ORIGINAL ARTICLE

Do circulating antibodies against C1q reflect the activity of lupus nephritis?

Katarzyna Smykał-Jankowiak, Zofia I. Niemir, Magdalena Polcyn-Adamczak

Laboratory for Molecular Nephrology, Department of Nephrology, Transplantology and Internal Medicine, Poznan University of Medical Sciences, Poznań, Poland

KEY WORDS

anti-C1q and anti-dsDNA antibodies, circulating immune complexes, C3 and C4, hematuria, lupus nephritis

ABSTRACT

INTRODUCTION The results of recent studies suggest that there is a link between the presence of antibodies against C1q (anti-C1q Abs) and kidney involvement in systemic lupus erythematosus (SLE). However, it remains unclear whether the clinical symptoms of lupus nephritis (LN) may be associated with the presence of anti-C1q Abs in serum.

OBJECTIVES The aim of the study was to compare the prevalence and levels of anti-C1q Abs and antibodies against double-stranded DNA (anti-dsDNA Abs), circulating immune complexes binding C1q (CIC-C1q), as well as complement components C3 and C4 in the sera of patients with LN in relation to the clinical activity of SLE and symptoms of LN.

PATIENTS AND METHODS The study involved 48 patients with LN and 66 healthy controls. Anti-dsDNA Abs, anti-C1q Abs, and CIC-C1q levels were determined by immunoenzymatic methods, while C3 and C4 by immunoturbidimetry. SLE activity was assessed using the Systemic Lupus Erythematosus Disease Activity Index (SLEDAI).

RESULTS Anti-dsDNA Abs, anti-C1q Abs, and CIC-C1q were detected in 77%, 60%, and 43.7% of the patients with LN, respectively. The prevalence and mean levels of anti-dsDNA and anti-C1q Abs were significantly higher in patients with active LN than in those with inactive LN or controls. The levels of C3 and C4 were significantly lower in active LN than in inactive LN or controls. In active LN, a positive correlation between anti-C1q and anti-dsDNA Abs was observed. In patients with detected anti-C1q Abs, microhematuria (59% vs. 16%, $P = 0.003$), urinary casts (28% vs. 8%, $P = 0.02$), and low levels of serum C3 ($P = 0.03$) and C4 ($P = 0.01$) were observed statistically significantly more often.

CONCLUSIONS Simultaneous presence of hematuria and anti-C1q Abs may indicate an ongoing inflammatory process in the glomeruli in patients with SLE.

Correspondence to:
Prof. Zofia I. Niemir, MD, PhD, Pracownia Nefrologii Molekularnej, Katedra i Klinika Nefrologii, Transplantologii i Chorób Wewnętrznych, Uniwersytet Medyczny im. Karola Marcinkowskiego, ul. Przybyszewskiego 49, 60-355 Poznań, Poland, phone: +48-61-869-17-68, fax: +48-61-869-16-88, e-mail: zniemir@ump.edu.pl
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INTRODUCTION Systemic lupus erythematosus (SLE) is an autoimmune disease characterized by B cell hyperactivity resulting in overproduction of autoantibodies against cytoplasmic, nuclear, and surface antigens and immune complex formation. Despite many hypotheses concerning the pathogenesis of SLE, the primary cause of the immune system dysregulation is still unknown. Recent studies highlight the role of defective removal of apoptotic cells in the pathogenesis of SLE.[1-4] Apoptotic cell debris become antigenic and initiate a pathological immune response resulting in the production of autoantibodies. Complement component C1q plays a crucial role in the removal of apoptotic cells and circulating immune complexes (CIC). Homozygous patients with deficiency of classical pathway components, especially C1q and C4, are at a risk of developing SLE.[5] However, in most SLE patients, hypocomplementemia is considered to be secondary to the complement activation.[3,4,6,7] Deposits containing complement components were found in the glomeruli of lupus-prone mice as well as of patients with primary and secondary glomerulonephritides.[8-11] Although SLE involves almost all organs in the body, renal involvement considerably deteriorates a long-term prognosis. Lupus nephritis (LN) develops in about 40% to 85% of the patients with SLE, and in 50% of the cases it occurs during the first year after the diagnosis

of SLE.[12] LN is characterized by relapses and periods of remission. Despite many suggestions, investigators have not yet found a specific marker that could be used to identify patients with renal involvement in the course of SLE.[13] It is also difficult to identify patients at a risk of lupus flare. Repeat biopsies may be necessary to associate the clinical symptoms with histological findings and confirm the effectiveness of therapeutic management. However, renal biopsy may be contraindicated in an active lupus flare, and, what is also important, it is not free of complications. Hence, it is vital to detect a biomarker that would be able to identify kidney involvement and help monitor LN activity.

