

## AYURVEDIC MANAGEMENT OF CELEBRAL PALSY - A CASE SERIES

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### ABSTRACT

**Introduction:** Cerebral palsy (CP) is a group of non-progressive disorder of movement and posture caused by malformation of the brain and/ or due to non-progressive brain injury to motor control center. Conventionally physiotherapy (PT) and/or botulinum toxin are indicated for release of contractures and spasticity, but satisfactory response is rarely observed with any of these treatment modalities. Usually the patients seek Ayurvedic treatment after failure with PT and development of severe contractures and other long-term complications of CP. Here three cases that were treated with ayurvedic treatment are discussed; two of them were ataxic type of CP while one was dystonic CP. **Case presentation:** Case no.1 was a 16-year-old, wheel-chair bound male child with ataxic type of CP (**GMFCS-V**), severe spasticity of all limbs along with severe contractures of all joints, kyphotic posture, and partial head control with tendency of neck-tilting on either side and below average intellectual function. Case no. 2 was a 4-year-old female child with ataxic type of CP (**GMFCS-V**) who had not achieved several milestones including those of head control, sitting with support, gross grasp and other motor disability with good intellectual function. Case no. 3 was a 5½-year-old female child who had dystonic CP (**GMFCS between IV-V**) with right-sided weakness, dragging right foot, inability to stand without support and walk with support, and speech of only a couple of disyllables. She had good head control. **Management, outcome and follow-ups:** After complete examination, all the three children were treated with Pachakarma protocol (comprising of abhyanga with *balataila*, *shashti-shali-pinda swedana* and *shiro-abhyanga*) developed for pediatric CP patients along with internal use of *medhya rasayana* drugs to obtain optimum results. All the three achieved good results in their motor dysfunctions and improved upon their GMFC scores.

**Keywords:** Cerebral Palsy, *abhyanga*, *shashti-shali-pinda swedana*, *brahmarasayana*, *bala taila*, *vacha churna*

### INTRODUCTION

Cerebral palsy is a term used to describe a diverse group of chronic, non-progressive disorders of movement, posture and tone resulting from a central nervous system insult during its early development. The timing of the insult may be prior to, at the time of, or shortly after birth. Although the term cerebral palsy refers solely to the motor deficits, features such as seizures, mental retardation, speech, hearing, vision and learning disabilities may accompany it. Swedish classification of CP describes 4 sub types of CP, viz. spastic, dyskinetic, ataxic and mixed. All types of CP are characterized by abnormal muscle tone, reflexes, motor development and coordination. There can be joint and bone deformities and contractures. The classical symptoms are cortical thumb, spasticity, spasms, other involuntary movements, unsteady gait and problems with balance.

There may be disturbances of sensation, and perception, difficulty in communication, cognition problem and behavioral abnormality, secondary musculoskeletal problems and seizures. Cerebral palsy is the result of abnormal function of cortex, basal ganglia and cerebellum. A three case-series involving different type of cerebral palsy is presented here. They all were treated with ayurvedic medicaments and panchakarma therapy.

## Case Presentations

### Case no 1

A 15 year-old- male child came (on 15<sup>th</sup> February, 2019) with the complaints of inability to stand with calipers, inability to walk with walkers, right-sided weakness, inability for eye contact while talking, severely stooping posture in sitting, head control partial with tendency to keep neck flexed, left hand preferences and strabismus

**Neonatal History:** The child was FT forceps delivered. There was delayed cry and he had neonatal asphyxia immediately after birth. NICU stay of 11 days was reported. His birth weight was 1.040 kg. His mother was on ROZA for one month up to the previous day of delivery. During this period, she developed hypertension with pedal edema. The boy had globally

delayed development. He received some treatment from some hakim for hearing and speech difficulty and motor dysfunction. As a result, he got partial head control, developed speech and also hearing.

**Family history:** His parents are a non-consanguineous couple. The teenager is fourth in order out of five live siblings. The remaining 4 siblings are healthy. The younger brother immediately next to this patient died of SIDS at the age of 11 months.

**Development history:** Globally delayed development with partial neck control 2 years of age, standing and speech 2 ½ years, hearing 3 years. Fine grasp, gross grasp, standing and independent walking milestones were not achieved.

