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Cognitive Dysfunction in Patients with Systemic Lupus Erythematosus: A Case Control Study

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ABSTRACT

Aim: To explore the incidence of cognitive impairment in individual having Systemic Lupus Erythematosus.
Study Design: Case control study.
Place and duration: Bilawal Medical College Jamshoro Pakistan, from rom September 2019 to September 2020.
Methodology: Total 31 female patients with neuropsychiatric Systemic Lupus Erythematosus (nSLE) and thirty-one cognitively healthy women with Systemic Lupus Erythematosus (Control group) participated in the study. The researchers employed single-photon emission computed tomography to obtain information on sociodemographic, clinical, neuropsychological, & SLE-related markers.
Results: When it came to cognitive complaints, 22.6 percent of those with nSLE reported them, compared to 6.5 percent in the control group (p=0.147); the frequency of cognitive dysfunction was 32.3 percent in those with nSLE, compared to 6.5 percent in the control group (p=0.01). Overall, the nSLE group seemed to be impaired in all cognitive domains at the same level, and there were correlations between cognitive dysfunction and less skilled occupation (r=0.41; p=0.02).
Conclusion: In nSLE, cognitive impairment is rather common, and it seems to have a detrimental impact on social functioning. A number of interconnected elements (such as SLE-related factors, drugs, and psychosocial factors) seem to have a role in cognitive impairment and cognitive complaints in nSLE patients.

Key words: Cognitive dysfunction, Systemic lupus erythromatosis, Prevalence

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INTRODUCTION

SLE is a chronic autoimmune illness that manifests itself in a variety of ways and may affect almost every organ in the body [1]. Stroke, convulsions, migraine, psychosis, and cognitive decline are all symptoms of systemic lupus erythematosus, and they are all classed as neuropsychiatric (NP) symptoms, according to the American Academy of Neuropsychiatry. Neuropsychiatric disorders are known to affect 14 percent to 75 percent of people with SLE [2-4].

In SLE, the pathophysiology of neuropsychiatric dysfunction is unknown. Immune-mediated vascular disease and antibodies against neurological tissue are two widely hypothesized disease pathways [5,6]. Distinct pathogenic pathways might be involved in different neuropsychiatric symptoms of SLE.

Several studies have shown that autoantibody activity and cerebral ischemia may play a role in cognitive impairment in SLE, with autoantibody activity and cerebral ischemia both being mentioned [7]. A number of other factors, including health parameters (illness duration, disease activity, and medication use), immunological activity (pro-inflammatory cytokines), and behavioural variables, have also been proposed [8]. Anti-DNA antibodies that cross react with certain regions on the ligand binding domain of

NR2 receptors, especially NR2a and NR2b, have been postulated to have a role [9,10].

There is a large concentration of these receptors in the hippocampus, which has an effect on learning and memory. Another kind of antibody connected to cognitive impairment is the ACL (anticardiolipin antibody). Additional antibodies related to cognitive problems include the antineuronal antibody, the anti-endothelial cell antibody (AECA), and the anti-Nedd5 C-ter antibody [11]. When compared to patients without neuropsychiatric symptoms, individuals with neuropsychiatric symptoms of systemic lupus erythematosus exhibited significantly higher levels of matrix metalloproteinase-9 (MMP-9) in both blood and cerebrospinal fluid (CSF) [12, 13].

In 21–81 percent of SLE patients, cognitive impairment develops [14,15]. Variations in the frequency of cognitive dysfunction might be attributable to differences in research groups, cognitive function assessment methodologies, and cognitive impairment criteria. Patients with both ongoing and resolved CNS illness, as well as those with no history of CNS symptoms, have been shown to have cognitive impairment [16-18].

Deficits in cognition have been identified in the areas of verbal and visual information processing, attention, verbal and visual speed, verbal productivity, and visuospatial memory [17,19,20]. Because these anomalies are not restricted to a particular brain location or cognitive domain, it is possible that these findings represent an amalgamation of people who have a range of neuropsychiatric symptoms. When it comes to neuropsychological testing, patients who have had a right parietal stroke, for example, would perform much differently from those who have had seizures in the left temporal lobe [21].