In this study, we assessed antibodies against double-stranded DNA (anti-dsDNA Abs) and C1q (anti-C1q Abs) with some other serological parameters including complement components C3, C4, and CIC binding C1q (CIC-C1q) in the sera of patients with LN. We then tried to establish associations between these parameters and the clinical symptoms of LN.

PATIENTS AND METHODS The study involved 48 patients (all women) with LN who were hospitalized in the Department of Nephrology, Transplantology and Internal Medicine of the Poznan University of Medical Sciences, Poznań, Poland. The control group included 66 age-matched healthy volunteers. The study was approved by the Bioethical Committee at the Poznan University of Medical Sciences. A written informed consent was obtained from all the examined subjects.

Patients were divided into a group with active LN and inactive LN according to the Systemic Lupus Erythematosus Disease Activity Index (SLEDAI-2K) score. Active LN was identified if the score was 10 points or higher (including the minimum 4 points for renal involvement [proteinuria >0.5 g per 24 h, hematuria, heme-granular or red blood cell casts, leukocyturia without urinary tract infection]).[14]

Histological, clinical, and biochemical data of the patients are presented in TABLE 1. Complementary clinical and laboratory characteristics, including extrarenal symptoms, renal abnormalities, and other lupus-related autoantibodies, are presented in TABLE 2. With respect to renal complications, the development of the nephrotic syndrome, a decrease in glomerular filtration rate (GFR) below 60 ml/min/1.73m^2 in the last month, and indications for temporary hemodialysis were also considered.

In 34 patients with active LN, the median SLEDAI-2K score was 14 (range 10–34). In 25 of these patients, the diagnosis of LN was supported by kidney biopsy. Kidney samples were assessed according to the International Society of Nephrology/Renal Pathology Society classification[15] in the Department of Clinical Pathomorphology of

TABLE 1 Morphological, clinical, and biochemical data of patients with lupus nephritis

Morphological class of LN	Number of patients	Age, y mean ±SD	Disease duration, y mean ±SD	SLEDAI score median (range)	Serum creatinine, µmol/l mean ±SD	eGFR, ml/min/1.73 m^2 mean ±SD	Proteinuria, g/24 h mean ±SD
active LN (n = 34)							
class II	2	31 ±8	3.8 ±3.5	12 (10–14)	66.3 ±6.2	90.5 ±4.9	0.27 ±0.25
class III	10	33 ±11	4.6 ±5.3	14 (10–22)	81.3 ±37.1	84.4 ±31.8	1.82 ±1.97
class IV	13	33 ±12	5.7 ±6.0	18 (12–34)	162.7 ±160.9	57.8 ±35.0	4.30 ±4.30
no biopsy	9	37 ±10	7.3 ±2.1	13 (10–19)	97.2 ±35.4	63.3 ±23.0	1.20 ±1.70
inactive LN (n = 14)							
class II	1	19	2	5	46.8	149	0.14
class III	4	32 ±5	4.5 ±4.0	6 (4–8)	61.0 ±16.8	107.5 ±30.2	0.30 ±0.20
class IV	6	35 ±7	7.3 ±3.0	5 (2–8)	90.2 ±32.7	69.8 ±25.0	0.73 ±0.38
class V	1	24	9	2	70.7	88	0.20
no biopsy	2	39 ±12	6.8 ±3.1	5.5 (5–6)	212.2 ±123.8	29.5 ±19.1	0.80 ±0.80

Abbreviations: eGFR – estimated glomerular filtration rate (according to the Modification of Diet in Renal Disease formula), LN – lupus nephritis, SD – standard deviation, SLEDAI – Systemic Lupus Erythematosus Disease Activity Index