**Clinical examination:** CVS: Pulse 110/min; RRR; S1 S2 normal; no murmur or extra sound heard.

RS: b/L good air entry with clear breath sounds

P/A: No hepatosplenomegaly

**Mental status: always smiling:** Appearance: Short stature – wheelchair bound – growth failure as per his age – S/o puberty (moustache or beard)

**Neurological examination:** LL: b/L flexion contractures of hip and knee; b/L plantar flexor

Muscle power: b/L grip very weak (grade IV); b/L flexor muscles of hip poor (grade IV); b/L flexor muscles of knee poor (grade IV)

UL: b/L flexor contracture of elbows; b/L tendency for wrist drops, but corrects on command – keeps both the legs in frog posture

Muscle power: b/L elbow extensor poor (grade IV); severely stooping posture

Dysdiadochokinesis was present

Speech good comprehensible

**GMFCS level: 5 at the time of hospitalization**

### Management and Outcome

Patient was put on following treatment:

Oral medications

1. *Vacha churna*<sup>1,2,3</sup> 500mg + *Brahmi churna*<sup>4</sup> 1gm + *Shankhapushpi churna*<sup>5</sup> 1gm + *Godanti bhasma*<sup>6,7</sup> 500mg – twice a day with honey on empty stomach
2. *Brahma rasayan*<sup>8</sup> – 10 gm bid with milk
3. *Brahmi ghrita* – 10 ml bid with milk

4. *Shirobhyanga* with *brahmi ghrita* – 10 minutes (in the evening and kept overnight)

Panchakarma procedures

1. *Sarvang abhyanga* with *bala taila*<sup>9,10</sup> – 30 minutes (by panchakarma technician in the hospital)
2. Local abhyanga (on spastic parts and wasted muscles) with *ashvagandha taila*<sup>11</sup> – daily 2-3 times (additionally) by the parent or attendant
3. *Sarvanga swedana* with *shastishali pinda swedana* for 30 minutes
4. Daily *bashpa swedana*<sup>12</sup> (steam bath with *nirgundi* steam) in the evening (as the child was very overweight considering his immobile status, which would not allow him to stand on his own)

### Outcome

#### Before treatment: GMFCS V

1<sup>st</sup> week: Keeps both hands straight (full extension of both elbows achieved), alternate flexion and extension of knee in sitting (7<sup>th</sup> day)

2<sup>nd</sup> week: ROM of both knees improved, spasticity of both the knees reduced, flexion contracture of right knee reduced (8<sup>th</sup> day) - Walked for 10 minutes (needed good support), proper sitting with full extension of both the knees, keeps head in the center (all the time meaning good head control) (9<sup>th</sup> day) - Flexes both the hips and does cycling movement (slowly) (11<sup>th</sup> day) - b/L abduction of hips reduced; able to keep both legs straight at hips and at knees; right knee flexion contracture reduced; left knee contracture relieved completely (13<sup>th</sup> day) - Right hand gross grasp improved, right hand power very much improved, pulls the examiner or other with good force with right hand (19<sup>th</sup> day)

3<sup>rd</sup> week: Walks with walker up to 40 feet with rest in standing during this and turned on both the sides as well as U turn (24<sup>th</sup> day) - Right knee contracture reduced further (26<sup>th</sup> day)

4<sup>th</sup> week: Gets up easily from his bed and sits back easily (28<sup>th</sup> day) - Treadmill without any support for ~ 5 mt, stands without support with calipers on (30<sup>th</sup> day) - Partial pedaling in sitting; alternate punching movement in the air (33<sup>th</sup> day) - Kicks ball in (free standing position (34<sup>th</sup> day)

5<sup>th</sup> week: Pedaling movement partially, walks for a longer distance (with calipers) and then extends both shoulder; *Ardhakatichakrasan* in sitting; extends both shoulder properly; approximation of thumb with finger tips (one by one) with left hand good and somewhat fast action - with right hand slow, but one after another (36<sup>th</sup> day) - Treadmill walk 5-6 mins (37<sup>th</sup> day) - Posture correction-almost complete with head in the center all the time (39<sup>th</sup> day) - Treadmill walking on 7mts+10mts nonstop, throwing, kicking in standing (40<sup>th</sup> day) - Improvement in walking with walker (41<sup>st</sup> day)

6<sup>th</sup> week: Throws ball with hand in standing freely (44<sup>th</sup> day) - Good sitting posture 30-minute-session without tiring (54<sup>th</sup> day)

9<sup>th</sup> week: Can stand with support (63<sup>rd</sup> day) - Can walk with support for 1 hr in different sessions during day-time (66<sup>th</sup> day)

