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Clinical study on the efficacy of *Rajayapana Basti* and *Baladi Yoga* in motor disabilities of cerebral palsy in children

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Abstract

Background: Cerebral palsy is a static encephalopathy that may be defined as a non-progressive disorder of posture and movement often associated with epilepsy and abnormalities in speech, vision and intellect resulting from a defect or lesion of the developing brain. There are 25 lakhs cerebral palsy affected children in India. **Aim:** To assess the efficacy of *Rajayapana Basti* (RB) and *Baladi Yoga* in motor disabilities of cerebral palsy in children. **Materials and Methods:** Total 98 children satisfying diagnostic criteria and between the age group of 2-10 years were included and randomly divided into two groups. In RB with *Baladi* group (*n* = 40) patients were treated with *Mustadi Rajayapana Basti* for 8 days, followed by oral administration of *Baladi Yoga* with honey and ghee for 60 days. Before administering *Basti,* patients were subjected to *Sarvanga Abhyanga* and *Sastikashali Pinda Sveda*. In the control group (*n* = 40), patients were given tablets of *Godhuma Choorna* for 60 days. Before administering the placebo tablet, the patients of the control group were given *Sarvanga Abhyanga* and *Sastikashali Pinda Sveda* for 8 days. The patients of the control group were given *Basti* with lukewarm water for 8 days. **Results:** RB group has shown improvements in understanding ability (13.43%), speech (10%) and performance skill (11.11%), in fine motor functions such as putting small object in to a container (14.3%), throws the ball in all direction (21.8%), use of thumb and index finger (10.93%), retaining 2 inch cube in fist (19.04%), folds paper and inserts into envelope (10.30%), in gross motor functions such as in crawling (26.7%), sitting (31.7%), standing (13.75%), walking (9.5%) and claps hands (13.9%) respectively. **Conclusion:** *Mustadi* RB along with *Baladi Yoga* provided a significant improvement in all the parameters and has promising result in managing motor disabilities of cerebral palsy in children.

Key words: *Baladi Yoga*, cerebral palsy, children, motor disabilities, *Rajayapana Basti*

Introduction

Cerebral palsy is the second commonest cause of disability in children next to poliomyelitis.[1] Cerebral palsy is a static encephalopathy that may be defined as a non-progressive disorder of posture and movement often associated with epilepsy and abnormalities in speech, vision and intellect resulting from a defect or lesion of the developing brain.[2] The prevalence of cerebral palsy among children is 2/1000 live births.[3-5] There are 25 lakhs cerebral palsy affected children in India.[6] The World Health Organization estimates that about 10% of the population have some form of disability.[7] Statistics from a different source indicates that 3.8% of the population has some form of disability in India.[8] Nearly 15-20% of total physical handicapped children suffer from cerebral palsy.[2]

Cerebral palsy n Ayurveda can be considered as *Shiro-Marmabhigathaja Bala Vata Vyadhi*, which may manifest itself in any of the following main clinical presentations such as spastic monoplegia (*Ekanga Roga*), hemiplegia (*Pakshavadha*), spastic diplegia (*Pangu*), spastic quadriplegia (*Sarvanga Roga*), choreoathetoid (*Vepathu*) and ataxia, which are described under *Vata Vyadhi* in the texts.[2] In Ayurvedic classics while describing *Shiromarmabhighata*, there is mentioning of diseases of *Vata* such as *Chesta-nasha*, *Gadgada* and *Sadata* including mental impairment.[9] *Basti Karma* is the best treatment in the management of *Vata Vyadhi*. *Basti Chikitsa* is also better treatment for disorders of *Marmas*-"*Bastikarmam Samam Nasti Kinchit Karma Marmaparipalanam.*"[10] *Basti* is advised for both children and aged persons, which is excellent both for the elimination of *Doshas* and nourishment of the body.

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This *Basti* therapy instantaneously promotes *Bala* (strength), *Varna* (complexion), *Harsha* (sense of exhilaration), *Mardavatva* (tenderness) and *Snehana* (unctuousness) of the body.[11] Hence, in the present study, *Mustadi Rajayapana Basti* (RB) followed by internal administration of *Baladi Yoga* was selected, which is having *Vatahara* and *Sadyobalajanana* properties. The objective of this study is to assess the efficacy of RB and *Baladi Yoga* in motor disabilities of cerebral palsy in children in comparison to control group.

