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Audiovestibular Assessment of Systemic Lupus Erythematosus Patients: A Case Control Study

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Abstract

Background: An earlier investigation indicated that SLE patients had auditory vestibular symptoms, such as vertigo, considerably more frequently than control participants. In a histological examination, patients with SLE had a considerably reduced mean density of type I cells in the peripheral vestibular sensory epithelium.

Aim of Study: This study is to perform a comprehensive audiovestibular tests to determine the effect of systemic lupus erythematosus on auditory and vestibular system and correlate it with duration and severity of the disease.

Patients and Methods: The study comprised 30 participants diagnosed as systemic lupus erythematosus as patients group with 30 healthy controls. Audiovestibular system was assessed using pure tone audiometry, cervical Evoked Myogenic Potential (cVEMP), and Videonystagmography (VNG).

Results: Significant difference in PTA thresholds between two groups was found. In cVEMP, delayed latencies and lesser amplitude of waves was found. Significant difference between the two groups regarding abnormal VNG results. No correlation was found between PTA, cVEMP, VNG results with disease duration nor severity.

Conclusions: SLE can lead to hearing loss and is associated with vestibular symptoms, so it is recommended that audiovestibular examination become a part of routine follow-up visits of SLE patients for early intervention and to minimize patient handicap.

Key Words: *Systemic lupus erythematosus – Audiovestibular.*

Introduction

THE incidence of systemic lupus erythematosus (SLE), an autoimmune disease that affects multiple organs (non-organ specific), can reach 39 per 100,000 people **[1]**. SLE primarily affects females; the female to male ratio is 9:1 **[2]**, it is more prevalent in Asians and Africans than in Europeans (3:1), and it most frequently affects people between the ages of 20 and 45 **[3]**.

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The inner ear may be involved in immunologic processes, according to some theories **[4,5]**. For SLE, it holds true as well. The impact of SLE on the inner ear has also been demonstrated in a number of studies **[1,6,7]**. According to Kastaniousdakis et al. **[8]** and Sperling et al. **[9]**, audiovestibular symptoms can occur in SLE patients. An earlier investigation indicated that SLE patients had auditory vestibular symptoms, such as vertigo, considerably more frequently than control participants **[10,11]**. In a histological examination, patients with SLE had a considerably reduced mean density of type I cells in the peripheral vestibular sensory epithelium **[12]**. Organ damage in SLE is primarily brought on by the formation of humoral antibodies, immune complexes, and circulating autoantibodies. Otologic symptoms may be brought on by vasculitis in the spiral ligament, internal auditory artery, and striavascularis **[13]**. Uncertain genetic predisposition, exogenous causes like drugs, viruses, or UV rays, or a combination of these, may cause the condition **[14]**.

Several processes, including vasculitis, drug toxicity, free radical generation in cochlear vessels, and thrombosis in ear vascular related to antiphospholipid syndrome, were hypothesised in several investigations **[15,16]**.

This study's objectives were to assess how SLE affected the audiovestibular system and investigate the relationship between subjective and objective audiovestibular symptoms and the severity and durationof the disease in SLE patients.

Patients and Methods

Thirty patients were included in this case-control study that used the 2012 Systemic Lupus International Collaborating Clinics (SLICC) categorization criteria **[9]**. The first study group is represented by these patients. Thirty (30) normal

healthy adult participants with normal hearing thresholds made up the second group. They were chosen from patients' accompanying relatives to serve as the control group. Both groups included people of both sexes and ranged in age from 20 to 45.

From May 2021 to August 2022, patients attending the University Hospital's rheumatology clinics diagnosed as SLE were asked to join the study. Patients with a history of ear diseases (hearing loss, noise exposure, ototoxic drug intake) or a history of medical systemic diseases, such as rheumatic diseases, diabetes mellitus, hypertension, renal, and cardiovascular diseases, were excluded from the study. Likewise, patients with abnormal otoscopic findings and normal middle ear functions as evidenced by tympanometry and acoustic reflex were excluded.

