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Comparative Efficacy of Therapeutic *Panchkarma* Procedures Alternate Brimhan-Rukshan Versus only Brimhan in Children with Cerebral Palsy

Research Article

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Abstract

Introduction: Cerebral palsy (CP) continues to be one of the most common but challenging physical disabilities in children. It is named *Balsanvardhan Vikruti* as there is delayed growth and development due to brain damage. It accounts for nearly 15% of the child population (1 in 6). Objectives: To compare the efficacy of *Brimhan* (Anabolic) procedures Vs alternate *Brimhan- Rukshan* (Anabolic - Catabolic) *Panchkarma* procedures in the management of CP children of 2-8 years age group. Material and Methods: The study was carried out in the IPD of Kaumarbhritya, MGACHRC, Salod. Twenty patients fulfilling the diagnostic criteria were included and randomly distributed into two groups of 10 each. Group A was given *Brimhan* procedures like *Talapothichil/Shiropichu, Annalepan, Pindswed, Tailadhara and MatraBasti* for 3 days followed by *Rukshan* procedures like *Talapothichil/Shirolepan, Udgharshan, Kwathdhara, Patrapottali and Niruh Basti* for next 3 days alternate 5cycles starting and end with *Brimhan* in total 15 days and 15 days follow-up for 3 consecutive months. Group B received only *Brimhan* procedures for the same pattern and duration. Three such courses were administered to both Groups with an interval of 15 days along with necessary symptomatic treatment, physiotherapy and occupational therapy. Result: The study revealed that Group A patients showed more improvement (21%) than Group B (19%) in all parameters like gross motor, fine motor, language/speech, and personal social with enhancement in power and activities of daily living (Barthel index). Spasticity, convulsions were reduced and quality of life was increased in both the Groups. Conclusion: Multiple interventions are essential in the management of CP. Alternate *Brimhan-Rukshan Panchkarma* procedures are more beneficial with physiotherapy and occupational therapy as CP has *Vata-Kapha Dosha* dominance.

Key Words: *Brimhan-Rukshan,* CP- Cerebral palsy*, Panchkarma,* Spasticity, Convulsions.

Introduction

Cerebral palsy (CP) continues to be one of the common but challenging physical disabilities in children. It is named as *Balasamvardhan vikruti* (~disease related to abnormal growth) as there is a delayed growth and development.(1) It can be also named as *Mastishkaghat janya Vatavyadhi* (~disease due to trauma to the brain causing vitiation of *Vata dosha*) as CP is a product of brain damage.(2) The estimated global and Indian incidence are around 3 per 1000 live births. (3) Nearly 3.8% of the total population in India, 15-20% of the total physically handicapped children suffer from CP.(3) As far as management or preventive aspect is concerned, no satisfactory protocol has been developed till today. In Ayurveda, on the basis of some scattered references, the disease shows its existence. (4)

The study mainly aims to improve a child's capabilities, motor skills, communication and behavior. In CP, mainly *Vata Dosha* dominance is found in etiology, clinical features and disease presentation; it is similar & close to *Vatavyadhi* (~disease developed due to vitiation of *Vata Dosha*).(2) To correct abnormal functions of *Vata Dosha* which is the main culprit, *Brimhan* (~anabolic modalities) as well as alternate *Brimhan-Rukshan* (~anabolic and catabolic modalities) procedures externally was chosen for the study to see its comparative effect in CP because children are *Kapha Dosha* dominant. As CP is a product of hypoxic encephalopathy, multiple interventions are necessary hence *Shiropichu* (~application of medicated oil dipped cloth on scalp) with *Brahmi tail (*~medicated oil prepared from *Centella asciatica* L.*)* has good synergetic effect.(5) Therefore, the combination of alternate *Brimhan-Rukshan* versus only *Brimhan* is the unique modality employed in this study including internal administration as symptomatic treatment.(1)

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Materials and methods

Patients satisfying the diagnostic criteria attending IPD of Kaumarbhritya Department, MGACHRC, Salod were registered after taking informed consent for the study. The IEC- institutional ethical approval was sought. It was a randomized comparative interventional study.

Inclusion Criteria

- Children with CP of 2-8 years age group of both genders.
- Children with developmental physical and mental disabilities.
- Children with all types of CP.

