



Review Article

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AMYOTROPIC LATERAL SCLEROSIS: A REVIEW FROM AN AYURVEDIC PERSPECTIVE

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ABSTRACT

Amyotrophic lateral sclerosis (ALS) is a type of Motor neuron disease (MND) is a disease afflicting the motor part of the nervous system. It includes the disturbances related to both upper motor neuron and lower motor neuron. It is usually characterised by steady, continuous, progressive degeneration of cortico-spinal tract, anterior horn cells, bulbar motor nuclei or any of the above mentioned parts of the nervous system. Symptoms of the motor neuron disease include muscle weakness, atrophy, fasciculations, emotional disturbances and in severe cases respiratory muscle weakness. Severity of the symptoms may vary in different individuals. Diagnosis of the disease is confirmed by nerve conduction study, electromyogram and exclusion of other diseases by MRI and other laboratory findings. In Ayurveda, we can come to a conclusion that this disease is coming under the category of Vatavyadhi. Based on the features observed in the disease, this clinical condition is usually correlated with Dhatukshayajanya Sarvangavata. The following paper illustrates the hypothesis put forth based on the comparison of findings of motor neuron disease and symptoms mentioned in literatures of Ayurveda.

Key words: Amyotrophic Lateral Sclerosis, motor neuron disease, Dhatukshaya, Sarvangavata

INTRODUCTION

Amyotrophic lateral sclerosis is the most common motor neuron disease (MND)¹. This is usually presenting with random asymmetric symptoms involving both upper motor neuron (UMN) and lower motor neuron (LMN) signs². The aetiology of the disease is usually unclear to western medical fraternity³. The disease is most commonly observed among males and in 5th or 6th decade of life⁴. There will be selective loss of function of upper or lower motor neurons resulting in the progressive loss of functions of either upper or lower motor neurons or both. The motor neuron cytoskeleton is affected at the initial stage of the illness followed by focal enlargement of proximal motor neurons due to the accumulations of neurofilaments and proteins. These affected neurons undergo shrinkage later on with accumulation of pigmented lipid (lipofuscin). The sequel to the shrinkage of neurons is denervation and consequent atrophy of corresponding muscle fibres. As denervation progresses, muscle atrophy is readily recognised by clinical examination as well as through muscle biopsy. Hence the term 'amyotrophy' arises in the ALS. The loss of motor neurons of cortex leads to the thinning of the corticospinal tracts. These corticospinal tracts travel via internal capsule and brain stem to the anterior and lateral white matter of the spinal cord. The loss of fibres in the lateral columns results in the fibrillary gliosis of the spinal cord. Hence the term 'lateral sclerosis' arises in the ALS⁵. However, diabetes mellitus can also be responsible for amyotrophy. This is characterised by gradual weakness in quadriceps group of muscles in elderly diabetic people, though there may be a possibility of involvement of muscles in leg, hip and foot⁶.

Clinical features of ALS

The patient initially presents with muscle cramps, weakness, muscle atrophy of hands and feet. Weakness usually progresses to forearms, shoulders and lower limbs. Fasciculations, spasticity, exaggerated deep tendon reflexes, extensor plantar

responses, clumsiness and stiffness of the movement, weight loss, fatigue and difficulty in controlling facial expressions and difficulty in tongue movements are observed. Other symptoms include hoarseness of voice, dysphagia, slurred speech, increased production of saliva and tendency to choke on consumption of liquids. This is followed by inappropriate, involuntary uncontrollable excesses of laughter or crying⁷. Sensory system, consciousness, cognition, voluntary eye movements, sexual function, functions of urethral and anal sphincters are usually not affected in the progression of pathogenesis in case of Amyotrophic lateral sclerosis⁸. Death is observed in 50% of the patients due to failure of respiratory muscles within a period of 3 years. 20% of the individuals suffering from ALS die within a span of 5 years and 10% of the patients die within 10 years. Survival of the individual suffering from ALS after 30 years of onset is rare. In bulbar involvement of ALS, deterioration of health and death occur rapidly as it is one of the vital part controlling respiration, deglutition, circulation⁹.