TABLE 2 Complementary clinical and laboratory characteristics of patients with active and inactive lupus nephritis

	active LN (n = 34)	inactive LN (n = 14)	*P*
systemic signs and symptoms, n (%)			
neurological disorders	9 (26.5)	0	<0.05
vasculitis	1 (2.9)	0	1.00
arthritis	2 (5.9)	0	1.00
skin lesions	5 (14.7)	2 (5.9)	1.00
mucosal ulcers	1 (2.9)	0	1.00
serositis	3 (8.8)	0	0.54
fever	6 (17.6)	0	0.16
hematological disorders (decreased PLT and/or WBC and/or Hb)	22 (64.7)	2 (5.9)	0.003
renal abnormalities, n (%)			
urinary casts (heme-granular or RBC casts)	8 (23.5)	0	0.12
hematuria (>5 RBC/high power field)	20 (58.8)	0	<0.0001
proteinuria (>0.5 g/24 h)	24 (67.6)	6 (17.7)	0.14
nephrotic syndrome	12 (35.3)	0	0.01
leukocyturia (>5 WBC/high power field)	17 (50.0)	1 (7.1)	0.01
decrease in GFR below 60 ml/min/1.73m^2 in the last month	5 (14.7)	0	0.32
need for hemodialysis	2 (5.9)	0	0.89
immunological parameters, n (%)			
ANA	34 (100.0)	8 (57.1)	0.0002
antinucleosome Abs	8 (23.5)	0	0.12
anti-Ro (SS-A) Abs	11 (32.4)	6 (42.9)	0.72
anti-La (SS-B) Abs	3 (8.8)	0	0.62
anti-Sm Abs	3 (8.8)	0	0.62
anti-RNP Abs	2 (5.9)	0	0.89
antiribosomal P Abs	0	1 (7.1)	0.64
antihistone Abs	5 (14.7)	1 (7.1)	0.81
anti-PCNA Abs	1 (2.9)	0	0.51
anticentromere Abs	1 (2.9)	0	0.51
anticardiolipin Abs	5 (14.7)	1 (7.1)	0.81
anti-β_2 glycoprotein I Abs	3 (8.8)	1 (7.1)	0.85

Abbreviations: Abs – antibodies, ANA – antinuclear antibodies, GFR – glomerular filtration rate, Hb – hemoglobin, PCNA – proliferating cell nuclear antigen, PLT – platelets, RBC – red blood cells, RNP – ribonucleoprotein, WBC – white blood cells, others – see **TABLE 1**

the Poznan University. The remaining patients had contraindications to biopsy such as coagulation disorders or reduced size of the kidneys due to long-standing disease. In 9 patients, blood and serum samples were collected at the time of renal biopsy. In the remaining patients, the mean time since biopsy to sample examination was 5 months (1–12 months). In all of them, it was the next renal exacerbation. The mean time between our study and the diagnosis of SLE in the group with active LN was 6 years (1–16 years).

Fourteen patients with the median SLEDAI-2K score of 5 (2–8) constituted the group with inactive LN. Twelve patients had biopsy-proven LN. The examined samples were collected at the mean time of 28 months after biopsy (6–60 months). Mean time between our study and the first symptoms of SLE in this group was 7.7 years (1–18 years).

Thirty-eight percent of the patients with active LN and 79% with inactive LN had been previously treated with methylprednisolone (MP) intravenously (*P* <0.05), 18% and 15% with cyclophosphamide (CYC), 15% and 3% with azathioprine, and 6% and 29% with antimalarial drugs, respectively. All patients with inactive LN were maintained on tapered doses of oral MP. Twenty-six percent of the patients with the active form were hospitalized due to newly diagnosed LN. They received MP and CYC intravenously followed by oral MP.

Venous blood was collected from patients with LN and from controls. Antinuclear antibodies (ANA) were detected by indirect immunofluorescence using the Mosaic HEp-2/Liver