11<sup>th</sup> week: Standing without moving leg (involuntary) in front for ~ 30 second (78<sup>th</sup> day) - Diadochokinesia with clapping and spreading hands partially achieved - 20% of the attempts successful (83<sup>rd</sup> day)

12<sup>th</sup> week: Clapping improved (84<sup>th</sup> day) - *Pashchimotanasan* >30 seconds (85<sup>th</sup> day) - Walk for more than 40 mins (86<sup>th</sup> day)

13<sup>th</sup> week: Walks on tread mill for 40mins, stands continuously for 30 mins (95<sup>th</sup> day)

14<sup>th</sup> day: Standing time without calipers increase (98<sup>th</sup> day) - Walks without support 2-3 steps (103<sup>rd</sup> day)

15<sup>th</sup> week: Walks with walker with 1km - walking session of >1 hour (109<sup>th</sup> day)

17<sup>th</sup> week: Standing up (by self) holding walker (121<sup>st</sup> day) - Lt hand power improved; walking improved - Hip flexion degree improved (123<sup>rd</sup> day)

18<sup>th</sup> week: Hip flexion degree improved (128<sup>th</sup> day) - Walking with walker for >1hr, walking with walker without calipers (131<sup>st</sup> day) - Walk improved (132<sup>nd</sup> day)

21<sup>st</sup> week: Free walking in small steps with calipers only – achieved **GMFCS II** (150<sup>th</sup> day)

22<sup>nd</sup> week: Rt wrist flexion contracture completely released (155<sup>th</sup> day) - approximation of all fingers (one by one) with their achieved (158<sup>th</sup> day)

24<sup>th</sup> week: Hanuman posture with little support – finger-to-finger achieved (168<sup>th</sup> day)

26<sup>th</sup> week: Flexion contracture of left hand completely relieved (keeps both hands in dhyanamudra (183<sup>rd</sup> day)

**GMFCS from V** (on the day of admission) to **GMFCS II** at the end of 21<sup>st</sup> week.

**Case no 2:** The second case is of a 4-year-old female child who came (On 18<sup>th</sup> January 2019) with the complaints of inability to walk, sit and stand with support. She had scissoring attitude. She had weakness in both the hands (right > left). She showed left hand preference. She had not achieved gross grasp. She also had salivary drooling and stooping posture (when made seated with support and tumble within a few seconds). She was a case of athetoid cerebral palsy.

**Natal history:** The child was born to a non-consanguineous elderly couple (mother 51 years and father 54 years old) with an IVF technique. She was elder twin born at 24<sup>th</sup> week gestational period (emergency LSCS) due to maternal eclampsia. She did not cry after birth and her weight was 900gm at time of birth. The newborn girl had NICU of 51 days and 10 days in general nursery. The younger twin (male) died due to very much prematurity and IUGR.

**Family history:** There was no family history of DM or hypertension. Maternal TORCH status was negative at the time of conception (IVF conception). Antenatal care was proper. Mother suddenly developed eclampsia during last week of 6<sup>th</sup> gestational month and the twins were delivered by LSCS.

**Developmental history:** The child had globally delayed development. She achieved partial head control at the age of 3 ½ years. She had not achieved the milestones of sitting with support. Anal and bladder control were achieved at age of about 1 year. She had speech at age of about 1 yr. At the time hospitalization she could speak full sentences, which were very slow, slurred and difficult to understand.

**Clinical examination:** Nutritional status: Very lean and poor built with weight 10.2 kg (<5 percentile for age) and height ~ 97 cm (~ 10 percentile for the age). Her head circumference was 42.00 cm (25<sup>th</sup> percentile).

CVS: Pulse 110/mt; S1, S2 normal; no murmur sound

RS: b/L Good air entry with clear breath sound

P/A: No hepatosplenomegaly

Mental status: smiling

Appearance: Short thin stature – growth failure as per his age

**Neurological examination:** LL: Severe hypertonia (spasticity) and wasting of all muscles; flexion contractures of b/L ankle, knee and hip joints with extensor; adduction contractures of b/L hips. She had clawing of toes of both the feet. The legs showed scissoring due to persistent spasm of adductor muscles. She also had hip instability. She could not sit with support. DTR: b/L knee and Achilles increased; b/L Babinski sign was positive.