Exclusion Criteria

- Children with other diseases like acute infections, gastro-esophageal reflux(GER), etc
- Children with congenital defects
- Children with 0 gradation in GMFCS

Treatment Schedule

- **Group A-** *Brimhan* procedures like *Talapothichil/ Shiropichu, Annalepan* (~application of medicated *Oryza sativa* L. paste all over body), *Tailadhara* (~ pouring medicated oil over head region), *Pindswed* (~rubbing medicine filled bolus over body) and *Matra Basti* (~therapeutic enema) for 3 days followed by *Rukshan* procedures like *Talapothichil/ Shirolepan* (~application of medicinal paste on scalp), *Udgharshan* (~rubbing dry medicine powder over body), *Kwathdhara* (~pouring medicated liquid overhead region), *Patra pottali* (~rubbing medicinal leaves filled bolus over body) and *Niruh Basti* (~type of therapeutic enema) for next 3 days alternate 5 cycles starting and end with *Brimhan* in total 15 days and 15 days follow-up was given till 3 months.
- **Group B** - was received only *Brimhan* procedures for same pattern and duration. Three such courses were administered to both Groups with interval of 15 days.
- Patients of both groups were received necessary symptomatic treatment, physiotherapy and occupational therapy.(6)

Procedures details

- ***Shiropichu/Talapodichhil-*** In *Brimhan* therapy, it includes *Dashamoola tail* (~medicated oil of 10 Ayurveda herbs) application on scalp of anterior fontanel for half hour. *Rukshan* category the semisolid paste of *Kola (~Ziziphus mauritiana* Lam.*), Kulattha (~Dolichos biflorus* L.*), Yava (Hordeum vulgare* Linn.*)* with *milk/takra* (~butter milk)in equal proportion to be kept on scalp for same duration.(7,8)
- ***Annalepan-*** It comprises *Shali* (*Oryza sativa* L. powder), *Bala/Ashwagandha* (~*Sida cordifolia* L. or *Withania somnifera* (L.) Dunal.) powder with milk to make uniform warm paste to apply on paralytic part for half hour and then removed.(9)
- ***Utsadan & Udgharshan-*** The application of *Kola-Kulattha* paste was kept on affected part until became cold means *Utsadan* and then removed by friction to enhance micro-circulation means *Udgharshan*.(10)
- ***Tailadhara/Kizhichil-*** Warm *Vatahar* (~drug helping in pacification of *Vata Dosha*) oil is to be poured on paralytic body for at least half an hour .(11)
- ***Parishek/Kwathdhara-*** *Vatahar Kwatha* (~decoction) is to be poured on affected part, for at least half an hour in *Rukshan* modality.(12)
- ***Shirodhara-*** Warm oil prepared with *Brahmi (Bacopa monnieri* L.) was poured on forehead for half hour. (13) In *Rukshan* variety, warm *Vataahar* decoction stream was poured instead of oil on scalp for same duration.(14)
- ***Shashtikshalipindasweda* (SSPS): Sudation therapy with cooked rice bolus -** Warm decoction of *Bala* 1litre, milk-1litre, *Shashtikshali (Oryza sativa* L.*)*-200gm, (an approximate measurement according to the paralytic part involved). After *Abhyanga* (~local massage) with medicated oil of *Bala tail* for 10 min. After the massage, the paste of rice should be wiped out from the body and allowed to take rest for 10 min followed by bath by warm water. (15)
- ***Patrapottali sweda-*** The *Pottali* (~bag) is made up of leaves of *Vatahar* herbs fried in *Vatahar* oil to massage on affected parts up to half hour by maintaining warm temperature.(16)
- ***Niruh Basti-*** It is a medicated enema prepared with decoction of *Vatahar* drugs, oil, salt, honey but medicinal bolus (~*Kalka*) was not added to make it less potent, also dose kept very less as below six years it is not mentioned in texts.(16)
- ***Matra Basti-*** It is a medicated enema with *Vatahar* oil for retention up to minimum 8 hours.(16)

Assessment criteria-

1. Centre for Disease control and prevention (CDC) grading for gross motor milestones.(17,18)
2. The Modified Ashworth Scale-MAS.(19)
3. Barthel Index- Activities of daily living-ADL.(20)
4. MRC-Medical Research Council scale of muscle power grading.(21)
5. Overall effect of Therapy:
   - Maximum improvement- >75% improvement of clinical signs and symptoms
   - Moderate improvement-more than 50-75% improvement of clinical signs and symptoms
   - Mild improvement-more than 25-50% improvement of clinical signs and symptoms
   - No improvement-Equal or less than 25% improvement of clinical signs and symptoms
   - Statistical analysis by paired and unpaired t test was carried out.