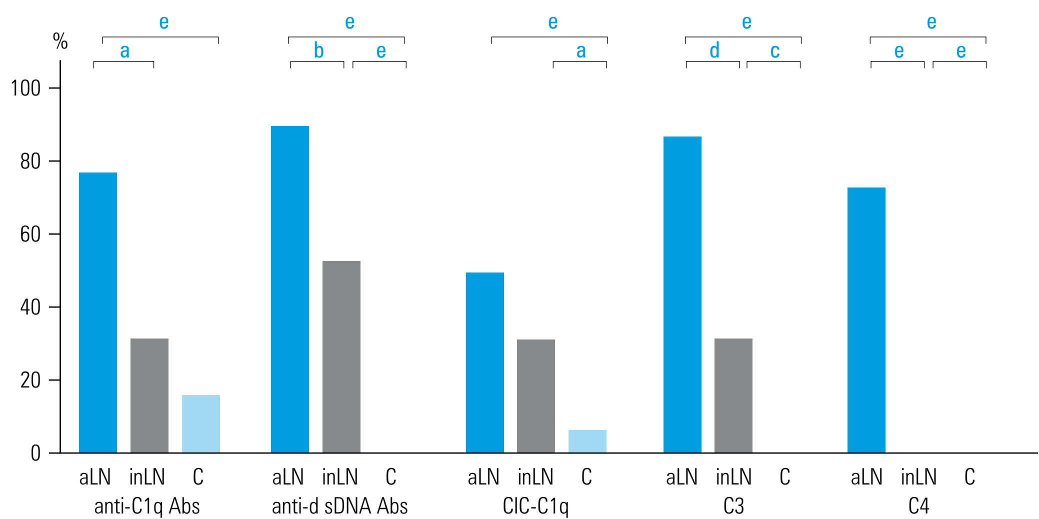


FIGURE 1 Prevalence of anti-C1q Abs, anti-dsDNA Abs and CIC-C1q, and decreased levels of complement components C3 and C4 in the sera of patients with active LN (aLN), inactive LN (inLN), and controls (C)
a $P < 0.05$
b $P < 0.01$
c $P < 0.005$
d $P < 0.0005$
e $P < 0.0001$
Abbreviations: anti-C1q Abs – antibodies against C1q, anti-ds DNA Abs – antibodies against double-stranded DNA, CIC-C1q – circulating immune complexes binding C1q, LN – lupus nephritis

(Monkey) test (EUROIMMUN, Lübeck, Germany). Titers equal or exceeding 1:320 were considered positive. Qualitative estimation of autoantibodies against 14 antigens: RNP, Sm, SS-A, SS-B, Scl-70, PM-Scl, Jo-1, centromere B, PCNA, dsDNA, nucleosome, histone, ribosomal protein P, AMA-M2 was performed by ANA Profile 3 EUROLINE test (EUROIMMUN). Antibodies against β_2-glycoprotein I and anticardiolipin were investigated using the enzyme-linked immunosorbent assays (ELISA) (EUROIMMUN) with cut-off points set at 20 RU/ml and 12 RU/ml, respectively. An ELISA test with an antigen consisting of dsDNA bound to nucleosomes (EUROIMMUN) was used to detect the anti-dsDNA Abs (in the immunoglobulin G [IgG] class) in serum. The results exceeding 100 IU/ml were considered positive.

Detection of anti-C1q Abs (IgG) was performed with an ELISA test with purified C1q (BŰHLMANN Laboratories, Schönenbuch, Switzerland). The originally recommended cut-off point for this test (15 U/ml) yielded 29% of positive results in the control group. Therefore, we followed the recommendations of Meyer et al.[16] and considered the values above 32 U/ml as positive.

CIC-C1q were assessed by an enzyme immunoassay containing purified human C1q (Quidel Corporation, San Diego, United States). We calculated an optimized cut-off point at mean + 2 standard deviations obtained in the control group with the values exceeding 12 μg Eq/ml defined as positive. Concentrations of C3, C4, and IgG were measured by immunoturbidimetry (Cobas Integra 800, Roche Diagnostics, Mannheim, Germany). The normal range for C3 was 0.9 to 1.8 g/l, for C4 – 0.1 to 0.4 g/l, and for total IgG – 7 to 16 g/l.