UL: Hypertonia (spasticity) and wasting of all muscles; flexion contractures of all finger joints (PIP>DIP); b/L cortical thumb; b/L flexion contracture of elbow and restricted movement (all) of both shoulder joints; gross grasp not achieved; b/L flexion contracture of all joint. Dysdiadochokinesis was observed

Speech was very slow, with sentences of 3-4 words, but slurred and difficult to understand

**GMFCS level: 5 at the time of admission:**

#### **Management and Outcome**

The patient was treated on the same treatment protocol as it is mentioned in the case no.1; only difference was in the dose of drug and period of panchakarma procedures.

Oral medications

1. *Vacha churna* 250mg + *Brahmi churna* 500mg + *Shankhapushpi churna* 500mg + *Godanti bhasma* 500mg –twice a day with honey on empty stomach
2. *Brahma rasayan* – 5 gm bid with milk
3. *Brahmi ghrita* – 5 ml bid with milk
4. *Shirobhyanga* with *brahmi ghrita* – 10 minutes (in the evening and kept overnight)

Panchakarma procedures

1. *Sarvang abhyanga* with *bala taila* – 20 minutes (by panchakarma technician in the hospital)

2. Local abhyanga (on spastic parts and wasted muscles) with *ashvagandha taila* – daily 2-3 times (additionally) by the parent or attendant
3. Sarvanga swedana with shastishali pinda swedana for 20 minutes

### Outcomes

#### Before treatment **GMFCS V**

All the improvements are given in chronological order

1<sup>st</sup> week: sitting with support (4<sup>th</sup> day) Opening of the scissoring of leg (voluntary) and sitting without support holding (abnormal holding) the bed railing on one side and drop side railing on other side in stooping posture (5<sup>th</sup> day) - Able to flex both the knees fully while sitting with wall support (sitting in knee-chest position) and use both the hands to balance the body when leaned on one side, scissoring completely relieved, able to alternatively flex and extend fingers, flexion contractures of b/L elbow relieved - Free sitting time extended to 15-20 minutes in one session (7<sup>th</sup> day)

2<sup>nd</sup> week: Grip with right hand improved (11<sup>th</sup> day) - Standing session in the corner with wall support (15mt in one session) (14<sup>th</sup> day)

3<sup>rd</sup> week: Rolling over by self from left side (supine to prone and vice versa); some success to lift the body on four limbs with head in line with trunk and crawling (16<sup>th</sup> day) – Rolling over to prone from right side also, tries to be on four limb and crawling (18<sup>th</sup> day) – Alternately abducts both the hips (crude pedaling) (23<sup>rd</sup> day)

4<sup>th</sup> week: Able to balance in prone with one hand flexed and mild support (27<sup>th</sup> day) - Stands in proper posture (28<sup>th</sup> day)

5<sup>th</sup> week: Stands with support (held by hands), sitting properly (39<sup>th</sup> day)

8<sup>th</sup> week: Stands properly holding bed frame - for a few seconds standing without any support (43<sup>th</sup> day) – Sits without scissoring, flexion contractures of last two fingers of right hand largely relieved; able to extend DIP and PID; grasp (gross) improved (52<sup>nd</sup> day) – Able to sleep in supine from sitting posture with little support and vice versa (53<sup>rd</sup> day) – Jumping with support at hips (55<sup>th</sup> day)

9<sup>th</sup> week: Sleeping from sitting without scissoring, sitting from sleeping (minor support with wrist holding) without scissoring (57<sup>th</sup> day) Sits properly, bends up and touches the toes and stands up when held at hips; Rolling over repeatedly (58<sup>th</sup> day)

10<sup>th</sup> week: Mild pedaling in sitting (64<sup>th</sup> day) - Climbs the stair care with support (67<sup>th</sup> day) - Preference to keep left foot on upper step to climb stair while difficult in flexing left knee (69<sup>th</sup> day)

11<sup>th</sup> week: Spasticity reduced while walking (71<sup>st</sup> day) – Speech fluency improved with good clarity; holds milk mug by self and drinks by self (75<sup>th</sup> day) – ROM of flexor of both knees improved (77<sup>th</sup> day)

12<sup>th</sup> week: Alternate flexing of both knee (78<sup>th</sup> day)

13<sup>th</sup> week: Alternate flexing of both hips (86<sup>nd</sup> day) - Stands with support (88<sup>th</sup> day) - Standing posture perfect, tries to get down from the bed (89<sup>th</sup> day)

