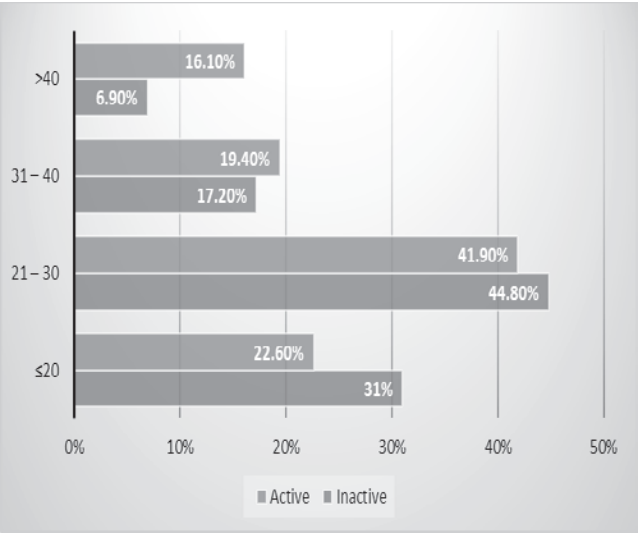

Figure-1: Age distribution of the patients.

In figure-2 shows gender distribution the patients where most of the patients in both groups were female. There was also no significant difference in gender between active and inactive lupus nephritis patients. The following figure is given below in detail:

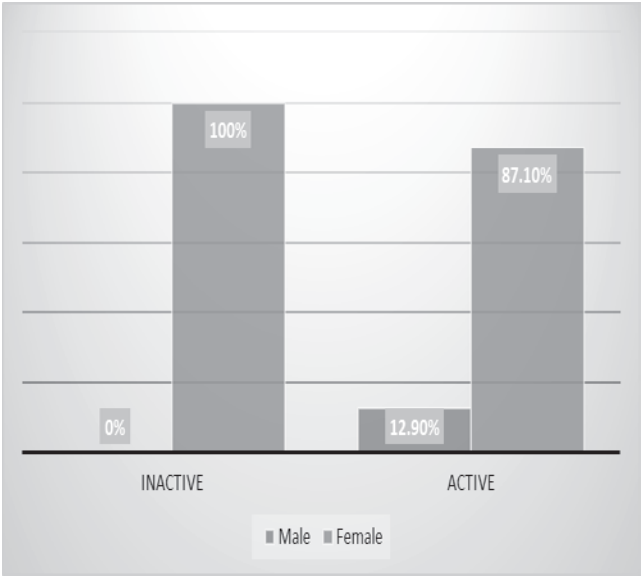

Figure-2: Gender distribution the patients.

In Table: I - shows sensitivity and specificity of uNAG at different cutoff value for determination of lupus nephritis where 62(mIU/ml) is the best uNAG cutoff value for determination of lupus nephritis activity. The following table is given below in detail:

Table: (i) - Sensitivity and specificity of uNAG at different cutoff value for determination of lupus nephritis (n=60)

uNAG	Sensitivity	Specificity
61	0.966	0.903
62	0.966	0.935
65	0.931	0.935
68	0.897	0.935
70	0.897	0.968
71	0.862	0.968

In table: (ii)- shows lupus nephritis patients by uNAG. Lupus nephritis activity was determined by SLEDAI 2K (renal). Among 29 active lupus nephritis cases raised uNAG was found in 28 cases and among 31 inactive lupus nephritis cases raised uNAG was found in 2 cases. The following table is given below in detail:

Table-(ii): Distribution of lupus nephritis patients by uNAG (n=60)

uNAG	Lupus nephritis		Total
	Active	Inactive	
≥62	28 [TP]	2 [FP]	30
<62	1 [FN]	29 [TN]	30
Total	29	31	60

In table: (iii) - shows validity parameters of uNAG in determination of lupus nephritis activity. uNAG showed very good agreement in determination of lupus nephritis activity according to Kappa statistics. uNAG in determination of lupus nephritis activity showed accuracy, sensitivity, specificity, PPV and NPV were 0.950, 0.966, 0.935, 0.933 and 0.967 respectively. The following table is given below in detail:

Table: (iii) Validity test of uNAG in determination of lupus nephritis activity (n=60)

Statistics	Value	Low 95% CI	High 95% CI
Kappa	0.900		
Accuracy	0.950	0.841	0.982
Sensitivity	0.966	0.853	0.988
Specificity	0.935	0.830	0.966
Positive Predictive Value (PPV)	0.933	0.825	0.965
Negative Predictive Value (NPV)	0.967	0.858	0.998

Discussion

This cross-sectional study was done to evaluate the role of uNAG for the diagnosis of activity of lupus nephritis in Department of Nephrology, Dhaka Medical College Hospital. A total of 60 lupus nephritis patients in Nephrology Ward of Dhaka Medical College Hospital, Dhaka were included in this study from January 2017 to December 2017. Adult SLE patients with biopsy proven lupus nephritis were enrolled in this study.

In this study it was observed that there was a high prevalence of anaemia among the active LN patients, about 86.2% of all active patients had anaemia also found 132 cases of anaemia (122 women, 10 men) from a total of 345 screened SLE patients and the identified cases of anaemia were ACD (37%), IDA (35.6%), AHA (14.4%) and other causes (12.9%).[7] Although ESR is a nonspecific marker of inflammation it is a useful tool in lupus nephritis management which was significantly higher in this study. One study found significant correlation of ESR with systemic lupus activity measure.[8] In this study, serum C3 was significantly low in active LN but C4 was almost similar in both active and inactive lupus nephritis. Another report found that serum C3 less in active LN. [9] Another study mentioned that that C3 level was more sensitive index of disease activity than those of C4. [10] Other study identified that serum C3 level are diagnostically more sensitive and specific for systemic lupus erythromatosus activity than serum C4 level.[10] In this study proeinuria was significantly higher in active LN but in inactive LN it was significantly lower (<500 mg/24 hours).[11] Another study reported that urinary protein more in active lupus nephritis. Other report found that serum albumin was the parameter that was most significantly (negatively) correlated with proteinuria (p <0.00001).[12] Mean anti ds DNA ab titre in this study was 103.00066.64 in active LN and 54.2378.16 inactive LN which mean that high titre of anti-ds DNA ab is present in active LN than that of inactive LN. Though anti ds DNA ab titre is in this study but not statistically significant. Similar findings were observed by other study.[13]

Conclusion

From our study we can conclude that, uNAG is a useful biomarker for determination of lupus nephritis activity. Further large-scale study should be carried out for reaching optimal goal.

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