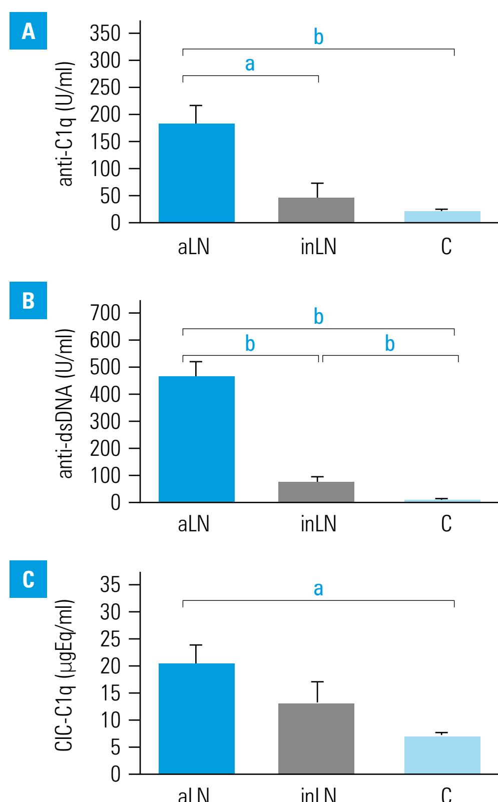
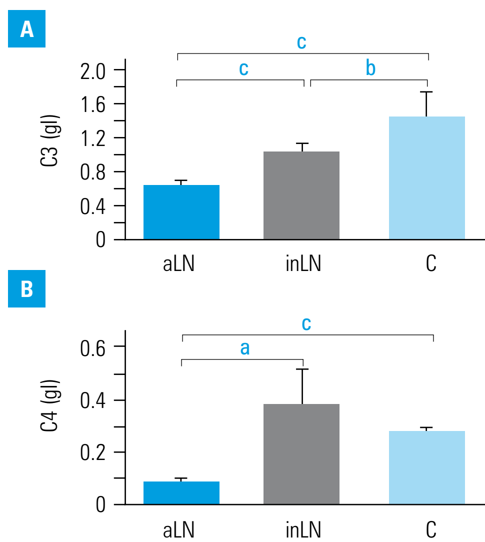


FIGURE 2 Mean levels of anti-C1q Abs (A), anti-dsDNA Abs (B), and CIC-C1q (C) in the sera of patients with active LN (aLN), inactive LN (inLN), and controls (C)
a $P < 0.001$
b $P < 0.0001$
Abbreviations: see FIGURE 1

Statistical analysis All examined parameters were presented as the mean ± standard deviation, standard error of mean, or percentage. The SLEDAI-2K score was reported as medians and ranges. Data analysis was preceded by the verification of consistency of the results with Gaussian distribution using the Shapiro-Wilk normality test. Then, one-way analysis of variance was performed. The Spearman correlation was used to examine correlations in all groups. The Fisher's exact test was used to assess associations between the prevalence of anti-C1q, anti-dsDNA Abs, CIC-C1q and decreased levels of C3, C4 among patients with active LN, inactive LN, and controls. $P < 0.05$ was considered statistically significant.

RESULTS Neurological disorders ($P < 0.05$), hematological abnormalities ($P = 0.003$), and features of renal involvement, such as hematuria ($P < 0.0001$), leukocyturia ($P < 0.01$), and proteinuria, were observed significantly more often in patients with active LN. Of note, nephrotic syndrome was observed only in patients with active LN ($P = 0.01$). Also, positive ANA were more common in patients with the active form ($P < 0.0005$; TABLE 2). In line with the latter finding, the mean titers of ANA and total IgG were significantly higher in active than in inactive LN

FIGURE 3 Mean levels of complement components C3 (A) and C4 (B) in the sera of patients with active LN (aLN), inactive LN (inLN), and controls (C)
a $P < 0.05$
b $P < 0.001$
c $P < 0.0001$



(1040 ±142 vs. 323 ±110, $P < 0.0005$ and 12.1 ±1.7 vs. 7.8 ±0.9 g/l, $P < 0.05$, respectively).

The prevalence of anti-C1q Abs in patients with LN significantly exceeded that observed in the control group. The difference was particularly evident between patients with active LN and controls, but it was also significant between those with active and inactive LN. However, there was no significant difference between patients with inactive LN and controls (FIGURE 1).

The mean serum level of anti-C1q Abs differed significantly between the active and inactive groups, and particularly between active LN and controls (FIGURE 2A).

Regarding anti-dsDNA Abs, they were detected in nearly 90% of the patients with active LN, but also in 50% of those with inactive LN. Nonetheless, no subject from the control group had positive anti-dsDNA Abs (FIGURE 1). The mean serum concentration of anti-dsDNA Abs was significantly higher in the active group compared with the inactive group and controls. However, the same was true for the inactive group and controls (FIGURE 2B).

Of interest, there was no significant difference in the detection of CIC-C1q in the sera of patients with active and inactive LN, although the values differed significantly between the active group and controls and less significantly between the inactive group and controls (FIGURE 1). The differences in the mean levels of CIC-C1q were observed only between the active group and controls (FIGURE 2C).

