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AYURVEDA'S UNDERSTANDING OF LOU GEHRIG'S DISEASE (AMYOTROPHIC LATERAL SCLEROSIS)

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ABSTRACT

Lou Gehrig's disease (Amyotrophic lateral sclerosis) is a rapidly progressing, fatal, neurological disease which attacks the neurons which are responsible for controlling of voluntary muscles. This disease belongs to the group of disorders known as motor neuron disease. In this there is gradual degeneration and progressive death of all types of motor neurons in brain & spinal cord. motor neurons are the neuronal cells that control muscles and their degeneration leads to weakness & wasting of muscles causing increasing loss of mobility in all extremities and difficulties with speech production, swallowing

and breathing. This disease progresses rapidly and relentlessly with life expectancy between 2-5 years from the onset of symptom. In Ayurveda neuronal diseases like ALS (Amyotrophic lateral sclerosis) are induced by *Vata dosha. Vata dosha* is responsible for the peripheral, autonomic and pivotal functioning of nervous system. It manages the neurological & cognitive functions of brain. As there is no cure for Amyotrophic lateral sclerosis, it's understanding becomes of prime importance so that ayurvedic science can manifold therapy for ailing humanity.

Keywords: *Ayurveda,* Amyotrophic lateral sclerosis, Lou Gehrig's disease, motor neuron disease, onuf's nucleus, *Vata dosha*

INTRODUCTION

The motor neuron disease or MND are a group of neurological disorders that electively affects motor neurons, the cells that control voluntary muscle activity including speaking, walking, breathing, swallowing and general movements of the body. There is degeneration of motor neurons in the spinal cord and cranial nerve nuclei, and of pyramidal neurons in the motor cortex. The prevalence of disease is 5/100000.

Motor neurons are nervine cells located in the brain, brain stem, and spinal cord that function as controlling units and important communication links between the nervous system and the voluntary muscles of the body. Signals from motor neurons in the brain (known as upper motor neurons) are transmitted to motor neurons in the spinal cord (known as lower motor neurons) and from them to particular muscles. In Amyotrophic lateral sclerosis, both the upper motor neurons and the lower motor neurons degenerate eventually die, ceasing to send signals to muscles. Due to this the muscles gradually weaken, wastes away causing atrophy and twitch causing fasciculations. Causing, the ability of the brain to start and control voluntary movement is lost. Amyotrophic lateral sclerosis causes weakness with a wide range of disabilities.

Etiology- The exact nature of the disease is not known, though it is generally considered to be a degenerative disease. Several etiological factors have been postulated from time to time. These include chronic toxicity due to aluminium and manganese, slow virus infection, low intake of calcium and magnesium and auto immunity. Another hypothesis is that glutamate, which is a primary excitatory neurotransmitter in the central nervous system, accumulates to toxic levels at synapses and causes the neurons to die, probably through a calcium dependent mechanism and free radical production **[1]**.

Pathology- The motor neurons in the cerebral cortex, brainstem and spinal cord show atrophy and their axons show degenerative changes. Muscles show

groups of atrophic fibers amidst groups of normal fibres

Clinical features-

Onset – Usually occurs in the age after 50 years, uncommon before the age of 30 years and affects males more commonly than females **[2]**.

Symptoms- Limb muscle weakness, cramps, occasionally fasciculation and disturbance of speech/swallowing (Dysarthria/Dysphagia).

Signs- Wasting and fasciculation of muscles, weakness of muscles of limbs, tongue, face and palate, pyramidal tract involvement causing spasticity, exaggerated tendon reflexes, extensor plantar responses, external ocular muscles and sphincters usually remain intact, no objective sensory deficit, no intellectual impairment in most cases.

- followed by the body trunk, arms and hands and finally the bulbar muscles.
- Symptoms include difficulty with balance, weakness and stiffness in the legs, clumsiness spasticity in the legs which produces slowness and stiffness of movement
- The major differences between ALS and PLS are the motor neurons involved and the rate of the disease progression. The disorder is not fatal but may affect the quality of life.
- PLS often develops into ALS.

Course – The symptoms often begin focally in one part and spread gradually but relentlessly to become widespread.

