Poster QOL16

Quality of Life and Treatment Outcomes Among People With Multiple Sclerosis Before and During the COVID-19 Pandemic

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CONCLUSIONS

MSLL participants had favorable QoL vs. NHWS participants with MS

MSLL participants had favorable mental QoL vs. NHWS participants without MS; however, differences were small and must be interpreted in the context of study design limitations

BACKGROUND

- Ongoing research on the impact of COVID-19 on people with multiple sclerosis (MS) is needed

OBJECTIVE

- To evaluate quality of life (QoL) and treatment outcomes before and during COVID-19 among participants in MS Lifelines (MSLL), a patient-support program for individuals receiving cladribine tablets or subcutaneous interferon-β1a (sc IFN β-1a), and the National Health and Wellness Survey (NHWS)

METHODS

- MSLL participants with relapsing MS, treatment with cladribine tablets or sc IFN β-1a, and aged ≥18 years from May 12–July 2, 2021, were propensity-score matched based on age, sex, race, and Charlson Comorbidity Index (CCI) score to individuals without MS from the 2019 and 2021 NHWS
- Participants with MS from the 2019 and 2021 NHWS were also evaluated
- Demographics, clinical characteristics, QoL (Short-Form 12-Item v2), fatigue (Modified Fatigue Impact Scale-5 item), cognitive impairment (Perceived Deficits Questionnaire-5 item), and depression (Patient Health Questionnaire-9) were compared
- Primary data collection consisted of a cross-sectional questionnaire (~35 minutes) administered online. Each respondent completed the cross-sectional questionnaire only once
- The convenience sample included patients with MS recruited from MSLL and who were currently taking or had previously taken cladribine tablets

RESULTS

- Among MSLL and NHWS participants, mean (standard deviation [SD]) age (**Table 1**), the proportion of participants that were female (**Table 1**), and mean (SD) CCI scores (**Table 2**) were similar between groups
- A majority of the participants from all groups had relapsing-remitting MS (RRMS, **Table 3**)
- Compared with 2019/2021 NHWS participants without MS, MSLL participants had lower mean physical component QoL and health utilities, and more depression (**Table 4**)
- However, compared with 2019/2021 NHWS participants without MS, MSLL participants had higher mental component QoL (**Table 4**)
- Compared with 2019/2021 NHWS participants with MS, MSLL participants had higher mean QoL (**Table 4**)
- QoL, fatigue, and cognitive impairment for NHWS participants with MS were similar before and during the COVID-19 pandemic (**Table 4**)

Table 1. Patient demographic characteristics

		A. MSLL cohort n=1090		B. 2019 NHWS MS n=101		C. Matched 2019 NHWS non-MS n=2180		D. 2021 NHWS MS n=65		E. Matched 2021 NHWS non-MS n=2180		*P* values			
		N/Mean	%/SD	N/Mean	%/SD	N/Mean	%/SD	N/Mean	%/SD	N/Mean	%/SD	A vs. B	A vs. C	A vs. D	A vs. E
Age, years	Mean, SD	50.01	11.85	51.75	12.26	49.90	11.88	51.77	12.60	49.92	12.02	0.160	0.791	0.248	0.840
	Median, min - max	51	19 - 84	54	23 - 73	51	19 - 84	52	20 - 74	51	19 - 85				
Biological sex	Male	238	21.8%	18	17.8%	476	21.8%	6	9.2%	476	21.8%	0.348	1.000	**0.016**	1.000
	Female	852	78.2%	83	82.2%	1704	78.2%	59	90.8%	1704	78.2%				
Current BMI (category)	Valid N	1090		99		2083		64		2042		0.252	0.200	0.662	0.554
	Underweight (<18.5)	25	2.3%	4	4.0%	61	2.9%	3	4.7%	62	3.0%				
	Normal weight (18.5 to <25)	341	31.3%	36	36.4%	651	31.3%	19	29.7%	654	32.0%				
	Overweight (25 to <30)	309	28.3%	20	20.2%	644	30.9%	19	29.7%	583	28.6%				
	Obese (30 or greater)	415	38.1%	39	39.4%	727	34.9%	23	35.9%	743	36.4%				
Education	Less than college/university	384	35.2%	53	52.5%	1143	52.4%	33	50.8%	1013	46.5%	**0.002**[a]	**<0.001**	**0.034**[a]	**<0.001**
	College/university degree	697	63.9%	48	47.5%	1033	47.4%	32	49.2%	1165	53.4%				
	Don't know/decline to answer	9	0.8%	0	0.0%	4	0.2%	0	0.0%	2	0.1%				
Annual household income	<$25,000	143	13.1%	40	41.7%	504	24.2%	21	33.9%	383	18.8%	**<0.001**	**<0.001**	**<0.001**	**<0.001**
	$25,000 to <$50,000	198	18.2%	22	22.9%	707	33.9%	17	27.4%	557	27.3%				
	$50,000 to <$100,000	303	27.8%	22	22.9%	513	24.6%	15	24.2%	635	31.1%				
	$100,000 +	272	25.0%	10	10.4%	274	13.1%	5	8.1%	354	17.4%				
	Don't know/decline to answer	174	16.0%	2	2.1%	86	4.1%	4	6.5%	110	5.4%				
Race/ethnicity	Hispanic	73	6.7%	4	4.0%	223	10.2%	4	6.2%	198	9.1%	0.078[a,b]	**<0.001**	**<0.001**[a,b]	**<0.001**
	Non-Hispanic White	842	77.2%	80	79.2%	1685	77.3%	53	81.5%	1679	77.0%				
	Non-Hispanic Black	103	9.4%	12	11.9%	207	9.5%	4	6.2%	209	9.6%				
	Asian or Asian American	7	0.6%	2	2.0%	14	0.6%	2	3.1%	14	0.6%				
	American Indian/Alaska Native	0	0.0%	0	0.0%	0	0.0%	1	1.5%	8	0.4%				
	Multirace	12	1.1%	3	3.0%	45	2.1%	0	0.0%	45	2.1%				
	Some other race or origin	9	0.8%	0	0.0%	6	0.3%	1	1.5%	27	1.2%				
	Decline to answer	44	4.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%				
US census region of residence	Northeast	197	18.1%	16	15.8%	457	21.0%	14	21.5%	426	19.5%	0.584	**<0.001**	0.095	**<0.001**
	Midwest	324	29.7%	25	24.8%	824	37.8%	13	20.0%	470	21.6%				
	South	380	34.9%	40	39.6%	447	20.5%	20	30.8%	806	37.0%				
	West	189	17.3%	20	19.8%	117	5.4%	18	27.7%	478	21.9%				

