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AN OBSERVATIONAL STUDY ON STHANA SANCHYAY AVASTHA OF ALPHA- SYNUCLEIN PROTEIN IN PARKINSON'S DISEASE

DR. PRADEEP KUMAR

Associate professor, Department Rog Nidan evum Vikriti Vigyan. Bapu Ayurvedic medical College Evam Hospital Ladanpur Kopaganj. MAU Uttar Pradesh

CORRESPONDING AUTHOR: Dr. Pradeep Kumar, Associate professor, Department Rog Nidan evum Vikriti Vigyan. Bapu Ayurvedic medical College Evam Hospital Ladanpur Kopaganj. MAU Uttar Pradesh

ABSTRACT

Parkinson's disease is referred to as Kampavata in Ayurveda. Lakshanika Chikitsa is usually associated in Ayurveda with the various stages of sickness, giving meaning to the prevention of further derangement. Yet, the course of the sickness may be comprehended under the several descriptions of Bahukampavata, Snayugatavata, Kaphavruta Vyanavata, and Kampavata. Parkinson's disease is a mental illness in which 70% of the existence of Parkinson's disease is compensated since Parkinsonism is often treated in Ayurveda with greater success. Parkinson's disease really refers to those who have the condition without any unusual symptoms and who have essentially typical MRIs that rule out any other potential explanations of their Parkinsonian symptoms. The medication's impact on Parkinson's disease and not the other condition is the main distinction between the two. With general interventions, drug rehabilitation, and surgery, Parkinson's disease, the second most common neurodegenerative condition after Alzheimer's disease, affects about 1 in 1000 people in the general population and 1% of people over 65. Treatment is primarily focused on preventing further complications and maintaining the disease. Presynaptic neuronal protein -synuclein is connected to Parkinson's disease genetically and neuropathologically. However, it is generally accepted that -synuclein's aberrant soluble oligomeric conformations, known as protofibrils, are the toxic species that mediate disruption of cellular homeostasis and neuronal death through effects on various intracellular targets, including synaptic function. -Synuclein may contribute to Parkinson disease pathogenesis in a variety of ways. Moreover, released -synuclein may have negative consequences on nearby cells, such as seeding aggregation, thus promoting the spread of illness.

KEYWORDS: Parkinson Disease, Kampavata, Sthana Sanchyay Avastha etc.

INTRODUCTION

The initial link between Parkinson's disease and alpha-Synuclein therefore has historical and philosophical relevance as it was the first conclusive proof of a genetic issue causing Parkinson disease. And others talked of the disorder's exposure to the family. A significant advance was the specific identification of a gene defect linked to Parkinson's disease in specific families, which sparked a wave of investigation into the disease's genetic basis and gave rise to more recent genome-wide association studies (GWAS), which have miraculously come full circle to the beginnings of Parkinson's disease's molecular genetic era[1]

The four cardinal symptoms of Parkinsonism are tremor, rigidity, akinesia, and postural abnormalities. Parkinsonism is a clinical condition. It is also known as the Paralysis Agitans or the Shaking Palsy. The Tremor, Rigidity, Akinesia, and Postural Disturbances syndrome is frequently caused by Parkinson's disease, but there are many additional conditions that should be examined in the differential diagnosis of Parkinson's disease. 80 percent are caused by Parkinson's disease. Parkinson's disease specifically refers to those with Parkinson's disease without any unusual symptoms and who have a largely normal MRI that rules out all potential causes of Parkinson's symptoms.[2]

The effect of the contemporary treatment on Parkinson's disease, not the other, is what distinguishes the two most. Parkinson's disease affects around 1 in 1000 persons in the general population and 1% of those over the age of 60, making it the second most common neurodegenerative disorder after Alzheimer's disease. Because it is generated by the Substantia Nigra, the area of the brain afflicted by Parkinson's disease, and is exclusively present in males owing to a sex gene, men are affected substantially more frequently than women. Many of the symptoms of Parkinson's disease are caused by a shortage of dopamine in the Neostriatum as a result of the death of pigmented dopaminergic neurons in the Substantia Nigra midbrain cells. Unless the disorder's clinical features change, over 60% of these dopaminergic neurons may have deteriorated. Parkinsonism comes in two main varieties: primary and secondary.[3]