Materials and Methods

Method of collection of data

Source of data

Patients were selected successively from the Out-patient and In-patient Department of Kaumarabhritya, SDM College of Ayurveda and Hospital, Hassan. Ethics clearance was obtained from Institutional Ethics Committee (dated 20-12-2005).

Inclusion criteria

The patients of cerebral palsy with mild to moderate physical disability within 2-10 years of age group were selected.

Exclusion criteria

Patients of cerebral palsy below 2 years and above 10 years with severe physical disability were excluded.

Research design

The study was an open labeled randomized, controlled clinical trial at inpatient level conducted in a tertiary Ayurveda Teaching Hospital located in district head quarter in Southern India. In the present clinical study, a total of 98 children with cerebral palsy were registered, out of which 46 patients were registered in treated (RB) group and 52 patients in the control group. 40 patients were completed the course in each group.

Treated (RB) group

Patients were given *Mustadi Rajayapana Basti*,[12] as per convention, before administration of *Basti*, the patients were subjected to *Sarvanga Abhyanga* with *Tila* (*Sesamum indicum*) *Taila* (oil) and *Svedana* (fomentation) with *Shastika Shali Pinda Sveda* (for about 45 min) as per classical method. Thereafter the *Mustadi* RB[13] (luke warm) was given in the morning on an empty stomach once a day for 8 days. The methods of administration and after care were adopted as per the textual guidelines. Quantity of *Mustadi* RB *Dravya* was fixed on the basis of age and was gently pushed into the rectum with a plastic syringe and catheter while patient is lying down in left lateral position with their right thigh pressed over abdomen. Then the patient was asked to lie on supine posture and gentle tapping was made over buttocks. The patient was advised to retain the material as long as possible and lie on the bed. Course of *Basti* treatment was followed by oral administration of *Baladi Yoga* in a dose of 1 g twice a day for 60 days with ghee and honey after food.

Control group

The patients were subjected to *Sarvanga Abhyanga* with *Bala Taila* and *Svedana* with *Shastika Shali Pinda Sweda* as per classical method for 8 days. This was followed by administration of placebo tablets of *Godhuma Choorna* (2 g, i.e. 4 tablets/day, each 500 mg) for next 60 days.

Table 1: The ingredients of *Baladi Yoga* along with the quantity of each

Ingredient	Botanical name/ English name	Proportion
Bala	*Sida cordifolia* Linn.	16 parts
Prasarani	*Merremia tridentate* (Linn.) Haller.f.	16 parts
Eranda Mula	*Ricinus communis* Linn.	8 parts
Ashvagandha	*Withania somnifera* (L.) Dunal	8 parts
Lasuna	*Allium sativum* Linn.	2 parts
Kharpara	Calamine (Zinc ore)	1 part
Shuddha Mandura	Dros iron/sludge iron	1 part
Abhraka Bhasma	Mica (biotite)	1/2 part

Method of preparation of Baladi Yoga

Ingredients of *Baladi Yoga* are depicted in Table 1. Raw drugs were obtained from genuine sources in the market and the medicine was prepared in Teaching Pharmacy of the institute. The drugs such as *Bala* (*Sida cordifolia* Linn.), *Prasarani* (*Merremia tridentate* (Linn.) Haller.f.), *Eranda Mula* (*Ricinus communis* Linn.), *Ashvagandha* (*Withania somnifera* (L.) Dunal), *Lasuna* (*Allium sativum* Linn.), *Kharpara* (calamine), *Shuddha Mandura* (dros iron/sludge iron) and *Abhraka Bhasma* (biotite) are powdered and later made three *Bhavana* (impregnation) each with *Kumari* (*Aloe barbedensis* Miller.) *Swarasa* (juice) and *Mandukaparni* (*Centella asiatica* Linn.) *Swarasa*. After the *Bhavana* is over, the material is dried and sieved and later collected and packed in 120 g per bottle.

Investigations

- Routine blood, urine and stool examination for assessing the present status of health as well as to exclude other pathology
- CT scan, EEG, ECG, MRI, CSF test etc., test to exclude other pathology if necessary.