Although cognitive impairment has been documented in 27–52 percent of SLE patients with current or previous severe neuropsychiatric symptoms (nSLE), it has also been found in 20–42 percent of SLE patients who have never showed such signs. Cognitive impairment has usually been classified as 'subclinical' in this category.

Specifically, the goal of this study was to investigate the prevalence, frequency, and intensity of cognitive complaints, and cognitive impairment, in females with nSLE.

METHODOLOGY

Total 62 women with SLE [22] were selected from a hospital-based rheumatology outpatient clinic after giving their informed permission. Total 31 women were in case group having neuropsychiatric SLE, while 31 women were in control group (women having SLE but no neuropsychiatric complaints). In this study, participants were between the ages of 20 and 49, and they did not have any present or recent history of SLE-related neuropsychiatric symptoms other than mild cognitive impairment, headache, anxiety, or mood disturbances [23]. Thirty-one females were matched to nSLE patients based on their age and educational level. They were chosen from medical Centre or hospital staff (55 percent), neurology clinic patients (with main headache and syncope; 23 percent), and the researchers' acquaintances and colleagues (23 percent) In the control group, there were no substantial cognitive complaints, and they did not have a history of medical, neurological, or psychiatric issues that would have influenced their cognition in the past.

By a senior neurologist who specializes in behavioural neurology, a semi-structured neuropsychiatric interview as well as a neurological evaluation were done. Questions concerning cognitive problems were asked, as well as a search for present and previous psychiatric illnesses. If the inclusion criteria were met after the neuropsychiatric evaluation, a neuropsychologist (I.C.) performed a neuropsychological test without knowing any clinical or preclinical data other than the SLE diagnosis. It was a 90-minute battery that followed the guidelines of the American College of Rheumatology's ad hoc committee.

To be classified as having cognitive dysfunction, a subject had to perform below the 5th percentile in at least two cognitive tests as compared to the control group, regardless of whether or not they reported cognitive complaints. Because 6.5 percent of the control females were classified as cognitively impaired under this idea, and because they were using their own knowledge as a reference, two altered scores were utilized rather than one in the analysis of the results.

A comparison was made between the two study groups, as well as between the cognitively normal and cognitively impaired nSLE subgroups, and between the two study groups, based on sociodemographic and clinical characteristics. In this investigation, the two-sided Student and Mann-Whitney tests, as well as two additional tests, were used. It was observed that there were plausible associations between cognitive complaints and cognitive impairment in the nSLE group after assessing the bivariate Spearman rank coefficients. There were two dependent variables chosen: cognitive complaints (yes or no) and cognitive dysfunction (number of altered cognitive scores). Age and educational level were included as extra factors. Further research on components with a correlation coefficient larger than 0.2 was conducted using the regression analysis approach.

RESULTS

One of the women in the control group had a modest anxiety illness that did not affect cognition. Patients with nSLE had more current psychiatric problems and a history of headache than controls, and there was a tendency toward more frequent cognitive symptoms (Table 1). Attention/concentration/speed of thinking (2 females), memory (1 female), orientation (1 female), and language (1 female) issues, or a combination of the above, were characterized as cognitive deficits in nSLE patients (4 women).

Five subjects had a few cognitive scores that were not recorded (3 nSLE and 2 control women). Ten individuals with nSLE had cognitive impairment, accounting for 32.1 percent of the total.

With regard to cognitively impaired nSLE patients' altered tasks and domains, each patient demonstrated a distinct pattern of dysfunction (Table 2).

