Poster # P1192

Associations Between Cognition, Fatigue, and Work Productivity and Activity Impairment in a US Patient Support Program in Relapsing Multiple Sclerosis

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CONCLUSIONS

- **Fatigue was present in two-thirds of the patients, while cognitive impairment was present in more than one-fifth, both occurring from the early stage of the disease**
- **Moderate correlations were generally observed between poorer cognition, greater fatigue, and worse work productivity and activity impairment in patients with relapsing multiple sclerosis (MS). The strongest correlation was observed between activity impairment and fatigue**
- **Fatigue and cognition should be routinely assessed in all patients with relapsing MS as these symptoms are present from the early stages of disease and impact their work productivity and activity**

INTRODUCTION

- Cognitive impairment and fatigue are common among patients with MS[1,2]
- Because MS affects most patients during their most productive years of life, productivity loss has been found to be the main cost driver of the disease from a societal perspective[3,4]
- Research into the impact of cognition and fatigue on work productivity and activity impairment (WPAI) among patients with relapsing MS is ongoing[5-7]; however, contemporary studies in the United States (US) are lacking

OBJECTIVE

- **To characterise the associations between cognition and fatigue with WPAI among a cohort of participants with relapsing MS using the US-based MS LifeLines® patient support program**

METHODS

- The study used cross-sectional survey data collected from 7 July-29 August 2022, from a cohort of participants from the MS LifeLines® patient support program for cladribine tablets or subcutaneous interferon beta-1a (scIFN β-1a). Participants provided their consent for these data to be disclosed.
- Demographics, MS-related medical history, cognition (Patient-Reported Outcomes Measurement Information System [PROMIS] Cognitive Function Score), fatigue (5-Item Modified Fatigue Impact Scale [MFIS-5]), and WPAI questionnaire results were evaluated
- Cognition was classified into "worse than average" (scores ≤40), "average" (scores between >40 and <60), and "better than average" (scores ≥60).
- A cutoff score of ≥6 was used to identify patients with a higher level of fatigue
- Fatigue and cognition were reported for the overall patient cohort and by time since MS symptom onset
- Spearman's correlation analyses (r_s) examined the relationships between cognition, fatigue, and WPAI

RESULTS

- A total of 1102 participants were included in the analysis (602 taking cladribine tablets, 500 taking scIFN β-1a; mean [SD] age 50.8 [11. 8] years; 79.1% female; 79.1% White, 8.3% Black or African American, 6.1% Hispanic; 62.3% diagnosed ≥11 years ago; **Table 1**)

Table 1. Patient Baseline Characteristics

		Total MSLL survey respondents (n=1102)
Age, years	Mean (SD)	50.8 (11.8)
	Median (min-max)	52.0 (20.0-81.0)
Sex	Female	872 (79.1%)
Drug group	Cladribine tablets	602 (54.6%)
	scIFN β-1a	500 (45.4%)
Race/ethnicity	Hispanic	67 (6.1%)
	White	872 (79.1%)
	Black or African American	92 (8.3%)
	Asian or Asian American	5 (0.5%)
	American Indian/Alaska Native	2 (0.2%)
	Multi-race	18 (1.6%)
	Some other race or origin	7 (0.6%)
	Decline to answer	39 (3.5%)
US Census region of residence	Northeast	193 (17.5%)
	Midwest	319 (28.9%)
	South	413 (37.5%)
	West	177 (16.1%)
Age at start of MS symptoms	Mean (SD)	33.3 (10.9)
	Median (min-max)	32.0 (0.0-67.0)
Age at time of MS diagnosis	Mean (SD)	37.0 (10.6)
	Median (min-max)	36.0 (1.0-68.0)
Time since MS diagnosis	0-3 years	147 (13.3%)
	4-10 years	269 (24.4%)
	11-20 years	466 (42.3%)
	21+ years	220 (20.0%)
Experienced a relapse in the past year	Yes	354 (32.1%)
PDDS score	Mean (SD)	1.9 (2.1)
	Median (min-max)	1.0 (0.0-8.0)
Number of MS medications ever taken	Mean (SD)	2.5(1.7)
	Median (min-max)	2.0 (1.0-12.0)

Max, maximum; **min**, minimum; **MS**, multiple sclerosis; **MSLL**, MS LifeLines®; **PDDS**, Patient Determined Disease Steps; **scIFN β1a**, subcutaneous interferon beta-1a; **SD**, standard deviation.