The two main types of Parkinsonism are inherited and sporadic. Idiopathic sporadic disease frequently starts in late middle age and becomes more common as people age. Alpha-synuclein, uchL1, LRRK2, parkin, PINK1, and DJ-1 mutations, among others, are commonly brought on by genetic involvement in Parkinson's disease. Parkinsonism Plus Syndrome is sometimes termed Atypical Parkinsonism. It includes Corticobasal syndrome, Multiple System Atrophy, Progressive Supranuclear Palsy, and Lewy Body dementia. Progressive diseases, which can mimic any of the symptoms of Parkinson's disease, are atypical Parkinsonian illnesses that often do not respond well to current medication therapies.[3]

Atypical Parkinsonian disorders are not thought to be inherited at this time. Although some cases may be linked to addiction to or side effects from long-term drugs, the majority of cases are due to unclear factors. Drugs (antipsychotics, reserpine, tetrabenazine), infections (post encephalitic infection), toxins (like carbon disulphide), heavy metals (like mercury), brain trauma, brain tumours, liver failure, and other conditions are some of the causes of secondary Parkinsonism.[4]

THE STRUCTURE AND FUNCTION OF A-SYNUCLEIN

The 140 amino acid protein that the SNCA gene produces is known as a "Natively Unfolded Protein" because it lacks a stable structure in aqueous solutions. Yet, with prolonged incubation durations, -Synuclein generates -helic structures that bind to negatively loaded lipids, such as phospholipids found in biological membranes, and -sheet structures. The protein is divided into three sections: a central hydrophobic structure (i.e., 61–95), the so-called NAC (non-A) sheet, which provides the capacity for the -sheet and the highly loaded and vulnerable carboxylic terminus; an amino terminus (i.e., residue of 1–60 amino acids) with a lipid-binding motif containing Apo lipoprotein, which is required to form amphiphilic helices that give –helical structures a tendency.[5]

METHODOLOGY

Materials pertaining to Parkinson's disease and its protein, alpha-synuclein, were gathered from a variety of publications, modern and traditional textbooks, reputable newspaper authoritative websites, authoritative literature, manuscripts, a Sanskrit dictionary, etc.

CLINICAL MANIFESTATION

- Eye twitch reduction
- Resting tremors (4-6 cycles per second)
- Freezing
- Rigidity
- Hypophonia
- Dysphagia

Continuous resistance to passive movement is provided by the lead pipe's stiffness across the whole motion spectrum with no changes. The jerky resistance to passive movement as muscles tighten and release called Cogwheel stiffness. Bradykinesia is the slowness of motion accompanied by a steady drop in speed. Neuropsychiatric symptoms like depression, depressive disorders, apathy, autonomic disorders like urinary dysfunction and constipation, sensory symptoms like discomfort, anxious syndrome, and olfactory dysfunction, sleep disorders like extreme daytime sleepiness, changes in the REM rhythm, and cognitive impairment like dementia in 80% of patients are the other non-motor signs.[6]

Examinations should include CT, MRI, PET, and Transcranial Ultrasonography, among others, in order to rule out any other factors and verify the diagnosis. There are several forms of Parkinson's, each with its own set of characteristics and phases. Usually, staging is carried out by staging Changed (Hoehn and Yahr).[7] The three ways that the allopathic medical system treats risks such as recurrent slips, incapacitation, fatigue, and dementia, postural hypotension, urine incontinence, constipation, and aspiration are as follows:

- **Physiotherapy**
- **Speech therapy**
- **Nutrition regulation.**

CONCEPT OF KAMPAVATA

The aetiology of neurological illnesses is thought to be influenced by the Dhatu Kshaya and Avarana principles6. Consider the Lakshanas like Snayugata Vata, Kaphavrutavyana Vata, and Kampavata that are present in Parkinson's illness. According to Basavarajeeya, Baahukampavata refers to tremors on one side of the arm that interfere with bodily functions and cause various types of discomfort both during the day and at night. This may be related to the early phases of Parkinson's disease, when axial participation and unilateral interference coexist. When the disordered Vatadosha is found in the tendons, Snayugata Vata may manifest as Shoola, Akshepaka, Kampa, Stambha, and Anilaodbhava, according to Bhava Prakasha.[8]

In this situation, Swedana, Upanaha, Agnikarma, and Bandhana are suggested as treatments. Bahudoshaavasta are not intended for the surgery. According to Charaka Samhita's explanation of Kapavruta Vyanavata, if Vyanavayu is blocked by Kapha, there would be weight in the body, pain in all of the joints and bones, limited mobility, or a severe loss of morbidity. By using a comparison with modern science's anatomy, this may be understood. Parkinson's disease is primarily characterised by a propensity for substantia nigra pars compact cell death.[9]

Dopamine is a hormone and a neurotransmitter that is produced by these cells (chemical released by neurons to send signals to other cells). Dopamine promotes movement, memory, sleep, mood, pleasure-inducing reward, activities, and cognition. Dopamine depletion prevents muscarinic auto receptors from automatically inhibiting the production of acetylcholine, leading to excessive acetylcholine release, which in turn prunes the spines of the striatum neurons' indirect pathway projections and disrupts the input from the cerebral cortex's motor control centres. 7 In other words, they are of an inverse type: the decrease in dopamine causes an increase in the amount of acetylcholine.[10]

The neurotransmitter known as acetylcholine regulates REM sleep, endocrine sleep, and pain responses in addition to contracting muscles. As a result, when acetylcholine levels are raised, it also causes bradykinesia, stiffness, postural irregularities, and tremors, which the Acharya also classified as Gatisanga and Adhika. Gatisanga: an obstruction to Vata's normal function. This can be interpreted as stiffness, disturbances, and bradykinesia. Here, heightened activity can be taken into account, including tremors. This is explained by the Avarana principle, according to which the Kapha that leads to Avarana obstructs Vyanavata's course. The dopamine molecule is too polar to pass across the blood-brain barrier. As a result, under certain circumstances, L-Dopa, a dopamine precursor that may easily cross the blood–brain barrier, is used as a therapeutic. Avaranahara Chikitsa is first practised in Ayurveda as well, using Kapikachu medicine being the drug of preference. Basavarajeeya describes Kampavata, which may be seen as the complete expression of the disease, physically requiring the sufferer to be in a wheelchair or bed bound.[11]

NIDANA

It is possible to comprehend primary and secondary Parkinson's disease from the perspectives of Swatantra and Paratantra Vyadhis. While the origins of primary Parkinson's disease are idiopathic, they can be described as

Swatantra or Anubandhya Vyadhi. Since that the therapy calls for addressing the underlying cause rather than the subsequent symptoms, Paratantra or Anubandha Vyadhis may be referred to as the secondary Parkinson's disease brought on by secondary reasons.[12]

STHANA SANCHYAY AVASTHA OF ALPHA – SYNUCLEIN PROTEIN.