14<sup>th</sup> week: Good sitting posture with different hand movement (93<sup>th</sup> day) - Balances on four limbs (95<sup>th</sup> day)

14<sup>th</sup> week: Standing with support for about 30-45mins since 4-5 days (103<sup>th</sup> day)

16<sup>th</sup> week: Range of neck movement improved (105<sup>th</sup> day) - Stands almost freely, walks better when hold from frank (106<sup>th</sup> day) - Good control of hand from sitting to sleeping in supine stable on four leg for > 1min (107<sup>th</sup> day) - Stands almost freely with just touching a person in front - Pedaling movement, climbing stairs up and down (108<sup>th</sup> day) - Walks with support (110<sup>th</sup> day)

17<sup>th</sup> week: Stands up and sits down with little support of knee (112<sup>th</sup> day) - ROM of b\L knee flexion improved (113<sup>th</sup> day) - Walks properly (passive), when supported (114<sup>th</sup> day) - Sits up & down when supported at knee (115<sup>th</sup> day) - Standing with 10 count (117<sup>st</sup> day) - Standing posture very good (in-door stay of four months) (119<sup>rd</sup> day)

Follow up at 6<sup>th</sup> month: Walks with support – stands with wall support

**GMFCS from V to GMFCS IV at 17<sup>th</sup> week**

#### Case No 3

A 5½-year-female child came (On 29<sup>th</sup> January,2019) with the complaints of inability to stand without support and walk with support. She also had delayed de-

velopment of speech and could speak only a few disyllables. She had not achieved crawling and other motor milestone. She had learning disability and difficulty in concentration. Her cognition was below average.

This child was FTND hospital born. She had delayed cry and needed resuscitation after birth. She stayed in NICU for 5 days during which she received phototherapy for 4 days. She also had neonatal seizures during this period. Next day of discharge from hospital she again developed seizures and needed hospitalization for another 8 days in general nursery. Her birth weight was 2.9kg.

**Family history:** It was not significant. Both the parents were non-consanguineous and in their late twenties when this child was born. Maternal antenatal care was proper with 2 TT doses. Her TORCH panel was negative. The patient's 1½ year-old younger brother was healthy.

**Developmental history:** She had achieved head control at about 6 months of age, sitting without control at about 18 months of age. Standing with support 4 years and anal control at the age of 4½ years.

Previous medical history: H/o pneumonia 1 year back (at the age of 4½ years) and was hospitalized for 3 days.

#### **Clinical examination**

CVS: Pulse 108/t; RRR S1 S2 normal; no murmur sound.

RS: Bilateral good air entry with clear breath sounds

Liver, spleen: Not palpable

Mental status: always smiling; however, did not talk much

Appearance: Short stature – growth failure as per his age

#### **Neurological examination**

DTR: LL b/L knee increased; b/L Achilles normal; b/L planter flexor; right knee flexor grade 2; right hip flexor 2; muscle tone good

Muscle power: Lt. knee flexor 3; left hip flexor 3; muscle tone good. b/L leg external deviation (Lt > rt)

ROM hip extension 160°; knee flexion 90°

Upper limbs: Lt hand preference, left hand adduction contraction; Lt elbow flexion contracture. Unable to flex both the shoulders with full elbow extension

Standing free: Not achieved

Standing with support achieved at ~ 4 years with b/L external deviation, and both hips and knees flexed

Gait (when held by two hands): Swinging gait with small steps and outward deviation of both feet (R>L) – needed support at axillae (holding from the back)

Speech only few disyllables, cognition was good

**GMFCS level between IV – V (at the time of admission)**

#### **Investigations**

**Fetal USG (07-09-2013):** Mild oligohydramnios

**CRP (11-06-2014):** 45.0 mg/L

**MRI brain (28/05/2019)**

- Areas of increase intensity involving periventricular white matter in bilateral frontal, parietal and occipital lobes on T2 and FLAIR images, which appear hypointense on T1 images. S/O PVL.
- Areas of altered signal intensity involving b/L posterior insular cortical, b/L perirolandic cortical and subcortical regions, and b/L increase intensity in frontal parasagittal region, which appear hyperintense on T2 and FLARE images and hypointense on T1 images suggesting gliosis.
- Symmetrical T2 increase intensities involving bilateral thalamus and both putamen. Mild dilatation of bilateral lateral ventricle with paucity of cerebral white matter.