Types/Patterns in motor neuron disease- [3] [4]

1) **Primary lateral sclerosis (PLS)**

- Primary lateral sclerosis is a progressive isolated upper motor neuron disorder
- Compared to Amyotrophic lateral sclerosis it has got a slower progression
- Some patterns with Primary lateral sclerosis never develop clinical lower motor neuron signs
- The disorder affects the legs first,

2) **Progressive muscular atrophy**

- Progressive muscular atrophy is a progressive lower motor neuron disorder
- There is marked but slow degeneration of only the lower motor neurons and it largely affects males with onset earlier than other motor neuron diseases
- Weakness is typically seen first in hands and then spreads into lower body, where it can be severe.
- This is the most benign variety of motor neuron disease.

- There is atrophy, fasciculation's and weakness in muscles.
- **Progressive Bulbar Palsy**
- It is also called as progressive bulbar atrophy, involves the bulb shaped brain stem.
- Bulbar region is the area that controls lower motor neurons activity needed to swallowing, speaking, chewing and other functions.
- There is early involvement of tongue, palate and pharyngeal muscles, associated with dysarthria and Dysphagia.
- There is also Wasting and fasciculation of tongue.

3) Pseudobulbar palsy

- There is degeneration of corticobulbar pathways of V, VII, IX, XI and XII cranial nerve nuclei.
- It is associated with weakness of muscles of mastication and difficulty in chewing.
- Patient has an expressionless face because of progressive weakness in facial muscles.
- Jaw jerk reflex is brisk.
- The tongue becomes immobile and unable to protrude from the mouth.

4) Amyotrophic lateral sclerosis (Lou Gehrig's disease)

This is the most common type of MND. The disease sets in insidiously by the age of 50-55 years, males suffer twice as commonly as females. Average age of onset is 45 years in India.

It is not uncommon to find several members of a family affected. The classic form starts with wasting of the small muscles of the hand, deltoid and shoulder girdle muscles and then progresses to involve the other muscles of the limb.

History: 5-10 % of patients with MND have family history, suggesting an autosomal dominant trait; 20% of such families have mutation of the superoxide dismutase (SOD-1) gene on chromosome 21 **[5]**.

Pathogenesis: While most cases are sporadic, 5 to 10 percent are familial, mostly with autosomal dominant inheritance

Clinical features: [6]

- It often starts unilaterally, later involves contralateral side, often symmetrically in a matter of a few weeks to months.
- There is progressive muscle wasting which usually begins in the small muscles of hand (first thenar group

of muscles and then forearm muscles)

- It usually presents with Upper motor neuron signs (spasticity, exaggerated deep tendon reflexes and Babinski sign in the lower limbs) and Lower motor neuron signs (muscle fasciculation, wasting, weakness) in the upper limbs.
- Foot and wrist drop may occur.
- The ocular muscles and sphincters of the bowel and bladder are characteristically spared.
- The cause of death in motor neuron disease is respiratory paralysis.

Course and prognosis: The course is one of relentless progression to produce severe disability and death in 4-5 years. Known prognostic factors include age, site of initial involvement, extent and severity of wasting, severity of bulbar muscle dysfunction and respiratory functions **[7]**.

Management:

- At present none of the known modalities arrest the progress of the disease. Palliative measures include physiotherapy, use of orthotic devices to help functioning of the limbs and treatment of intercurrent illness and ventilatory support.
- Psychological and physical support, with the help from occupational and speech therapists and physiotherapists, is essential to maintain the patient's quality of life.
- Feeding percutaneous gastrostomy may be needed, if necessary, because of bulbar failure.
- Relief of distress in terminal stages usually requires the use of opiates and sedative drugs.

Ayurvedic Perspective:

Importance of *Vata dosha* for maintaining healthy neurological equilibrium:

Vata is considered as a chief and impotant factor for the physiological maintenance of the body. *Vata dosha* is responsible for functions of the central, autonomic, and peripheral nervous systems. *Vata dosha* actively controls functioning of the respiratory, circulatory, lymphatic, excretory, and reproductive systems, as well as all types of movements. It is also responsible for the cognitive and neo-cognitive function of the brain and secretion of various important chemical neurotransmitters and hormones. By This description of *Vata* we can consider *Vata dosha* as chief factor

which controls all the functions of central, peripheral, and autonomic nervous systems **[2]**.