The familial cases of SNCA multiplication showing a dose-dependent association of alpha-synuclein load to the Parkinson's disease phenotype, the autosomal-dominant inheritance trend for point mutations, and the concentration of alpha-synuclein in the brain of synucleinopathy are the basis for the hypothesis that increased alpha-synuclein protein levels are causative in Parkinson's disease pathogenesis. Aging is associated with higher amounts of alpha-synuclein protein in the substantia nigra and lower levels of immunostaining (Chu and Kordower 2007).[13]

There is inadequate proof that alpha-synuclein protein is generally abundant in the brains of people with Parkinson's disease. In reality, research on mRNA has been mixed in this area, with some studies indicating a decline in SNCA gene expression in Parkinson's disease (Dachsel et al. 2007). Normal protein levels are not elevated in Parkinson's disease brains, but there is an induction of insoluble substances, such as monomeric and oligomeric species. Parkinson's disease patients' levels of membrane-associated monomeric alpha-synuclein were only slightly elevated in the substantia nigra and not in other brain areas, according to a comprehensive examination of several brain regions.[14]

In sensitive brain areas, the increase in membrane-associated alpha-synuclein was persistent (Tong et al. 2010). Naturally, neurons with the greatest levels of alpha-synuclein expression may also be the most vulnerable and die early in the illness process, relinquishing their place to glia and deceiving the results. To partially address this issue, Gründemann et al. (2008) used laser-capture micro dissection procedures, and they found that SNCA expression was much higher in surviving PD-derived nigral neurons than in controls. Nevertheless, this increase did not appear to be specific to SNCA (Gründemann et al. 2008).[15]

DISCUSSION

The Prakupitavata, which is also present during the early stages of Parkinson's disease, contributes to Dhatukshaya and manifests as Ekabahukampa as a result of some of the Nidana stated for Vatavyadhi. According to verse, Nidana leads to Vataprakopa, which builds up in Rikta Srotas and eventually leads to Lakshanautpatti in Baahukampavata. With the Lakshanas of Snayugatavata, the Nidana might develop to Vataprakopa, which would then rise to the Snayusthana, adopting Snayugatavata's Lakshana as the probable Samprapti leading to Parkinson's disease.[16]

With the Lakshanas of Snayugatavata, the Nidana might proceed to Vataprakopa and then ascend to the Snayusthana, taking Snayugatavata's Lakshana Utpatti, which could Samprapti into Parkinson's disease. In the latter stages, when postural dysfunction and physical exhaustion are noticeable, Kapha's Avarana of Vyanavata may be used. Here, the Nidana integrates to introduce Vataprakopa to diverse Sthanas, resulting in Pitta and Kapha

Udhirana. As a result, Kapha creates the Vyanavata Avarana. This latter alludes to Kaphavruta Vyanavata, which is the manifestation of Rasadhidhatu's Shoshana. The whole manifestation of Parkinson's disease includes resting tremors, bed rest, and wheelchair use. The entire expression of Parkinson's illness, like Kampa in the body, may be seen in the Kampavata Lakshanas, which can cause insomnia and leave a person malnourished. Nidana leads to the Dhatukshaya Avastha, which contains Vataprakopa.[17] It is the Vriddhi of Vyanavata that is at issue here. Rasayanis spreads this, which aids in Kampavata's manifestation.

CONCLUSION

The information presented above makes it abundantly evident that -synuclein is a viable therapeutic target in Parkinson disease and probably in similar synucleinpathies. it shows a possible treatment approach that may be imagined. Small compounds with the ability to change the shape of protofibrillar forms of -synuclein and render them nonpathogenic represent maybe the most promising approach. Scyllo inositol and the green tea derivative EGCG are two examples of such natural compounds (Bieschke et al., 2010). (Vekrellis et al. 2009). Given the feed-forward amplification loops involved in the pathogenic consequences of -synuclein, it's possible that various treatment modalities will need to be utilised. As there is no known cure for Parkinson's disease, treatment also aims to stop the condition from getting worse. In Ayurveda, the Lakshanika Chikitsa is frequently used in relation to Parkinson's disease treatment. As a result, it is important to make the correct diagnosis whenever feasible and to follow the Oushadi and techniques that facilitate it while keeping in mind our limitations.

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CONFLICT OF INTEREST: NIL

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