Ayurvedic interpretation of amyotrophic lateral sclerosis

This disease is usually comparable to Dhatukshayajanya Sarvangavata. Here an attempt is made to compare the progression of symptoms and analysis of each symptom with abnormality of Dosha (bioenergy) and Dushya (body tissues). As the disease is considered to be chronic and debilitating illness, we can infer the Dhatukshaya (loss of body elements) likely to occur. As the disease involves Sarvanga (whole body) and in almost all the cases, Vata Dosha likely to be vitiated throughout the course of the disease, the diagnosis of Sarvanga Vata is made. The following table shows the chronology of the symptoms in the patient of amyotrophic lateral sclerosis, terminology used for these clinical features and likely involvement of Dosha and Dhātu in the pathogenesis of the disease from the onset till the complete manifestation of the disease.

Table 1: Symptoms of Amyotrophic lateral sclerosis with terminology in Ayurveda, involvement of Dosha and Dhatu in the disease process

Symptom	Ayurveda terminology	Dosha vitiation	Dhatu involvement
Stiffness	Stambha	Vata vitiation	Rasa Kshaya
Muscle weakness	Aksha glani	Vata vitiation	Rasa, Mamsa kshaya
Atrophy	Mamsa Shosha	Vata vitiation	Mamsa kshaya
Fasciculation	Sphurana	Vata vitiation	Mamsa kshaya
Muscle cramps	Udveshtana/ Avamotana	Vata vitiation	Mamsa kshaya
Facial weakness	Ardita	Vata vitiation	Mamsa kshaya
Dysphagia	Annapravesha krichrata	Vata vitiation	Rasa kshaya
Dysarthria	Vak sanga	Vata vitiation	Mamsa kshaya

Samprapti Ghataka of Dhatukshayajanya Sarvangavata

By observing the clinical features of amyotrophic lateral sclerosis with the Dosha (bioenergy) and Dhatu (body tissues) involvement and terminology in Ayurveda for the clinical features, the following Samprapti Ghataka can be framed. The tabular format is described in detail in the coming pages.

Table 2: Samprapti Ghataka of the Dhatukshayajanya Sarvangavata

Factor of Samprapti Ghataka of the disease	Factor involved in the disease process
Dosha	Vata
Dushya	Rasa, Rakta, Mamsa
Srotas	Rasavaha, Raktavaha, Mamsavaha and Annavaha Srotas
Srotodushti Prakara	Sanga, Vimargagamana
Agni	Jatharagni mandya, Rasa, Rakta, Mamsa Dhatvagni mandya
Ama	Koshthastha and Dhatustha Ama
Udbhava Sthana	Pakvashaya
Sanchara Sthana	Sarva Sharira
Vyakta Sthana	Sarva Sharira
Vyadhyavastha	Chirakari
Vyadhi bheda	Adhyatmika, Doshabala Pravritta, Sharirika and Pakvashaya Samuttha Vikara
Rogamarga	Bahya, Madhyama and Abhyantara
Sadhyasadhya	Asadhya – Pratyakhyeya

The clinical features of amyotrophic lateral sclerosis observed are indicating that there is generalised Vata (bio energy) vitiation in the body. The dominance of Vata Dosha (bio energy) can be observed from the onset of the illness till the complete manifestation of the disease. Stiffness (Stabdha), muscle weakness (Aksha glani), atrophy (Mamsashosha), fasciculations (Sphurana), muscle cramps (Avamotana), facial weakness (Aksha glani), dysphagia (Annapravesha Krichrata) and dysarthria (Vak Sanga) will indicate the dominance of Vata (bio energy) throughout the progression of the illness from onset to complete manifestation of the disease¹⁰. Further, there will be abnormality of Vyanavata, Pranavata and Udanavata (subtypes of Vata bio energy) are affected during the progression of the disease¹¹. Thus, this is considered to be Vataja Nanatmaja Vikara¹².

