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Management of Hypertonicity in Cerebral Palsy - An Ayurvedic Understanding

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ABSTRACT

Cerebral palsy is a brain disease with non-progressive degeneration of brain tissues. Spastic cerebral palsy accounts for a major portion of CP with incidence between 60% -70% of all cerebral palsy case. Various Panchakarma procedures like Snehana (body massage with medicated oil), *Swedana*, Udwartana (medicated powder massage), Shirodhara, Lepa and *Basti* (oil and decoction enemas) etc are found to be beneficial in the management of hypertonicity in children. All these Panchakarma procedures improve flexibility of joints, improves circulation and reduces pain. It improves gross as well as fine motor functions, provides nourishment, improves overall general condition and quality of life in children with hypertonicity.

Key Words: *Hypertonicity, Shirodhara, Basti*

INTRODUCTION

Cerebral palsy also known as Little's Disease causing damage to the brain¹. This is a brain disease with non-progressive degeneration of brain tissues². Referred as to group of disorders that affects the muscle movements and the coordination. This is the most common cause of motor disabilities of the childhood. Most common causes are prenatal (radiation, infections like TORCH, hypoxia, placental insufficiency etc.), perinatal (Birth asphyxia, Fetal distress, obstructive deliveries and related head injuries), postnatal (head trauma, infections herpes simplex, brain infections like encephalitis, meningitis etc.)³. Asphyxia neonatorum is major pathological event during labor or delivery. Gene mutations leading to abnormal brain development (2% genetic cause). Risk factors of cerebral palsy

premature birth, low birth weight, twin / triplets, low Apgar score, breech presentations, Rh incompatibility. Most common risk of prematurity is it leads to C.P with Periventricular Leukomalacia. There will be non-functional white matter of the brain which looks like holes. Common symptoms of cerebral palsy includes the movement problems, difficulty in thinking, learning, feeling, communication and the behavior do occur as co- morbidity. Almost 28% cases will be with epilepsy while 58% are with difficulty in communication and 42% has problems related to vision and 23-56% have got learning disabilities. Common signs are delay in reaching the motor skill milestones (rolling over, sitting up again, crawling), variation in muscle tone (too stiff, floppy), delayed speech development and difficulty in speaking, spasticity of muscles with



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exaggerated reflexes, tremors or the involuntary movements, excessive drooling and problems with swallowing, difficulty in walking, favoring one side of the body while performing the routine work or reaching with one hand to the object. Neurological problems like seizures, intellectual disabilities and blindness is also common. Spasticity as main symptom in which muscle tone becomes spastic in spastic type of cerebral palsy (others are while it may be hypotonic in Ataxic or Dyskinetic type) Abnormal muscle tone and reflexes leads to problems in coordination. Neurological lesion is primary and permanent while orthopedic manifestations are secondary and progressive.

In CP there is unequal growth between muscle tendon units and bone which eventually leads to bone and joint deformities later complications of spasticity includes deformities. General and static deformities are in specific like joint contractures, which leads to difficulties like tip toe walk (Achilles) and scissoring gait etc. Earlier it is identified at birth by irregular posture and bodies may be stiff and floppy and then symptoms may changes child gets older 6-9 months when starts to move with preferential use of the limbs, asymmetry, gross motor developmental delay etc. Drooling is common and has got impacts like social rejection, mouth infections, choking. Lower urinary tract symptoms due to spasticity of bladder muscles with storage issue rather than voiding issues of urine (55.5%). Pelvic floor muscle over activity may leads to upper urinary tract disorders, scoliosis etc. Cortex is the main area of brain

where all the motor fibers originate. Involvement of the different areas like precentral gyrus, pre motor center of the cortex leads to motor inability and becomes an upper motor neuron lesion. As Cortex is must for appreciation of pain control and voluntary movements. The main pathology is cortex fails to receive the GABA neurotransmitter which is needed for inhibition of muscular action, this leads to continuation of the muscles in contracted state or excited state with hyper flexion and hypertonic and ultimately ending in spasticity (70-80%). This leads to spastic type of Cerebral palsy. Lower motor area has got its own activity, which control all the skeletal muscles but it has got inhibitory control from the upper motor area and when this upper motor control (which is inhibitory), is lost then lower motor neurons will over fire and this leads to over functioning of the gama motor neurons and there will be over activity of the golgi tendon reflex or stretch reflex which leads to clasp- knife rigidity which is also called as spasticity. Depending on the area involved the spastic cerebral palsy can be further divided in to monoplegic, diplegic, hemiplegic and paraplegic, quadriplegic etc⁴. Similarly, hypertonicity may occur due to *Vata Vridhi*, *Avarana* of the *Vata*, *Marmabhogatha*, *Vata Parkopa*, *Kaphakshya* which ledas to *Vatavridhi* and hypertonicity (*Vatavridhi* and *Kaphakshya* conditions)

Pathophysiology:

To understand the pathology in *Ayurveda*, there will be *Dhatukshya* especially *Majja dhatu gata kashya* (if we consider the brain as *Masthiska* as *Majja* of the *Kapala* bones) this *Dhatukshya*



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obviously leads to chronic *Vatavyadhi*. Hypertonicity developed due to persistent contraction of the muscles leading to loss of function of the limb or the muscles, and ultimately the *Chala* property is affected and excessive *Rukshatva* leads to dryness of the *Snayu* and *Maasa Kandara* leading to spasticity. This also disturbs the *Sukshma* property so that nerve conduction is not possible.

