Tandem position with eyes closed: clinical, cognitive and radiological insights for an easy and sensitive task for balance function in non-disabled patients with Multiple Sclerosis.

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INTRODUCTION

Multiple sclerosis (MS) is often associated with balance impairments, which significantly affect mobility and daily functioning.
By using inertial sensors, subtle balance deficits have been detected even in non-disabled patients, but they are not yet fully integrated in clinical practice.

AIM

To evaluate a simple balance test of maintaining upright tandem position with eyes closed, in a cohort of early, non-disabled pwMS, and to analyse its correlations with other clinical and radiological assessments.

METHOD

-***Study design***: observational cross-sectional monocentric study.

-***Patients***: relapsing remitting pwMS, aged 18-65 years, Expanded Disability Status Scale (EDSS) score ≤2,0, disease duration ≤5 years, with clinical stability of disease.

-***Procedures***: EDSS score, timed 25-foot walk test (T25FW), 9-Hole Peg Test (9HPT), Brief International Cognitive Assessment in Multiple Sclerosis (BICAMS) battery and 3T Magnetic Resonance Imaging (MRI) were performed. Balance was assessed through 4 tasks: maintaining the upright position with eyes opened (EO) and closed (EC), and tandem position with eyes opened and closed, up to a maximum of 60 seconds for every task, and time was measured.

-***Outcomes***: patients' performances on each task and their relationships with clinical, cognitive and radiological features were evaluated through Pearson tests. Linear regression analyses were used to examine predictors of performances.

RESULTS

Tab 1. Demographic and clinical features of pwMS

	pwMS (n=51)
Age, y, mean±SD	36,4±10,4
Sex (F), n(%)	36 (71)
EDSS, median [quartiles]	1 [1;1]
Disease duration, y, mean±SD	2,6±1,3
T25FW, mean+SD	3,7±0,5
9HPT, mean±SD	21,4±3,5
BDI-2, mean±SD	8,4±8,1
MFIS, mean±SD	23,8±15
SDMT, mean±SD	62,4±10,3
CVLT, mean±SD	57,2±11

Fig 1, Tab 2. Performances on the four balance tasks

Normal standing, EO, s	Normal standing, EC, s	Tandem position, EO, s	Tandem position, EO, s
60±0	60±0	60±0	**27,1±22,6**

Tab 3. Correlations of performance on tandem position with eyes closed

	Tandem EC	Age	EDSS	T2 lesion volume	Cerebellar cortex	9HPT	T25FW	SDMT	CVLT
Tandem, EC	1	_	_	_	_	_	_	_	_
Age	**-0,453****	1	_	_	_	_	_	_	_
EDSS	0.128	-0.031	1	_	_	_	_	_	_
T2 lesion volume	-0,306	**0,528****	0.106	1	_	_	_	_	_
Cerebellar cortex	**0,361***	**-0,295***	0,252	0,123	1	_	_	_	_
9HPT	**-0,338***	0,229	0,132	**0,461****	-0,190	1	_	_	_
T25FW	-0,183	0,137	0,121	-0,011	-0,254	**0.459****	1	_	_
SDMT	0.150	**-0,266***	0,100	-0,060	**0,419****	**-0.306***	**-0,466****	1	_
CVLT	**0,276***	-0,061	0,068	-0,139	0,022	**-0,285***	**-0,462****	**0,414****	1

*p < 0.05, **p < 0.001.

Tab. 4. Predictors of peformance on tandem position with eyes closed

	B	95%CI	p
Cerebellar Cortex Volume	0,1	0,09-0,12	**0,039**

Other variables included: age, sex, T2 lesional volume

CONCLUSIONS

Maintaining tandem position with eyes closed was related to cerebellar cortex volume, episodic memory function and manual dexterity.

Therefore, it could be a sensitive and easy task to perform, potentially useful to unveil subtle cerebellar dysfunction, with consequences on balance, cognition and manual dexterity in early non-disabled pwMS.

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