Aging with MS

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Introduction Even though Multiple Sclerosis (MS) is often described as a disease of young and middle aged adults, about 10% of all people with MS (PwMS) are over the age of 65. Although the proportion of elderly PwMS is relatively small, the general and disability-specific trends towards increasing life expectancy suggest that their numbers are likely to increase over time [1,2]. Few studies evaluated what it means to grow old with a disability as MS, and what are the unmet needs for these patients.

Objects To identify the aspects changing with aging in PwMS.

Methods Data, derived from the project "A New Functional Profile to Monitor the Progression of disability in MS", were collected on consecutive outpatients or in-home rehabilitation patients attending the North Italy Rehabilitation units (Genoa, Padua, Como, Aosta, Brescia, Vicenza). We analyzed the first visit data (before to any rehabilitation treatment) including only patients with relapsing-remitting and secondary-progressive form.

Clinical scales collected during the visit

Outcome	Clinical Scale
Disability level	*Expanded Disability Status Scale* (**EDSS**)
Fatigue in terms of physical, cognitive, and psychosocial functioning	*Modified-Fatigue Impact Scale* (**M-FIS**) · **M-FIS1** subscale cognitive fatigue · **M-FIS2** subscale physical fatigue · **M-FIS3** subscale psychosocial fatigue
Functional Independence as cognitive and social skills, communication, sphincter control, personal care, locomotion and mobility	*Functional Independence Measure* (**FIM**) · **FIM1** subscale cognitive and social skills · **FIM2** subscale communication · **FIM3** subscale sphincter control · **FIM4** subscale personal care · **FIM5** subscale locomotion · **FIM6** subscale mobility
Life Satisfaction	*Life Satisfaction Index* (**LSI**)
Cognitive impairment	*Montreal Cognitive Assessment* (**MoCa**)
Attention impairment	*Symbol Digit Modality Test* (**SDMT**)
Cognitive and attention impairment and information processing speed	*Paced Auditory Serial Addition Task 3* (**PASAT 3**)
Bladder problems	*Overactive Bladder Questionnaire* (**OAB-Q**)
Depression and anxiety	*Hospital Anxiety and Depression Scale* (**HADS**) · **HADS1** subscale anxiety · **HADS2** subscale depression

Analysis Participants were divided in two groups, based on age (≥60 and <60 years). Differences between groups were evaluated using univariate analysis (χ^2 or Mann-Whitney U test), and a logistic regression model was performed to test the relationship between explanatory variables selected in univariate analysis ($p < 0.10$) and the subjects age (<60y and ≥60y). Collinearity was assessed for logistic regression model using variance inflation factor (VIF) and Tolerance techniques. The final model only includes significant predictors, after selection using the likelihood ratio test.

Risultati

A total of **466** PwMS were included in the analysis, mean age was 55,3 ± 12,9 years, 68,2% were female