Decreased C3 and C4 levels were much more common in patients with active LN than in those with inactive LN (FIGURE 1). The mean concentration of C3 differed significantly between the active group and controls, inactive group and controls, and, particularly between the active and inactive groups (FIGURE 3A). The same was true for C4. The latter parameter tended to be even higher in inactive LN than in controls (FIGURE 3B).

In active LN, a positive correlation was observed between CIC-C1q level and the SLEDAI-2K score ($r = 0.58$, $P < 0.0005$). Anti-C1q Abs, anti-dsDNA Abs, and complement components did not show a significant correlation with LN activity assessed by the SLEDAI-2K. In active LN, the levels of total IgG correlated positively with anti-dsDNA Abs ($r = 0.68$, $P < 0.0005$) and anti-C1q Abs ($r = 0.55$, $P < 0.001$). They correlated negatively with the C3 concentration ($r = -0.44$, $P < 0.01$). Significant negative correlations were also observed between the levels of anti-dsDNA Abs and C3 and C4 ($r = -0.47$, $P < 0.01$; $r = -0.43$, $P < 0.05$, respectively). There was correlation between anti-C1q and anti-dsDNA Abs in patients with active LN ($r = 0.41$, $P < 0.05$), but not in those with inactive LN.

We tried to establish whether the reactivity to C1q has any effect on the clinical manifestation of LN. TABLE 3 shows the differences in SLE-related clinical and biochemical features between patients with positive and negative anti-C1q Abs. Of interest, in patients with positive anti-C1q Abs microhematuria and urinary casts were commonly observed. In addition, significantly lower serum levels of C3 and C4 were noted in this subgroup of patients.

DISCUSSION

We examined 48 patients with LN. First, to select patients with the active and inactive form of LN, we used the SLEDAI-2K score.[14] Based on the score, we aimed to establish whether the determination of serum anti-C1q Abs and CIC-C1q would make the diagnosis of active LN easier. Our results revealed that both these biomarkers complement the diagnosis of active LN, but their use as a sole marker does not allow to classify patients into the active or inactive group. Compared with anti-dsDNA Abs, anti-C1q Abs were less frequently detected in inactive LN, but unfortunately they were also positive in 12% of the control subjects. With respect to CIC-C1q, the corresponding results were even worse.

Nowadays, there are many tests detecting Abs in the sera of patients with SLE, such as ANA, anti-dsDNA, anti-C1q, antinucleosomes (anti-Ns), antiribosomal protein P, anti-SS-A, anti-SS-B, anti-α-actinin, and others.[8,11,12,17,18] Only few of them are used in clinical practice and the associations between autoantibody profile and clinical symptoms are still unclear. It is well known that LN is characterized by variable clinical course. Recent studies that assessed LN activity have shown inconclusive results.[11,12,17-20] SLEDAI and the British Isles Lupus Assessment Group (BILAG) are the most popular scales used by investigators to assess the activity of LN. Other authors used only biochemical data or both morphological and clinical data to classify patients either into an active or inactive group.[21-23]

We supplemented the SLEDAI-2K scale with a broader spectrum of renal abnormalities and other SLE-related autoantibodies. From the nephrological point of view, the results of this complementary analysis are quite satisfactory. All patients with active urinary sediment and nephrotic syndrome were assigned to the active group. Out of extrarenal symptoms, neurological disorders, and hematological abnormalities

TABLE 3 Associations between SLE-related clinical and laboratory parameters and the prevalence of anti-C1q Abs in patients with lupus nephritis