As far as the western medicine is concerned, there is no specific causative factor for the manifestation of amyotrophic lateral sclerosis. Based on the fundamentals of Ayurveda, we can go retrospectively. The duration of the illness is prolonged and progression of the disease is slow suggests the causative factors which provoke the Vata (bio energy) are responsible for the pathological process. In other words, the measures such as excess amount of exercise, the measures which are leading to the lightness of the body, falling from height, the manoeuvres which are leading to Dhatukshaya (depletion of body elements) in the body, depriving of sleep during night time, suppression of the natural urges, exposure to cold atmosphere, excess consumption of substances having Ruksha (dry) quality, excess consumption of food substances having Kashaya (astringent), Katu (pungent) and Tikta (bitter) taste are responsible for the vitiation of Vata (bio energy) Dosha¹³. From the onset of the

disease till the complete manifestation of the disease, Vata Dosha (bio energy) will be dominant.

Based on the concept of Kriyakala (time for the treatment of the disease), the earliest sign observed Dhatukshayaja Sarvangavata is related to Koshtha (alimentary canal) i.e. Stabdha Koshthata (reduced motility in the Koshtha region) and Purna Koshthata (fullness of the abdomen). The Lakshana observed during Prakopa (stage of aggravation) are Koshtha toda (pricking type of pain in abdominal region) and Koshtha Sancharana (movement of vitiated Vata in the abdominal region). The Lakshana observed during Prasara (stage of spreading) stage are Vimargagamana of Vata (displacement of Vata to other parts of the body) and Atopa (discomfort of abdominal region with pain). These Lakshana indicate the earliest manifestation of the disease¹⁴. As per the Sushruta, these Lakshana are considered to be Dosha Lakshana (the clinical features which indicate the increase of Dosha in the body).

The Lakshana such as Gatrastabdha (stiffness of the body parts), Akshaglani (muscular weakness), Mamsasosha (atrophy of body parts), Sphurana (fasciculations), Udveshtana/ Avamotana (muscle cramps), Arditia (facial weakness), Annapravesha Krichrata (difficulty in swallowing), Vaksanga (dysarthria) are considered to be Vyadhi Lakshana (the clinical features which indicate the manifestation of the disease in the body). These Lakshana appear in the patients during or after the stage of Sthanasamshraya (stage of localisation).

Dosha (bioenergy): By analysing the clinical features explained in the context of amyotrophic lateral sclerosis it is evident that from the onset of the disease till the complete manifestation of the disease, dominance of Vata Dosha (bio energy) is observed.

Therefore, as per the fundamental principles of Ayurveda, Amyotrophic lateral sclerosis is a Vataja Nanatmaja Vikara (Vata will be dominant from the onset till the complete manifestation of the disease). As the duration of the illness is prolonged, mechanism of Dhatukshaya (depletion of body elements) likely to be responsible for the disease manifestation.

Dushya: Rasa (plasma tissue), Rakta (blood tissue) and Mamsa Dhatu (muscular tissue) are likely to be afflicted during the pathogenesis of the disease. As the disease is showing chronic course and stiffness of the body parts, Rasa Dhatu (plasma tissue) suspected to be involved in the pathogenesis. In the late stage of the disease process, the person is unable to consume the food substances. This also suggest the involvement of the Rasa Dhatu (plasma tissue) during the pathogenesis¹⁵. The Lakshana such as Mamsashosha (atrophy), Sphurana (fasciculations), Udveshtana or Avamotana (muscle cramps), Ardita (facial weakness) and Vaksanga (speech disturbances) are supporting the involvement of Mamsa Dhatu (muscular tissue) in the disease manifestation¹⁶. Involvement of Rakta (blood tissue) can be predicted as Kandara (tendon) will be involved in the disease process and Kandara (tendon) is considered to be Upadhatu (bi-product) of Rakta Dhatu (blood tissue)¹⁷.