Assessment criteria

The assessment criteria[14] as per depicted in Table 2.

Observations

Age wise distribution of registered subjects shows that 59.18% (n = 58) were in 2-4 years age group, 34.69% (n = 34) were in 5-7 years age group and 6.12% (n = 6) were in 8-10 years group. Sex wise distribution showed that 59.18% (n = 58) were males and 40.82% (n = 40) were females. The religion based distribution showed that 90.9% (n = 91) of the children were Hindus and 9.1% (n = 7) were Muslims. The socio-economic status based distribution showed that 35.7% (n = 35) belonged to poor socio-economic status while 64.2% (n = 63) belonged to middle class. 36.8% (n = 36) were having the history of consanguinity. Distribution on the pre-conception status of mother showed that 8.16% (n = 8) had a spontaneous abortion, 2.04% (n = 2) done D and C, 2.04% (n = 2) used I.U.C.D, 33.67% (n = 33) used oral contraceptives and 54.08% (n = 53) were without any above complaints. Observation on mother's health status during pregnancy showed

Table 2: Assessment criteria of cerebral palsy

Domain	Criteria	Grade
Gross motor		
Crawls a distance of 5 feet or more	Not at all does	3
Sitting	Can do with support	2
Standing	Can do without support	1
Walk for minimum 5-10 steps	Can do independently	0
Claps hands		
Fine motor		
Puts small object in to a container	Not does at all	2
Throws ball in any direction	Does with help	1
Uses thumb and index figure		0
Retains 2 one inch cubes in one hand for 30 s	Does independently	
Folds paper and insert in to envelope		
Language		
A. Ability to understand for verbal commands	No response	3
	Turns face but not understanding	2
	Understands but not acting according	1
	Understands and acts accordingly	0
B. Speech	No speech and sound	4
	Pronounce sound without meaning	3
	Pronounce some words with meaning	2
	Making not well formed sentences	1
	Well-formed sentences	0
Performance		
Making a triangle between three points	Cannot draw at all	2
	Can meet 2 points, not triangle	1
	Can draw triangle	0

that 54.08% (n = 53) mothers were healthy, 12.2% (n = 12) were with pre-eclampsia (PET), 9.2% (n = 9) were with pregnancy induced hypertension (PIH), 18.4% (n = 18) were with anemia and 6.12% (n = 6) were with fever. Observation on *Garbinicharya* (antenatal care) of the mother showed that 44.9% (n = 44) were taken proper ante-natal care and 55.10% (n = 54) were taken improper ante natal care.

Observation of maturity at birth showed that 62.2% (n = 34) patients were full term, 34.7% (n = 16) were premature and 3.1% (n = 3) were postmature. Observation on the mode of delivery of the mother showed that 80.6% (n = 79) were delivered normally, 13.3% (n = 13) were by lower segment Cesarean section and 6.1% (n = 6) by instrumental application. Observation on birth asphyxia (delayed cry) of child showed that 45.92% (n = 45) were presented with delayed birth cry and remaining 54.08% (n = 53) had a normal birth cry. Observation of birth weight of patients showed that 57.14% (n = 56) were having a normal birth weight and 42.86 (n = 42) were having low birth weight. Observation on incubation required showed that 40.8% (n = 40) children were kept in the incubator, while remaining 59.9% (n = 58) children did not need incubation. Observation on head circumference at birth showed that 57.1% (n = 56) patients were with normocephaly, nearly 41.8% (n = 41) patients with microcephaly and remaining 1.1% (n = 1) patients with macrocephaly. Observation on the history of infantile illness of the patients showed that 12.24% (n = 12) were with a history of neonatal jaundice, 4.1% (n = 4) with the meningoencephalitis, 1.1% (n = 1) with tubercular meningitis, 6.1% (n = 6) with gastro-enteritis, 1.1% (n = 1) with post-vaccine encephalitis, 1.1% (n = 1) with cardiac illness and 74.5% (n = 73) with no specific history. Observation on immunization status of patients showed that 86.7% (n = 85) were taken in full course of immunization in proper time while 13.3% (n = 13) were taken, but not in the proper course. Distribution of patients according to the types of cerebral palsy showed that 21.4% (n = 21) were of spastic hemiplegic, 77.6% (n = 76) were spastic diplegic and 1% (n = 1) were spastic monoplegic.