The following procedures were applied to participants in both groups:

1- A thorough history is taken, emphasizing on hearing loss, tinnitus, hyperacusis, vertigo or dizziness while excluding systemic disorders, exposure to loud noises, use of ototoxic drugs, and family history of hearing loss. Also duration ofillness, type of medications and SLE disease activity index (SLEDAI) score.

2- Otological assessment.

3- Each participant in the study received basic audiological evaluation of both ears, which included the following:

A- Octave-step pure-tone audiometry (PTA) for bone conduction from 500 to 4000 Hz and from 250 to 8000 Hz for air conduction using Interacoustics AD 629 audiometry. According to the severity, hearing loss can be categorized. 26 to 40 dB of hearing loss is regarded as mild, 41 to 55 dB as moderate, 56 to 70 dB as moderately severe, 71 to 90 dB as severe, and greater than 91 dB as profound **[17,18]**. Speech discrimination scores utilizing Arabic spondee words for speech reception threshold (SRT) **[19]** and Arabic phonetically balanced words for speech discrimination scores (PB words) **[20]**.

B- Impedancemetry and acoustic reflexes using: Interacoustics AT235 (ipsilateral and contralateral).

4- Videonystagmography (VNG) Computerized 2-channels VNG Micromedical: For accurate nystagmus recording. Occulography tests (smooth pursuit, saccade, and optokinetic), spontaneous nystagmus, gaze positional, positioning, and caloric tests were all included in the VNG. The unilateral weakness, directional preponderance, and total eye velocity were automatically determined by a software algorithm utilising conventional equations. According to the Bárány Society Consensus document **[21]**, unilateral weakness more than (20 to 25%) is noteworthy when subjected to caloric testing. A total average caloric response of less than 12°/s is indicative of bilateral insufficiency.

5- Cervical vestibular evoked myogenic potential: Eclipse EP 15 by Interacoustics

For each ear, the peak to peak amplitudes (P1-N1) and peak latencies of waves P1 and N1 will be measured. After rectified for baseline, the asymmetric Ratio (AR) will be calculated.

6- The DHI **[22]**, Dizziness Handicap Inventory: The DHI consists of 25 items that are used to gauge one's self-perceived level of dizziness-related impairment. Physical, functional, and emotional domains are used. Each question had three possible answers (yes, sometimes, and no), each worth four, two, or no points. with a total score ranging from 0 to 100, where 100 represents the greatest felt severity of vertigo and 0 indicates no reported handicap.

7- Short Fall Efficacy Scale-International (FES-I): Using cross-culturally valid items, the Short FES-I was devised to assess fear concerns falling regarding demanding activities outside the house and social activities. The total score ranging from no worry about falling to severe concern about falling **[23]**.

8- Using the systemic lupus disease activity index and conventional parameters, the disease severity index for the patients was calculated (SLEDAI). Severe SLE, >12 **[24]**, moderate SLE, SLEDAI 6-12, and mild SLE, SLEDAI 0-5.

9- Laboratory studies that help in diagnosis and classification of SLE including erythrocyte sedimentation rate (ESR), rheumatoid factor (RF), antinuclear antibody (ANA), anti-double stranded nuclear antibody (anti-DNA), anti-Smith.

Statistical analysis:

Qualitative data was presented as frequency and percent; while numerical data was presented as or median and IQR (for not-normally distributed data).

Chi-square/Fisher's exact tests were used to compare qualitative variables between groups,

while Mann-Whitney U test and Spearman's correlation were used for analysis of quantitative data.

Results

This study recruited 60 individuals, 30 patients suffering from SLE and 30 normal individuals (controls). Among the patients group; 70% (21) were females and 30% (9) were males; while 60% (18) of the control group were females and 40% (12) were males. Audio vestibular symptoms among patients were as follow, 19 (63%) patients was suffering from tinnitus, 19 (63%) patients with hyperacusis and 14 (47%) patients with dizziness and vertigo.

About 63% (19) of the patients had severe SLEDAI scores while 30% (9) had moderate and only 7% (2) had mild SLEDAI scores.

Pure tone results:

Using Mann-Whitney U test to compare the hearing sensitivity at various frequencies between patients and controls. There were statistically significant differences between both groups at frequencies of (1kHz, 2kHz,4kHz & 8kHz) for the right ear. However, for the left ear; there were statistically significant differences between both groups at frequencies of (2kHz,4kHz & 8kHz); with higher threshold for the patients (Table 1).

Table (1): PTA findings for both groups.

Frequency	Patients (n=30)				Control (n=30)				*p*-value*
	Mean (SD)	Median	Min	Max	Mean (SD)	Median	Min	Max	
Right ear:									
250 Hz	21.5 (±7.3)	20.0	10	40	20.5 (±4)	20	15	25	0.502
500 Hz	22.5 (±6.3)	22.5	10	40	20.7 (±4.1)	20	10	25	0.275
1k Hz	23.3 (±5.3)	25.0	15	35	20.3 (±3.9)	20	10	25	0.018
2k Hz	28.7 (±13.7)	25.0	10	60	20.7 (±3.7)	20	15	25	0.020
4k Hz	35.2 (±18.6)	25.0	10	75	20.5 (±3.8)	20	15	25	<0.001
8k Hz	36 (±20.1)	25.0	10	70	20.3 (±3.9)	20	10	25	0.001
Left ear:									
250 Hz	21.5 (±7.3)	20.0	10	40	18.8 (±4.3)	20	10	25	0.053
500 Hz	22.5 (±6.3)	22.5	10	40	22.3 (±4.1)	25	10	25	0.701
1k Hz	23.3 (±5.3)	25.0	15	35	22.3 (±2.9)	23	15	25	0.349
2k Hz	28.5 (±13.7)	25.0	10	60	20.8 (±4.4)	20	10	25	0.040
4k Hz	34.2 (±16.9)	25.0	10	65	22.3 (±4.7)	25	10	25	0.011
8k Hz	36.5 (±20.1)	25.0	10	70	20.5 (±4.6)	20	10	25	0.002

*Mann-Whitney U test.

Table (2): Correlation between duration of the disease and PTA parameters.

	Frequency	Spearman's correlation coefficient	*p*-value
Right	250 Hz	0.019	0.921
	500 Hz	–0.026	0.890
	1k Hz	0.063	0.740
	2k Hz	0.131	0.492
	4k Hz	0.052	0.786
	8k Hz	0.082	0.665
Left	250 Hz	0.019	0.921
	500 Hz	–0.026	0.890
	1k Hz	0.063	0.740
	2k Hz	0.126	0.507
	4k Hz	0.064	0.736
	8k Hz	0.073	0.700

There was no significant correlation between disease duration and PTA results (Table 2).

Mann-Whitney U test was conducted to compare between severe and non-severe (mild and moderate) SLEDAI scoresas regards the PTA results. No statistically significant difference was found (Table 3).

Results of cVEMPs:

Mann-Whitney U test was conducted to compare the results of the VEMPS between the patients and the controls. There were statistically significant differences between both groups as regards cVEMP P1, N1 and amplitude for both left and right ears; higher median among the patients (Table 4). No statistically-significant correlation between disease duration and VEMP results (Table 5).

Table (3): Relation between SLEDAI scores and the results of the PTA.

Frequency	Severe SLEDAI (n=19)					Non-severe SLEDAI (n= 11)					*p*-value
	Mean	SD	Median	Min	Max	Mean	SD	Median	Min	Max	
Right:											
250 Hz	23.2	7.7	25.0	10.0	40.0	18.6	6.0	20.0	10.0	25.0	0.123
500 Hz	23.7	7.0	25.0	10.0	40.0	20.5	4.2	20.0	15.0	25.0	0.2
1k Hz	23.9	5.7	25.0	15.0	35.0	22.3	4.7	25.0	15.0	30.0	0.497
2k Hz	32.4	15.8	25.0	10.0	60.0	22.3	5.2	20.0	15.0	35.0	0.094
4k Hz	40.0	21.1	40.0	10.0	75.0	26.8	8.7	25.0	15.0	45.0	0.171
8k Hz	41.1	22.6	35.0	10.0	70.0	27.3	10.6	25.0	15.0	50.0	0.216
Left:											
250 Hz	23.2	7.7	25.0	10.0	40.0	18.6	6.0	20.0	10.0	25.0	0.123
500 Hz	23.7	7.0	25.0	10.0	40.0	20.5	4.2	20.0	15.0	25.0	0.2
1k Hz	23.9	5.7	25.0	15.0	35.0	22.3	4.7	25.0	15.0	30.0	0.497
2k Hz	32.1	15.8	25.0	10.0	60.0	22.3	5.2	20.0	15.0	35.0	0.094
4k Hz	38.4	19.2	40.0	10.0	65.0	26.8	8.7	25.0	15.0	45.0	0.171
8k Hz	41.3	22.6	35.0	10.0	70.0	28.2	11.7	25.0	15.0	50.0	0.232