	Anti-C1q (+) (n = 29)	Anti-C1q (–) (n = 19)	*P*
systemic signs and symptoms, n (%)			
neurological disorders	7 (24.1)	2 (10.5)	0.29
vasculitis	1 (3.4)	0	1.00
arthritis	2 (6.9)	0	0.51
skin lesions	4 (13.8)	3 (15.8)	1.00
mucosal ulcers	1 (3.4)	0	1.00
serositis	3 (10.3)	0	0.27
fever	5 (17.2)	1 (5.3)	0.38
arterial hypertension	15 (51.7)	13 (68.4)	0.37
leukopenia	3 (10.3)	1 (5.3)	1.00
thrombocytopenia	5 (17.2)	2 (10.5)	0.69
Hb (<12.0 g/dl)	11 (37.9)	3 (15.8)	0.11
renal abnormalities, n (%)			
urinary casts (heme-granular or RBC casts)	8 (27.6)	0	0.02
hematuria (>5 RBC/high power field)	17 (58.6)	3 (15.8)	0.003
leukocyturia (>5 WBC/high power field)	14 (48.3)	4 (21.0)	0.07
proteinuria (>0.5 g/24h)	18 (62.1)	12 (63.2)	1.00
nephrotic syndrome	9 (31.0)	3 (15.8)	0.32
decrease in GFR below 60 ml/min/1.73 m^2 in the last month	4 (13.8)	1 (5.3)	0.64
immunological parameters, n (%)			
ANA	29 (100)	13 (68.4)	0.002
anti-dsDNA	25 (86.2)	12 (63.2)	0.09
antinucleosome Abs	5 (17.2)	3 (15.8)	1.00
anti-Ro (SSA) Abs	9 (31.0)	8 (42.1)	0.54
anti-La (SSB) Abs	3 (10.3)	0	0.27
anti-Sm Abs	2 (6.9)	1 (5.3)	1.00
anti-RNP Abs	0	2 (10.5)	0.15
antiribosomal P Abs	1 (3.4)	0	1.00
antihistone Abs	4 (13.8)	2 (10.5)	1.00
anti-PCNA	1 (3.4)	0	1.00
anticentromere Abs	1 (3.4)	0	1.00
anticardiolipin Abs	3 (10.3)	3 (15.8)	0.67
anti-β_2 glycoprotein I Abs	3 (10.3)	1 (5.3)	1.00
CIC-C1q	13 (44.8)	8 (42.1)	1.00
low C3	23 (79.3)	9 (47.4)	0.03
low C4	18 (62.1)	4 (21.0)	0.01

Abbreviations: see **FIGURE 1** and **TABLE 2**

differentiated patients with active and inactive phase of the disease. Surprisingly, the autoantibody profile was not helpful in this respect. Only the frequency of total ANA prevailed in patients with active LN.

ANA were the first antibodies that were used in SLE diagnosis. About 95% of the patients with SLE have positive tests detecting ANA.[24] Anti-dsDNA Abs are less sensitive, but more specific for SLE. They can be found in the sera of 55% to 80% patients with SLE, but not in the sera of healthy individuals, which was also confirmed in our study. Most of the investigators indicate that anti-dsDNA Abs are a useful marker of the overall activity of SLE.[11,25,26] Some of them consider the elevated levels of anti-dsDNA Abs as indicative of active, proliferative forms of LN.[26,27] However, other studies have provided evidence that this test cannot be used to evaluate the activity of LN.[16,28,29] In particular, anti-dsDNA Abs do not allow to distinguish exacerbations with and without renal involvement.[25-28] In this context, interesting results were obtained by Mok et al.[25] The authors compared the serum levels of anti-dsDNA, anti-Ns, and anti-C1q Abs in patients with active LN and extrarenal SLE. All antibodies correlated

positively with the general activity of SLE and negatively with C3 and C4 levels. However, anti-C1q Abs appeared to be significantly more specific for both LN and extrarenal SLE.

Anti-C1q Abs have been suggested as a new potential parameter that helps establish the diagnosis and evaluate LN activity. However, they are detected not only in SLE (in 21% to 50% of the patients), but also in other systemic diseases, including those without renal involvement.[12,25,30] As mentioned previously, 12% of healthy individuals in our study had elevated titers of anti-C1q Abs. This prevalence is even higher than that previously reported by Siegert et al.[31] According to some authors, LN does not occur in the absence of anti-C1q Abs.[32,33] Nevertheless, other investigators outlined a high negative predictive value of anti-C1q Abs (87%–100%), but a poor positive predictive value (37%–68%) in diagnosing LN.[11,16,20,21,24,34,35] Gueirreiro de Moura et al.[19] observed that there was no difference in anti-C1q levels in patients with active and inactive SLE without renal symptoms. However, the mean levels of these antibodies were significantly higher in active SLE with LN compared with active SLE without LN. The authors concluded that anti-C1q Abs seemed to play an important role in the pathogenesis of LN, and low titers of these antibodies excluded the presence of active LN. Fang et al.[33] and Moroni et al.[20] observed that anti-C1q Abs are the best marker for the assessment of renal involvement, mainly in proliferative forms of LN. The investigators suggested that the detection of anti-C1q Abs combined with the measurement of serum C3 and C4 levels may serve as the best predictors of renal flare.[7,11,16,20,22,36] The sensitivity of anti-C1q Abs titers in diagnosing renal exacerbation ranges from 44% to 100% and specificity from 70% to 92%. In our study, the presence of anti-C1q Abs identified patients with active urinary sediment and low serum levels of C3 and C4. Because most of our patients had proliferative forms of LN, our results complement those mentioned above. However, a larger patient cohort should be studied to further validate these findings.