Results

Effect of therapies on language and performance

The effect of therapy on the ability to understand was 13.43% and 1% respectively in RB group and control group respectively ($P < 0.001$). The effect of therapy on speech shows 10% and 2% improvement respectively in RB group and control group ($P < 0.001$). The performance skill was improved by 11.11% and 3% in RB group and control group respectively ($P < 0.001$).

Effect of therapies in fine motor function

The effect of therapy on fine motor function of the RB group shows improvement of 14.3%, 21.8%, 10.93%, 19.04%, 10.30% in characteristics such as putting small object in a container,

throws the ball in all direction, uses thumb and index finger, retain 2 one inch cube in fist, folds paper inserts into envelope respectively ($P < 0.001$ except first character). The control therapy group, fine motor functions such as putting small objects in container, throws the ball in all direction, uses thumb and index finger, retain 2 one inch cube in the first fold paper and inserts in the envelope with have shown improvement of 2%, 6%, 0%, 4%, 0% respectively ($P < 0.001$).

Effect of therapies in gross motor function

RB group provided significance of $P < 0.001$ in all the characteristics of gross motor with improvement of 26.7%, 31.7%, 13.75%, 9.5% and 13.9% in crawling, sitting, standing, walking, and claps hands respectively. The effect of control therapy on gross motor with characteristics such as crawling, sitting, standing, walking, claps hands shows improvement of 5%, 4%, 0%, 1%, 4% receptively ($P < 0.001$).

The overall improvement of both RB group and control group is shown in Table 3. The overall effect of therapies on both RB group and control group is shown in Table 4.

Discussion

Effect of therapies

The language and performance of the patients were assessed before and after treatment. The effect of therapy on the ability to understand was found comparatively higher in RB group (13.43%) than the control group (1%). The effect of therapy on speech was found comparatively higher in RB group (10%) than the control group (2%). The effect of therapy on performance skill was better in RB group (11.11%) than the control group (3%).

Overall assessment of motor activity and co-ordination skills was assessed by way of the performance skill test conducted. RB group showed better result due to the improved inherent action of alleviation of *Vata* by *Basti*. All the above results are statistically significant ($P < 0.001$). Thus, it can be inferred beyond doubt that *Mustadi* RB and *Baladi Yoga* provided better improvement on the language learning and performance skills of children suffering with cerebral palsy.

Table 3: Overall improvement of both RB group and control group

Assessment criteria	Study group - % improvement	Control therapy - % improvement
Gross motor	19.11	2.8
Fine motor	15.29	2.4
Language	11.72	1.5
Performance	11.11	3

RB: *Rajayapana Basti*

Table 4: Overall effect of both RB group and control group

Overall effect	Study group		Control therapy	
	No. of patients	%	No. of patients	%
Complete cure (100%)	-	-	-	-
Marked relief (>50% - <100%)	-	-	-	-
Moderate response (>25% - <50%)	3	7.5	-	-
Mild response (<25%)	37	92.5	17	42
No response (0%)	-	-	23	58

RB: *Rajayapana Basti*

The fine motor functions were assessed under different characteristics and have showed comparatively better improvement in *Basti* group. The *Mustadi* RB and *Baladi Yoga* therapy provided highly significant ($P < 0.001$) improvement in ability of putting small objects in a container by 14.3%, in throwing ball in all directions by 21.8%, in use of thumb and index finger by 10.99%, in retaining 2 one inches cubes by 19.04% and in folding paper and inserting it into envelope by 10.3%. Although the control therapy provided improvement in throwing the ball in different directions by 6%, in retaining the one inch cubes by 4% and in putting the small objects in a container by 2%. The control therapy showed no effect on using the thumb and index finger and folding the paper and then inserting it in an envelope. All these effects were also statistically insignificant. It is obvious from the foregoing discussions that *Mustadi* RB and *Baladi Yoga* provided better improvement in fine motor functions than the control group.

On the parameters of gross motor functions, *Mustadi* RB and *Baladi Yoga* therapy provided 30.85% improvement in sitting, 26.7% improvement in crawling, 13.9% improvement in hand clapping, 13.75% improvement in standing and 9.5% improvement in walking ($P < 0.001$). On the other hand, the control group provided 5% improvement in crawling, 4% in ability of sitting and clapping hands and 1% in ability to walk. However, it provided no improvement in ability to stand. However, all these effects of control therapy were statistically insignificant.