Observations and Results

It was observed that maximum patients were below 4 years (88%) of age having 72.5 % male children with 42 % belonged to lower socio-economic condition. As per obtained Antenatal history, 44% mothers had stress and overload of work, hypertension in 31%, infection was found in 25% mothers. Mode of delivery was normal/vaginal in 62% and caesarean section in 38%, out of which 13% had twins and

pregnancy induced hypertension in 17% cases. 42% CP patients were born as first sibling. Among all the registered patients, there was history of IUGR and preterm in 28%, sepsis in 31%, asphyxia neonatorum in 22% and in 11% convulsions was the probable cause of CP. In 8% CP cases, reason was not known (Idiopathic), may be due to un-awareness. 84.5 % neonates required NICU care and hospitalization.

All CP patients had delayed milestones with speech problem 100%, vision problems in 80% patients, feeding problems in 90% with drooling of saliva were observed. In 80% children there was history of spasticity, mental retardation, microcephaly, recurrent respiratory infections with no control on bowel and bladder. In 40 % patients, behavioral problems, convulsions or other abnormal movements and postures were present. Among 20 CP children, 60 % were of quadriplegic while 40% of diplegic in type. In only 5% patient positive family history of CP was found while 20 % were having positive consanguinity history. 60 % mothers were of primi-parity. No history of trauma was found. All patients were receiving only symptomatic treatment with Physiotherapy in treatment history.

Table 1: Showing effect of alternate procedures on Developmental Milestones in Group A Post versus pre treatment

Parameters	Groups	Mean	Std Dev	SEM	Paired t test	Remark
Head holding	**Post**	2.100	0.974	0.314	t = 3.674	P = 0.005 **Significant**
	Pre	1.500	1.269	0.401		
Sitting	**Post**	2.800	1.317	0.416	t 4.583	P = 0.001 Significant
	Pre	2.100	1.524	0.482		
Standing	**Post**	1.300	1.160	0.367	t=3.000	P = 0.015 Significant
	Pre	0.800	1.229	0.389		
Fine Motor	**Post**	2.600	1.265	0.400	t=6.000	P<0.001 **Significant**
	Pre	1.800	1.398	0.442		
Personal Social	**Post**	3.000	1.054	0.333	t= 3.674	P=0.005 Significant
	Pre	2.400	1.265	0.400		
Language	**Post**	3.800	0.422	0.133	t= 3.674	P=0.005 Significant
	Pre	3.200	0.789	0.249		

Effect of alternate procedures on developmental milestones in Group A Post versus pre-treatment depicted in table 1. Group (gp) A showed highly significant results ($p<0.001$) in fine motor and language milestones while significant in head holding, sitting, standing and personal social activities in comparison to pre and post treatment.

Table 2: Effect of *Brimhan* procedures on Developmental Milestones in Group B Post versus pre treatment

Parameters	Groups	Mean	Std Dev	SEM	Paired t test	Remark
Head holding	**Post**	2.100	0.974	0.314	t = 3.674	P = 0.005, Significant
	Pre	1.500	1.269	0.401		
Sitting	**Post**	2.800	1.317	0.416	t 4.583	P = 0.001, Significant
	Pre	2.100	1.524	0.482		
Standing	**Post**	1.300	1.160	0.367	t=3.000	P = 0.015, Significant
	Pre	0.800	1.229	0.389		
Fine Motor	**Post**	2.600	1.265	0.400	t=6.000	P<0.001, Significant
	Pre	1.800	1.398	0.442		
Personal Social	**Post**	3.000	1.054	0.333	t= 3.674	P=0.005, Significant
	Pre	2.400	1.265	0.400		
Language	**Post**	3.800	0.422	0.133	t= 3.674	P=0.005, Significant
	Pre	3.200	0.789	0.249		

Effect of *Brimhan* procedures on Developmental Milestones in Group B post versus pre-treatment is shown in table 2. Group B showed highly significant results in only fine motor milestones while significant in head holding, sitting, standing and personal social and language in comparison to pre and post treatment.

Table 3: Comparative analysis of Post t/t Gr A Vs Gr B post t/t

Parameters	Groups	Mean	Std Dev	SEM	Paired t test	Remark
Head holding	**Post t/t-A**	2.900	1.197	0.379	t = 6.000	P = 0.001 **Significant**
	Post t/t-B	2.100	0.994	0.314		
Sitting	**Post t/t-A**	3.300	1.160	0.367	t 3.000	P = 0.015 Significant
	Post t/t-B	2.800	1.317	0.414		

Standing	**Post t/t-A**	1.400	1.430	0.452	t=1.000	P = 0.343 Significant
	Post t/t-B	1.300	1.160	0.367		
Fine Motor	**Post t/t-A**	3.100	1.370	0.433	t=3.000	P=0.015 Significant
	Post t/t-B	2.600	1.265	0.400		
Personal Social	**Post t/t-A**	3.100	1.197	0.379	t= 1.000	P=0.343 Significant
	Post t/t-B	3.000	1.054	0.333		
Language	**Post t/t-A**	4.100	0.738	0.233	t= 1.964	P=0.081 Significant
	Post t/t-B	3.800	0.422	0.133		

Comparative analysis of post treatment (tt) Gp. A Verses Gp. B post tt shown in table 3, significant results are found in intergroup comparison.

Table 4: Effect of *Brimhan –Rukshan* procedures on MAS, ADL, Power in Group A post versus pre treatment

Parameters	Groups	Mean	Std Dev	SEM	Paired t test	Remark
MAS	**Post**	2.700	0.949	0.300	t = = 9.798	P <0.001 Significant
	Pre	1.100	0.738	0.233		
ADL	**Post**	6.500	3.028	0.957	t = 12.000	P <0.001 Significant
	Pre	2.500	2.635	0.833		
Power	**Post**	2.900	0.738	0.233	t== 8.573	P <0.001 Significant
	Pre	1.500	0.850	0.269		

Effect of *Brimhan –Rukshan* procedures on MAS, ADL, and Power in Group A post versus pre treatment is shown in table 4.

Table 5: Effect of *Brimhan* procedures on MAS, ADL & power in Group B post versus pre treatment

Parameters	Groups	Mean	Std Dev	SEM	Paired t test	Remark
MAS	**Post**	2.300	0.949	0.300	t = 6.708	P <0.001 Significant
	Pre	1.300	0.949	0.300		
ADL	Post	5.100	2.378	0.752	t = 13.286	P <0.001 Significant
	Pre	2.000	2.582	0.816		
Power	**Post**	2.500	0.707	0.224	t=(+inf)	P <0.001 Significant
	Pre	1.500	0.707	0.224		

Effect of *Brimhan* procedures on MAS, ADL & power in Group B post versus pre treatment is shown in table 5.

Table 6: Effect of post treatment efficacy on MAS, ADL & Power comparative analysis of Group A versus B

Parameters	Groups A vs B	Mean	Std Dev	SEM	Paired t test	Remark
MAS	**Post t/t**	2.700	0.9490	0.300	t = 1.000	P = 0.343
	Post	2.300	0.949	0.300		
ADL	Post	6.500	3.028	0.957	t = 1.146	P = 0.281
	Pre	5.100	2.378	0.752		
Power	**Post**	2.900	0.738	0.233	t=1.500	P=0.168
	Pre	2.500	0.707	0.224		

Significant results are found in all the scales with both the treatment modules. Effect of post treatment efficacy on MAS, ADL & Power comparative analysis of Group A versus B is shown in table 6. Insignificant results were evaluated. Overall maximum improvement in Group A, post treatment was calculated as 21% in comparison to 19% in Group B while moderate and mild improvement were 38, 32% in Group A and 41 and 49% in Group B consecutively.