Table (4): The results of the VEMPS for both groups.

cVEMPs	Patients				Control				*p*-value*
	Mean (±SD)	Median	Min	Max	Mean (±SD)	Median	Min	Max	
Right:									
cVEMP P 1	13.2 (±5.3)	15.2	0	16.48	13.8 (±0.5)	13.8	13.2	14.7	<0.001
cVEMP N 1	22.5 (±9)	25.8	0	26.8	23.5 (±0.5)	23.6	22.3	24.2	<0.001
c VEMP amplitude	26.1 (±11.3)	29.9	0	39.1	35.1 (±9.4)	32.7	24.6	62.1	0.008
Left:									
cVEMP P 1	13.4 (±5.4)	15.4	0	16.6	14.1 (±0.8)	13.9	13.0	15.8	<0.001
cVEMP N 1	22.5 (±9)	25.9	0	27.1	23.6 (±0.4)	23.7	22.7	24.2	<0.001
cVEMP amplitude	27 (±11.7)	31.0	0	44.1	40.4 (±7.2)	39.8	25.1	53.5	<0.001
cVEMP asymmetry ratio (%)	7.5 (±6.9)	5.1	0	24.9	13.7 (±6.2)	14.4	1.13	28.96	0.001

*Mann-Whitney U test.

Table (5): Correlation between disease duration and VEMP results.

cVEMP	Spearman's correlation coefficient	*p*-value
Right:		
P1 latency (ms)	0.149	0.432
N1 latency (ms)	0.041	0.828
Amplitude	0.206	0.274
Left:		
P1 latency (ms)	0.165	0.383
N1 latency (ms)	0.034	0.859
Amplitude	–0.212	0.261
Inter-aural amplitude difference ratio	–0.135	0.478

Using Mann-Whitney U test; no statistically-significant association between severe and non-severe (mild and moderate) SLEDAI scores and parameters of the cVEMP (Table 6).

VNG results:

Five patients suffered from unilateral canal paresis; 10% (3/30 patients) in the left ear and 6.7% (2/30 patients) in the right ear. Chi square/ Fisher's exact test was conducted to determine the difference between patients and controls as regards the VNG results. We found a statistically significant difference between both groups as regards the VNG positioning test; *p*-value is <0.001 and for total number of patients who had abnormal VNG results as *p*-value is 0.002 (Table 6). Otherwise, insignificant *p*-value.

Using Mann-Whitney U test, we didn't find a statistically-significant relation between disease duration and abnormal VNG (Table 8).

Fisher's exact test was conducted to determine the difference between severe and non-severe (mild and moderate) SLEDAI scores as regards the results of the VNG; no statistically significant difference was found (Table 9).

DHI and Short FES-I results:

No significant correlation between disease duration and scores of the DHI and short FES-I (Table 10).

Using Mann-Whitney U test, no statistically significant difference between patients with severe and non-severe (mild and moderate) SLEDAI as regards the DHI and short FES-I scores (Table 11).