- **Onuf's nucleus:**

  Onuf's nucleus is a group of motor neurons located in the anterior horn of the S2 segment of the spinal cord. It maintains micturition and defecatory continence as well as muscular contractions during orgasm. interestingly, is the only motor neuron preserved in Amyotrophic lateral sclerosis. as per *Ayurveda Apana Vata* moves and circulates in lower part of colon and intestines, navel region, urinary bladder and genital system. Functions of these body parts are also monitored by normal *Apana Vata* hence it can be considered that there is least vitiation of *Apana Vata* in this disease that can be seen as sparing of sphincters of the bowel and bladder.

- If the *Vata dosha* has association with vitiated *Pitta dosha* then degeneration is much quicker.

  The *tikshna, ushna gunas* of *Pitta* together with *soshana svabhav* of *Vata* leads to much rapid degeneration **[9]**.

  Which can be appreciated very evidently in the bulbar onset form of the disease in which there is *shosha* of the bulbar muscles which leads to dysphagia's and dysarthria's.

- If the of *Vata dosha* is associated with *avarana* (covering) of *Kapha dosha* with

  Kaphakara nidan then it may cause the aggravation of *Vata* by *Ruksha* and *Sheeta gunas* and produces the disease.

- When *Vyan* gets aggravated due to *Kapha Avarana* (covering) it gets obstructed in *siras* and *snayus* causing *Vak graham, Sarvanga guruta* (heaviness) which can be clinically observed as impairment while walking and dysarthria's.

- When *Prana* gets aggravated due to *Kapha Avarana* (covering) and travels to *uras* and *kantha* it causes clinical symptoms like difficulty in *nisvasa uchvasa* (difficulty breathing eventually leading to respiratory paralysis), difficulty in anna *pravesana* (dysphagia) which can be seen in pseudo bulbar palsy.

- As the disease progresses *Vata dosha* keeps aggravating eventually causing *pidana* of especially *Prana*, *Vyana* and *Udana Vata* which leads to loss of *Ojas* and *bala* which indeed ends life which is observed

in Amyotrophic lateral sclerosis as the average life expectancy is only 2-5 years **[7]**.

DISCUSSION

Vata dosha plays and important role in maintaining healthy neurological equilibrium. In the pathology of motor neuron disease all the Three doshas are involved but classical Amyotrophic lateral sclerosis is *Vata dosha* predominant and the bulbar involvement is because of *anubandha* (association) of *Pitta dosha*. In Amyotrophic lateral sclerosis aggravated *Vata dosha* has *Avarana* (covering) of *Kapha* with *dushyas* like *mamsa*, *medas*, *asthi sira* and *snayu* in *madhyam* and *bahya roga marga* produced *rupa avastha* like *Balakshaya* (weakness), *Sphurana* (fasiculations), *mamsa sosha* (wasting), *sthamba* (spasticity), *Vak graha* (dysarthria's) difficulty in *nisvasa – uchvasa* (difficulty in respiration). As per *khavaigunya* (Vitiated channels) *Vata Dosha* produces different symptoms presenting different types of motor neuron disease as described earlier. Lou Gehrig's disease (Amyotrophic lateral sclerosis) is the deadliest type of all motor neuron disease here *Vata Dosha* has *Anyonyavarana (parasparavana)* as well as *Avarana* (covering) by other *doshas* as well which makes this disease very difficult to treat and manage hence it can be considered as *Asadhya* hence all the efforts should be focused on arresting the progression of disease and to improve quality of life of the patient hence *Ayurveda* can play pivotal role.

CONCLUSION

Amyotrophic lateral sclerosis (ALS) is the most common degenerative disease of the motor neuron system. The disorder is named for its underlying pathophysiology, with "amyotrophy" referring to the atrophy of muscle fibers, which are denervated as their corresponding anterior horn cells degenerate. "Lateral sclerosis" refers to the changes seen in the lateral columns of the spinal cord as upper motor neuron. Over the last decades, more than 40 randomized controlled trials in patients with Amyotrophic lateral sclerosis failed to show a beneficial effect on disease progression or on survival, illustrating the complexity of the disease **[8] [10]**.

As *Ayurveda* is not reductionist science it believes in considering body as a whole can and has holistic approach towards any disease can become silver bullet in managing Amyotrophic lateral sclerosis as the pathology of the disease can be understood in terms of *dosha* and *dushyas*.

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