To conclude, the results of our study show that the measurement of anti-C1q Abs may be a helpful tool in the assessment of patients with LN.

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ARTYKUŁ ORYGINALNY

Czy krążące przeciwciała przeciw C1q odzwierciedlają aktywność toczniowego zapalenia nerek?

Katarzyna Smykał-Jankowiak, Zofia I. Niemir, Magdalena Polcyn-Adamczak

Pracownia Nefrologii Molekularnej, Katedra i Klinika Nefrologii, Transplantologii i Chorób Wewnętrznych, Uniwersytet Medyczny im. Karola Marcinkowskiego w Poznaniu

SŁOWA KLUCZOWE

C3 i C4, krążące kompleksy immunologiczne, krwiomocz, przeciwciała przeciwko C1q i dsDNA, toczniowe zapalenie nerek

STRESZCZENIE

WPROWADZENIE Wyniki ostatnich badań wskazują na związki pomiędzy obecnością krążących przeciwciał przeciwko C1q (p-C1q) a zajęciem nerek w przebiegu tocznia rumieniowatego układowego (*systemic lupus erythematosus* – SLE). Nie jest jednak jasne, czy objawy kliniczne toczniowego zapalenia nerek (TZN) można powiązać z występowaniem p-C1q w surowicy.

CELE Celem badania było porównanie występowania oraz stężeń przeciwciał przeciwko C1q (p-C1q) i dwuniciowemu DNA (p-dsDNA), a także krążących kompleksów immunologicznych wiążących C1q (KKI-C1q) oraz składowych dopełniacza C3 i C4 w surowicy chorych na TZN w odniesieniu do aktywności klinicznej SLE i objawów TZN.

PACJENCI I METODY Badaniem objęto 48 chorych na TZN oraz 66 zdrowych ochotników. Stężenia p-C1q, p-dsDNA i KKI-C1q oznaczono metodami immunoenzymatycznymi, a C3 i C4 metodą immunoturbidymetryczną. Aktywność SLE oceniano za pomocą skali SLEDAI (Systemic Lupus Erythematosus Disease Activity Index).

WYNIKI P-dsDNA, p-C1q oraz CIC-C1q wykrywano odpowiednio u 77%, 60% i 43,7% chorych na TZN. Częstość występowania i średnie stężenia p-dsDNA i p-C1q były istotnie większe w aktywnym TZN niż w nieaktywnym TZN i u zdrowych ochotników. Średnie stężenia C3 i C4 były znamiennie mniejsze w aktywnym TZN w stosunku do nieaktywnego TZN i zdrowych ochotników. W aktywnym TZN zaobserwowano dodatnią korelację między stężeniem p-C1q i p-dsDNA. U chorych z wykrywanymi p-C1q istotnie statystycznie częściej stwierdzano krwiomocz mikroskopowy (59% *vs* 16%; p = 0,003) i wałeczkomocz (28% *vs* 0%; p = 0,02) oraz obniżone stężenia C3 (p = 0,003) i C4 (p = 0,01) w surowicy.

WNIOSKI Skojarzone pojawienie się krwiomoczu i p-C1q u chorych na TZN może wskazywać na utrzymywanie się aktywnego procesu zapalnego w kłębuszkach nerkowych u chorych na SLE.

Adres do korespondencji:
prof. dr hab. med. Zofia I. Niemir, Pracownia Nefrologii Molekularnej, Katedra i Klinika Nefrologii, Transplantologii i Chorób Wewnętrznych, Uniwersytet Medyczny im. Karola Marcinkowskiego, ul. Przybyszewskiego 49, 60-355 Poznań, tel.: 61-869-17-68, fax: 61-869-16-88, e-mail: zniemir@ump.edu.pl
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