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A COMPARATIVE CLINICAL STUDY TO EVALUATE THE EFFECT OF MUSTADI YAPANA BASTI IN PAKSHAGHATA WITH AND WITHOUT CO-MORBIDITIES

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ABSTRACT

Current health trends show a significant rise in cerebrovascular accidents (CVAs) or strokes, primarily due to sedentary lifestyles, poor dietary habits, and increasing rates of hypertension, diabetes mellitus, and obesity. These risk factors contribute to Tridosha imbalance, particularly aggravating Vata dosha, leading to disorders like Pakshaghata, which closely mirrors stroke in its sudden onset and severe functional impairment. Post-stroke rehabilitation is essential to restore motor function and improve quality of life, but conventional therapies often leave residual deficits, particularly in patients with co-morbidities. Ayurveda outlines a systematic management approach, with Basti Chikitsa being a prime intervention for Vata disorders. Mustadi Yapana Basti, known for its balya, bruhmana, rasayana, and shodhana properties, is particularly effective in post-stroke rehabilitation. The present study aims to evaluate the efficacy of Mustadi Yapana Basti in Pakshaghata management, assessing its impact on blood glucose levels, blood pressure, and functional recovery in patients with and without co-morbidities. This open-label, comparative clinical study followed a pre-test and post-test design in 30 patients divided into two groups. Clinical assessments were conducted at baseline, after treatment, and post-follow-up. Statistical

analysis revealed significant improvement in muscle strength, tone, hand grip, and speech, with no significant variations in blood glucose levels or blood pressure. Mustadi Yapana Basti demonstrated notable efficacy in neuromuscular recovery, warranting further studies to validate its therapeutic potential.

KEYWORDS: Pakshaghata, Basti, Yapana Basti, Rajayapana Basti, Mustadi Yapana Basti, Stroke, Hemiplegia, Cerebrovascular Disease.

INTRODUCTION

Current health trends indicate a marked increase in the prevalence of cerebrovascular accidents (CVAs), commonly known as strokes, largely due to lifestyle changes, dietary shifts, and rising rates of chronic conditions. The adoption of sedentary lifestyles, increased stress, poor dietary habits, and other risk factors associated with modern living have contributed significantly to higher incidences of hypertension, diabetes mellitus, and obesity—all of which are primary risk factors for stroke. This shift in lifestyle contributes greatly to an imbalance of the Tridosha, particularly aggravating Vata dosha, which results in Vatavyadhi such as Pakshaghata.

The World Health Organization (WHO) defines stroke, or cerebrovascular accident (CVA), as "rapidly developing clinical signs of focal disturbances in cerebral function, with symptoms lasting for 24 hours or longer, or leading to death, with no apparent cause other than vascular origin.[1]"

Pakshaghata is closely associated with the clinical presentation of stroke. The severity of this condition was astutely recognized by Acharyas, who termed it vadha[2], meaning "to assassinate," and ghata[3] meaning "to strike hard and suddenly." Both terms underscore the abrupt and forceful onset of symptoms, including shiromarmaghata, indriyanasha, ekanga karmahani, and, in severe cases, death. All these factors aptly justify why Pakshaghata is regarded as both a mahagada and dushchikitsya.[4]

Post-stroke rehabilitation plays a critical role in improving functional independence and quality of life for stroke survivors. Conventional rehabilitation often includes physical therapy, occupational therapy, and speech therapy to restore motor function, enhance muscle strength, and regain daily living skills. However, despite the advancements in modern post-stroke rehabilitation, many patients are left with residual deficits, particularly in cases where

co-morbidities like hypertension and diabetes mellitus contribute to vascular damage and impede neurological recovery.

Therefore, a comprehensive, step-by-step management regimen has been outlined in Ayurvedic texts, beginning with snehana, swedana, mrudu virechana, basti, nasya and mastishkya.[5] While these approaches are appropriate, a safe and precise remedy aligned with the disease samprapti is crucial, as multiple factors may be involved, including anubandha doshas, gambheera doshas, avarana, and marma sthana.

