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IMPACT OF *PANCHKARMA* INTERVENTIONS ON NEUROMUSCULAR DISORDERS IN CHILDREN

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ABSTRACT

Neuromuscular disorders constitute a broad category of diseases that impair the function of at least one component of the motor unit. They constitute a significant proportion of Pediatric neurological diseases. In Pediatrics, the majority of these disorders have a genetic basis, either as a de novo or an inherited pathogenic variant in a single gene. Common clinical presentations in include floppy infant and muscle weakness. Older children may present with difficulty in walking, abnormal gait, enlargement of muscles or pain in muscles. With the help of different *Panchkarma* procedures, quality of life in these children can be improved.

KEYWORDS: Neuromuscular disorders, Genetic basis, Muscle weakness, *Panchkarma* procedures.

INTRODUCTION

Neuromuscular disorders encompass the spectrum of diseases where the primary abnormality or lesion is in the peripheral nervous system, defined as including the anterior horn cell, the peripheral nerve, the neuromuscular junction, and the muscle. It affects the motor unit, which includes the lower motor neuron (anterior horn), peripheral nerve, neuromuscular junction, and muscle. The predominant presenting complaint of a patient with this disorder is weakness. Weakness may also result from disorders of the upper motor neuron and is associated with increased tone, brisk reflexes and extensor plantar responses. e.g. Cerebral

Palsy. Lower motor neuron lesions are associated with significant weakness, hypotonia, depressed reflexes and flexor plantar responses.

CLASSIFICATION

A) BASED ON ETIOLOGY[2-i]

Table: 1.

Genetic	Acquired
Spinal muscular atrophy, Muscular dystrophy, Hereditary motor sensory neuropathy, Congenital myopathy	Poliomyelitis, Guillain Barre syndrome, Myasthenia gravis, Viral myositis.

B) BASED ON NEUROANATOMICAL SITE OF LESION[2-ii]

Table: 2.

S. No.	Site of lesion	Disorders
1.	Anterior cell horn disease	**Genetic**- Spinal muscular atrophy
		Acquired-Poliomyelitis
2.	Neuropathy	**Genetic**- Charcot-Marie-Tooth disease, Hereditary sensory autonomic neuropathy, Neuropathy in mitochondrial, neurodegenerative disease, Hereditary ataxia
		Acquired- Guillain- Barre syndrome, Lead neuropathy, Porphyria.
3.	Neuromuscular junction disorders	**Genetic**- Congenital myasthenic syndromes
		Acquired- Myasthenia gravis, botulism.
4.	Myopathy	**Genetic**- Congenital myopathy, Muscular dystrophy, Congenital myotonic dystrophy
		Acquired-Dermatomyositis, Viral myositis.

CLINICAL MENIFESTATIONS

1. **Spinal muscular atrophy-** Second leading genetic disorder inherited in autosomal recessive pattern due to absence of SMN1 gene.

Type 1 Disease-Profound hypotonia, flaccid weakness, flaccid weakness, global areflexia. Respiratory weakness, poor swallowing and tongue fasciculations.

Type 2 Disease-Onset of illness at 6-28 months. Symptoms include kyphoscoliosis, tremors. Poor swallowing and respiratory failure.

Type 3 Disease-Present later in childhood after 18 months and these children usually able to walk.[1-i]

2. Neuropathies

(i) Charcot-Marie-Tooth disease -Distal weakness, wasting (especially of peroneal compartment-stork leg appearance, skeletal deformities contractures, diminished or absence deep tendon reflexes, frequent falls due to twisting to ankles, progressive gait difficulties.[1-ii]

(ii) Hereditary ataxia- A diverse group of rare, inherited neurological disorders that impair balance and coordination, primarily due to cerebellar damage. These conditions, can be inherited in autosomal dominant, recessive, X-linked or mitochondrial patterns. Symptoms include progressive coordination and balance problems, leading to a wide-based, unsteady gait, and a predisposition to falls. Other signs are clumsiness with hands and arms, affecting fine motor skills and slurred or slow speech. Symptoms can also include slow eye movements, difficulty swallowing and in some cases, muscle weakness or tremors.

3. Neuromuscular junction disorders

(i) Transitory neonatal myasthenia

Symptoms usually start within few hours after birth but may be delayed till 3rd day. These include difficulty in feeding, weak cry, hypotonia, lack of facial expression and respiratory insufficiency.[1-iii]

(ii) Congenital Myasthenia syndromes- Common features include hypotonia, limb weakness, feeding difficulties, respiratory difficulties, dysphagia, dysarthria, arthrogryposis, ptosis, ophthalmoparesis.[1-iv]

(iii) Myasthenia gravis is the most common autoimmune disorder that affects the neuromuscular junction.[3] It is a Greek word “Mys” means muscle and “Astheneia” means weakness and the Latin word gravis means serious.[4] It usually affects the extra-ocular muscles, but can also affect all skeletal muscles leading to generalized weakness and fatigability usually due to autoantibodies directed against acetylcholine receptors at neuromuscular junction.[5]

4. Myopathy (Muscle disorders)

(i) Congenital myopathies-Majority of these disorders present as “floppy infant” syndrome. Features include hypotonia, static or progressive muscle weakness and normal or decreased deep tendon reflexes.

Respiratory insufficiency, feeding difficulties, contractures and skeletal deformities may be present.[1-v]

(ii) Muscle Dystrophies

Duchenne muscular dystrophy- Usually become symptomatic before 5 years of age and may even have delayed walking. Waddling gait, Gower sign and calf muscle pseudohypertrophy are classical findings. The progression of weakness may plateau between 3-6 years of age. Weakness of neck flexors is early. Other muscles that show hypertrophy include Infraspinatus, deltoid, tongue and masseter. Subsequently there is increase in gait difficulty, contracture development and increased lumber lordosis. Intellectual disability and impaired gastric motility may be present.[1-vi]

Emery-Dreifuss Muscular dystrophy- Characterised by slowly progressive muscle wasting, weakness in humeroperoneal distribution, early contractures especially of elbows, Achilles tendon and post cervical muscle and cardiac conduction defects.

Limb Girdle Muscular Dystrophy- Autosomal dominant or recessive in inheritance. Mostly associated with lower extremity predominant weakness, mild facial weakness, cardiac and other systems may be involved.[1-vii]

Congenital Muscular Dystrophy- Usually presents at birth or 1st year of life. Clinical features include hypotonia, weakness, arthrogryposis, bulbar dysfunction or respiratory insufficiency. Intellectual disability may be present. Joint contractures are predominant, particularly at large joints of the lower limbs.[2-iii]

ROLE OF *PANCHKARMA* INTERVENTIONS

The above condition must comprise of not only *Brimhana Chikitsa* but also *Srotoshodhaka, Raktaprasadaka* and *Dhatvagnivardhak* measures. For *Brimhana Karma* and *Strotoshodhaka Karma*, *Panchkarma* procedures plays important role.

The management emphasizes on providing symptomatic relief. With the help of various *Panchkarma* procedures quality of life of children with these disorders can be improved and further progression of disease can be delayed. To increase functional and physical capabilities, to maintain the ambulation for longer time and to improve quality in the activities of daily living these *Panchkarma* procedures are very useful.

1. ***UDVARTANA*** **-** It is procedure of massaging the whole body below neck with the herbal powder in the direction opposite to the hair follicles by exerting some pressure. The massage should be done from feet to head- in reverse direction.

Postures of the patient- There are four postures- supine, left lateral, prone, right lateral position.[6] It opens the minute channels and improves blood as well as lymphatic circulation. It is *Kapha, Vatahara* and removes *Aavarana* or *Srotorodha*, is suitable in '*Amavastha*' and stabilizes the limbs (*Sthirikaran* of *Angas*).[7] It provides a platform for further procedures like *Abhyanga*, *Swedana* and *Basti*.

Various *Churna* that can be used are *Shastika Churna, Kolakulatthadi Churna, Yava Churna, Triphala Churna.*

2. *ABHYANGA* - *Acharya Charaka* states the procedure which causes *Snehana*, *Kledana*, *Mriduta* and *Snigdhata* in the body.[8] In these disorders *Abhyanga* helps to overcome the fatigue caused by physical activities (*Shramahara*), *Vatahara*, nourishes all the *Dhatus* of the body (*Pushtikara*), promotes longevity of an individual (*Ayushya*).[9]

Postures of *Abhayanga*[10]

1. Sitting upright with knees extended
2. Supine position
3. Left lateral position
4. Prone position
5. Right lateral position
6. Supine position
7. Sitting upright with knees extended

Duration-As the procedure of *Abhyanga* is done in seven postures and each posture takes approximately five minutes.

EFECT OF *ABHYANGA* ON *SHARIRA DHATU*

Acharya Dalhana cited a reference, which specifies the time duration of penetration of *Sneha* at various levels.[11]

Table 3: Sequential penetrations of oil into *Dhatus.*

S. No.	Tissue	*Kala*	
		Matra	**Seconds**
1.	Hair follicles (*Kesha*)	300	95
2.	Skin (*Tvacha*)	400	127
3.	Blood (*Rakta Dhatu*)	500	159
4.	Muscular tissue (*Mamsa Dhatu*)	600	190

5.	Fat (*Meda Dhatu*)	700	220
6.	Bones (*Asthi Dhatu*)	800	254
7.	Nervous tissue or bone marrow (*Majja Dhatu*)	900	285

When *Snehana* therapy is administered, the depleted tissues are promptly nourished, thereby enhancing vitality, body plumpness, strength and *Agni*. This therapy revitalizes the body by directing nourishment to the areas where it is most required. By stimulating the sensory nerve endings of the skin, it provides abundant inputs to the cortical and other centres of the central nervous system, which in turn influence the muscular system, glands, and blood vessels. Consequently, it improves blood circulation to the muscles, alleviates fatigue, strengthens both superficial and deep muscle groups, stabilizes joints, and reduces stiffness. Additionally, *Abhyanga* helps minimize spasticity, lubricates the joints for smooth movement, and prevents the formation of contractures.

Taila used for *Abhyanga- Ksheerbala Taila, Bala Taila.*

3. *SWEDANA KARMA*

Refers perspiration through the body and usually given after *Snehana* therapy. It is the procedure that relieves *Stambha, Gaurava, Sheeta* which induces *Swedana*.[12] It plays a dual role in *Purvakarma* as well as *Pradhanakarma.* It rectifies the function of *Medadhatwagni* and *Bhutagni* and fastens the *Pakakarma* which causes *Srotomukhashodhana* and profuse *Sweda* production. That causes the displacement of exudates hence relieve pain, relaxes muscular spasm and increases blood circulation.

SHASHTISHALI PINDA SWEDA- In SSPS heat, massage and pressure are provided which nourishes muscles and stimulate nerve endings. In this specific part or whole body made to perspire by the application of *Shashti shali* (a variety of rice) in the form of *Potali. Ushna Guna* stimulates the sympathetic nervous system and causes vasodilation. The warm, unctuous materials such as *Shashtishali* rice, milk are absorbed through the skin and transported via *Dhamanis* and *Rasavaha Srotas* to nourish the deeper tissues, especially *Rasa, Mamsa, Meda* and *Asthi Dhatus*. The heat of the bolus stimulates *Dhatwagni*, enhances circulation and facilitates better penetration of nutrients. *Brimhana* properties of the *Shali*, provides nutrition to muscular tissue thereby preventing from atrophy.

The combined application of *Abhyanga* and *Shashtishali Pinda Sweda* aids in reducing spasticity, promotes free joint mobility and helps to prevent the onset of deformities and contractures in diverse neuromuscular disorders.

4. *BASTI*

The procedure by which the drug prepared as per classical reference is administered through anal canal, reaches up to the *Nabhi, Kati, Parshva* and *Kukshi Pradesha* and churns the accumulated *Purisha* and *Doshas* which spread all over the body and easily comes out along with the churned *Purisha* and *Doshas.*[13] *Vata Dosha* is considered the primary dosha affecting the nervous and muscular systems. This therapy aims to pacify vitiated *Vata,* which can help alleviate pain, stiffness, and other symptoms associated with *Vata*-related disorders. Both *Anuvasana Basti* and *Niruha Basti* is the major treatment focusing on restoring balance to the body and mind, improves gross as well as fine motor functions, provides nourishment, improves overall general condition and quality of life in children with this disorder. Oil is the main component of the *Anuvasana Basti* which nourishes the body, makes the mind happy and increases strength and complexion of the body. While in *Niruha Basti* decoction of medicinal plants is used. It acts as life prolonger, aphrodisiac, increases quality of voice, complexion, and digestive fire. It provides good strength to children, causes clarity of the *Indriyas* and softness of the body parts.[14]

Administration of *Basti* directly into the gut stimulates the Enteric nervous system, which functions in close coordination with the Central nervous system. Activation of the ENS, in turn, influences the respective regions of the CNS. The rectal mucosa, with its rich vascular and lymphatic network, facilitates the absorption of water-soluble substances directly into systemic circulation, thereby bypassing significant first-pass metabolism, enhancing drug bioavailability, and supplying nourishment to deficient tissues. These absorbed components can modulate autonomic nervous system activity, regulate the gut–brain axis and thus contribute to improve brain function and motor control in these disorders.

Anuvasana Basti- With *Mahamashadi Taila, Ksheerbala Taila, Sahachradi Taila, Dashmooladi Taila, Balaashwagandhadi Taila.*

Niruha Basti- *Madhutailika Basti, Mustadi Yapana Basti, Raja Yapana Basti.*

Table 4: Dose of *Sneha Basti*.[15]

Age	Dose
3 years	3 *Karsha*
4-5 years	1 *Pala*
6-11 years	1 *Prasrita*
12-15 years	2 *Prasirta*
16- M*adhyama Vaya*	4 *Prasrita*

DOSE OF *NIRUHA BASTI*- *Niruha Basti* dose is three times of *Sneha Basti*.

5. *NASYA*

It is a therapeutic measure in which medicated oil, *Swarasa*, *Kwatha*, Churna etc. is administered through the nostrils. As nose is considered as gateway for head, this therapy eliminates the vitiated *Doshas* of the *Urdhvanga* ensuring the smooth functioning of the brain and ultimately whole body.

Drugs administered through nose stimulate the higher centres of brain thereby improving coordination, sensory and motor functions. Provides neuroprotective and rejuvenating effects, improving overall neuromuscular performance.

Ghrita for *Nasya- Kalyanka Ghrita, Bramhi Ghrita, Anu Taila.*

DISCUSSION

In the context of neuromuscular disorders, *Panchakarma* interventions emerges as a comprehensive therapeutic strategy addressing both preventive and curative dimensions by addressing the root cause, mainly *Vata* vitiation. Each procedure contributes uniquely to the restoration of neuro-muscular harmony. *Udvartana* works at the level of *Srotoshodhana* thereby reducing stiffness, improve mobility and stimulate neuromuscular activity. *Abhyanga* provides nourishment to muscles and nerves by increasing blood circulation to the affected parts, enhancing tone, strength. *Swedana* with its sudation effect, decreases spasticity and rigidity, promotes joint flexibility and prevents secondary complications such as contractures, thus safeguarding musculoskeletal integrity. *Basti*, being the prime therapy for *Vata* disorders, supports bowel regulation, strengthens the nervous system and enhances overall motor functions. *Nasya* nourishes higher centres of the brain, improves cognitive development and neuromotor function. Collectively, by facilitating the expulsion of accumulated *Doshas*, these interventions rejuvenate the neuro-muscular systems and re-establishing the homeostatic equilibrium of body and mind. Thus, *Panchakarma* procedures not only alleviates symptoms

and supports functional recovery by improving motor skills, but also slows down the progression of the disease and improves the overall quality of life in affected children.

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