It is evident from the above description that *Mustadi* RB and *Baladi Yoga* provided better improvement in gross motor functions, fine motor function and language and performance skill in comparison to the control group.

Mode of action of therapies

Cerebral palsy is *Vata Vyadhi*, characterized by *Dhatu Kshaya Lakshanas* with manifestation of vitiated *Vata* and its disorders. Therefore, the therapies having *Brumhana and Balya* properties were selected for this study, which include *Mustadi* RB and oral administration of *Baladi Yoga*. Further as *Poorvakarma* of *Basti*, *Abyanga* with *Moorchita Tila Taila* and *Shashstikashali Pinda Svedana* were also carried out. In this way the beneficial effects shown by the therapy are all due to the specific treatment modalities selected for the study.

Action of *Abhyanga* and *Shashtikashali Pinda Sveda*

Skin is considered as the main abode of *Vata* along with *Pakvashaya*.[15] As *Abhyanga* and *Shashtikashali Pinda Sveda* involve cutaneous manipulation, it is considered as one of the prime procedures for mitigating *Vata*.[16,17] These modalities of external therapy may act by dermal mechanisms of drug absorption and action. Primarily it acts by two mechanisms *viz*., local and central. The local mechanisms include cutaneous stimulation causing the arterioles to dilate and thereby achieving more circulation. It also assists venous and lymphatic drains. This state of hyper circulation also enhances the transdermal drug absorption and assimilation. Massage

causes movement of the muscles thereby accelerating the blood supply, which in turn helps in relieving the muscular fatigue and reduces stiffness. Skin is an organ with rich sensory nerve endings, which on stimulation gives abundant sensory inputs to the cortical and other centers in CNS. This fact was exploited since thousands of years for stimulation of higher centers of central nervous system, which is evident when it is referred that *Snehana* and *Svedana* are the prime mode of treatment in treating neurological conditions.[15]

Effect of *Mustadi* RB

Basti is considered to be the best treatment to normalize the *Vata Dosha*[18] which is mainly involved in this condition. Moreover, the *Yapana Basti* are having *Rasayana* effect and can be administered for longer duration without any adverse effects. With the advancement of modern science, a new nervous system of abdomen has been discovered, which is named as enteric nervous system (ENS) and is called as the mini brain.[19] Though nothing about the relation between ENS and *Basti* therapy is known until date, the same is supposed to work in diseases of central nervous system like cerebral palsy. The ingredient drugs of *Mustadi* RB have predominant *Vatahara* and *Rasayana* properties. Hence *Mustadi* RB being a type of *Niruha Basti*, does the *Shodhana* as well as it gives strength to the patient. Govindadasa affirms the role of *Rasayana* in the *Mastishkakshaya*.[20] According to his opinion, *Rasayana* is the last resort for the patients of *Mastishka Vridhhi* and *Rasapradoshaja*.[21] RB performs all these functions by alleviating *Vata*. Charaka observes "*Sadyo-Balajanana*" (improves the strength quickly) as the unique quality of *Rajayapana*.[21] *Bala* is a multifaceted phenomenon that depends upon *Udana Vayu*,[23] *Agni*,[24] *and Kapha*.[25] As the *Vata* is *Shighrakari* (quick in action) and formation of fresh *Rasadhatu* takes place daily, the "*Sadyo-Balajanana*" effect of *Rajayapana* is attributed to improved functions of *Udana Vayu* and enrichment in the qualities of *Rasadhatu*.