Discussion

Although CP is a non-progressive disorder, It is better to start multiple interventions to combat with CP at the earliest.(22) Ayurved has jewels of many good herbs, *Panchkarma* procedures and yoga which can better manage CP and associated conditions. These make a micro-environment for neuronal plasticity by neuro-regenerative, neuroprotective, and nootropic properties of herbs like *Bala*, *Brahmi*, *Dashamoola* allowing *Vata Dosha* to perform its normal function. (23) These properties are essential to treat CP especially with spasticity, poor cognitive function, behavioral problems, and mental retardation and seizure disorders.

Among the found observations, prevalence 72.5 % of male was present in study which is in consonance with present prevalence. This disparity is uncertain however studies suggest that estrogen provide neonate brain protection against hypoxic ischemic encephalopathy. (24) 88% CP kids in study were below four years because as awareness is increasing day by day, more parents approached to physicians with their kids. Increased prevalence was observed in low socio-economic class (42%) may be due to adoption of deprived health facilities, awareness and poor hygiene.

(25) There was normal labor in 62% cases than caesarian (38%) due to more case population of lower middle class to insist for normal labor which resulted into 13% cases of obstructed labor.(26) It can be said that onset and mode of labor does not much matters than presence of risk factors during delivery.

The other probable causes of CP might be PIH-pregnancy induced hypertension (17%), maternal stress, work overload, intra-uterine infections, twin pregnancy, IUGR and preterm labor.(26) By clinical experience and supportive research studies depicts that there is positive relation between consanguinity and CP, suggesting a possible genetic link [53]. In present study, the major causative factors for CP were perinatal infections (31%), prematurity (28%) and birth asphyxia (22%) respectively.(27) Maximum patients were received NICU stay with symptomatic treatment. In this study, 28% IUGR cases were found.(28) There is a strong relationship between antenatal hemorrhage and CP, studies have also revealed the association of vaginal bleeding during pregnancy and CP.(29)

From the above fact, it is obvious that imbalance in *Vata Dosha* and *Vata* functions in pregnancy played a vital role to develop CP as it is a product of brain damage hence called as *Mastishkaghat janya Vatavyadhi*.(2) All common symptoms were present in CP children like have close similarity with symptoms explained in Ayurved samhitas like *Sharirika Kunchan* (~spasticity), *Anga sad* (~rigidity), *Pakshavadha/ Sarvangaghat/Pangulya* (~paralysis), speech, hearing, vision problems including behavioral (*Anavasthit Chitta*) and mal-nutrition. *Akshepak* and recurrent respiratory ailments were present in few cases. (30,31,32)

In all cases *Vata Vikara Lakshnas* like *Stambhan* (~spasticity) with restricted movements, *Shosh* (~atrophy), *Cheshtavriddhi* or *Hani* (~loss or uncontrolled movement) was found.(33) In all these problems abnormal *Vata Dosha* functions are found and therefore to relieve these complaints regularizing *Vata Dosha* functions are mandatory. Due to perinatal, natal or postnatal causes normal function of *Vata Dosha* gets disrupted and above features appeared.(34) As it is a *Anukta vyadhi* (~diseases which is not exactly explained),its *Samprapti* (~pathogenesis) could be understood as *Vata Dosha* dominant *Tridosha* (~ all three *Doshas*) vitiation with brain damage of fetus or child (*Pran-Endriya Vikruti*~ abnormality in mental and physical level) in developing stage produces features of injury of both brain and sense organs, hence the treatment is planned according to the involved *Dosha*. (35)

As CP is a symptom complex, there are several problems occurs which disrupts the life of not only affected child but whole family. *Panchkarma* has ability to treat the disease with long term efficacy, promote health, and prevent ailments by *Rasayan (*~rejuvenator effect*)-Brimhan* properties and by eliminating accumulated morbid *Doshas* from body in the form of detoxification and bio-purification.(16) *Panchkarma* in children causes discomfort and debility so Kashyap has simplified it and told to give *Panchkarma* to children in vitiated *Doshas* to treat the ailment.(36) There are five ways of pre-procedures like *Dipan* (~help in increasing digestive fire), *Pachan* (~help in digestion), *Rukshan*, *Snehan* (~oleation) and *Swedan* (~fomentatio) while *Panchkarma* which comprises five main procedures-*Vaman* (~therapeutic emesis), *Virechan* (~therapeutic purgation), *Basti*, *Nasya* (~pouring medicated oil in nostrils) and *Raktamokshan* (~bloodletting). Internally *Rukshan* is done by *Dipan-Pachan* while externally *Rukshan* can be done by *Udvartan* or *Utsadan* on affected part.(37) It brings about micro-circulation superficially from *Rasa* to *Meda dhatu* (~adipose tissue) means skin to muscle and fat level. By these procedures *Gurutwa* (~sense of heaviness), *Snigdhata* (~viscid) and *Ama* (~undigested food) of the body comes down and there by the body becomes more ready to accept the treatment applied thereafter with minimum complications.(38) It enhances cellular circulation thereby not only improves transportation of fluid and nutrients but also clears channels by helping proper excretion.(38) CP children are emaciated hence need *Utsadan* in which oil massage with *Kola-kulatthadi* powder were used, in this study.(38)