RESULTS (cont.)

- 21.3% reported worse than average cognitive function (those with worse than average by time since symptom onset: 0-3 years: 32.9%, 4-10 years: 21.1%, 11-20 years: 20.1%, 21+ years: 20.3%; **Table 2**)
- 67.8% had a high level of fatigue (those with a high level by time since symptom onset: 0-3 years: 62.0%, 4-10 years: 63.2%, 11-20 years: 64.8%, 21+ years: 75.1%; **Table 2**)
- WPAI was greater among patients with worse cognitive function and fatigue (**Tables 3** and **4**)
  - Patients with "worse than average" cognitive function had 13.9% and 34.0% greater activity impairment compared with those with average cognitive function and those with "better than average" cognitive function, respectively
  - Patients with a high level of fatigue had 38.1% greater activity impairment compared with those with a low level of fatigue
- WPAI was negatively correlated with cognition (r_s absenteeism −0.25, presenteeism −0.53, overall work impairment −0.51, and activity impairment −0.48; all P<0.001; **Table 5**) and positively correlated with fatigue (r_s absenteeism 0.30, presenteeism 0.67, overall work impairment 0.64, and activity impairment 0.76; all P<0.001; **Table 5**)

Table 2. Cognitive Function and Fatigue Overall and By Time Since Symptom Onset

		Overall	0-3 years since symptom onset	4-10 years since symptom onset	11-20 years since symptom onset	21+ years since symptom onset
		n=1102	n=79	n=209	n=440	n=374
PROMIS cognitive function abilities subset score	Valid n	1100	79	209	438	374
	Mean (SD)	48.8 (10.8)	46.3 (11.4)	49.3 (11.0)	49.5 (11.1)	48.2 (10.1)
	Median (min-max)	49.2 (26.6-64.9)	43.9 (26.6-64.9)	50.8 (26.6-64.9)	49.6 (26.6-64.9)	47.9 (26.6-64.9)
PROMIS cognitive function abilities subset score categories	Valid n	1100	79	209	438	374
	Worse than average (≤40), n (%)	234 (21.3%)	26 (32.9%)	44 (21.1%)	88 (20.1%)	76 (20.3%)
	Average (>40 to <60), n (%)	361 (32.8%)	22 (27.8%)	60 (28.7%)	137 (31.3%)	142 (38.0%)
	Better than average (≥60), n (%)	505 (45.9%)	31 (39.2%)	105 (50.2%)	213 (48.6%)	156 (41.7%)
MFIS-5 score	Mean (SD), n (%)	8.5 (5.3)	7.9 (5.4)	7.9 (5.38)	8.3 (5.35)	9.3 (5.10)
	Median (min-max), n (%)	9.0 (0.0-20.0)	9.0 (0.0-18.0)	8.0 (0.0-20.0)	8.0 (0.0-20.0)	10.0 (0.0-20.0)
MFIS-5 score categories	Low level of fatigue (0-5), n (%)	355 (32.2%)	30 (38.0%)	77 (36.8%)	155 (35.2%)	93 (24.9%)
	High level of fatigue (6-20), n (%)	747 (67.8%)	49 (62.0%)	132 (63.2%)	285 (64.8%)	281 (75.1%)

Note: Cognition was classified into "worse than average" (scores ≤40), "average" (scores between >40 and <60), and "better than average" (scores ≥60). A cutoff score of ≥6 was used to identify patients with higher levels of fatigue.
Max, maximum; **MFIS-5**, 5-Item Modified Fatigue Impact Scale; **min**, minimum; **PROMIS**, Patient-Reported Outcomes Measurement Information System.

Table 3. WPAI By Patient Cognitive Function Ability

		PROMIS cognitive function abilities subset score		
		Worse than average, n=234	Average, n=361	Better than average, n=505
Absenteeism (%)	Valid n	93	168	286
	Mean (SD)	9.7 (19.5)	2.7 (8.0)	2.1 (9.6)
	Median (min-max)	0.0 (0.0-100.0)	0.00 (0.0-70.0)	0.0 (0.0-87.0)
Presenteeism (%)	Valid n	92	168	286
	Mean (SD)	36.4 (28.7)	24.3 (22.5)	7.8 (15.4)
	Median (min-max)	40.0 (0.0-100.0)	20.0 (0.0-100.0)	0.0 (0.0-100.0)
Overall work impairment (%)	Valid n	92	168	286
	Mean (SD)	39.0 (31.0)	25.8 (23.6)	9.2 (17.6)
	Median (min-max)	40.0 (0.0-100.00)	20.0 (0.0-100.0)	0.0 (0.0-100.0)
Activity impairment (%)	Mean (SD)	53.5 (31.1)	39.6 (28.5)	19.5 (26.6)
	Median (min-max)	60.0 (0.0-100.0)	30.0 (0.0-100.0)	10.0 (0.0-100.0)

Note: WPAI measures include absenteeism (work time missed), presenteeism (impairment at work), overall work impairment (absenteeism + presenteeism), and activity impairment (activity impairment outside work).
Max, maximum; **min**, minimum; **PROMIS**, Patient-Reported Outcomes Measurement Information System; **SD**, standard deviation; **WPAI**, work productivity and activity impairment.

Table 4. WPAI By Patient Level of Fatigue

		MFIS-5 Score	
		Low level of fatigue n=355	High level of fatigue n=747
Absenteeism (%)	Valid n	249	299
	Mean (SD)	1.1 (5.4)	5.7 (14.9)
	Median (min-max)	0.0 (0.0-50.0)	0.00 (0.0-100.0)
Presenteeism (%)	Valid n	249	298
	Mean (SD)	4.2 (9.4)	28.9 (25.3)
	Median (min-max)	0.0 (0.0-70.0)	20.0 (0.00-100.0)
Overall work impairment (%)	Valid n	249	298
	Mean (SD)	5.1 (11.2)	31.2 (27.1)
	Median (min-max)	0.0 (0.0-70.0)	25.0 (0.0-100.0)
Activity impairment (%)	Mean (SD)	7.5 (15.0)	45.6 (29.6)
	Median (min-max)	0.0 (0.0-100.0)	40.0 (0.0-100.0)

Max, maximum; **MFIS-5**, 5-Item Modified Fatigue Impact Scale; **min**, minimum; **WPAI**, work productivity and activity impairment.

Table 5. Correlations Between WPAI and Cognitive Function Ability and Level of Fatigue

Spearman's correlations		Cognitive function abilities subset score	MFIS-5 score
Absenteeism (%)	r_s	−0.25	0.30
	P value	<0.001	<0.001
Presenteeism (%)	r_s	−0.53	0.67
	P value	<0.001	<0.001
Overall work impairment (%)	r_s	−0.51	0.64
	P value	<0.001	<0.001
Activity impairment (%)	r_s	−0.48	0.76
	P value	<0.001	<0.001

Note: A negative correlation indicates that WPAI decreases with greater cognitive function while a positive correlation indicates that WPAI increases with greater fatigue.
MFIS-5, Modified Fatigue Impact Scale; **r_s**, Spearman's correlation analyses; **WPAI**, work productivity and activity impairment.

LIMITATIONS

- Disease severity, medical comorbidities, and other factors may confound the association between cognition and fatigue with work productivity and impairment; these factors were not adjusted in the correlation analysis
- The insights gained provide information regarding the association between cognition and fatigue with work productivity and impairment in a sample of patients participating in a patient support program and receiving cladribine tablets or scIFN β1a; however, the findings may not be generalisable to all patients or to all settings of care

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