Univariate Analysis

Variables		<60 y (n=297)	≥60 y (n=169)	P value
Sex, (%)	Male Female	27.3% 72.7%	39.6% 60.4%	**0.006**
Diagnosis, (%)	Relapsing-Remitting (RR) Secondary-Progressive (SP)	57.4% 42.7%	20.7% 79.3%	**<0.001**
EDSS, mean (SD) score		4.8 (2.3)	6.2 (2.0)	**<0.0001**
MoCA, mean (SD) score		23.7 (4.5)	20.7 (4.5)	**<0.0001**
SDMT, mean (SD) score		38.3 (15.4)	25.4 (14.2)	**<0.0001**
PASAT3, mean (SD) score		30.1 (18.3)	19.7 (17.2)	**<0.0001**
HADS 1, mean (SD) score		7.2 (4.3)	6.2 (4.3)	**0.007**
HADS 2, mean (SD) score		5.3 (3.7)	5.0 (3.3)	0.649
FIM 1, mean (SD) score		19.9 (1.9)	19.6 (2.4)	0.634
FIM 2, mean (SD) score		13.5 (1.3)	13.4 (1.4)	0.203
FIM 3, mean (SD) score		12.4 (2.4)	11.1 (3.7)	**<0.0001**
FIM 4, mean (SD) score		37.8 (7.4)	33.2 (10.4)	**<0.0001**
FIM 5, mean (SD) score		11.8 (4.0)	9.3 (4.2)	**<0.0001**
FIM 6, mean (SD) score		18.0 (4.8)	15.5 (5.9)	**<0.0001**
LSI, mean (SD) score		12.6 (4.7)	11.4 (4.3)	**0.006**
MFIS 1, mean (SD) score		14.4 (10.6)	12.0 (9.6)	**0.031**
MFIS 2, mean (SD) score		20.2 (9.1)	21.7 (8.0)	0.100
MFIS 3, mean (SD) score		3.4 (2.3)	3.9 (2.5)	**0.026**
OAB-Q, mean (SD) score		21.9 (10.9)	22.0 (11.0)	0.954

PwMS over 60y show:

> % Male
> % Secondary-Progressive
> Disability level (↑ EDSS)
> Cognitive impairment (↑ MoCA)
>Attention and cognitive impairment and information processing speed (↓ SDMT, ↓ PASAT3)
< Anxiety (↓ HADS 1)

< Sphincter control (↓ FIM 3)
< Personal care (↓ FIM 4)
< Locomotion (↓ FIM 5)
< Mobility (↓ FIM 6)
< Life satisfaction (↓ LSI)
> Cognitive fatigue (↑ MFIS 1)
> Psychosocial fatigue (↑ MFIS 3)

Logistic Regression Model

Variables associated with aging (≥60y vs. <60y)

Variabili	Full Model			Reduced Model		
	OR	95% CI	P value	OR	95% CI	P value
SDMT	0.96	0.93-0.99	0.008	0.96	0.94-0.98	<0.001
LSI	0.95	0.89-1.01	0.125	0.94	0.88-1.00	0.056
HADS1	0.91	0.85-0.98	0.017	0.93	0.87-0.99	0.026
Diagnosis	1.58	1.13-2.20	0.007	1.54	1.17-2.04	0.002
EDSS	1.05	0.84-1.30	0.672			
MoCA	0.99	0.92-1.07	0.805			
PASAT3	0.99	0.97-1.01	0.303			
MFIS2	0.99	0.94-1.03	0.557			
MFIS3	1.11	0.96-1.29	0.147			
FIM3	0.91	0.81-1.03	0.143			
FIM4	1.05	0.97-1.13	0.204			
FIM5	0.95	0.86-1.05	0.312			
FIM6	1.05	0.92-1.19	0.513			
Sex	1.11	0.62-1.99	0.725			

Hosmer-Lemeshow goodness-of-fit statistic, p=0.460

- Attention impairment (↓ SDMT)
- Life satisfaction (↓ LSI)
- Anxiety (↓ HADS1)
- Diagnosis (SP)

Conclusioni Aging involves changes and deterioration of PwMS health. Many skills are decreased and some symptoms become more important. However, as shown by multivariate analysis, with aging the psychosocial aspects are more impacting with respect to physical aspects. To note that the variables associated with aging were: less attention capacity (mean score SDMT (25.4) lower also to that considered non-pathological (34.2 observed in normal population) [3]; the lower level of satisfaction and well-being measured by LSI (11.4 vs. 12.6); lower level of anxiety also considering the clinical cut-off ≥8 [4] identifying anxiety disorders in 36% of people over 60 compared to 46% of subjects aged <60 years (p = 0.042) and higher frequency of subjects with SP diagnosis.
In conclusion, in a debilitating disease as MS, in addition to the progressive MS form are the cognitive (attention impairment) and psychosocial factors (life satisfaction) that impact on aging, while the anxiety appears diminish.

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