There will be derangement of the *Tridosha* in the *Shira*. Once the *Vata* increases there will be corresponding decrease in the *Kapha*, as result it leads to loss of inhibitory property. *Sthiratva* property has been lost, leads to disturbance in the homeostasis of the brain. Brain mainly works by two mechanism. One is excitatory neurotransmitter and another is inhibitory neurotransmitter. Excitatory are the dopamine, epinephrine, norepinephrine, etc. This is responsible for motor activities and can be compared with *Vata*. Another set of neurotransmitters are inhibitory like GABA and serotonin etc. which controls the motor activities by inhibiting it when it reaches above the threshold level, this controlling over is called as *Kapha*. Same can be interpreted as *Raja* (*Pravartaka*) or *Tama* which is *Niyamaka*.

So, in this condition the treatment includes, to maintain *Vata* and *Kapha* in normal state of brain and establishment of *Raja* and *Tama* state for normal functioning of brain. Increasing quality of the *Kapha* so that inhibitory control over the (*Niyamaka*) will be enhanced that is nothing but increasing the *Tama* quality of the mind, which

can be achieved by *Vatashamaka* and *Kaphavardhaka* treatments because there is *Vata Vridhi* or *Vata Prakopa*. There will be relative decrease in the *Kapha* and when *Kapha* is decreased abnormally there will be abnormal increase in the *Vata*. In cerebral palsy due to *Dhatukshya* (*Kaphakshya*) and various causes leading to atrophy of brain.

DISCUSSION

Role of *Bahya Snehana* in the management of hypertonicity

With the help of this we can even bend the dry stick (*Shuskasyapi Kashthani*) that is true for muscles spasticity etc. but not for the contractures. Once contracture develop it can't be corrected with help of this. But hypertonic muscle, spasm of the muscle, stiff muscles can be made soft and functional.

Drug of choice will be oils which are having the *Vatanashaka* property with special effects on the nervous system like *Ksheerabala Taila*, *Chandana Balalakshadhi Taila*, *Dhanwantara Taila*, *Prasarini Taila*, *Sahacharadi Taila*, *Lashunadi Taila*, *Ashawaganadabala lakshadi Taila*, *Mahavishagarbha Taila* etc. and different types of *Abhyanga*⁵, *Mardana* etc. stimulate the free nerve endings and corpuscles of the proprioceptive receptors, pain, temperature, touch receptors through the dorsal column, anterior lateral sensory tracts etc. and gives the continuous sensory input in to the sensory cortex (*va-gati gandhanayo*). Sensory cortex in turn stimulate the motor cortex to plan the particular function



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accordingly, this helps to modulate the CNS functioning which is improve the cerebral palsy. There may be production of certain new neuronal circuits, collaterals, so that there will be scope for the correction. The *Virya* which is present in the *Abhyanga*, *parisheka*, *Avagaha*⁶, *Lepa* etc. is absorbed in to the skin and later digested by the *Agni* (*Sushruta*). *Dalhana* says that *Snehana* drug applied which reach the particular *Dhatu* and cures the disease of particular *Dhatu*. *Vayu* dominates in the *sparshanendriya*, all the sensory receptors are basically present in the skin (proprioceptors, pain, temperature, touch pressure etc.) when constantly stimulate it gives the sensory cortex which interns send the message to motor area to stimulate. The physical manipulation in the form of massage increases the circulation, muscles and deep connective tissues will gets the relaxation and increases in the flow of circulation to the local area. Relief in the pain is obtained by releasing the acute or chronic tension in muscles and by affecting the pressure and touch nerve endings. Note that *Udvaltana* cause the *Kaphakshya*, but in this case there will be already *Kaphakshya* existing along with *Vata Vridhi*, So *Udvaltana* don't have role in modulation of the brain activity rather it hampers it, but locally to reduce the spasticity to some extent it can be used. So, *Udvaltana* can be done to the muscle which is locally involved as it is basically *Kaphavata* disorder. *Abhyanga* and other *Bhaya* procedures mainly follows the gating theory for pain modification. So if we stimulate some other sensations like pressure, vibration etc. by

massaging etc. they block the pain carrying fibers due to this connector neuron activity which release glutamate -P and truly the pain is reduced. So, while doing *Abhyanga* and other *Bahya* procedures, we are providing many stimulations like pressure, touch, temperature and other proprioceptors which decrease the intensity of the pain. CNS also has got emotional component so, perception is altered at limbic system. *Abhyanga* provides the gentle touch along with soothing words with patient can even initiate these chemical substances which are pain reducing.