Effect of *Baladi Yoga*

Baladi Yoga is formulated by including certain *Vatahara* drugs along with consideration of properties such as *Rasayana*, *Medhya*, *Brumhana*, which are necessary to improve the ability in children of cerebral palsy. *Bala* and *Ashvagandha* along with its *Vatahara* property have *Brumhana*, *Balya* and *Dhathuvardhaka* property. *Ashvangandha* is also having anticonvulsant, antistress and CNS depressant action might have helped in reducing the muscular spasm and abnormal movement.[26] *Prasarini* and *Erandamula* are *Vatanulomaka* and in addition possess *Vrishya* and *Balya* properties. *Lashuna* in addition to its *Vatahara* action has *Deepana* property, which may help in enhancing the digestion and assimilation in the gut. Because of *Ushna* and *Teekshna* properties it also helps in stimulating the sensory and motor functions by relieving muscular spasticity. *Jadatwa* seen in cerebral palsy can be reduced by its *Rajasika guna*. *Abhraka* is having *Deepana*, *Pachana*, *Balya*, *Rasayana*, *Dhatuvivardhana*, *Shareeradhardyakara*, *Prajnabodhi*, *Varnya*, *Netrya*, *Medya*, *Stairya* and *Smrithikara* actions, helps in the improvement of sensory and motor functions which are impaired in the cerebral palsy. *Kharpara* contains zinc which helps for regeneration of nervous cell and *Shuddha Mandura* helps in correction of *Pandu* and also helps in health promotion.[27] Because of *Rasayana*, *Balya* and *Brumhana* properties, *Bhavana* with *Kumari Swarasa* has been given in most of the *Rasa Yogas* mentioned for *Vata Vyadhi*. *Mandukaparni Kwatha* is also used in *Bhavana* for imbibing its *Medhya* property which helps in neuronal regeneration and helps improvement in mental faculties.[28] The drugs like *Bala*, *Eranda Mula*, *Ashvagandha*, *Kumari* and *Mandukaparni* which are made use in *Baladi Yoga* are having imunomodulatory action, which improves the immunity.[29-34]

Due to all the properties mentioned above of the various ingredients of the therapy, along with *Mustadi* RB it has provided significant improvement in the daily activities, gross and fine motor functions, language and performance skill. Thus, the results of this clinical study are very encouraging and glimpse a ray of hope for the crippled children to get a remedy for their improvement through Ayurveda.

Conclusion

Rajayapana Basti along with oral administration of *Baladi Yoga* has definitely improved in gross motor functions, fine motor function and language and performance skill. Thus children can be helped by this treatment protocol to develop self-sustainability. However, it appears that, if training and physiotherapy is coupled with the present therapy, it might give better improvement since stimulation always leads to improvement.

References

1. The facts of cerebral palsy. USA: When there's hope. Available from: http://www.cpinfo.org/facts/. [Last cited on 2013 Mar 12].
2. Shailaja U, Jain CM. Ayurvedic approach towards cerebral palsy. AYU 2009;30:158-63.
3. Bax M, Goldstein M, Rosenbaum P, Leviton A, Paneth N, Dan B, *et al.* Proposed definition and classification of cerebral palsy, April 2005. Dev Med Child Neurol 2005;47:571-6.
4. Odding E, Roebroeck ME, Stam HJ. The epidemiology of cerebral palsy: Incidence, impairments and risk factors. Disabil Rehabil 2006;28:183-91.
5. Nair MK, Pejaver RK. Child Development 2000 and Beyond. Bangalore: Prism Books Pvt. Ltd.; 2000. pp. 9.
6. Anjaiah B. Clinical Pediatrics. 3rd ed. Hyderabad: Paras Medical Publisher; 2006. pp. 230.
7. Boyle CA, Yeargin-Allsopp M, Doernberg NS, Holmgreen P, Murphy CC, Schendel DE. Prevalence of selected developmental disabilities in children 3-10 years of age: The Metropolitan Atlanta Developmental Disabilities Surveillance Program, 1991. MMWR CDC Surveill Summ 1996;45:1-14.
8. Nair MK, George B, Padmamohan J, Sunitha RM, Resmi VR, Prasanna GL, *et al.* Developmental delay and disability among under – 5 children in a rural ICDS block. Indian Pediatr 2009;46 Suppl: s75-8.
9. Agnivesha, Charaka, Dridhabala, Charaka Samhita, Siddhi Sthana, Trimarmeeyam Siddhim Adhyaya, 9/6, translated by Sharma RK and Bhagwan Dash, Vol. 2, Reprint. ed. Chaukhambha Sanskrit Series Office, Varanasi; 2012. p. 329.
10. Ibidem. Charaka Samhita, Siddhim Sthana, Trimarmeeyam Siddhim Adhyaya, 9/7, Vol. 6; 330.
11. Ibidem. Charaka Samhita, Siddhi Sthana, Basti Siddhim Adhyaya, 10/8, Vol. 6; 367.
12. Sushruta. Sushruta Samhita, Chikitsa Sthana, Niruha Krama Chikitsitham, 38/96-101, translated by Srikantha Murthy KR, Shastri KA, Vol. 2, Reprint. ed. Chaukhambha Orientalia, Varanasi; 2012; 379.
13. Ibdem. Sushruta Samhita, Chikitsa Sthana, Niruha Krama Chikitsitham, 38/106-111, Vol. 2; 380-1.
14. Shailaja U, Rao Prasanna N, Arun Raj GR. Clinical study on the efficacy of Samvardhana ghrita orally and by matrabasti in motor disabilities of

