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# Role of Traditional Therapy Protocols with *Samvardhana Ghrita* on Language Developmental Delay in Cerebral Palsy Children

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## ABSTRACT

The present study was planned to evaluate the efficacy of *Samvardhana Ghrita* given with traditionally practiced therapy for language development delay found in Cerebral Palsy (CP) Children.

48 CP children, irrespective to sex, age between 1-16 years were randomly distributed into four groups, **Group –I**: IPD patients were treated with protocol–I (*Purva-Panchkarma* therapy such as *Snehana* (~oleatation)- *Abhyanga*, *Shirodhara*/*Shiropichu*; sudation with *Shashtishali Pindasweda*, *Avagahana* (tub-bath with decoction ) and *Vacha mula (root of Acorus calamus* Linn) with *Samvardhana Ghrita*; **Group-II**: patients were treated in IPD with protocol- I without *Samvardhana Ghrita*; **Group-III**: patients were treated on OPD basis with protocol- II [*Snehana – Abhyanga* (massage), *Shiropichu* and *Vacha-mula*] along with *Samvardhana Ghrita*, while OPD patients in **Group-IV** were treated with protocol - III (Herbomineral drugs with *Snehana-Abhyanga*, *Shiropichu* with *Vacha-mula*) without *Samvardhana Ghrita*; after proper screening and getting written informed consent from the parents/guardian. Further, these cases were subcategorized on the basis of period considered important for the brain development i.e., having age < 5 years and having age > 5 years. Dose of *Samvardhana Ghrita* was given in accordance to *Sharangadhara Samhita* .The response of therapy in patients of all groups was observed on 30$^{th}$ and 45$^{th}$ day.

However, the result of this study suggest that all therapy protocols, either given with *Samvardhana Ghrita* or not, have good effect in terms of achieving early catch up of language mile stones, while therapy with protocol – I, given with *Samvardhana Ghrita* has better response ($p<0.05$) in children having age <5 years.

**Key words**: Cerebral Palsy, *Samvardhana Ghrita*, *Purva-Panchkarma*, Herbomineral drugs

## INTRODUCTION

Cerebral Palsy (CP) is the commonest cause of motor impairment and disability in children,[1] making them physically and mentally handicapped and socially aloof,[2] and its motor impairment is characterized by abnormalities in movement, posture and tone.[3] It is often associated with epilepsy, abnormalities in speech, vision and intellect resulting from a defect or lesion of the developing brain,[4] at any time during prenatal, natal and postnatal period of life.[5] Worldwide incidence of CP is 2 to 2.5/1000 live births, [6] while in India it is 03.8% of population,[7] which includes about 25 lakh CP children as per the last statistical information.[8] Nearly 15-20% of total physically handicapped children are suffering from CP. [9]

CP cannot be correlated with any single disease, as it is a multi-factorial one. However, considering the etiology, clinical features and classification of CP, it may be the result of *Shiromarmabhighata* (injury to brain) and can be considered as *Vata Vikara.*

*Shiromarmabhigathata* (injury to brain) occurs during in-utero, at the time of delivery or after the birth of a baby and may manifest in any one of the following forms or in mixed form viz. *Ardita* (facial paralysis), *Chakshu-Vibhrama* (squint/nystagmus), *Manyastambha* (neck rigidity), *Udveshtana* (body spasm or tonic spasm), *Chestanasha* (Loss of motor activities including limbs), *Lalasrava* (drooling), *Mukata* (dumbness), *Gadgadatva* (speech defect), *Swarahani* (loss of speech), *Vadan-Jihamtva* (~facial spasm or bending).[10] Delay in acquiring language development is usually an early indicator of learning disability in CP children. Such children need early treatment on the line of *Vata Vikara* such as *Snehanadi* therapy. [11] *Samvardhana Ghrita*, one of the *Vatashamaka* medicine indicated for promoting growth, strength, intellect of children, [12] and curing delayed mile stones like *Pangu* (lame) and *Muka* (inability to speak) disorders.[13] Therefore, this electuary was considered for the clinical trial in CP children and was given along with the traditionally used *Purvakarma* therapy under different protocols.

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## MATERIALS AND METHODS

### Sources of data

48 CP patients were registered from the O.P.D of *Kaumarbhritya /Balroga*, S.S. Hospital, I.M.S, B.H.U., after getting written informed consent from the parents/guardian.

## Inclusion criteria

1. Children, suffering from CP, age between 1 to 16 years, irrespective of sex and religion.
2. Children having delayed milestones, specific to language development delay and having history and/or evidence of asphyxia, either in-utero, natal or postnatal.

## Exclusion criteria

1. CP patients having language disorder due to associated oral congenital anomalies like cleft palate, dental mal-occlusion, macroglossia, chronic obstructive pulmonary disease, BPD, velopharyngeal insufficiency, laryngeal anomalies, psychiatric disorders, metabolic or genetic disorders and life threatening disorders.
2. Patients suffering from any *Kaphaja* or other disorders.
3. Patient/parents not willing to participate in the clinical trial at any stage of the study.

## Ethical clearance

The study was approved by the ethical committee of IMS, BHU vide letter no. Dean/2014-15/EC/671 dated 24-06-2014.

## Research design

All the registered CP cases were divided randomly into four groups as follows-

**Group-I (n=12):** IPD patients who were treated with Protocol-I with *Samvardhana Ghrita.*

**Group-II (n=12):** IPD patients who were treated with Protocol-I without *Samvardhana Ghrita.*

**Group-III (n=12):** OPD patients who were treated with Protocol-II with *Samvardhana Ghrita.*

**Group-IV (n=12):** OPD patients who were treated with Protocol-III without *Samvardhana Ghrita.*

These cases were further subcategorized on the basis of period considered important for the brain growth, i.e. having age < 5 years and, having age > 5 years.

## Diagnostic criteria

Diagnosis of each case was made by the detailed history in respect to disease, i.e. delayed physical and mental growth, perinatal history, physical and systemic examination and investigations including *Vagendriya Pariksha* (assessment of speech /language development).

A scoring–system was adopted also for overall assessment of the clinical features [Table1] and investigations observed at the time of registration and subsequent follow ups, in regard to *Vag-Indriya* defect (~ language development delay) in CP patients. Thereafter, change in scores of various features on subsequent follow ups were analyzed statistically to get mean ± SD and z score with p -values by using SPSS software.

**Table 1: Maximum time limit (in weeks) for normal speech development, [a] [14] and language development score**

| Weeks | Normal Speech Development | Language Development Score [b] |
|---|---|---|
| 8 | Smile and vocalization when to talk | 8 |
| 12 | Sequel of pleasure | 12 |
| 16 | Laugh loud to talk | 16 |
| 20 | Razzing aa-goo | 20 |
| 28 | Speaking monosyllable -Ba, Da, Pa | 28 |
| 32 | Speaking bi-syllable | 32 |
| 48 | One word with meaning | 48 |
| 52 | Two- three word with meaning | 52 |
| 72 | Jargoning-several intelligible words | 72 |
| 82 | Jargoning-many intelligible words | 82 |
| 104 | • Ask for drink, toilet, food<br>• Repeat things said (I, me, you)<br>• Joining 2-3 words in sentence<br>• Talk incessantly | 104 |
| 156 | Constantly asking question (uses pronouns) | 156 |
| 208 | Talk story in flow | 208 |

a. Beyond this time limit, delay in achieving language development or milestone was considered.
b. Score, equal to maximum time limit for achieving particular normal speech/language development, was given for the ease of calculation.

## Investigations

CT scan and MRI to identify anatomical abnormality in the region(s) of brain, while EEG was advised to look out for abnormal neuronal discharges.

## Procedure

**Management**: The following important principles for the treatment was adopted for the CP cases instead of classical serial steps as described for the adults under different protocols are –

i. The different therapy protocols were adopted in CP children, who were weak, on the basis of *Niriupkarma* (~without a definite plan or steps), [15] the procedures were adopted according to *Desha* (place/person), *Kala* (time, climate, etc) and *Bala* (strength), *Vaya* (age), *Agni* (digestion & metabolic efficiency) and *Satmyata* (congeniality). [16, 17, 18]
ii. One day before, in night, a liquid, quantified, compatible, light, lukewarm, strength providing, *Agni-Yukta* [19](high energy density) diet (*Krit-Akrit*), as per the age and digestive capacity, was given to the patients of all age group after calculating daily caloric requirement, [20, 21] at a peaceful place. [22] On next day, i.e. the day of procedure, first, vitals of all the registered patients were assessed by multichannel pulse-oximeter. [23] After getting normal findings, *Purvakarma* therapy was initiated, in morning, between 8-11 A.M.[24]
iii. It was ensured that the patient has passed stool and urine, prior to initiating *Purvakarma.*
iv. After completion of *Snehana* procedures, boiled lukewarm water was given to the child to drink, and baby was kept in a comfortable environment with due precautions. [25, 26]

**Different Therapy Protocols:**

**Protocol–I:** Includes *Purva-Panchakarma* therapy: *Snehana* (- *Abhyanga, Shirodhara or Shiropichu* based on the patient's condition and cooperation for the procedure), Sudation [- *SSPS* (*Shashti Shali Pinda Swedana*), *Avagahana* (Stiz bath or Tube bath)] and oral administration of *Vacha-mula* (root of *Acorus calamus* Linn) with *Samvardhana Ghrita.*

**A. The *Purva-Panchakarma* therapy**

i. ***Shirodhara***: *Shirodhara* is a type of *Murdha taila* (application of oil over the head).[27] Under this procedure, *Shirodhara Yantra* filled with lukewarm (~40 $^0$C) oil, 250 ml of each of *Jyotishmati*, *Mahanarayna* and *Bala* (750 ml) was drizzled from ~8 to 10 cm height, [28] over the forehead and *Murdha* region for about 15-20 minutes initially, then increased to up to 30-45 minutes/ day within a week, and was given for a total period of 21 days.

ii. ***Sarvanga Snehana*:** *Sarvanga Snehana* (full body massage) was given with *Mahanarayana* oil mixed with equal amount of *Bala* oil in *Anuloma* (downward) direction [29] for 20 minutes, 10 minutes each in supine and prone position. Thereafter, SSPS was given for 20 minutes duration. The pattern used for *Abhyanga* (massage), was also adopted for the sudation. The lukewarm decoction of *Dashamula, Rasnasaptaka* and *Nirgundi* (*Vitex Negundo* Linn) leaves, mixed with cow's milk was used for dipping of bolus. The total duration for both *Abhyanga and SSPS* therapy was ~ 40 minutes, with a reduction or increments of 5-10 minutes in accordance to strength of patient, disease, and season, when features of *Samyaka Snehana* (adequate sudation),[30] developed.

iii. After SSPS, *Avagahana* was given for a minimum of 20 minutes, by considering *Desha*, *Kala*, *Bala, Vaya*, *Agni* and *Satmyata* etc.[31] The *Droni* (tub) was filled with lukewarm *Nirgundi-Rasnasaptaka-Dashmula* decoction up to 6 *Angula* (finger breadths) above the umbilicus [32] Thereafter, lukewarm water bath was given to the baby.

iv. ***Shiropichu*** (a special method of oil application on head): Finally, the lukewarm *Jyotishmati* (*Celastrus Paniculatus* Willd) and *Mahanarayna* oil dipped cotton piece, covered by *Eranda Patra* (leaves of *Ricinus Communis Linn*), and were kept over the *Murdha* (*Shirasa* ~ head region) of CP children for 4 hours, twice a day. A swimming cap or comfortably tight bandage was applied to keep the *Pichu* in place and to get the optimum trans-dermal absorption of drugs.

**B. The oral therapy**: Under **Protocol-I,** the following drugs were given to CP patients orally -

i. *Vacha-mula*: It was rubbed 40 times on a stone in 5 ml of cow's milk, along with rubbing of half a piece of wet almond. The product so obtained, was then given mixed with 5 ml of honey to the CP children.

ii. *Samvardhana Ghrita,* a polyherbal formulation, was prepared as per the recommendation of *Kashyapa Samhita* [33] and *Ghrita Paka* method.[34] It contains *Khadria* (root of *Acacia Catechu* Linn), *Prisniparni* (bark of *Uraria Picta* Linn), *Syandana* (*Ougnia Dalbergiodes benth* Linn), *Saindhava* (Rock salt), *Bala* (root of *Sida Cordifolia* Linn), *Atibala* (root of *Abtuilon Indicum* Linn), *Kebuk* (*Costus Speciosus* Linn), *Ksira* (Cow's milk) and *Ghrita* (Cow's butter oil). [35] **Dose:** The dose of *Samvardhana Ghrita* was determined by using the guidelines of *Sharangadhara Samhita*, [36] after converting ancient unit *Ratti* and *Masa* into SI unit (mg & gram). The dose starts from 1 *Ratti* for one-month old child and was gradually increased to 12 *Ratti* for 12-month old child. Thereafter, the dose is increased by one *Masa* (~750 mg) every year, till 16 years of age.

**Protocol-II:** *Abhyanga*, and *Shiropichu* procedures of *Purva-Panchakarma* therapy were given on OPD basis by the attendant, after getting training in IPD. *Samvardhana Ghrita* along with *Vacha-mula* were also given orally as in Protocol-I.

**Protocol-III:** In it, along with *Purvakarma* (*Snehana- Abhyanga* and *Shiropichu*) and *Vacha-mula*, herbo-mineral drugs were also given. Herbo-mineral drugs included *Yogendra Rasa, Khanjanakari Rasa* and *Muktashukti Bhasma*, each in a dose of 4 mg/kg/day, BID, given with honey and given only to the patients of Group IV.

Data of all the registered 48 CP children were categorized into two parts in accordance to their age, < 5 years (n=30) and > 5 years (n=18) with a purpose of observing the response to therapy during or after the period of maximum brain growth, based on different protocols given with or without *Samvardhana Ghrita*.

## RESULTS

Out of 48 randomly selected cases, higher incidence of CP was observed in Hindu community and in male children, as shown in [Table 2].

**Table 2: Distribution of CP cases (n=48) according to age at registration and religion.**

| Age | Religion (n=48) | | Weight (n=48) | | Sex (n=48) | |
|---|---|---|---|---|---|---|
| | Hindu | Muslim | (< 80%) | (> 80%) | Male | Female |
| < 5 years (n=30) | 28 (93.33) [a] | 2 (6.67) | 11 (36.67) | 19 (63.33) | 23 (76.67) | 7 (23.33) |
| >5 years (n=18) | 17 (94.44) | 1 (5.56) | 11 (61.11) | 7 (38.89) | 14 (77.78) | 4 (22.22) |

**a.** Data in parenthesis indicates percentage, except 1st row.

Most of the registered CP cases were preterm (62.50%), delivered by SVD (54.17%) in hospital (85.42%) setup.

Out of 48 registered CP cases, only 35 cases (72.92%) were having the history of perinatal asphyxia, and were associated with meconium stained amniotic fluid (17.14%), cord around the neck (17.14%), neonatal hyperbilirubinemia (8.57%) and neonatal convulsion (8.57%), while perinatal asphyxia was not observed in 9 cases (18.75%). Rest 4 cases (8.33%) were associated with trauma and encephalitis during the perinatal period. 32 (66.67%) mothers were associated with maternal high risk factors like TORCH,

hypothyroidism, PIH, malaria, APH, asthma, prolonged labor, abnormal presentation and leaking which are considered contributory to CP. Hearing and vision disability were observed in 9 (18.75%) and 16 (33.33%) patients, respectively. Incidence of disease like maculopapular rashes, URTI, and UTI were also observed during the predefined therapy in 11% CP children. Incidence of associated neuropathological findings like PVL (periventricular leukomalacia), atrophic changes etc. observed in MRI/CT scan and EEG is projected in [Table 3].

**Table 3: Incidence of Neuropathological changes**

| S.No. | MRI/CT (n=48) | | | EEG (n=48) | | |
|---|---|---|---|---|---|---|
| | Abnormal (n=30) | | Normal (n=18) | Abnormal (n=6) | | Normal (n=42) |
| | Pathological Findings | Incidence | | Pathological Findings | Incidence | |
| 1 | PVL + HIE | 20 (66.67) | (37.50) | Generalized brain dysfunction | 3 (6.25) | (87.50) |
| 2 | Encephalo-malcia | 5 (16.67) | | Epileptic changes | 1 (2.08) | |
| 3 | Atrophic changes | 4 (13.33) | | Slow wave abnormalities | 2 (4.17) | |
| 4 | Ventricular prominence | 1 (3.33) | | - | - | |

Effect of different protocols on speech/language mile stones in CP patients of all groups was assessed after 45 days of therapy, and was observed to be highly significant ($p<0.005$) except in group-IV ($p<0.05$, significant), irrespective to age subdivision [Table 4].

**Table 4: Effect of different therapy protocols on delayed language mile stones (Speech) associated in Cerebral Palsy children (n=48)**

| | Mean ± SD | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | R | F1 | R-F1 | F1 | F2 | F2-F1 | R | F2 | R-F2 |
| Group-1 (n=12) | 40.00 ±36.70 | 56.00 ±39.00 | 16.00 ±21.71 | 56.00 ±39.00 | 79.33 ±57.28 | 23.33 ±23.56 | 40.00 ±36.70 | 79.33 ±57.28 | 39.33 ±39.25 |
| Wilcoxon Signed Ranks test | Z= 2.384 p= 0.017 S | | | Z=2.818 p= 0.005 HS | | | Z= 2.943 p= 0.003 HS | | |
| Group-2 (n=12) | 26.00 ±5.53 | 32.33 ±10.16 | 6.33 ±7.52 | 32.33 ±10.16 | 52.00 ±39.45 | 19.67 ±30.34 | 26.00 ±5.53 | 52.00 ±39.45 | 21.33 ±24.86 |
| Wilcoxon Signed Ranks test | Z= 2.37 p= 0.017 S | | | Z= 2.533 p=0 .011 S | | | Z= 2.943 p= 0.003 HS | | |
| Group-3 (n=12) | 62.00 ±52.92 | 64.33 ±60.17 | 2.00 ±4.67 | 64.33 ±60.17 | 85.33 ±66.04 | 21.50 ±16.47 | 62.00 ±52.92 | 85.33 ±66.04 | 23.33 ±17.04 |
| Wilcoxon Signed Ranks test | Z= 1.890 p= 0.059 NS | | | Z= 2.944 p= 0.003 HS | | | Z= 2.943 p= 0.003 HS | | |
| Group-4 (n=12) | 42.50 ±44.97 | 45.67 ±51.89 | 3.66 ±5.25 | 45.67 ±51.89 | 48.00 ±51.11 | 6.00 ±5.78 | 42.50 ±44.97 | 48.00 ±51.11 | 6.00 ±5.78 |
| Wilcoxon Signed Ranks test | Z= 2.060 p= 0.039 S | | | Z= 2.33 p= 0.020 S | | | Z= 2.546 p=0 .011 S | | |
| Between group comparison Kruskalwallis test | $\chi^2$= 5.964 p=0.113 NS | | | $\chi^2$= 12.243 p=0.007 HS | | | $\chi^2$= 10.641 p= 0.14 NS | | |

**Table 5: Effect of different therapy protocols on delayed language mile stones (Speech) associated in cerebral palsy children less than 5 years of age (n=30).**

| Groups | Mean ± SD | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | R | F1 | R-F1 | F1 | F2 | F2-F1 | R | F2 | R-F2 |
| Group-1 (n=09) | 29.78 ±4.05 | 48.89 ±26.06 | 19.11 ±23.90 | 48.89 ±26.06 | 67.55 ±43.93 | 18.67 ±21.35 | 29.78 ±4.05 | 67.55 ±43.93 | 37.78 ±42.10 |
| Wilcoxon Signed Ranks test | Z= 2.207 p=0.027 S | | | Z= 2.375 p=0.018 S | | | Z=2.536 p= 0.011 S | | |
| Group-2 (n=08) | 24.50 ±4.98 | 30.00 ±10.03 | 5.50 ±6.74 | 30.00 ±10.03 | 40.00 ±27.04 | 10.00 ±17.89 | 24.50 ±4.98 | 40.00 ±27.04 | 15.50 ±23.56 |
| Wilcoxon Signed Ranks test | Z= 2.041 p= 0.041 S | | | Z=1.826 p=0.068 NS | | | Z= 2.388 p=0.017 S | | |
| Group-3 (n=06) | 28.00 ±4.38 | 28.67 ±4.68 | 0.67 ±1.632 | 28.67 ±4.68 | 43.33 ±10.56 | 14.67 ±7.45 | 28.00 ±4.38 | 0.67 ±1.632 | 15.33 ±8.16 |
| Wilcoxon Signed Ranks test | Z= 1.0 p=0.317 NS | | | Z=2.207 p=0.027 S | | | Z=2.214 p=0.027 S | | |
| Group-4 (n=07) | 25.71 ±5.00 | 30.86 ±8.55 | 5.14 ±5.98 | 30.86 ±8.55 | 32.57 ±8.14 | 1.71 ±2.14 | 25.71 ±5.00 | 32.57 ±8.14 | 6.86 ±6.41 |
| Wilcoxon Signed Ranks test | Z=1.841 p=0.066 NS | | | Z=1.732 p=0.083 NS | | | Z=2.041 p=0.041 S | | |
| Between group comparison Kruskalwallis test | $\chi^2$= 5.86 p=0.12 NS | | | $\chi^2$=8.34 p= 0.04 S | | | $\chi^2$= 5.58 p=0.13 NS | | |

**Table 6: Effect of different therapy protocols on delayed language mile stones (Speech) associated in cerebral palsy children more than 5 years of age (n=18)**

| Groups | Mean ± SD | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | R | F1 | R-F1 | F1 | F2 | F2-F1 | R | F2 | R-F2 |
| Group-1 (n=03) | 70.67 ±73.90 | 77.33 ±68.86 | 6.67 ±11.55 | 77.33 ±68.86 | 114.67 ±88.48 | 37.33 ±28.94 | 70.67 ±73.90 | 114.67 ±88.48 | 44.00 ±36.66 |
| Wilcoxon Signed Ranks test | Z=1.000 p=0.317 NS | | | Z=1.604 p= 0.109 NS | | | Z=1.604 p= 0.109 NS | | |
| Group-2 (N=04) | 29.00 ±6.00 | 37.00 ±10.00 | 8.00 ±9.80 | 37.00 ±10.00 | 76.00 ±53.36 | 39.00 ±43.37 | 29.00 ±6.00 | 76.00 ±53.36 | 34.00 ±25.82 |
| Wilcoxon Signed Ranks test | Z=1.342 p=0.160 NS | | | Z=1.841 p=0.066 NS | | | Z=1.826 p=0.068 NS | | |
| Group-3 (N=06) | 96.00 ±73.80 | 100.00 ±69.92 | 4.00 ±6.20 | 100.00 ±69.92 | 127.33 ±72.46 | 28.33 ±20.72 | 96.00 ±73.80 | 127.33 ±72.46 | 31.33 ±20.46 |
| Wilcoxon Signed Ranks test | Z=1.633 p=0.102 NS | | | Z=2.032 p=0.042 S | | | Z=2.032 p=0.042 S | | |
| Group-4 (N=07) | 64.80 ±80.86 | 66.40 ±79.83 | 1.60 ±3.58 | 66.40 ±79.83 | 69.60 ±78.00 | 3.20 ±3.35 | 64.80 ±80.86 | 69.60 ±78.00 | 4.80 ±5.21 |
| Wilcoxon Signed Ranks test | Z= 1.000 p=0.317 NS | | | Z=1.633 p=0.102 NS | | | Z=1.604 p=0.109 NS | | |
| Between group comparison Kruskalwallis test | $\chi^2$=1.348 p=0.718 NS | | | $\chi^2$=7.112 p=0.068 NS | | | $\chi^2$=6.818 p=0.078 NS | | |

## DISCUSSION

Higher incidence of CP in male children (68.75%) and in Hindu community (93.75%) was found, which supports the observation of previous studies. [37, 38, 39] This variation may be attributed to genetic

variation and relatively gender specific awareness difference in these two communities.

Asphyxia at birth was the most common associated cause (72.92%) for the cerebral palsy in the present study, which is nearer to the incidence (68.75%) stated in the previous study. [40]

Out of 48 patients, reports of MRI/CT scan had shown abnormality in 62.50 %. The most common pathology was PVL along with HIE (66.67%) than any other associated abnormality, while EEG findings suggest that only 12.50% CP children were having abnormal neuronal electrical discharges.

The result obtained from data of effect of different therapies on speech/ language developmental delay in CP children, was distributed into two- less than [Table 5] and more than 5 years age [Table 6]. This categorization was based on the fact that major period of brain growth in normal children is up to age of 5 years. At this age, speech is much more mature, and language is essentially completed in structure and form. [41]

However, all therapy protocols, either given with *Samvardhana Ghrita* or not, have good effect in terms of achieving early catch up of language mile stones. But therapy under protocol-I, i.e. given with *Samvardhana Ghrita*, has a relatively better response ($p<0.05$) in children of age < 5 years [Table 5].

This better response of *Samvardhana Ghrita* with *Purva-Panchakarma*, was probably due to *Samyoga Prabhava*, i.e. enhanced action due to combination of various drugs, in addition to the *Samskaranuvartana* and *Yogavahi* properties of butter oil. [42] Its *Yogavahi* property is attributed to the presence of active principles of various drugs in *Samvardhana Ghrita*.

The roots and rhizome of *Vacha* was given with honey to patients of all group. *Vacha* has also been claimed for subsiding neurological symptoms of brain,[43, 44,45] has beneficial effects on memory disorder, [46] and has been shown to improve grasping power, memory, intellect and speech (language milestones).[47] It also improves learning performance, by decreasing brain lipid peroxide content. [48]

It has been proved that use of honey with an *Ayurvedic* medicine can enhance the potency and palatability of drug and decreases its bitterness. [49]

*Shirodhara* and *Abhyanga* also have effect in improving the language development, by improving sensory and motor response. *Mahanarayana* oil, *Bala* oil and *Jyotishmati* oil was used for *Shirodhara* and *Abhyanga* in CP patients. These oils contain lipophilic and hydrophilic active principles of *Vatavyadhinashaka* (*Vata* normalizing) drugs, which may modulate the secretions of various neurotransmitters and hormones in brain.

Simultaneously, specific sensory inputs generated during the *Shirodhara, Abhyanga* and SSPS technique may sensitize the dormant cerebral and cerebellar neurons which are reaching from different sensory routes like ventral and dorsal spinocerebellar tracts. These sensory inputs are produced from specialized receptors and free nerve endings in the skin; from the superficial tissues; from the receptors, such as muscle spindles, Golgi tendon organs, Pacinian corpuscles and free nerve endings in muscles; and from other specified receptors present in the joints. The strokes used in *Abhyanga* viz. kneading and friction, also have effects like a local increase in circulation in the treated area;[50] proper application of pressure during massage can also help in reduction of motor neuron hyperexcitability by reducing the alpha motor neuron activity.[51]

*Shashtika Shali Pinda Sweda* is a *Brimhaniya Snehika* sudation performed by bolus of boiled *Shashtika Shali* (*Oryza Sativa* Linn) with *Vatahara Kwatha* and milk. *Dashamula Kwatha* as *Vatahara Kwatha* for SSPS was used due to its *Kapha-Pitta-Vatahara* properties, [52] while the reason for the use of *Rasanasaptaka kwatha* was its indication (pain in lumbosacral region), *parshwa* (pain in lateral side of vertebral column)-*prishtha* (backache)-*uru-peeda* (pain in thigh region) and ability to alleviate *Saptadhatugata-vata* (normalize the functions of *Vayu* in all the tissues of body). [53] Its main ingredient is *Rasana* (*Pluchea lanceolata* Linn), which is one of the best drug in alleviating *Vata*. [54]

In addition to these decoctions, *Nirgundi* leaves decoction was considered. *Vata* and *Kapha* are the main causative factors for CP and these *Doshas* can be pacified by *Tikta* and *Katu Rasa, Katu Vipaka* and *Ushna Virya* of *Nirgundi*. [55] This in turn minimizes the pathogenesis caused by these *Dosha*, especially when contractures have developed. Anti-inflammatory and pain-suppressing activities, [56] of fresh leaves of *Vitex Negundo*, possibly mediated via inhibition of prostaglandin synthesis, may be attributed to this.

Overall, improvement in language milestones may be attributed to *Yogavahi* property of honey; [57] *Medhya, Hridya, Tridoshashamaka* and *Brumhaniya* property of *Samavardhan Ghrita;* [58] *Vata-Kaphaghna, Srotoshodhaka, Sangyasthapaka, Mati-medha-ayukara* property of *Vacha mula;*[59] as well as the effect of drugs [60, 61, 62, 63] and the technique.[64]

## CONCLUSIONS

Cerebral Palsy is a multi-factorial disease. On the basis of etiology, clinical features and classification; it is considered a *Vata-Vikara* or *Vata-Vyadhi*, occurring as a result of *Shiromarmabhighata*. In this study on CP cases, all therapy protocols, either given with *Samvardhana Ghrita* or not, have good effect in terms of early catch up of speech/language mile stones during 45 days of management; but therapy with protocol-I (with *Samvardhana Ghrita*) has better response on speech or language mile stones in cerebral palsy, especially in patients of age <5 years.

## REFERENCES

1. Stanley F, Blair E, Alberman E. Cerebral palsies: epidemiology and causal pathways. Clinics in Developmental Medicineno. 151 MacKeith Press, London 2000; p 98–108.
2. Vyas AG, Kori VK, S Rajagopala, and Patel KS. Etiopathological study on cerebral palsy and its management by *Shashtika Shali Pinda Sweda* and *Samvardhana Ghrita*. *Ayu* 2013; 34(1): 56-61.

