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# Movement Disorders in Spinocerebellar Ataxias in a Cohort of Brazilian Patients

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**Key Words**
Movement disorders · Spinocerebellar ataxias · Dystonia · Myoclonus · Parkinsonism · Chorea

**Abstract**
***Background:*** Movement disorders (MDs) are well recognized in all subtypes of spinocerebellar ataxias (SCA), but phenomenology and frequency vary widely. ***Methods:*** Three hundred seventy-eight patients, from 169 Brazilian families, with SCAs were assessed with neurological examination and molecular genetic testing. ***Results:*** Dystonia was the most common movement disorder, found in 5.5% of all patients, particularly in SCA3. We observed Parkinsonian features in 6.6% of SCA3 patients, and myoclonus in two patients of our cohort. ***Conclusions:*** Our study demonstrated that MDs are major extracerebellar manifestations of SCA. The observed phenotypes in addition to ataxia may provide significant clues for a particular SCA genotype.



## Introduction

Spinocerebellar ataxias (SCA) are a large and complex heterogeneous group of autosomal dominant degenerative disorders characterized by progressive degeneration of the cerebellum and its afferent and efferent connections [1–3]. Movement disorders (MDs) other than those related to ataxia may be prominent clinical manifestations in some forms of SCAs, often challenging the clinician's ability to make an accurate diagnosis [1–6]. The aim of this study was to evaluate the frequency and type of MDs in a large sample of patients with familial ataxias, and clarify whether the occurrence of a specific MD may be more specific for certain SCA subtypes.

## Methods

This is a retrospective study that included a total of 378 patients, from 169 families. Inclusion criteria were a primary progressive clinical phenotype in which ataxia was the predominant symptom, in subjects with a family history compatible with auto-

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**Table 1.** Summary of clinical variables

| Clinical data | SCA1 | SCA2 | SCA3 | SCA6 | SCA7 | SCA10 | SCA total |
|---|---|---|---|---|---|---|---|
| Patient number | 9 | 20 | 167 | 3 | 7 | 68 | 274 |
| Gender, n | | | | | | | |
| Male | 6 | 12 | 92 | 2 | 3 | 33 | 148 |
| Female | 3 | 8 | 75 | 1 | 4 | 35 | 126 |
| Age of onset, mean ± SD | 37.2±8.05 | 29.3±12.04 | 35.6±9.12 | 42.7±1.15 | 29±10.52 | 33.9±9.41 | 34.6±10.08 |
| Disease duration, mean ± SD | 7.18±5.99 | 8.7±6.52 | 9.1±7.13 | 12.7±6.80 | 10.7±7.49 | 11.3±8.97 | 9.4±7.45 |
| SARA, mean ± SD | 12.2±3.15 | 18.9±7.80 | 16.4±8.35 | 17.7±0.35 | 25±14.14 | 12.8±7.65 | 15.1±8.52 |

SARA = Scale for the Assessment and Rating of Ataxia; SCA = spinocerebellar ataxia.

**Table 2.** Frequency of movement disorders in patients with SCA

| Movement disorders | SCA1 | SCA2 (%) | SCA3 (%) | SCA6 (%) | SCA7 (%) | SCA10 (%) |
|---|---|---|---|---|---|---|
| Parkinsonism | 0 | 0 | 11 (6.6) | 0 | 0 | 0 |
| Dystonia | 0 | 1 (5) | 13 (7.8) | 0 | 1 (14.3) | 0 |
| Oromandibular | | 1 (5) | 5 (3) | | | |
| Blepharoespasm | | | 4 (2.4) | | 1 (14.3) | |
| Focal (hand or foot) | | | 2 (1.2) | | | |
| Segmentar | | | 1 (0.6) | | | |
| Generalized | | | 1 (0.6) | | | |
| Myoclonus | 0 | 1 (5) | 1 (0.6) | 0 | 0 | 0 |
| Chorea | 0 | 0 | 0 | 0 | 0 | 0 |
| Tremor | 0 | 1 (5) | 4 (2.4) | 0 | 0 | 4 (5.9) |
| Patient, n | 9 | 20 | 167 | 3 | 7 | 68 |

SCA = Spinocerebellar ataxia.

somal dominant inheritance. Additionally, the severity of ataxia was evaluated using the Scale for the Assessment and Rating of Ataxia (SARA). Signed informed consents were obtained following a protocol approved by the Institutional Ethics Committee of the Federal University of Paraná. All patients were genetically tested for SCAs types 1, 2, 3, 6, 7, 8, 10, 12, 14, 17 and DRPLA.

## Results

Pathological mutations were observed in 274 (72.7%) patients and were most frequently identified for SCA3 (44.3%), followed by SCA10 (18%). Other subtypes detected included SCA2 in 5.3% of patients, SCA1 in 2.4%, SCA7 in 1.9% and SCA6 in 0.8%. SCA8, 12, 14, 17 and DRPLA were not found in our sample.

Among the patients examined, 203 (53.7%) were men, and the age at onset ranged from 6 to 75 with a mean onset at 34.6 ± 10.1 years of age. Mean disease duration was 9.4 ± 7.4 years. The mean SARA score was 15.1 ± 8.6 (range 1–38). Table 1 shows a brief summary of the demographic, clinical and molecular data for each form of SCA. MDs occurred in almost every SCA subtype, with different frequencies (table 2).

## Discussion

Although widely recognized, there are only a few studies assessing the frequency of MDs in patients with SCAs. Parkinsonism, especially the akinetic-rigid syndrome, has been described in patients with SCAs, particularly SCA2, SCA3 and SCA17, more so in Asian patients [5, 6]. In our cohort, 6.6% of our 167 patients with SCA3 presented with Parkinsonism, including all four cardinal signs. It is more common for patients with SCA2 Parkinsonism present isolated, but in later stages, ataxic manifestations may appear [7]. In our series, postural or action tremor was frequently associated with SCA10, while rest

tremor was present mainly in SCA3 patients with Parkinsonian features [8]. In our cohort, dystonia was present in 15 patients, 13 of which were SCA3 cases (7.8%), 1 was an SCA2 patient and 1 SCA7. Additionally, myoclonus was detected in 1 (5%) patient with SCA2 and in 1 (0.8%) patient with SCA3. Chorea is also a rare movement disorder in patients with SCAs. We did not find a case with chorea in our cohort.

Other MDs, like stiff-person syndrome (SPS), akathisia and restless legs syndrome, have been more rarely documented in patients with SCAs [8–10]. In conclusion, our study demonstrated that the MDs are major extracerebellar manifestations of SCAs. The observed phenotypes in addition to ataxia may provide significant clues for a particular SCA genotype.


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