Daily *Abhyanga* with *Ksheera Bala Taila*, (if more spasticity), *Sahacharadi Taila* (if more contracture), *Mahamashadi Taila* (in vounatry movements with hypertonicity), *Pinda Taila*, *Nirgundi Taila* (if with more pain, hyperactive), *Chanda bala Lakshadi Taila* (more bony deformities and joint involvement) for 30 minutes in all the postures of the body⁷.

Role of *Lepana* in the management of hypertonicity

Lepana is quite useful local method to decrease the hypertonicity and symptomatic relief at the individual muscle. *Lepana* with quite *Ushna*, *Teekshna* drugs again stimulate the free nerve endings, and sensation are carried to sensory cortex. These sensations are believed to induce modifications in brain parenchyma. Locally also it can work at skeletal muscle level. Skeletal muscles contains the Nm receptors where the neurotransmitter is Acetyl Choline by causing the anti -cholinergic activity and *Lepa* with Anti cholinergic activity like *Dattura lepa*, *Pilocarpine*,



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Bellodan alkaloids, *Shirisha patra lepa*, *Bhrihati*, *Suchi patra* (*Atropa bellodana*).

Agni Lepa- Agni Chikitsa

This is commonly practiced in Ankola Paralysis center - Traditional method. This is prior to *Shodhana* for inducing the *Deepana*, *Pachana*, *Agni mardana* and *Ama nashaka*. In spasticity also there will be collection of *Ama* at CNS level or at local muscle level. Drugs which are used

Wet drugs - *Eranda*, *Nirgundi*, *Agni manta*, *Vana tulasi*, *Bandaka*

Dry drugs - *Lashuna*, *Haridra*, *Lavanga*, *Sarshapa* (1/4 tsp), *Maricha* (1 tsp). *Lepa* should be applied on opposite direction of hair. This helps in clearing the *Srotusa* and remove the daily collection of the *Ama*. Of course the Drugs by the virtue of their *Virya* etc. also stimulate sensory cortex and locally acts on Acetylcholine receptors. If possible 1-2 grams can be given orally.

Role of the Swedana⁸ in the management of hypertonicity

Mridu Sweda is indicated as cerebral palsy is a debilitating disorder *Niragini sweda* like *Ushmasadana* should be followed. *Swedana* is not for the *Shodhana* purpose, here it just to cause *Mardawatva* of the *Anga*. *Hasta Sweda* and *Patasweda* can be used, even *Valauka sweda* can be used cautiously. Hypertonia is one which marked by *Stambha*, *Gourava*, and *Swedana* is good to relieve it. *Snehana* and *Swedana* is known to bend even the *Shuska* stick (dry stick also). *Swedana* drugs are generally having the *Ushna*, *Tikshna*, *Sara*, *Snigdha*, *Ruksha*, *Sukshama*, *Drava*, *Sthira* and *Guru*. *Kolakulattadi Pinda*

sweda, *Shasticashali Pinda sweda*¹, *choorna pinda sweda* . *valuka sweda*, *Jambira patra*, *pinda sweda* , *patra pinda sweda* can be used..

Swedana has got the role both locally as well as generally. Locally it causes the *Mardawatva* of the muscle and relax it, *Stambha* will be relieved. Mean time the arteriolar vasodilation which increase the circulation, it clear the *Srotorodha*, *Ama* will be cleared and other drug or procedures can have their effect after cleaning the *Srotus*. *Swedana* is also imparts the temperature. The nerve endings of the pain and temperature are stimulated and sensory input in to the brain will be increased which can help to modulate the motor functions.

Different types of *Swedan* like *Nadi sweda*, *Upnaha sweda* (paste prepared by *Vacha* , *Shatapushpa*, *Devadharu*, *Rasana*, *Eranda*, *Mamsa*, *Sneha*, *Lavana*, *Amala dravya* applied over the thin cloth and wrapped around the involved muscles), *Salavana Upnaha Sweda* (mixture of *Kakolyadhi gana* , *Vatahara dravya* , *Amla dravya* , *Anupa mamsa* , *Sneha* , *lavana* can be used in *Kevala vata roga*), *Pinda sweda* includes *Shasticashali Pinda sweda*, *Jambira Potali sweda* (*Amavata* , muscular cramps, *Avabhauka*, stiffness of joints etc). *Patra pinda sweda* (*Kati shoola*, Joint contractures, stiff joints), *Dhanya potali pinda sweda* (Painful contracture) , *Choorna pinda sweda* can be used (*vata kaphaja* disorders), *Kola Kulathadi Potali sweda* (all *vata Rogas*)(*Kola* , *kulatha*, *Amra taru*, *Yava* , *Misi* , *Masha*, *Atasi* , *Kustha* , *Rasna* , *Taila phala* , *Narikela* *Sarshapa* , *Karpasa*) + 16 parts



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of *Amala Kanji* and liquid is evaporated- then grind mixture in to paste) can be used.