Table (6): Relation between SLEDAI scores and the parameters of the VEMPs.

cVEMP	Severe SLEDAI (n=19)					Non-severe SLEDAI (n=11)					*p*-value
	Mean	SD	Median	Min	Max	Mean	SD	Median	Min	Max	
Right:											
P1 latency (ms)	12.9	5.8	15.1	0.0	16.5	13.8	4.6	15.2	0.0	16.0	0.866
N1 latency (ms)	21.9	9.8	25.8	0.0	26.8	23.5	7.8	25.8	0.0	26.7	0.866
Amplitude	25.4	12.2	31.4	0.0	37.1	27.3	10.1	26.5	0.0	39.1	0.8
Left:											
P1 latency (ms)	13.1	5.8	15.4	0.0	16.6	14.1	4.7	15.5	0.0	16.5	0.672
N1 latency (ms)	21.9	9.8	25.9	0.0	27.1	23.5	7.8	25.9	0.0	26.8	0.966
Amplitude	25.1	12.0	29.4	0.0	41.2	30.2	10.9	31.4	0.0	44.1	0.134
Inter-aural amplitude difference ratio	7.6	7.4	4.9	0.0	27.9	6.6	6.2	3.6	0.0	17.4	0.8

Table (7): Comparison between patients and controls as regards the VNG results.

VNG test	Patients (n=30) N (%)	Control (n=30) N (%)	*p*-value
Occulography:			
Abnormal	7 (23.3)	0	0.011*
Normal	23 (76.7)	30	
Unilateral canal weakness:			
No	25 (83.3)	30	0.052
Paresis	5 (16.7)	0	
Spontaneous nystagmus:			
No	27 (90)	30	0.237
Yes	3 (10)	0	
Positioning (Dix-Hallpike test):			
Negative	29 (96.7)	30	<0.001
Positive	1 (3.3)	0	
Abnormal VNG test:			
No	21 (70)	30	0.002
Yes	9 (30)	0	

*Fisher's exact test.

Table (8): Relation between VNG results and duration of the disease.

	Normal VNG result					Abnormal VNG result					*p*-value
	Mean	SD	Median	Min	Max	Mean	SD	Median	Min	Max	
Duration of the disease	6	2.5	7	2	10	6.1	3	6	2	10	0.824

Table (9): Comparison between SLEDAI scores as regards the VNG results.

	Severe (n=19)	Mild and moderate (n=11)	*p*-value
VNG occulography:			
Abnormal (n=7)	6 (31.6)	1 (9.1)	0.215
Normal (n=23)	13 (68.4)	10 (90.9)	
VNG unilateral canal weakness:			
No (n=25)	16 (84.2)	9 (81.8)	>0.999
Paresis (n=5)	3 (15.8)	2 (18.2)	
VNG spontaneous nystagmus:			
No (n=27)	16 (84.2)	11 (100)	0.279
Yes (n=3)	3 (15.8)	0	
VNG Positioning:			
Negative (n=29)	18 (94.7)	11 (100)	>0.999
Positive (n=1)	1 (5.3)	0	
Abnormal VNG:			
No (n=21)	12 (63.2)	9 (81.8)	0.271
Yes (n=9)	7 (36.8)	2 (18.2)	

Table (10): Correlation between duration of the disease and score of DHI and short FES-I.

	Spearman's correlation coefficient	*p*-value
Overall DHI score	0.160	0.400
Short FES-I score	0.138	0.466

Table (11): Relation between SLEDAI scores and the scores of DHI and short FES-I.

	Severe SLEDAI					Non-severe SLEDAI					*p*-value
	Mean	SD	Median	Min	Max	Mean	SD	Median	Min	Max	
Functional score DHI	8.63	4.425	10	2	14	7.09	5.467	4.00	2	20	0.25
Physical score DHI	10.42	6.167	10	2	20	7.09	6.220	4.00	0	20	0.134
Emotional score DHI	10.21	6.860	10	2	22	7.09	5.166	4.00	2	16	0.232
Overall DHI score	28.00	16.773	34	10	54	21.27	16.596	14.00	4	56	0.328
Short FES-I score	11.58	5.221	10	7	28	9.91	6.188	8.00	7	28	0.112