3. cdc.gov [homepage on the internet]. Atlanta: Center for Disease Control and Prevention, [Last updated 2012Sep7;accessed on 2013 Jan 22].Avail from: http://www.cdc.gov/ncbddd/cp/index.htm.
4. Shailaja U, Jain CM, Ayurvedic approach towards cerebral palsy Ayu 2009; 30(2):158-163.
5. Bass N. Cerebral palsy and neurodegenerative disease Curr opin Pediatar1999;8047.http://dx.doi.org/10.1097 1000 8480-199912000-00005.
6. Rightdiagnosis.com [homepage on the Internet]. Health Grades Inc.;c2011.Availablefrom: http//www.rightdiagnosis.com/c/cerebral_palsy/stats-country.htm [updated 2009 Apr 15; Accessed on 2013 Jan 22]
7. Kurubar AD, Munnoli BT, Vijay kumar.D. Arbar Aziz, Patil Amol. Role of Matra Basti (Enema) over Abhyanga (Massage) and Sweda (Sudation in reducing Spasticity in Cerebral Palsy with Shuddha Bala Taila-A. Randomized Comparative Clinical Study. Int. J. Ayur. Pharma Research 2014; 2(2): 47-52.
8. MedIndia [homepage on the Internet]. Kathy Jones: Incidence of Cerebral Palsy Remains Constant in India on Indian Health News, Inc.; c1997-2013 [updated 2010 Oct 04; Accessed on 2013 Jan 22]. Available from: http://www.medindia.net/news/Incidence-of-Cerebral-Palsy-Remains-Constant-in-India-74912-1.htm.
9. Shailaja U, Jain CM. Ayurvedic approach towards Cerebral Palsy. Ayu 2009; 30(20):158-163.
10. Sharma RK, Das B. Charaka Samhita, Shidhisthan; Tri-Marmiya-Shidhim: Chapter- 9, Verse 6. Varanasi: Chowkhamba Sanskrit Series 2015; p.329. thana;
11. Murthy S KR. Sushruta Samhita, Chikitsa Sthana; Vatavyadhi cikitsia: Chapter 4, verse 21; Varanasi Chaukhambha Orientalia 2014; p 59.
12. Sharma PH, Rajaguru. Kashyapa Samhita or Vrddhajivakiya Tantara, Sutra Sthana; Leha-Adhyaya: Chapter 18 verse 35-36, Sthana; Varanasi: Chaukhambha Sanskrit Sansthan 2015; p 6.
13. Ibidem (12) Kashyap Samhita or Vrddhajivakiya Tantara, Sutra Sthana; Leha-Adhyaya: Chapter 18, verse 35-36; p 6.
14. Gupta P. Clinical methods in Pediatrics editor, (3rd ed.). Developmental assessment 2014; p 110-114.
15. Ibidem(12) Kashyap Samhita or Vrddhajivakiya Tantara, Khila-sthana; Bheshjiyoupkrmniya:Chapter 3,verse 115-116; p. 248-249.
16. Ibidem (10) Charaka Samhita, Chikitshya-Sthana; Younivyapata: Chapter 30, verse 282, 284; p 198.
17. Ibidem (10) Charaka Samhita, Shidhi-Sthana; Panchkrmiyam Shidhi: Chapter 2, verse, 26; p 203.
18. Ibidem (12) Kashyap Samhita or Vrddhajivakiya Tantra, Sutra-Sthana; Sneha-adhaiyam: Chapter 22, verse 24; p 28.
19. Ibidem (12) Kashyap Samhita or Vrddhajivakiya Tantra, Sutra-Sthana; Sneha-adhaiyam: Chapter 22, verse 36; p 31.
20. Ibidem (10) Charaka Samhita, Sutara Sthana; Sneha adhaiyam: Chapter 13, verse 60; p 259.
21. Klein PD, James WPT, Wong et al. Calorimetric validation of the doubly labelled water method for determination of energy requirement in man. Hum Nutr Clin Nutr 1984; 35:95-106.
22. Ibidem (12) Kashyap Samhita or Vrddhajivakiya Tantara, Sutra-Sthana; Sneha adhaiyam: Chapter 22, verse 36; p 31.
23. Gupta Shilpy, Upadhyay PS, Singh BM. Role of Purva karma in management of cerebral palsy due to brain insult. Wjpr.net 2015; 4(3):1179-1188.
24. Kasture SD. Ayurvediya Panchkarama Vigayanam, Chapter 2, Shri Viadhiya nath Ayurveda bhavan limited 2011; p 95.
25. Shrinivasa G. Panchakarma illustrated, Sharirabhyanga, Delhi Chaukhamba Sanskrit Pratishthan, 2009, 2013; p 124.
26. Ibidem(10) Charaka Samhita, Shidhi-Sthana; Uttarbasti Shidhi: Chapter 12, verse 11; Varanasi: p 399.
27. Murthy S KR (10th ed.). Astanga Hridayam of Vaghbhata. Sutrasthan; Gandusadi vidhi:Chapter 22, verse 23; Varanasi: Chaukhamba Krishnadas, academy, 2014; p 273.
28. Lavekar GS. A Practical hand book of *Panchkarama* procedures; New Delhi, CCRAS, 2009; p. 64.
29. Ibidem (24) *Ayurvediya panchkarama vigayanam*, chapter 2; p. 83.
30. Ibidem (10) Charaka Samhita, Sutra Sthana; Sneha Adhyaya: Chapter 13, verse 58; p 258.
31. Ibidem (10) Charaka Samhita, Sutra Sthana; Upkalpaniya Adhyaya: Chapter15, verse 5; p 287.
32. Sitaram B, Chunekar KC. Bhavprakasha of Bhavamishra (1sted,) Purvakhand, part-II. Dhumapana vidhi: Chapter 7(VI), verse 71; Varanasi: Chaukhambha Orientalia, 2006; p 646.
33. Ibidem (12) Kashyap Samhita or Vrddhajivakiya Tantara, Sutra S Leha-Adhyaya: Chapter 18 verse 35-36; p 6.
34. Tripathi B. Editor. Sharngadhara-Samhita, Madhyam Khand; Sneh-PakaVidhi: Chapter 9, verse1; Varanasi: Chaukhamba Sanskrit prakashan 2006; p 218.
35. Ibidem (12) Kashyapa Samhita or Vrddhajivakiya Tantara, Sutra Leha-Adhyaya: Chapter 18, verse 35-36; p 6.
36. Ibidem (34) Sarngadhara Samhita, Purvakhand; Aharaadhigatikathanama: Chapter 6, verse 49-50; p 84.
37. Ghuse R, Vhora M, Patel KS, Kori VK, S Rajagopala. *Shashtika Shali Pinda Sweda* in the Management of Child Cerebral Palsy Spasticity. Joinsysmed vol 2015: 3(1):23-29.
38. Choudhary K, Sheokand A.Aclinical Study to evaluate role of Ayurvedic treatment for management of Cerebral Palsy in Children W.S.R to Gross motor function classification system. International Ayurvedic medical journal. 2014: 2(3):328-336.
39. Shailaja U, Rao Prasanna N, Arun Raj GR. Clinical Study on the efficacy of Samvardhana ghrita orally and by matra-basti in motor disabilities of cerebral palsy in children, Int. J. Res. Ayurveda pharm. 2013:4 (3):373-377.
40. Vyas AG, Kori VK, Rajagopala S and Patel KS. Etiopathological study on cerebral palsy and its management by *Shashtika Shali Pinda Sweda* and *Samvardhana Ghrita.Ayu* Jan- Mar 2013; 34(1): 56-61.
41. Ibidem (14) Clinical methods in Pediatrics. Developmental assessment 2014; p 117.