[a]The minimum expected cell count in this subtable is less than 1. Chi-square results may be invalid. [b]More than 20% of cells in this subtable have expected cell counts less than 5. Chi-square results may be invalid.

RESULTS

Table 2. Patient clinical characteristics

		A. MSLL cohort n=1090		B. 2019 NHWS MS n=101		C. Matched 2019 NHWS non-MS n=2180		D. 2021 NHWS MS n=65		E. Matched 2021 NHWS non-MS n=2180		*P* values			
		N/ Mean	%/SD	N/ Mean	%/SD	N/ Mean	%/SD	N/ Mean	%/SD	N/ Mean	%/SD	A vs. B	A vs. C	A vs. D	A vs. E
CCI score	Mean, SD	0.41	0.89	1.05	3.89	0.39	0.81	0.52	0.97	0.39	0.81	**<0.001**	0.616	0.322	0.433
	Median, min - max	0	0 - 8	0	0 - 37	0	0 - 6	0	0 - 4	0	0 - 7				
CCI score (category)	0	824	75.6%	70	69.3%	1648	75.6%	45	69.2%	1654	75.9%	**0.010**	0.985	0.405[a]	0.853
	1	149	13.7%	15	14.9%	301	13.8%	12	18.5%	303	13.9%				
	2	81	7.4%	6	5.9%	165	7.6%	4	6.2%	163	7.5%				
	3+	36	3.3%	10	9.9%	66	3.0%	4	6.2%	60	2.8%				
Conditions ever diagnosed	Hypertension	342	31.4%	39	38.6%	554	25.4%	23	35.4%	548	25.1%	0.136	**<0.001**	0.500	**<0.001**
	Depression	324	29.7%	48	47.5%	506	23.2%	34	52.3%	483	22.2%	**<0.001**	**<0.001**	**<0.001**	**<0.001**
	None of the diagnoses	305	28.0%	21	20.8%	852	39.1%	9	13.8%	852	39.1%	**<0.001**	**<0.001**	**<0.001**	**<0.001**
	Migraines	287	26.3%	16	15.8%	295	13.5%	22	33.8%	295	13.5%	**0.021**	**<0.001**	0.184	**<0.001**
	High cholesterol	224	20.6%	25	24.8%	528	24.2%	17	26.2%	475	21.8%	0.320	**0.019**	0.280	0.415
	Generalized anxiety disorder	171	15.7%	17	16.8%	215	9.9%	16	24.6%	238	10.9%	0.763	**<0.001**	0.058	**<0.001**
	Type 2 diabetes	64	5.9%	10	9.9%	190	8.7%	5	7.7%	153	7.0%	0.109	**0.004**	0.547[a]	0.214
	Fibromyalgia	52	4.8%	7	6.9%	93	4.3%	4	6.2%	72	3.3%	0.339	0.509	0.614[a]	**0.038**
	Ulcers	47	4.3%	8	7.9%	83	3.8%	6	9.2%	81	3.7%	0.098[a]	0.486	0.066[a]	0.407
	Any tumor	46	4.2%	7	6.9%	84	3.9%	3	4.6%	84	3.9%	0.206[a]	0.613	0.878[a]	0.613
	Psoriasis	44	4.0%	7	6.9%	106	4.9%	1	1.5%	73	3.3%	0.169[a]	0.287	0.312[a]	0.318
	Rheumatoid arthritis	33	3.0%	4	4.0%	69	3.2%	4	6.2%	73	3.3%	0.605[a]	0.831	0.164[a]	0.625
	Chronic bronchitis	26	2.4%	4	4.0%	75	3.4%	3	4.6%	58	2.7%	0.334[a]	0.100	0.264[a]	0.639
	COPD	21	1.9%	4	4.0%	46	2.1%	3	4.6%	41	1.9%	0.173[a]	0.727	0.140[a]	0.928
	Ulcerative colitis	19	1.7%	3	3.0%	32	1.5%	2	3.1%	34	1.6%	0.381[a]	0.549	0.434[a]	0.695
	Heart attack	18	1.7%	4	4.0%	31	1.4%	1	1.5%	36	1.7%	0.099[a]	0.611	0.945[a]	1.000
	Transient ischemic attack	17	1.6%	2	2.0%	20	0.9%	2	3.1%	20	0.9%	0.747[a]	0.102	0.350[a]	0.102
	Moderate/severe kidney disease	12	1.1%	1	1.0%	22	1.0%	1	1.5%	13	0.6%	0.918[a]	0.807	0.745[a,b]	0.118
	Stroke	9	0.8%	3	3.0%	20	0.9%	0	0.0%	24	1.1%	**0.039**[a]	0.792	0.462[a,b]	0.458
	Hemiplegia	9	0.8%	3	3.0%	4	0.2%	0	0.0%	3	0.1%	**0.039**[a]	**0.006**[a]	0.462[a,b]	**0.002**[a]
	Congestive heart failure	8	0.7%	5	5.0%	14	0.6%	0	0.0%	19	0.9%	**<0.001**[a]	0.762	0.488[a,b]	0.682
	Type 1 diabetes	8	0.7%	4	4.0%	22	1.0%	0	0.0%	12	0.6%	**0.002**[a]	0.436	0.488[a,b]	0.526
	Hepatitis B	6	0.6%	1	1.0%	2	0.1%	0	0.0%	14	0.6%	0.580[a,b]	**0.012**[a]	0.549[a,b]	0.751
	Connective tissue disease	5	0.5%	2	2.0%	4	0.2%	1	1.5%	12	0.6%	0.056[a,b]	0.157[a]	0.239[a,b]	0.731

[a]More than 20% of cells in this subtable have expected cell counts less than 5. Chi-square results may be invalid. [b]The minimum expected cell count in this subtable is less than 1. Chi-square results may be invalid.

Table 3. Patient MS disease history

		A. MSLL cohort n=1090		B. 2019 NHWS MS n=101		D. 2021 NHWS MS n=65		*P* values	
		N/ Mean	%/SD	N/ Mean	%/SD	N/ Mean	%/SD	A vs. B	A vs. D
Type of MS*	CIS	9	0.8%	0	0.0%	0	0.0%		
	RRMS	1022	93.3%	101	100.0%	65	100.0%	**0.007**	**0.031**
	SPMS	95	8.7%	0	0.0%	0	0.0%		
	Non-active SPMS	14	1.3%	0	0.0%	0	0.0%		
	PPMS	9	0.8%	0	0.0%	0	0.0%		
Age at time of MS diagnosis	Mean, SD	37.25	10.50	36.50	11.02	35.63	11.73	0.491	0.230
	Median, min - max	37	7 - 69	37	13 - 66	35	0 - 66		
Satisfaction with current prescription medication(s) (asked of each medication)	Extremely dissatisfied	28	2.6%	1	1.0%	2	3.4%	0.055[a]	0.560[a]
	Very dissatisfied	20	1.8%	1	1.0%	0	0.0%		
	Somewhat dissatisfied	29	2.6%	0	0.0%	1	1.7%		
	Neither dissatisfied nor satisfied	108	9.9%	5	5.0%	3	5.2%		
	Somewhat satisfied	155	14.2%	17	16.8%	10	17.2%		
	Very satisfied	334	30.5%	44	43.6%	23	39.7%		
	Extremely satisfied	421	38.4%	33	32.7%	19	32.8%		

[a]More than 20% of cells in this subtable have expected cell counts less than 5. Chi-square results may be invalid. *Respondents could select multiple types of MS (ie, were asked to "select all that apply").

Table 4. Patient QoL and treatment outcomes

		A. MSLL cohort n=1090		B. 2019 NHWS MS n=101		C. Matched 2019 NHWS non-MS n=2180		D. 2021 NHWS MS n=65		E. Matched 2021 NHWS non-MS n=2180		*P* values			
		N/ Mean	%/SD	N/ Mean	%/SD	N/ Mean	%/SD	N/ Mean	%/SD	N/ Mean	%/SD	A vs. B	A vs. C	A vs. D	A vs. E
SF-12v2*															
Mental Component Score	Mean, SD	48.35	10.47	44.88	12.12	47.59	10.87	45.48	12.91	46.91	11.85	**0.002**	0.057	**0.034**	**0.001**
	Median, min - max	50.35	11.73 - 69.79	44.40	15.57 - 68.53	50.14	7.53 - 71.06	46.15	21.77 - 70.31	49.73	3.87 - 67.26				
Physical Component Score	Mean, SD	43.82	11.51	39.41	10.89	50.04	9.41	39.46	10.65	50.48	9.35	**<0.001**	**<0.001**	**0.003**	**<0.001**
	Median, min - max	44.79	11.41 - 65.96	38.70	16.64 - 67.56	53.02	17.20 - 67.21	38.65	13.69 - 61.66	53.11	13.87 - 70.36				
SF-6D Health Utilities Domain	Mean, SD	0.687	0.145	0.633	0.132	0.722	0.136	0.638	0.123	0.717	0.146	**<0.001**	**<0.001**	**0.008**	**<0.001**
	Median, min - max	0.660	0.345 - 1.000	0.620	0.300 - 1.000	0.730	0.320 - 1.000	0.640	0.390 - 1.000	0.720	0.300 - 1.000				
Modified Fatigue Impact Scale-5 Item†															
MFIS-5 Score	Mean, SD	9.24	5.36	10.95	5.33	.	.	10.85	5.60	.	.	**0.002**	NA	**0.019**	NA
	Median, min - max	9	0 - 20	11	0 - 20	.	.	10	0 - 20	.	.				
Perceived Deficits Questionnaire-5 Item‡															
PDQ-5 Score	Mean, SD	8.10	4.66	8.87	5.53	.	.	8.72	5.32	.	.	0.118	NA	0.299	NA
	Median, min - max	8	0 - 20	9	0 - 20	.	.	9	0 - 20	.	.				
Patient Health Questionnaire-9§															
PHQ-9 Score (continuous)	Mean, SD	6.91	5.84	6.49	6.16	4.77	5.81	7.83	6.79	5.22	6.28	0.483	**<0.001**	0.223	**<0.001**
	Median, min - max	5	0 – 27	5	0 - 23	3	0 - 27	6	0 - 27	3	0 - 27				
PHQ-9 Score (category)	None-minimal	474	43.5%	48	47.5%	1399	64.2%	26	40.0%	1350	61.9%	0.644	**<0.001**	0.260	**<0.001**
	Mild depression	313	28.7%	22	21.8%	397	18.2%	15	23.1%	346	15.9%				
	Moderate depression	168	15.4%	17	16.8%	208	9.5%	10	15.4%	256	11.7%				
	Moderately severe depression	87	8.0%	10	9.9%	113	5.2%	10	15.4%	131	6.0%				
	Severe depression	48	4.4%	4	4.0%	63	2.9%	4	6.2%	97	4.4%				

*SF-12v2 Interpretation: differences in 3 points on the norm-based component summary scores and 0.041 points on health utilities represent clinically meaningful differences.[1,2] †MFIS-5 interpretation: scores range from 0 to 20, with higher scores indicating greater perceived impact of fatigue on daily activities.[3] ‡PDQ-5 interpretation: scores range from 0 to 20, with higher scores indicating greater perceived cognitive impairment.[3] §PHQ-9 interpretation: scores range from 0 to 27, with higher scores indicating more severe depression. Scores of 5, 10, 15, and 20 represent cutpoints for mild, moderate, moderately severe and severe depression, respectively.[4]

Abbreviations: BMI, body mass index; **CCI,** Charlson Comorbidity Index; **CIS,** clinically isolated syndrome; **COPD,** chronic obstructive pulmonary disease; **max,** maximum; **min,** minimum; **MS,** multiple sclerosis; **MSLL,** MS Lifelines; **NHWS,** National Health and Wellness Survey; **PPMS,** primary progressive MS; **QoL,** quality of life; **RRMS,** relapsing-remitting MS; **sc IFN β-1a,** subcutaneous interferon β-1a; **SD,** standard deviation; **SPMS,** secondary progressive MS.

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