#### **Management and Outcome**

Oral medications

1. *Vacha churna* 250mg + *Brahmi churna* 500mg + *Shankhapushpi churna* 500mg + *Godanti bhasma* 500mg – twice a day with honey on empty stomach
2. *Brahma rasayan* – 5 gm bid with milk
3. *Brahmi ghrita* – 5 ml bid with milk
4. *Shirobhyanga* with *brahmi ghrita* – 10 minutes (in the evening and kept overnight)

Panchakarma procedures

1. *Sarvang abhyanga* with *bala taila* – 20 minutes (by panchakarma technician in the hospital) 2.

2. Local abhyanga (on spastic parts and wasted muscles) with *ashvagandha taila* – daily 2-3 times (additionally) by the parent or attendant
3. *Sarvanga swedana* with *shastishali pinda swedana* for 20 minutes

### Outcomes

Relief in the improvement observed during hospital 85 days stay is as following chronological order. The number of days is given counting the first day of admission as day 1 and so on.

1<sup>st</sup> week: She could perform vajrasana; stand on both the knees and touch the forehead with both the hand alternatively (earlier she used to keep both hands outstretched to stand with bed support or wall support to avoid falling) (6<sup>th</sup> day)

2<sup>nd</sup> week: She was able to stand properly with full extension of both hips and both knees. She learnt to balance in *kukkutasana* and touch the floor with nose and then lift her head above the floor (8<sup>th</sup> day) - Started walking properly on 15<sup>th</sup> day holding furniture (no other support) and using hands effectively (16<sup>th</sup> day)

4<sup>th</sup> week: She started walking with walker (28<sup>th</sup> day) - Increase in vocabulary (forced to stand without support made her speak a lot many sentences of three to four words) (31<sup>st</sup> day)

5<sup>th</sup> week: Started writing and copying number (39<sup>th</sup> day) - Able to perform *paschimottanasana* (40<sup>th</sup> day)

6<sup>th</sup> week: Started walking holding with one finger (42<sup>nd</sup> day) - Free standing time increased to 5 minutes (47<sup>th</sup> day)

7<sup>th</sup> week: She could stand with calipers for 15 minutes (49<sup>th</sup> day) - Standing and walking freely (long sessions) and fluent conversation with others (52<sup>nd</sup> day)

9<sup>th</sup> week: Climbing up and down the staircase (64<sup>th</sup> day) - Climbing staircase (alone) holding the railing and one foot at a time on one step followed by another on the same step (66<sup>th</sup> day)

Maintained all the learned activities on the last day of hospital stay and continued improving in her motor ability during follow up

**Outcome:** GMFCS I (improvement from GMFCS V between 4-5 in just 66 days)

## DISCUSSION

Spasticity and flexion contracture of knees and elbows in all the three patients got relieved within 1 – 2 weeks (it depended on the severity of the spasticity)

Case 1 (age 15 years) and 2 (age 5 year) had the very severe spasticity involving all the limbs with stooping posture with side flexion of the neck. Pelvic girdle muscle strength to balance the body weight is achieved in 3-4 weeks (depends on the severity of patients)

Case 1 had achieved GMFCS V at the time of admission, he achieved GMFCS III (at 28<sup>th</sup> week). Case 3 had achieved GMFCS between IV and V, she achieved I at end of 2 months.

Speech: Case 3 became fluent with clear and comprehensible speech with increase vocabulary within one month. The difficulty in fluency and clarity was due to weakness of the muscles involved in articulation. Abhyanga with *bala taila* and *ashvagandha taila* on areas supplied by maxillary and mandibular divisions of trigeminal nerve improved the strength of these muscles and thereby the speech was improved. The worst case for speech disorder was case no 3. Her speech suddenly showed improvement in both fluency as well as vocabulary as she was forced (against her wish) to stand for five minutes by end of 1 month. The child was non-cooperative. But this forceful standing in the absence of her grandma made her complain with fluency and use of other words that she was not using. This behavior means that the words were registered in her brain and it was habit of the child to substitute words by signs most of the time during conversation. Case 2 achieved fluent speech with good quality by 2½ month. She really had severe spasticity of all the muscles including those of neck and trunk. She had the vocabulary normal for her age and new the use of words.

Case 2 gross grasp in 2½ months as her flexion contractures of all the fingers got relieved. Case 3 achieved fine grasp by 5 weeks.

Stooping posture with partial head control was mainly responsible for delayed in standing and walking milestone achievement.