42.Ibidem (10) Charaka Samhita, Sutra Sthana; Sneha adhyaya: Chapter-13, verse 13; p 247.

43.Howes, M.R. Plants used in Chinese and Indian traditional medicine for improvement of memory and cognitive function. Houghton. Pharmacology Biochemistry and Behavior. P.J., 2003; 75, 513–27.50.

44.Sala AV, Warrier PK, Nambiar VP, Ramankutty C. Indian Medicinal Plants: A Compendium of 500 Species, 1. Sangam Books Limited, London. 1993.

45.Hou JP, Jin Y. The Healing Power of Chinese. Herbs and Medicinal Recipes. The Haworth Integrative Healing Press, Binghampton, New York. 2005.

46.Mukherjee PK, Wahile A. Integrated approaches towards drug development of Ayurveda and other Indian system of medicines. J Ethnopharmacol 2006; 103: 25–35.

47.Vihra S, Shah S. and Dandiya P: Central nervous system studies on an ethanol extract of Acorus calemus rhizomes, J. Ethnopharmacol 1990; 28: 53-62.

48. Manikandan S, Srikumar R, Jeya PN, Sheela DR. Protective effect of Acorus calamus Linn on free radical scavengers and lipid peroxidation in discrete regions of brain against noise stress exposed rat. Bio Pharma Bull 2005; 28: 2327-30.

49.Gupta P, Tripathi A, Agrawal T, Narayan C, Singh BM, Kumar M, et al. Synergistic Experimental Biology 2016; 54: 530-536.

50.Ghuse R, Vhora M, Patel KS, Kori VK, S Rajagopala. *Shashtika Shali Pinda Sweda* in the Management of Child Cerebral Palsy Spasticity. Joinsysmed 2013; 3(1): 23-29.

51.Reif MH, Field T, Largie S, Diego M, Manigat N, Seoanes J, et al. Cerebral palsy symptoms in children decreased following massage therapy, Early Child Development and Care 2005; p. 445–456.

52.Ibidem (11) Sushruta Samhita, Sutra Sthana; Dravyasangrahaniya adhyaya: Chapter 38, verse 71; p 274.

53.Ibidem (34) Sarngadhara-Samhita , Madhyam khand , Kwathaadhi kalapna: Chapter 2, verse 86-87; p 146.

54.Ibidem (10) Charaka Samhita, Sutra Sthana; Yjagyapuruishiya Adhyaya: Chapter 25, verse 40; p 425.

55.Sharma PV. Dravyaguna Vijnana,Vedanasthapana: Chapter1; Varanasi: Chaukhambha bharati academy, 2009; p 67.

56.Dharmasiri JR, Jayakody AC, Galhena G, Liyanage SSP, Ratnasooriya WD. J Ethnopharmacol. 2003;87:199-206. [PubMed]

57.Ibidem (32) Bhavprakasha of Bhavamishra, Purvakhand, Misra Prakarana: Chapter 6, verse 237; p 126.

58.Shailaja U, Jain CM, Ayurvedic approach towards cerebral palsy Ayu 2009; 30(2): 158-163.

59.Tripathi I. Raj Nighantu, *Pipplyadivarga*: Varanasi: Chowkhamba Krishnadas academy 2010; p 144.

60.Ibidem (11) Sushruta Samhita, Sutra Sthana; Dravyasangrahaniya adhyaya: Chapter 38, verse 71; p 274.

61.Ibidem (34) Sarngadhara-Samhita , Madhyam khand , Kwathaadhi kalapna: Chapter 2, verse 86-87; p 146.

62.Ibidem (55) Dravyaguna Vijnana,Vedanasthapana: Chapter1; p 67.

63.Dharmasiri JR, Jayakody AC, Galhena G, Liyanage SSP, Ratnasooriya WD. J Ethnopharmacol.2003;87:199–206. [PubMed]

64.Ghuse R, Vhora M, Patel KS, Kori VK, S Rajagopala. *Shashtika Shali Pinda Sweda* in the Management of Child Cerebral Palsy Spasticity. Joinsysmed vol 3(1): 23-29.

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