Role of *Shirodhara*⁹ in the management of hypertonicity

Shirodhara, *Shiro Basti*, practically difficult in cerebral palsy. Best is *Shrolepa*, *Talam*, *Shiropichu*, *Shira Tarpana*, *Tala poticchil Shiro-Abhyanga* etc. in such patients. *Shirodhara* works by modulating the brain action. It helps in altering the concentration of neurotransmitters inside the brain. It decreases the excitability of the neurons. Drugs used for *Shirolepa* are most preferable like *Jyotishmati Taila*, *Bala Taila*, *Tungadrumadi taila*, *Lepa of Amalaki with Panchagandha choorna*, *Balamoola choorna* and the *Lepa* prepared by different *Medhya* drugs and *Ksheerabala Taila*.

Role of *Basti* in the management of hypertonicity

Basti is the main stay of treatment because there will be *Vata Vridhi* due to *Dhatu Kshaya* as a result there will be concomitant *Kaphakashya*. *Basti* is best treatment for *Vata*, it also called *Ardha Chikitsa*. *Anuvasana & Matra Basti*¹⁰ have got a property to regulate sympathetic activity, decrease adrenaline & nor adrenaline secretion & help in the balance of autonomic nervous system. Thus help in neuronal activation, by regulating the gut brain². *Mustadi Rajayapana Basti* with *Mamsa Rasa* or other *Brihmana* and *Vrishya* drugs should be given. *Matra basti* on daily basis nourishes the *Vatasthana* that is *pakwashaya* and gradually there is modulation of the brain which is the *Sthana* of the *Prana Vata* and the *Udana vata*.

Matra Basti can be given with *Ksheerabala Taila*, *Prasarini Taila*, *Sahachardai Taila*, *Kalyanka ghrita*, *Bhrahmi ghrita*. We can also correlate with gradually strengthening different *Chakras* starting from *Mooladhara*

Role of *Medhya* drugs in the management of hypertonicity

Medhya -Vayastahpana Drugs can be used in the form of *ksheera paka* and this is best way. *Medhya* drugs helps in changing the brain environment and strengthens the brain neurons. Different drugs like *Ashawgandha*, *Vidari*, *Shatavari*, *Guduchi*, *Yastimadhu*, *Punarnava* etc. are mixed together and prepared into *Ksheerapaka* to increase or sustain the *Vaya* of child.

Role of *Patta bandhana*¹¹ method in the management of hypertonicity

This is quite useful in contractures or tendency towards the contractures. Drugs are prepared into the *Kalka* and applied over a thin cloth, and then firmly applied over the affected limb and later tied with *Eranda* leaves, and tied with come hard cartons or prosthetics etc. Method is almost same to that of *Upanaha Sweda*.

Management of constipation in the management of hypertonicity

Spasticity of the puborectalis muscle leads to constipation. Daily *Matra basti* should be to manage this condition also.

Role of *Nidrajanana* Drugs in the management of hypertonicity

Mild sedative drugs are also useful to combat the Hypertonicity. *Kola*, *Badara*, *Tagara* are the main drugs used in hypertonicity. Certain Dopamine



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containing drugs like - *Kapikacchu*, *Masha* can be used.

Different drugs which carries neuron regenerating quality *Bala Prasarini*, *Kupeelu*, *Jatamamsi*, *Vacha*, *Masha*, *Kapikacchu*, *Yastimadhu* can also be used. Daily rubbing of *Vacha*, *Pippali*, *Manjistha* with *Madhu* and *Ghrita* to the tongue from anterior to posterior which is useful in speech problem and also for spasticity of tongue muscles. Mild physiotherapy exercises / ball pressing exercises. Parental counselling may also be useful.

CONCLUSION

So, the main focus of treatment should be directed towards the brain, not locally (Because motor programming and its inhibition in the brain itself is disturbed) because the chances of co-lateral neuronal circuit formation in the brain is maximum by using Ayurvedic drugs before the age of 3-5 years(Once brain growth is over we can't help much) in children. These *Panchakarma* procedures improve flexibility of joints, improves circulation and reduces pain. It improves gross as well as fine motor functions, provides nourishment, improves overall general condition and quality of life in children with hypertonicity



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