cerebral palsy in children. Int. J. Res. Ayurveda Pharm. 2013;4:373-77.
15. Vagbhata. Ashtanga Sangraha, Sutra Sthana, Doshabhediya Adhyaya, 20/1, translated by Srikantha Murthy KR, Vol. 1, 3rd ed. Chaukhambha Orientalia, Varanasi, 2004; 367.
16. Vagbhata. Ashtanga Hridaya, Sutra Sthana, Dinacharya Adhyaya, 2/8, translated by Srikantha Murthy KR, Vol. 1, Reprint. ed. Chowkhambha Krishnadas Academy, Varanasi, 2012; 24.
17. Vagbhata. Ashtanga Sangraha, Sutra Sthana, Swedavidhi Adhyaya, 17/25, translated by Srikantha Murthy KR, Vol. 1, 3rd ed. Chaukhambha Orientalia, Varanasi, 2004; 223-4.
18. Agnivesha, Charaka, Dridhabala. Charaka Samhita, Siddhi Sthana, Kalpana Siddhi Adhyaya, 1/39, translated by Sharma RK and Bhagwan Dash, Vol. 6, Reprint. ed. Chaukhambha Sanskrit Series Office, Varanasi, 2012; 163.
19. Kar PK. Mechanism of Panchakarma and its Module of Investigation. 1st ed. West Bengal: Sunita Biswas for Chhonya; 2012. pp. 66.
20. Govindadas, Bhaishajya Ratnavali, Balarogachikitsa Prakaran, 71/48, edited by Mishra BH, Shastri AS, reprint ed. Chaukhambha Prakashan, Varanasi, 2013; 1217-8.
21. Govindadas. Bhaishajya Ratnavali, Balarogachikitsa Prakaran, 71/63, translated by Sastry AD. Vol. 3, Reprint. ed. Varanasi: Chaukhamba Sanskrit Sansthan, 2009; 678.
22. Agnivesha, Charaka, Dridhabala. Charaka Samhita, Siddhi Sthana, Uttara Basti Siddhim Adhyaya, 12/16 (1), translated by Sharma RK and Bhagwan Dash, Vol. 6, Reprint. ed. Chaukhambha Sanskrit Series Office, Varanasi, 2012; 409.
23. Ibidem. Charaka Samhita, Chikitsa Sthana, Vatavyadhi Chikitsitam Adhyaya, 28/7, Vol. 5; 20.
24. Ibidem. Charaka Samhita, Chikitsa Sthana, Grahanidosha Chikitsitam Adhyaya, 15/3, Vol. 4; 1.
25. Ibidem. Charaka Samhita, Sutra Sthana, Kiyantashiraseeyam Adhyaya, 17/117, Vol. 1; 334.
26. Kulkarni SK, Akula KK, Dhir A. Effect of *Withania somnifera* Dunal root extract against pentylenetetrazol seizure threshold in mice: Possible involvement of GABAergic system. Indian J Exp Biol 2008;46:465-9.
27. Roney N, Smith CV, Williams M, Paikoff SJ. Toxicological Profile for Zinc. New York: US Department of Health and Human Services; 2005.
28. Soumyanath A, Zhong YP, Gold SA, Yu X, Koop DR, Bourdette D, *et al.* Centella asiatica accelerates nerve regeneration upon oral administration and contains multiple active fractions increasing neurite elongation *in-vitro*. J Pharm Pharmacol 2005;57:1221-9.
29. Pokale S. Fish toxicity study of aqueous extract of *Sida cordifolia* in *Poecilia reticulata* (guppy). Int J Pharm Pharm Sci 2012;4:76-7.
30. Kumar A, Singh V, Ghosh V. An experimental evaluation of *in vitro* immunomodulatory activity of isolated compound of *Ricinus communis* on human neutrophils. Int J Green Pharm 2011;5:201-4.
31. Verma SK, Shaban A, Purohit R, Chimata ML, Rai G, Verma OP. Immunomodulatory activity of *Withania somnifera* (L.). J Chem Pharm Res 2012;4:559-61.
32. Clement F, Pramod SN, Venkatesh YP. Identity of the immunomodulatory proteins from garlic (Allium sativum) with the major garlic lectins or agglutinins. Int Immunopharmacol 2010;10:316-24.
33. Kwon KH, Hong MK, Hwang SY, Moon BY, Shin S, Baek JH, *et al.* Antimicrobial and immunomodulatory effects of *Aloe vera* peel extract. J Med Plants Res 2011;5:5384-92.
34. Punturee K, Wild CP, Kasinrerk W, Vinitketkumnuen U. Immunomodulatory activities of *Centella asiatica* and *Rhinacanthus nasutus* extracts. Asian Pac J Cancer Prev 2005;6:396-400.