*Abhayang* on maxillary and mandible division of trigeminal nerve is helpful achieving clarity with fluency in all the three cases.

Case no.1 has still the issue of memorizing and then recollecting the points required for studies. However, his cognition has improved drastically, and he converse with others in a lot meaningful way and appropriate for the given situation or circumstances. His difficulty of opening eyelids while looking up to others has got completely relieved. As we thought it was due to the weakness of his neck muscles to balance his head in the center and as a result, he would not open his eyes while looking up. He appeared to us his external ophthalmic muscles to provide strength to his neck muscles. The abhyanga on neck (3-4 times a day) along with that on areas supplied by ophthalmic division of the trigeminal nerve improved the strength of these muscles and as a result the child can open his eyes while looking up.

GMFCS of all the patients

Patient no.	Before treatment	After treatment
Case 1	V	Between II - III
Case 2	V	IV
Case 3	Between IV - V	I

## CONCLUSION

*Balataila*<sup>1</sup> *abhyanga* improves the circulation in whole body, provides tactile stimulation to nerve ending and thereby tones up the weak muscles and provides strength to them. The access of lactate accumulated as a result of exercise done by the patient to improve their mobility including limb movement gets removed by this abhyanga as *bala taila* and *ashvagandha taila* are *vatahar*. *Balataila* lubricates the joints ensuring proper movement of the body parts. It restores the normal tone in muscles, which are in a state of hypertone. It promotes the formation of new dhatu<sup>2</sup>. *Ashvagandha taila*<sup>3</sup> also restores the muscle tone, lubricates the joints, makes them stronger and prevents their degeneration due to dysuse.

Swedana increases metabolism, enhances muscle consistency, provides strength to the nervous system by facilitating the regeneration and improves the overall appearances of skin. This dhatu-strengthening proper-

ty is employed in neurological disorders, malnutrition of limbs, arthritis, etc<sup>4</sup>

*Brahmi churna* has *ayushya* (promoting healthy life), *svarya* (promoting healthy voice), *smitiprada karma* (improving the memory and recollecting it at an appropriate time) and *medhya prabhav* (registration or reception, retention and recollection)<sup>5</sup>. Its pharmacological activities are anticonvulsive, promoting learning and memory, anti-spasmodic, antidepressant and antioxidant. *Brahmi churna* helps in increasing general mental ability, attention and concentration.

*Vacha churna* is used in the treatment of epilepsy. It promotes memory. It is neuroprotective, antioxidant, choline spasmolytic and vascular modulator<sup>6</sup>. It improves intelligence, and speech, helps in speech disorders in children along with quality of voice and quality of life<sup>7,8</sup>

*Shankhpushpi* has *medhya prabhav*. So, its acts as enhancing the brain power, improving memory and concentration, and in increasing the ability to recall. It is beneficial in dementia<sup>9</sup>.

The main action of *godanti bhasma* is on brain, blood vessels and lungs. It is indicated in child disorders<sup>10,11</sup> *Brahmarasayan* increases intelligence, memory and strength<sup>12</sup>.

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## Figures



**Figure 1: (Case no. 1)** 1. Patient is standing holding the walker (note the stance with knees flexed and patient bending in front). 2. Patient is walking with walker. 3. Patient is walking on treadmill. 4. Patient is doing-finger-to-finger. 5. Still photo captured from the recorded video of the patient walking. Lower image shows patient pushing other patient's soles by his own soles.



**Figure 2 (Case 2):** 1. The girl is sitting with tight posture due to severe spasticity. She is leaning in front. Images 2 and 3 are still photographs captured from the video recorded while she is opening scissoring of her legs. 4. The girl is standing almost without support. Mother is just touching with her hand for assurance while the girl is standing freely. Images 5 and 6 are the stills from the video recorded during catching exercise. Image 7 shows girl touching her toes while mother has given her support at hips. Images 8 and 9 show the girl standing freely. Image 10 depicts her perfect sitting posture (compare this with image 1).



**Figure 3 (Case 3):** 1. The girl used to stand holding furniture. 2. The girl raises her shoulder. Note that she is unable to extend the elbows fully with shoulder flexion. 3. The girl walks freely while her grandma is just keeping her hands in front without touching her assuring the girl that she would not fall. 4. The girl walks freely (a still photo from the recorded video). Images 5 to 7. Still images from a recorded video where the girl is climbing up the stairs. 8. MRI brain of the patient.

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