**Understanding the Epidemiology of Cerebrovascular Accidents in Childhood-Onset Lupus: A Retrospective Study [Research-in-Progress]**

Matthew R Bispo1,2, Abel Tesfaye3, Dhruti Sharma4, Megan Quinlan-Waters5, Mekbib M Altaye PhDD, Ekemini A Ogbu MD MSc1,2,4,5

1 The University of Scranton; 2 Cincinnati Children’s Hospital Medical Center – Division of Rheumatology; 3 Cincinnati Children’s Hospital Medical Center – Division of Biostatistics and Epidemiology; 4University of Cincinnati College of Medicine; 5Johns Hopkins University – Pediatric Allergy, Immunology and Rheumatology

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**Introduction**

Systemic Lupus Erythematosus (SLE)

- SLE is a chronic multisystem autoimmune disease
- Has a higher disease prevalence in minority populations
- Can affect every organ system (Gottlieb & Ilowite. 2006)
- Renal and Central Nervous System Involvement are the highest causes of morbidity (Gottlieb & Ilowite. 2006)
- 20% of people with SLE are diagnosed before turning 18 (Gottlieb & Ilowite. 2006) (MacDermott et al. 2007)
- Worse disease outcomes compared to adult onset SLE (Rina & Brunner. 2013)
- 70% of patients with childhood onset SLE develop nervous system involvement within one year of diagnosis (Benseler & Silverman. 2007)

Neuropsychiatric Lupus

- Frequency ranges from 12% to 95% of SLE patients (Schwartz et al. 2019)
- Symptoms include seizures, headaches, chorea, and neuropsychiatric disorders (Gottlieb & Ilowite. 2006)
- Patients with SLE have an increased risk of cerebrovascular accidents.

Cerebrovascular Accidents (CVA, aka Stroke)

- 5th leading cause of death in the United States
- Patients with SLE have a twofold higher risk of ischemic stroke, threefold higher risk of cerebral hemorrhage, and a fourfold higher risk of subarachnoid hemorrhage compared to the general population (Holmquist et al. 2015)
- Adult SLE studies have found minorities are at a higher risk of stroke than white SLE patients (Barbhaiya et al. 2017)
- While pediatric patients compared to adult incidence is lower, the rate of mortality is higher (Schwartz et al. 2019)

- There is limited research on the epidemiology of CVA in Childhood Onset Systemic Lupus Erythematosus

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**Objective and Hypothesis**

**Objective:** To better understand the epidemiology of Cerebrovascular Accidents in Childhood-onset SLE (cSLE)

**Hypothesis 1:** The prevalence of cSLE rated CVA will be higher in non-White pediatric patients compared to white cSLE patients

**Hypothesis 2:** The prevalence of cSLE related CVA will be higher in female pediatric patients compared to male pediatric patients

**Hypothesis 3:** The prevalence of cSLE related CVA will be higher in areas with a lower median household income

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**Methods**

Patients with ICD-9/10 codes corresponding to SLE and/or CVA seen at CCHMC from January 2009 to July 2022

N = 709

Included patients <18 years of age at time of cSLE diagnosis

Number of eligible participants N = 168

Number of ineligible participants N = 161

Excluded patients > 25 years old at time of data extraction (July 2023) N = 380

Total charts reviewed N = 329

Patients diagnosed with a CVA N = 2

Compared socioeconomic status, race, and sex of cSLE patients who had CVA to those who did not have CVA

Table 1: Comparison of Sex, Race, and Age, and Average Income of patients with childhood-onset SLE who did and did not have CVA

<table>
<thead>
<tr>
<th>Demographics</th>
<th>All cSLE (N = 166)</th>
<th>cSLE with CVA (N = 2)</th>
<th>cSLE without CVA (N = 164)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N(%)</td>
<td>N(2)</td>
<td>N(%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>28 (16.67)</td>
<td>1 (50.00)</td>
<td>27 (16.27)</td>
</tr>
<tr>
<td>Female</td>
<td>140 (83.33)</td>
<td>1 (50.00)</td>
<td>139 (83.73)</td>
</tr>
<tr>
<td>Black</td>
<td>50 (31.45)</td>
<td>1 (50.00)</td>
<td>49 (31.21)</td>
</tr>
<tr>
<td>White</td>
<td>95 (59.75)</td>
<td>1 (50.00)</td>
<td>94 (59.67)</td>
</tr>
<tr>
<td>Other Race</td>
<td>14 (8.60)</td>
<td>0 (0.00)</td>
<td>14 (8.92)</td>
</tr>
<tr>
<td>Age at cSLE diagnosis (N/SD)</td>
<td>11.50 (3.07)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Income by Zip Code (N/SD)</td>
<td>46,330.00 (26,599.94)</td>
<td>54,449.40 (19,9075.06)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Comparison of Sex, Race, and Age, and Average Income of age matched lupus patients who did and did not have CVA

<table>
<thead>
<tr>
<th>Demographics</th>
<th>cSLE with CVA (N = 2)</th>
<th>Age Matched cSLE without CVA (N = 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N(%)</td>
<td>N(2)</td>
<td>N(SD)</td>
</tr>
<tr>
<td>Male</td>
<td>1 (50.00)</td>
<td>1 (0.125)</td>
</tr>
<tr>
<td>Female</td>
<td>1 (50.00)</td>
<td>7 (0.875)</td>
</tr>
<tr>
<td>Black</td>
<td>1 (50.00)</td>
<td>2 (28.57)</td>
</tr>
<tr>
<td>White</td>
<td>1 (50.00)</td>
<td>5 (71.43)</td>
</tr>
<tr>
<td>Other Race</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>Average Income by Zip Code (N/SD)</td>
<td>46,330.00 (26,599.44)</td>
<td>47,482.00 (13,638.98)</td>
</tr>
</tbody>
</table>

Table 3: Comparison of Disease Activity in lupus patients who had and did not have a CVA

<table>
<thead>
<tr>
<th>Disease Activity</th>
<th>CSLE with CVA (N = 2)</th>
<th>CSLE without CVA (N = 166)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average SLEDAI-2k Score</td>
<td>14.00 (5.66)</td>
<td>4.48 (5.95)</td>
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</tbody>
</table>

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**Conclusions**

These are preliminary results documenting the socioeconomic status, race, sex, and age of patients with childhood-onset SLE following CVA.

Although this is a limited population, our current results show a trend between lower socioeconomic status and increased disease activity with an increased risk of a CVA.

**Limitations**

- Single-center study
- Small population of patients with cSLE who had CVA
- Only used zip code as a determinant of socioeconomic status
- Study population mainly from Ohio and Kentucky

**Future Directions**

- Complete review of patient charts of those diagnosed with cSLE but with age 25 years old at time of data extraction
- Multi-center study of stroke in cSLE
- Further analyze socioeconomic association of stroke in cSLE using composite indices inclusive of zip code
- Study the association of medications with cSLE related strokes

**References**


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**Funding**

Cincinnati Children’s Hospital Research & Education Foundation. Research support was provided by the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) and the National Institute of General Medical Sciences (NIGMS) and the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK).