Integrative Approach Improves Fall Risk and Postural Stability in Spinocerebellar Ataxia-2 – A Case Report

Abstract

Spinocerebellar ataxias (SCAs) comprise a large heterogeneous group of autosomal dominant cerebellar ataxias. Despite availability of various conventional treatments, reducing disability and improving the quality of life is a challenge in this condition. In the present case report, based on the clinical symptoms and site of pathology, an Ayurveda-based diagnosis of *kaphavruta vayana* and *kaphavruta udana* was considered. Therapeutic measures such as *rookshana* (drying therapy), *vatahara* (measures to pacifying *vata), balya* (strengthening), and *brimhana* (nourishing) regimens were adopted along with oral medications and specific yoga practices. The objective of the treatment was to improve stability, posture, and balance. After 10 weeks of integrative treatment, a demonstrable improvement was observed in scale for assessment and rating of ataxia Scale for the Assessment and Rating of Ataxia (SARA), fall risk, and limit of stability (using computerized dynamic posturography). Hence, an integrated Ayurveda and Yoga-based lifestyle regimen may serve as a useful adjuvant in improving fall risk and limit of stability in patients with SCAs.

Keywords: *Fall risk, Panchakarma, postural stability, spinocerebellar ataxia, Vata Vyadhi*

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Introduction

Spinocerebellar ataxia (SCA) is a group of hereditary ataxias characterized by slowly progressive incoordination of gait often associated with poor coordination of hands, speech, and eye movements. The core pathology involved in SCA is progressive degeneration of the cerebellum. SCA is associated with recessive or dominant genetic inheritance with a global prevalence of 3 in 100,000.[1] Despite various treatment options available with conventional medicine, the search for effective disease-modifying therapies is still continuing.[2] Hence, there is a need to explore traditional systems of medicine for SCA. There are few case reports on Ayurveda management in SCA, but this is the first case report that reports satisfactory outcomes based on postural stability and fall risk indexes measured on dynamic posturography. The primary focus of the management was aimed to improve coordination. SCA can be considered under the preview of *vatavyadhi* (~ neurological disorders) in Ayurveda. Due to gait and speech disturbance, in this case, a diagnosis of *kaphavruta vayana* (~ movement disorders) and *kahavruta udana* (~ speech disorders) was considered.

Patient Information

A 59-year-old male working as a supervisor in the fabric industry came to the Outpatient Department of Integrative Medicine, NIMHANS Hospital with complaints of difficulty in maintaining balance and swaying toward the right side when walking for the past 2 and ½ years. The patient had slurring of speech, sleep disturbance, tremors of both the hands, and difficulty in writing. He also reported an episode of fall. The patient is a known case of type 2 diabetes mellitus for the past 1 year, and a history revealed that he had rapid eye movement sleep behavior disorder. In 2019, the patient had consulted the Neurology Department, NIMHANS, and he was diagnosed with late-onset SCA-2/ multiple system atrophy-cerebellar. Conservative treatment (tablet amantadine hydrochloride 100 mg twice daily and tablet clonazepam 0.25 mg once daily) was advised. The patient sought treatment

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through integrative medicine (Ayurveda and Yoga) approaches for improving his gait and balance.

Clinical findings and diagnostic assessment

Clinical findings

The patient was conscious and oriented. Gait examination revealed intermittent swaying toward the right side and reduced arm swing on the right side. Cranial nerve examination showed slow movement of the tongue, suggesting the involvement of hypoglossal nerve. The speech was dysarthric (poor pronunciation of words and change in rhythm), and hypermetric saccades with reduced blink rate were observed on ocular examination. Muscle bulk, tone, and power were within normal limits for all four limbs. The patient was unable to perform tandem walking and Romberg's sign was positive. Among the tests for coordination, the patient was not able to perform finger–nose test, knee–heel–shin test, and had dysdiadochokinesia. Sensory examination for pain, pressure, vibration, position, and discriminative sensation was found to be normal, and the plantar response was equivocal. Dynamic posturography suggested fall risk and postural instability [Figures 1-3].

Ayurveda perspective

Prakruthi (Ayurveda-based physical and mental constitution) of the patient was of *kapha-vata* type. Other Ayurveda clinical parameters were as follows: (1) digestive fire *(agni)* – irregular (*vishamagni*); (2) body symmetry (*pramana*), nourishment, and constitution of tissues (*SARA*) – medium (*madhyama*); (3) *Satmya* (suitability of the body and daily routine), *sattva* (mental strength), and *samhanana* (built) – medium (*madhyama*); (4) physical endurance capacity (*vyayamashakti*) – *Avara* (low); and (5) *Aharashakti* (food intake) and *jaraanshakti* (digestive power) – medium (*madhyama*). Predominant *dosha* involved was *vata* (attribute related to movement) associated with *kapha* (attribute related to body integrity). *Dhatu* (tissue elements) involved were *rasa* (fluid tissue of the body) and *majja dhatu* (*mastishka* majja/brain tissue).

Ayurveda-based pathophysiological understanding and diagnosis

Gadgadatwa (slurred speech), *anidra* (insomnia) and *kampa* (tremors), *Gatisanga* (restriction of movement/difficulty in walking) and *adhoshakha guruta* (heaviness of lower limbs) suggested impaired functions of *vyana* (~ Motor functions) and *udana* (~ Speech) *vata*. Symptoms such as *Vak swara graha* (impaired speech), *Dhourbalya* (weakness), *Guru gatrata* (heaviness of body), and *Gatisanga* (restriction of movement/difficulty in walking) are observed in *kaphavruta vayana* and *kaphavruta udana.* Hence, based on the clinical symptoms and site of pathology, the diagnosis of *kaphavruta vayana* and *kahavruta udana* was considered. As the diseases involved *Marma* (Brain) and chronicity was more than 1 year, it was considered under *Yapya Vyadhi* (A condition which can be managed through Palliative care).

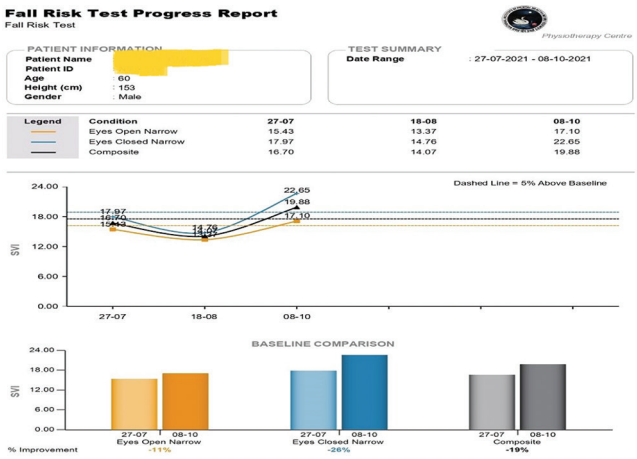

Figure 1: Fall risk test progress report

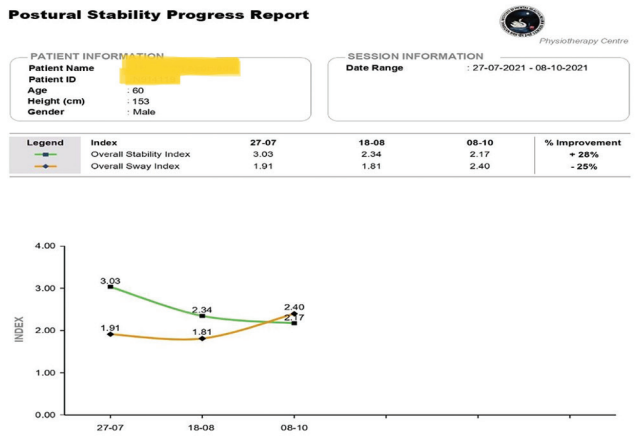

Figure 2: Postural stability progress report

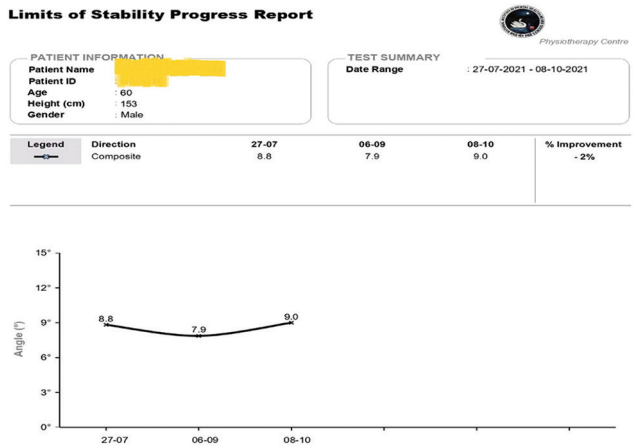

Figure 3: Limits of stability progress report

Timeline

Table 1: Disease course, management, and outcomes

Year	Incidence/Intervention
September 10, 2019	Onset of symptoms
September 21, 2019	Local neurology consultation - MRI report showed age-related atrophy, conservative management for three months, no significant improvement
From January 06, 2020 to July 22, 2021	NIMHANS neurology consultation - underwent detailed neurological examinations and investigations, eventually diagnosed with SCA-2/MSA-C, treated conservatively with minimal improvement in terms of balance
July 26, 2021	Visited integrative medicine OPD, NIMHANS. The patient had predominantly gait disturbance, imbalance, dysarthria, and sleep disturbance. The ayurvedic diagnosis of the condition was considered as *Kaphaavrita vyana* and *udana*. SARA showed moderate disability. Dynamic posturography assessments showed fall risk and impaired postural stability
July 27, 2021 to August 2, 2021	Ayurveda intervention phase 1
	Udhwartana (dry powder massage) with *Kolakulatthadi churna*
	Dhanadanayanadi Kashaya (15 ml twice daily with 45 ml of water before food), *Mahapaishachika ghrita* (10 ml at bed time with warm water)
August 4, 2021 to August 11, 2021	Ayurveda intervention phase 2
	Shashtikashali pinda sweda (application of warm medicated rice poultice), *Mustadi yapana basti* (therapeutic enema)
August 12, 2021 to August 18, 2021	Ayurveda intervention phase 3
	Brimhana nasya (nasal instillation of nourishing type medicated oil)
	Shirobasti (retention of medicated oil over head for a prescribed period) with *Dhanwantaram oil* *Kalyanavaleha churna jihwa pratisarana* (application of medicated paste over the tongue) and *ksheeradhooma* (inhalation of steam of medicated milk)
	Bhadradarvadi Kashaya (15 ml twice daily with 45 ml of water before food) was added
August 19, 2021 (during discharge)	Ayurveda intervention phase 4
	Dhanwantaram taila Shiropichu (application of cotton pad dipped in oil over vertex region)
	Bhadradarvadi Kashaya (15 ml twice daily with 45 ml of water before food) continued
	Kalyanavaleha churna (5 g twice daily after food) and
	Mahapaishachika ghrita (10 ml at bed time with warm water) was added
October 8, 2021 (first follow-up)	Ayurveda intervention phase 5
	*Mahapaishachika ghrita*was discontinued and the rest of the treatment was continued as per phase 4 treatment
	In addition, *Vidaryadi ghrita* 20 ml-0-0 with warm water on empty stomach was added

SARA=Scale for Assessment and Rating Ataxia, SCA=Spinocerebellar ataxia, MSA-C=Multiple system atrophy-cerebellar, OPD=Out Patient Department, NIMHANS=National Institute of Mental Health and Neurosciences, MRI=Magnetic Resonance Imaging

Treatment plan

The management was aimed at improving the coordination and balance. Initially, *Rookshana* (measures which induce dryness in the body) to remove *avarana* (blockage of movement of *vata* by *kapha)* followed by *vatahara* (measures which pacifying *vata* imbalance*), Balya* (strengthening), and *Brimhana* (nourishing) along with oral medications and yoga practices specifically, to improve stability, posture, and balance, were adopted. The details of the ayurvedic medications and Panchakarma measures and the yoga module are summarized in Tables 1 and 2.

Outcome measures and assessment time points

SARA (scale for the assessment and rating of ataxia), functional ambulatory performance, and dynamic posturography were assessed at the baseline, end of the treatment, and on follow-up after 1 month of discharge. The patient started noticing an improvement in clinical symptoms pertaining to his gait and speech from the 2nd week of treatment. The SARA score improved from moderate disability to mild disability at discharge. Functional ambulatory performance score, however, decreased during discharge from 81 to 70, although it improved to 73 during follow-up. A significant improvement in fall risk, overall stability index, and limits of stability was noticed from baseline to discharge using computerized dynamic posturography. The improvement in overall stability index was maintained during follow-up after 1 month. The details of changes in outcome measures are summarized in Table 3.

