

Effect of Sex and Race on the Severity of Multiple Sclerosis

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Multiple sclerosis (MS) is an autoimmune disease that causes chronic inflammation and demyelination of the central nervous system, and MS affects nearly 1 million people in the US (1). The genetic and environmental factors in determining the distribution and severity of multiple sclerosis (MS) have been debated ever since morbidity and mortality statistics were first derived. Studies show that Black American MS patients are at a higher risk for spinal cord disease, increased number and severity of relapses, disability following a relapse, faster transition from relapsing to progressive MS, and severe impairment in ambulation (2).

While there is a recent recognition that racial or sexual differences affect MS incidence and disease course, further investigation into these trends may provide additional evidence into the risk or protective factors within racial groups. To investigate the effect of race and sex on the severity of MS, we statistically analyzed different groups of patients with MS at the LSUHSC neurology clinic using the Expanded Disability Status Scale (EDSS) and Symbol Digit Modalities Test (SDMT). EDSS is a widely utilized measure of physiological disability in people with MS, and SDMT is an assessment tool which measures information processing speed as a surrogate measure of cognitive decline in people with MS.

≥	±	«	π	ж	ψ	Δ	ο	↑
1	2	3	4	5	6	7	8	9

±	π	ψ	±	ο	≥	Δ	↑	ж	±	«	±	≥
2	4											
Δ	↑	ο	π	«	Δ	↑	ж	±	«	«	«	ж
±	«	π	ж	ψ	≥	ο	±	≥	±	«	«	ψ
π	«	ψ	ж	±	Δ	ο	↑	ο	±	«	π	ж
±	«	π	ж	ψ	ο	±	ο	≥	±	«	π	ο
π	«	Δ	«	π	Δ	ο	↑	Δ	«	«	Δ	ж
±	«	±	ж	«	±	ο	«	≥	±	±	π	Δ

Figure 1: Symbol Digit Modalities Test (SDMT) is a short test with a symbol key at the top of the page that pairs each unique symbol with a symbol digit ranging from 1-9. Below the keys, there are rows of the symbol only, and patients are asked to repeat the correct number that corresponds to the symbol

Sample Demographics

Sample characteristics	n	%
Gender		
Male	16	19
Female	68	81
Race		
White	56	67
Black or African American	27	32
American Indian/Native	1	1
Ethnicity		
Hispanic or Latino	1	1
Non-Hispanic or Latino	82	98

Table 1 shows the demographics of the sample

For this study, 84 participants diagnosed with MS were recruited. Participant's EDSS was evaluated by physicians at the LSUHSC neurology clinic, and SDMT was administered to each participant.

Out of 84 total participants, 68 participants were female. 56 were white, 27 were black, 1 were American Indian/Native. 82 were Non-Hispanic or Latino. (Table 1)

Results: Black vs White

We used one-way analysis of variance (ANOVA) to compare different variables in black versus white participants. There was no significant difference in EDSS score (F=0.469, p=0.495) or SDMT (F=0.106, p=0.745). However, the white sample was significantly older (F=15.91, p<0.0001) and had a longer disease duration (F=4.93, p=0.029) compared to the black sample. (Table 2)

Characteristic	ANOVA F	Group	Minimum	Maximum	Mean (SD)
Highest Education (yrs)	5.262 (p = 0.024)	White	10	20	15.11 (2.839)
		Black	9	20	13.63 (2.559)
Age (yrs)	15.910 (p < 0.001)	White	26	71	50.16 (11.122)
		Black	19	69	39.44 (12.264)
SDMT	0.106 (p=0.745)	White	15	72	47.53 (12.245)
		Black	25	65	46.63 (10.645)
Disease Duration (months)	4.929 (p = 0.029)	White	2	466	148.12 (121.039)
		Black	8	372	89.27 (88.539)
EDSS Score	0.469 (p = 0.469)	White	0.0	8.0	4.109 (2.366)
		Black	0.0	6.5	3.727 (1.744)

Table 2: A one-way analysis of variance (ANOVA) comparison of the highest education, age, Simple Digit Modality Test (SDMT) score, disease duration, and Expanded Disability Status Scale (EDSS) between Black and White sample.

Results: Female vs Male

We used one-way analysis of variance (ANOVA) to compare different variables in female versus male participants. EDSS score (F=1.64, p=0.20), SDMT (F=2.49, p=0.12), and age (F=2.37, p=0.13) were not significantly different between groups. However, male participants had a significantly higher disease duration (F=4.27, p=0.042).

Characteristic	ANOVA F	Group	Minimum	Maximum	Mean (SD)
Highest Education (yrs)	0.459 (p = 0.500)	Female	10	20	14.53 (2.729)
		Male	9	20	15.06 (3.255)
Age (yrs)	2.367 (p = 0.128)	Female	19	71	45.71 (11.429)
		Male	20	70	51.00 (15.971)
SDMT	2.487 (p = 0.119)	Female	15	72	48.21 (12.186)
		Male	26	59	43.13 (8.461)
Disease Duration (months)	4.269 (p = 0.042)	Female	2	466	117.22 (108.357)
		Male	19	451	181.88 (128.928)
EDSS Score	1.639 (p = 0.204)	Female	0.0	8.0	4.151 (2.1565)
		Male	0.0	7.5	3.321 (2.3583)

Table 3: A one-way analysis of variance (ANOVA) comparison of the highest education, age, Simple Digit Modality Test (SDMT) score, disease duration, and Expanded Disability Status Scale (EDSS) between Female and Male sample.

Conclusions

Although there were no significant differences in EDSS score and SDMT in black versus white participants, the white sample was significantly older and had a longer disease duration compared to the black participants. This suggests that black participants have more aggressive MS course and lead to an earlier disability as they reached the same disease state (EDSS and SDMT) as white participants much more quickly.

When comparing male and female participants, male participants had a significantly longer disease duration, but did not score significantly worse on the EDSS score and SDMT. This indicates that MS in female participants may lead to worse disease course.

References

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