Srotas (channels): By analysing the Lakshana (clinical features) of Dhatukshayajanya Sarvangavata, it is observed that Rasa (plasma tissue), Rakta (blood tissue) and Mamsadhatu (muscular tissue) will be involved in the pathogenesis of the disease. Hence, Rasavaha (channels which circulate the micronutrients related to plasma tissue), Raktavaha (channels that circulate the micronutrients related to blood tissue) and Mamsavaha Srotas (channels that circulate the micronutrients related to muscular tissue) will be involved in evolution of the disease. The presence of Stabdhatu (stiffness), Aksha glani (muscular weakness), Annapravesha kricchrata (inability to swallow) suggest the involvement of Rasavaha Srotas (channels that circulate the micronutrients related to plasma tissue). Mamsavaha Srotas (channels that circulate the micronutrients related to muscular tissue) affliction can be predicted by the presence of Akshaglani (muscular weakness), Mamsa shosha (atrophy), Sphurana (fasciculation), Udveshtana/ Avamotana (muscle cramps), Ardita (facial weakness), Vaksanga (dysarthria)¹⁸. Raktavaha Srotas (channels that circulate the micronutrients related to blood tissue) involvement can be predicted with the Lakshana such as Udveshtana (muscle cramps), Ardita (facial weakness), Vaksanga (dysarthria) where in involvement of Kandara (tendon) will be present. The presence of Annapravesha Kricchrata (inability to swallow) is suggestive of the involvement of Pranavaha (channels that help in the movement of Pranavayu in the body from the exterior and vice versa)¹⁹ as well as Annavaha Srotas (channels where in the movement of the food from exterior to Koshtha i.e. alimentary canal takes place)²⁰.

Srotodushti Prakara (type of abnormal function in the channels): As Dhatukshayaja Sarvangavata is a Nija Vikara, the disease commences from Mahasrotas (alimentary canal) and spreads all over the body²¹. Thus, Sanga (obstruction) in Pakvashaya (large intestine) will be the initial Sroto dushti Prakara followed by Vimargamana (abnormal movement of the Vata, bioenergy from its natural course)²².

Agni (digestive fire): The clinical features of amyotrophic lateral sclerosis mimic the features of Dhaukshayajanya Sarvangavata. In this illness, dominance of Vata (bioenergy) is observed throughout the course of the disease. Hence, we can consider the presence of Vishamagni²³ (status of Agni due to the dominance of Vata, bioenergy in the body) in the patients of

Dhatukshayajanya Sarvangavata. As far as involvement of Dhatvagni (type of digestive fire in the body tissues) is concerned, involvement of Rasa Dhatvagni (digestive fire related to plasma tissue), Rakta Dhatvagni (digestive fire related to blood tissue) and Mamsa Dhatvagni (digestive fire related to muscular tissue) is predicted, as there will be involvement of Rasa (plasma tissue), Rakta (blood tissue) and Mamsa Dhatu (muscular tissue) is suspected during the course of the disease²⁴.

Ama (improperly processed materials): As there is weak Jatharagni (digestive fire present in the alimentary canal), we are going to suspect the presence of Ama (improperly processed material) in the Mahasrotas (alimentary canal). Due to the weak Rasa, Rakta and Mamsa Dhatvagni (weak digestive fire in the plasma tissue, blood tissue and muscular tissue respectively), we are going to suspect the presence of Ama (improperly processed materials) in Rasa (plasma tissue), Rakta (blood tissue) and Mamsa Dhatu (muscular tissue) as well²⁵.

Udbhava Sthana (origin of the Dosha or bioenergy): This disease is considered to be Nija Vikara (disease caused due to endogenous factor) and Vataja Nanatmaja Vikara (Vata will be dominant from the onset till the complete manifestation of the disease). The word 'Udbhava Sthana' refers to the site where in a particular Dosha is produced in the Koshtha (alimentary canal). This implies that the production of normal/ abnormal Dosha (bioenergy) starts in the Koshtha (alimentary canal). As per the fundamentals of Ayurveda, Vata Dosha (bioenergy) will be produced in the Pakvashaya (large intestine). Hence, Udbhava Sthana in this disease is Pakvashaya²⁶ (large intestine).