Discussion

Currently available treatments for SCA-2 are supportive in nature as there is no known therapy to delay or

Table 2: Yoga module

Practices	Counts	Duration
Joint loosening	5 rounds each	First week onward till the last follow-up
Trikonasana, Veerabhadrasana	10 counts	First week onward till the last follow-up
Utkatasana, Setubandhasana, lumbar stretch		Asanas were chosen with the objectives of: 1. Enhancing the balance and body awareness (*Trikonasana, Veerabhadrasana*) 2. Strengthening the thigh (*Utkatasana*) and back muscles (*Setubandhasana*) 3. Relaxing the spinal column (*Supta Udarakarshanasana*)
Deep abdominal breathing	5 rounds	First week onward till the last follow-up
Kapalabhati	30 strokes in 2 rounds	2nd week onward till the last follow-up (as preparation for pranayama, to enhance cognition and breathing capacity)
Nadishuddhi	9 rounds	2nd week onward till the last follow-up (to reduce anxiety and bring parasympathetic nervous system activation)
Bhramari	5 rounds	2nd week onward till the last follow-up (to bring deep calmness to the mind)
Nadanusandhana	3 rounds	2nd week onward till the last follow-up (to enhance selective attention and concentration)

Table 3: Details of changes in outcome measures

Assessments	Before treatment	After treatment	Follow-up - 1
SARA	13/40 (moderate disability)	7/40 (minimum disability)	9/40 (minimum disability)
Functional ambulatory performance score	81	70	73
Fall risk	16.70	14.07	19.88
Postural stability	Overall sway index - 3.03	Overall sway index - 2.34	Overall sway index - 2.17
	Overall stability index - 1.91	Overall stability index - 1.81	Overall stability index - 2.40
Limit of stability	8.8	7.9	9.0

SARA=Scale for Assessment and Rating Ataxia

halt the progression of the disease. Neither exercise nor physical therapy has been shown to stem the progression of incoordination or muscle weakness.[3] The management of SCA-2 in Ayurveda is based on *vatavyadhi chikitsa* (treatment of diseases caused predominantly due to *vata dosha*).[4] Classical texts of Ayurveda provide a detailed description of various *vatavyadhis* and their management. Based on the clinical presentation, *vatavyadhi* line of treatment was followed for Ayurveda and yoga intervention in the present case.

Initially, *Udhwartana* (powder massage) was administered with *Kolakulatthadi churna* to remove *Kapha avarana* (impedance to movement of *vata* by *kapha*). It also helps in bringing stability to the body.[5] The patient reported reduction in heaviness of lower limbs after the treatment. Post-*Udvartana*, *Shashtikashalipinda sweda,* and *Mustadi yapana basti* with *shuddha bala taila Anuvasana* (oil enema) were administered to mitigate *vata dosha* and to restore the strength of lower limbs. Studies on *Shashtikashali pinda sweda* in various neurological conditions suggest an improvement in motor deficits and activities of daily living and have nourishing effects on muscles and peripheral nerves.[6] Local heat application improves muscle excitability, improves hemodynamics, and enhances parasympathetic activity. Further therapeutic massage improves motor control and performance in the balance parameters.[7] *Basti* is considered the best treatment for *Vata Vyadhi*.[8] It helps in achieving Sroto shodhana (clearing the channels) and *Vatanulomana* (downward regulation of vata). Studies on *basti* suggest an improvement in activities of daily living,[9] enhanced vagal activity, and changes in gut microbiome post-*Basti chikitsa*.[10] *Nasya karma* is exclusively indicated in diseases involving head and neck and nose is said to be the gateway of the brain. Nourishing oil administered through the nose may improve brain functioning.[11]

SARA scoring showed a significant improvement after treatment, but slight worsening was observed during the first follow-up. Whereas there was deterioration in the functional ambulatory scale posttreatment, the scores improved during the first follow-up. Worsening in SARA score during the first follow-up was mainly due to slight deterioration in speech and Heel-shin slide domines. In general, patients recover very slowly during the *basti parihara kala* (post*basti* recovery period), which might be the reason for delayed improvements. Similar delayed responses are also noticed in most of the neurological disorders in routine clinical practice. The yoga intervention may have led to an improvement in proprioceptive and interoceptive awareness with reduction in anxiety. This may be the reason for reduction in fall risk, enhancement in stability index after treatment. On follow-up during the postrecovery period, significant improvements were noted in both these parameters. Considering the progressive nature of the disorder, the patient may require continued long-term follow-up with a regular application of

suggested yoga- and Ayurveda-related regimens for further improvement and to delay the progression of the disease.

Conclusion

Integrative approach of treatment combining Ayurveda and yoga therapies along with conventional modalities of treatment can produce a synergistic effect in SCA. A long-term integrative Ayurveda and yoga-based lifestyle regimen can be particularly useful in improving postural stability and fall risk in patients with chronic neurological disorders like SCA-2. This should be explored further through systematic trials.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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