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हिन्दी सारांश

मोटर डिसएबिलिटी ऑफ सेरिब्रल पाल्सी में राजयापन बस्ति एवं बलादि योग का प्रयोगात्मक अध्ययन

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बच्चों के मोटर डिसएबिलिटी ऑफ सेरिब्रल पाल्सी में राजयापन बस्ति एवं बलादि योग के प्रभाव का प्रयोगात्मक अध्ययन एस.डी.एम., कॉलेज ऑफ आयुर्वेद एण्ड होस्पिटल, हासन, कर्नाटक के कौमारभृत्य विभाग की आई.पी.डी. में किया गया। ९८ बच्चे रोग पहचान परीक्षण प्रक्रिया के अन्तर्गत चयनित किये गये, जो २-१० वर्ष की आयु के थे। इन्हें दो समूह मे बाँटा गया जो कि एक राजयापन बस्ति, बलादि के साथ -आर.बी. ग्रूप और दूसरा कन्ट्रोल ग्रूप। आर.बी. ग्रूप के ४० रोगियों की चिकित्सा ८ दिन तक राजयापन बस्ति से की गयी, उसके साथ ६० दिनों तक बलादि योग का आन्तरिक प्रयोग का अनुसरण किया गया। बस्ति प्रयोग से पूर्व, तिल तैल का अभ्यंग ओर षष्टिकशालि पिण्ड स्वेद प्राचीन विधि अनुसार दिया गया। कन्ट्रोल ग्रूप के ४० रोगियों को गोधूम से निर्मित वटी का ६० दिनों तक प्रयोग किया गया प्लेसिबो टैब्लेट देने से पहले कन्ट्रोल ग्रूप के रोगियों को उष्ण जल की बस्ति दी गई, इससे पहले तिलतैल अभ्यंग और षष्टिकशालि पिण्ड स्वेदन दिया गया। आर.बी.ग्रूप में समझने की क्षमता में वृद्धि हुई (१३.४३%), बोलने में १०% क्रियात्मक वृद्धि (११.११%) सूक्ष्म क्रियात्मक वृद्धि जैसे छोटी वस्तुओं को पात्र में रखना (१४.३%), विभिन्न दिशाओं में गेंद फेंकना (२१.८%), अंगूठे एव तर्जनी अंगुली का प्रयोग (१०.९३%), मुट्ठी में २ इन्च क्युब को पकडना (१९.०४%), मुड़े कागज को लिफाफे में डालना (१०.३०%); ग्रॉस मोटर फंक्शन, जैसेकि घुटने से चलना (२६.७%), बैठना (३१.७%), खड़ा होना (१३.७५%), टहलना (९.५%), ताली बजाना (१३.९%), आदि। बच्चों मे मोटर डिसएबिलिटी ऑफ सेरिब्रेल पक्षवध में मुस्तादि राजयापन बस्ति के साथ बलादि योग इस अध्ययन के अनुसार अत्यन्त प्रभावी रहा।