The apt treatment protocol is an alternate *Brimhan* and *Rukshan* combined with *Swedana* throughout the protocol. CP child is usually emaciated due to regular ongoing sympathetic action in the body. Child is in regular fright and flight mode and needs more resting energy expenditure (REE) to perform regular activities as compared to a normal sibling.(39) This situation creates a need to give a nutrition-based therapy that provides quota for energy and proper management of the root cause. Altogether loss of movement reflects a root cause of *Vata Dosha Kshaya* (~decreased *Vata dosha* function) is Ayurveda.(40) As movement is related to *Vata dosha* and the condition of CP reflects *Vata Dosha Kashaya* status.(41) Hence, the group A was designed with alternate *Brimhan* and *Rukshana* procedures to balance *Vata* and *Kapha Dosha.*

However, *Rukshana* being alternate therapy with *Brimhan* in group A, and *Brimhan* is the sole therapy in group B, *Brimhan* holds dominance in the whole treatment protocol. This is because of the nourishing age of a child, sole *Rukshana* may debilitate the already weakened child and Acharya Kashyapa also advises not to give too much *Vishoshana* (~catabolic therapies) and *Shanshodhana* (~catabolic therapies) therapies in the child.(43) The hypothesis behind the alternate *Rukshna* therapy is to stimulate decreased *Vata dosha* in the body to perform its regular functions. Alternate, *Brimhan* counteract the deprived nourishment during the *Rukshana* period. The ultimate raised result in Group A (21%) as compared to group B (19%) supports the above hypothesis. In such neuromotor diseases like CP, multimodalities play pivotal role in stimulating motor function. As this disease is related to brain, per day 4-6 procedures are commonly undertaken for lesser pressure and duration without any complaint.

In both Group A and B, there were highly significant results found in fine motor, gross motor except standing, personal social and language

milestones, in which results were significant in unpaired t test also *Swedan* is a common platform in both modalities, which normalizes *Kapha Dosha* and *Vata Dosha* functions, and improves spasticity and developmental milestones, muscle strength, tone and tendon reflexes.(44,45) In both the groups MAS, ADL and muscle power were highly significant but when compared with unpaired t test then Group A was insignificant over B, the difference was not enough to reject the possibility of sampling variability.(4,46) In more sample size and keeping patient's in-door for better observation and care, it may turns into a significant treatment protocol. It can be also said that spastic CP needs an alternate combination of *Rukshan-Brimhan* procedures than non-spastic one, but as randomization was there hence patients were not adhered to Group A for the same and therefore the unpaired t test result was not significant. It was observed that total effect of therapy found in group A was more than B due to alternate procedural method. In present study, sample size was less hence recommended that research studies with large sample size, multi-centric and double-blind study design to develop standard treatment protocol for CP.

Conclusion

Ayurveda in the present era has provided a better substitute to the management of CP cases than the existing resources. Among which *Panchkarma* therapies are giving promising results in various presenting complaints of CP. Alternate *Brimhan-Rukshan Panchkarma* procedures are more beneficial than Brimhan alone in various parameters of CP with physiotherapy and occupational therapy as CP has *Vata-Kaphaj* dominance. In nutshell, it can be said that Ayurved *Panchkarma* therapy along with other multi-modal therapies CP and its associated ailments can better manageable; however, more double-blind studies are needed to prove it with evidence in the scientific globe.

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No conflict of interests

IEC-approved and CTRI-registered study.

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