Sanchara Sthana (area of movement of Dosha): The word 'Sanchara Sthana' refers to area of the body where in vitiated Dosha (bioenergy) will move in the body. In case of Dhatukshayajanya Sarvangavata, clinical features observed during the course of disease suggest the involvement of whole body in the pathogenesis. Hence, Sarva Sharira (whole body) is considered to be Sanchara Sthana (area of movement of Dosha) in Dhatukshayajanya Sarvangavata²⁷.

Vyakta Sthana (part of the body full blown symptoms of the disease seen): In case of Dhatukshayajanya Sarvangavata, the clinical features are seen all over the body. Hence, Sarva Sharira (whole body) is considered to be Vyakta Sthana (part of the body where full blown symptoms of the disease seen) in Dhatukshayajanya Sarvangavata²⁸.

Vyadhyavastha (stage of the disease): Amyotrophic lateral sclerosis is a slowly progressive disease. In other words, it shows complications in the long run. Hence, the Vyadhyavastha in this clinical condition is Chirakari (long standing illness).

Vyadhi bheda (type of the disease): As far as the types of disease based on fundamentals of Ayurveda are concerned, Dhatukshayajanya Sarvangavata is a Adhyatmika Vikara (disease manifests in the patient due to deeds done by self). Among the type of Adhyatmika Vikara, it is further classified under Doshabala Pravritta Vikara (disease manifests in the patient due to the dominance of the Dosha or bioenergy), Sharirika Vikara (disease related to the body) and Pakvashayasamuttha Vikara²⁹ (disease having the origin in the large intestine). This type of classification will be helpful in determining the Sadhyasadhya (prognosis) of the disease as well as planning line of treatment at a particular stage of the illness.

Rogamarga (course of the disease): The presenting complaints such as Stabdhatu (stiffness), Akshaglani (muscular weakness),

Mamsashosha (atrophy), Sphurana (fasciculations), Udveshtana/ Avamotana (muscle cramps) are suggestive of the involvement of Bahya (external) Rogamarga. The presence of Vaksanga (dysarthria), Ardita (facial weakness) imply the involvement of Madhyama (middle) Rogamarga. The presence of Annapravesha Kricchrata (inability to swallow) is suggestive of Abhyantara (internal) Rogamarga involvement. Thus, during the progression of the disease, all the three Rogamarga will be involved³⁰.

Sadhyasadyata (prognosis): Several criteria are explained to determine the Sadhyasadyata of any disease. Based on following factors, Dhatukshayajanya Sarvangavata is considered to be Pratyakhyeya Vikara (incurable disease)³¹.

- First of all, based on onset of the disease, this disease is more common in 5th or 6th decade of life and is slow progressive disease. This implies the disease is more common during the age group where in Vata (bioenergy) dominance commences.
- The disease is having the dominance of Vata Dosha (bioenergy) from the commencement of disease till the complete manifestation of the disease.
- More than three Dhatu (tissue elements) are involved during the progression of the disease.
- All the three Rogamarga (course of the disease) are involved in the pathogenesis of the disease. Bahya (external) Rogamarga is afflicted in majority of the patients. As far as involvement of order of the Rogamarga is concerned, Bahya (external) Rogamarga is involved first, followed by the involvement of Madhyama (middle) Rogamarga and last, the involvement of Abhyantara (internal) Rogamarga.
- The clinical features show involvement of whole body. Karshyata (emaciation) will be observed during the late stage of the disease.

CONCLUSION

The disease amyotrophic lateral sclerosis is a slowly progressive disease usually manifests in the individuals during 5th or 6th decade of life. This disease is presented with the clinical features such as stiffness (Stabdhatata), muscle weakness (Aksha glani), atrophy (Mamsashosha), fasciculations (Sphurana), muscle cramps (Avamotana), facial weakness (Aksha glani), dysphagia (Annapravesha Kricchrata) and dysarthria (Vak Sanga). By observing the above said Lakshana, it is evident that Vata Dosha (bioenergy) will be dominant throughout the progression of the disease.

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