Discussion

SLE is a very complex, multifactorial autoimmune illness with unclear aetiology that is characterised by the development of autoantibodies and affects several organs **[25]**. Numerous investigations have demonstrated that autoimmune complex build-up leads to the development of vasculitis in the capillaries and arterioles. In the cochlea and stria-vascularis, free radicals build up due to vascular thrombosis and the antiphospholipid syndrome, according to temporal bone findings **[26]**. Chronic otitis media, increasing sensorineural hearing loss, and vertigo are ear-related signs and symptoms of SLE. Internal ear damage can be caused by viral infections, vascular lesions, and immune systems all at once **[27]**. Additionally, immune complexes can build up in numerous organs, including the glomerulus, and may result in local harm if the amounts of circulating DNA-anti-DNA exceed the capacity of the immune complexes to clean them up **[28]**.

Patients with SLE frequently experience vestibular symptoms **[29]**. In addition, patients with SLE have been documented to have cochlear, endolymphatic, and auditory vestibular disorders **[30,31]**.

According to our study, systemic lupus erythematosus primarily affects females; numerous investigations have confirmed this **[24,32]**. It can harm the inner ear by interfering with the balance or hearing systems **[33]**.

8 to 66% of SLE patients have reported having an auditory disturbance **[14,34,35]**. In comparison to controls, the patient group in the current study had SNHL of both ears, which was more noticeable

at high frequencies. Both Roverano et al. [32] and Maciaszczyk et al., [34] reported seeing the same thing, and both groups described bilateral, SNHL in air conduction high frequencies.

In this investigation, SLE individuals' air conduction hearing thresholds significantly increased across all frequencies, on average by 46.7%, when compared to control subjects. These findings were better than those of Karatas et al. [24], who reported a 21% incidence of hearing loss in SLE patients, Kastanioudakis et al. [8], a 21.5% incidence, a 26.7% incidence, Abbasi et al. [36], a 28.6% incidence, and Roverano et al. [32], who reported a 66% incidence of hearing loss in SLE patients. They were also better than We identified no cases of congenital hearing loss in this investigation, and Polanski et al., study's [37] also reported no such occurrences.

In this study, the SLEDAI scores and SNHL scores of individuals with SLE were examined. It was discovered that there is no connection between SNHL and the severity of SLE disease. Since SNHL is unrelated to the severity of the disease, the results are the same as those reported by Abbasi et al. [36]. It's important to keep other mechanisms in mind. To better understand the issue and describe the method, more thorough research should be planned. If an audiologic exam is performed as soon as the diagnosis is made, more concrete information regarding the pathophysiology and mechanism of SNHL may be discovered. Significant links between SNHL and the severity of the disease have been discovered by Roverano et al. [32] and Maciaszczyk et al. [34].

In this investigation, SNHL had no appreciable relationship to how long the SLE disease had been present. This was in line with the findings of Abbasi et al. [36], who had shown no conclusive link between the duration of SLE and air conduction hearing loss. These findings were in contrast to the study by Maciaszczyk et al. [34]. They discovered a strong correlation between the disease's length and hearing loss. As the autoimmune aetiology may react to glucocorticoid and immunosuppressive treatment [6], it was underlined that early diagnosis of hearing loss in SLE is crucial for effective treatment [37].

In our study 17% of patients suffered from unilateral canal paresis, 10% had spontaneous nystagmus and only 3% of patients had posterior canal benign paroxysmal positional vertigo. Occulography was abnormal in 23% of patients which might be due to vasculitis affecting central vestibular pathways.

Gad et al. [38], Stated in their study that (40%) of patients had abnormal VNG results, (15%) had only central vestibularlesion, (5%) had only peripheral vestibular lesion while the majority (20%) had combined central and peripheral lesions. This reflects that central vestibulardys function was more frequent than peripheral affection in patients with SLE which might bedue to vascul it is affecting central vestibular pathways. Previous study revealed significantly more frequent abnormal results in SLE group (50%) compared with the control group (7.14%), SLE group had significantly more peripheral vestibular pathology compared with the control group [39].