Table 1: Socio-demographic and clinical features of the two study groups.

	nSLE (n= 31)	Control (n= 31)	P
Age (years)	32.2	35.5	0.542
Education (%)			1
Primary	19.4	19.4	
Intermediate	48.4	48.4	
University	33.3	33.3	
Occupation			0.677
Unemployed	0	4.3	
Unskilled	25.7	26.1	
Skilled worker	51.5	52.6	
Professional	22.5	17.3	
Cognitive complaints (%)	22.5	6.5	0.146
History of headache	54.8	29	0.039
Anxiety	6.9	5.7	0.176
Depression	3.5	2.7	0.323
Psychiatric conditions			
Present (%)	25.7	3.2	0.026

Table 2: Cognitive performance of the two research groups.

Domain	Task	nSLE	Control group	P-value	% altered nSLE	
					Task	Domain
Mental status	MMSE	18.3+	28.9	0.104	6.5	6.5
Attention	Digital span backward,	4.2	4.5	0.143	3.3	25.8
	Digital span forward	5.7	6	0.252	0	
Memory	Immediate recall	48.8	53.4	0.028	6.5	19.4
	Delay recall	10	10.9	0.197	9.7	
	Delay recognition	12.8	13.6	0.104	12.8	
Visuospatial processing	Complex figure	33.4	34.2	0.16	6.5	9.7
	Copy box design	4.8	5.2	0.094	6.5	
Language	Verbal comprehension	8.5	8.8	0.096	10	
	Visual verbal naming	41.6	41.8	0.267	3.3	22.6
Reasoning	TONI	20.8	24	0.19	3.2	
	Arithmetic problem	6.4	7.1	0.176	6.7	9.7
Psychomotor speed	Digital symbol substitution	36.5	38.7	0.33	6.5	19.4
	Stroop words	99.7	106.7	0.105	10.3	
	Stroop colors	69.3	73.3	0.19	17.2	

DISCUSSION

Because of nSLE, 25.6 percent of the population had cognitive impairment (32.1 percent in nSLE minus 6.5 percent in the control group). Those values are in accordance with those discovered in previous studies.

While there was a great deal of inter-individual variation in the pattern of cognitive impairment, when looking at the whole nSLE group, it seemed that all cognitive domains were damaged in the same manner across the board.

A possible explanation for previous assertions of severe memory impairment in SLE is an overrepresentation of memory scores in the selected batteries [16,17].

Three out of ten cognitive scores in the battery touched into learning capacity, for example by Monastero et al. [17] We also discovered, by a post-hoc analysis of the current data, that there is a statistically significant association between how many cognitive scores are present in each domain as well as the incidence of malfunction in that area (r=0.92, p-value 0.01). Even after controlling for factors such as age and education, a consistent association between cognitive impairment and less skilled job was discovered. Because long-term data were not available, the possibility of the reverse explanation (i.e. cognitive deterioration because of a less challenging job) could not be ruled out either. In a recent study, it was shown that patients with nSLE were more likely than rheumatoid arthritis patients to have impairments in occupational competence and social function [24].

Quantitative approaches for analyzing SPECT images that have recently been developed should aid in better understanding the processes of cognitive impairment in SLE. Furthermore, lupus anticoagulant has been associated to worse cognitive function in nSLE more specifically than anti-cardiolipin antibodies, which was not tested in our investigation [25,26].

In SLE, the relationship between mood disturbance, cognitive symptoms, and cognitive function is likely to be complicated and multifaceted [27]. Previously, investigations with non-selected individuals found a link between depressed symptoms and cognitive function [28], it seems that psychological responses to illness or other psychosocial variables are the most important predictors of cognitive symptoms in nSLE, according to the present research results. However, when compared to patients with other chronic diseases, two studies found that nSLE patients have a higher prevalence of cognitive complaints and psychological distress [24].

CONCLUSION

Finally, a number of interconnected elements (such as SLE-related factors, drugs, and psychosocial factors) seem to have a role in cognitive impairment and cognitive complaints in nSLE patients. Larger samples are required to definitively identify the associated chemicals and processes, and this venture might considerably enhance the afflicted people's quality of life.

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CONFLICT OF INTEREST

None.

PERMISSION

It was taken from the ethical review committee of the institute.

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