In another study, electronystagmography (ENG) has been performed in SLE patients and abnormal findings have been found to be significantly higher than healthy subjects [31]. Another study confirmed the presence of abnormalities in the vestibular system via videonystagmography (VNG) and dynamic posturography in pediatric patients with SLE [29].

We didn't find a statistically-significant relation between disease duration and abnormal VNG results in our results we found no difference between severe and non-severe (mild and moderate) SLEDAI scores as regards the results of the VNG in contrast to Gad et al. [38], In their study of SLE patients who found significant association between active SLEDAI and peripheral vestibular system affection.

In our study, saccular function was evaluated by cVEMP. P1-N1 latencies were shown to be prolonged with lesser amplitude and asymmetry raio than controls. In accordance with our study, twenty patients with SLE underwent cVEMP testing and P1-N1 latencies were seen to be significantly prolonged [35]. No relationship between disease duration and latency of cVEMP was found in this study group, in contrast to Turkman et al. [40], who found that as the duration of the disease increased, latencies were prolonged in cVEMP. In our results we found no correlation between SLEDAI scores and the results of cVEMP.

In a histopathological study, type I hair cells of the cristas in the three semicircular canals, saccular macula and utricular macula have been observed to be affected and the mean density of type I cells was lower in the SLE group when compared to the control group. However, type II hair cells were found to be unaffected. The intensity of type I and type II hair cells affection has not been associated with the duration of SLE [12]. In

a study by Sone et al. **[41]**, the temporal bone of the patients with SLE has been investigated using histopathologic methods and loss of spiral ganglion cells, loss of hair cells in varying degrees and atrophy in striavascular is have been shown.

We used DHI to evaluate patient's perception of handicap caused by dizziness, with an emphasis on the effect on physical, functional, and emotional aspects of life and short FES-I to assess fear of falling during different activities.

Although higher scores of DHI and short FES-I in patients' group, there is no statistically significant difference between patients and controls. Disease duration had no correlation with DHI and short FES-I scores.

Conclusions:

SLE can lead to hearing loss and is associated with vestibular symptoms, so it is recommended that audiovestibular examination become a part of routine follow-up visits of SLE patients for early intervention and to minimize patient handicap.

Ethical Considerations:

All participants gave informed consent after being told of the study's goal and methodology, and the local ethics committee gave its approval to research.

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تقييم تغييرات جهاز السمع والاتزان المصاحبة لمرض الذئبة الحمراء

أشارت أبحاث سابقة إلى أن مرضى الذئبة الحمراء يعانون من أعراض دهليزية سمعية مثل الدوار، بشكل متكرر أكثر بكثير من المشاركين فى المجموعة الضابطة.

الغرض من هذه الدراسة هو إجراء اختبارات سمعية واختبارات اتزان شاملة لتحديد تأثير الذئبة الحمراء على الجهاز السمعى والدهليزى وربطها بمدة المرض وشدته.

تضمنت الدراسة مشاركاً تم تشخيصهم على أنهم الذئبة الحمراء كمجموعة مرضى مع عنصر تحكم سليم لا يعانى أمراض مناعية أو ضعف سمع أو مشاكل فى الاتزان. تم تقييم النظام السمعى باستخدام جهاز مقياس السمع، اختبار الجهد العضلى المثار الدهليزى العنقى، واختبار الاتزان بتصوير الفيديو. بالمقارنة مع المجموعة الضابطة، تم اكتشاف اختلاف كبير فى عتبات السمعين مجموعتين. أما فى اختبار الجهد العضلى المثار الدهليزى العنقى، وجدنا تأخر وسعة أقل للموجات.

اختلاف كبير بين المجموعتين فيما يتعلق بنتائج اختبار الاتزان. لم يتم العثور على ارتباط بين كل هذه النتائج مع مدة المرض وشدته. يمكن أن يؤدى مرض الذئبة الحمراء إلى فقدان السمع ويرتبط بأعراض الجهاز الدهليزى، لذلك يوصى بأن يصبح الفحص السمعى وفحص جهاز الاتزان جزءاً من زيارات المتابعة الروتينية لمرضى الذئبة الحمراء من أجل التدخل المبكر وتقليل إعاقة المريض.