In this regard, Basti Chikitsa is a fitting choice in durbala and avirechya Pakshaghata patients.[6] Classics emphasize Basti for its multifaceted, broad-spectrum therapeutic benefits. Thus, after the acute management, in post-stroke rehabilitation phase therapies yielding, bruhmana[7], sadyo balajanana[8], shodhana[9] and rasayana[8] effects should be employed and thus Mustadi Yapana Basti has been selected for this study. This particular type of Basti is considered nirupadrava, even in cases of weakened vitality or advanced age, as it serves as many vikalpa of Niruha Basti like Yapana Basti, Bruhmana Basti and Vataghna Basti while also functioning as a Rasayana.[8]

Thus a comparative study examining the effect of Mustadi Yapana Basti in patients with Pakshaghata, with and without co-morbidities including hypertension and diabetes was taken up. This study aims to contribute valuable insights into the clinical effectiveness of Mustadi Yapana Basti, along with its potential as an adjunct therapy for management of co-morbid conditions. Such an understanding will not only broaden the therapeutic applications of Ayurveda in neurological care but also provide a holistic treatment option that addresses both primary and secondary complications associated with stroke.

MATERIALS AND METHODS

Ethical committee clearance SDMCAU/ACA-49/ECH 33/2022-23.

Source of data

Sample source: A minimum of 30 patients diagnosed with Pakshaghata will be selected from OPD and IPD of Sri Dharmasthala Manjunatheshwara Ayurveda Hospital, Kuthpady, Udupi.

Drug source: Kashaya Dravyas, Kalka Dravyas, Madhu, Murchita gritha required for Mustadi Yapana Basti will be procured from SDM Ayurveda pharmacy, Udupi. Godugdha

and mamsa rasa required will be procured and prepared in Panchakarma department of SDM ayurveda hospital, Udupi.

Method of collection of the data

Study design: This is an open label comparative clinical study in pre-test and post-test design where minimum 30 patients will be selected based on diagnostic and inclusion criteria of pakshaghata/ stroke and distributed between with co-morbidity and without co-morbidity groups.

A detailed proforma will be prepared considering the points pertaining to history, signs, symptoms and examinations as mentioned in Ayurvedic classics and allied sciences to confirm the diagnosis.

Sample size: Minimum 30 patients of Pakshaghata/ Stroke.

Diagnostic criteria

Patients presenting with features of pakshaghata mainly hemiplegia of either side of the body along with symptoms like chesta nivrutti, hasta pada sankocha, vaksthambha, sirasnayu shosha, ruja.

Radiological evidence of cerebral infarct/haemorrhage or atrophic changes.

Inclusion criteria

• Patients fulfilling the diagnostic criteria.

• Patients of either gender between the ages of 18- 70 years.

• Patients fit for Niruha basti.

• Group A – patients with pre-existing co-morbidities i.e., Hypertension and Type 2 Diabetes Mellitus.

Exclusion criteria

Patients of hemiplegia with evidence of cerebral infections, space occupying lesions, RTA, malignancies.

• Pregnant or lactating women

• Patients with altered sensorium, hemodynamic instability.

Duration of study

• Treatment period - 8 days

• Follow up period - 16 days (after the treatment)

• Total duration of study - 24 days.

INTERVENTION

Selected 30 patients will be allotted into group A and group B (15 patients in each group)

GROUP A**:** patients of *pakshaghata* associated with co morbidities.

GROUP B**:** patients of *pakshaghata* without co morbidities.

The procedure is done as follows in both the groups.

Poorvakarma

Preparation of the medicine

- *Kashaya* drugs – *Musta, Eranda mula, Patha, Bala moola, Usheera, Aaragvadha, Amruta, Vibhitaki, Katukarohini, Raasna, Punarnava, Manjista, Laghu panchamula, Madnaphala.*
- *Kalka* drugs – *Rasanjana, Indravava, Priyangu, Madhuyasti, Shatapushpa.*
- Preparation of *ksheera paka* - First 250gm of *kashaya* drugs is taken. To this 500ml of water & 500ml of *godugdha* is added & boiled till it is reduced to 120ml.
- Preparation of *Mamsarasa* - 250gm *Aja mamsa* taken with 1 litre of water. It is boiled and reduced to 120ml.

- Preparation of *bas*ti.

1.	Madhu	80ml
2.	Saindhava lavana	5 gm
3.	Moorchita tila taila	120 ml
4.	Rajayapana kalka	40 gm
5.	Ksheerapaka of Rajayapana kwatha	120 ml
6.	Aja Mamsarasa	120 ml
	Total	480 ml

Preparation of the patient

- Patients will be advised to be on empty stomach for Yapana Basti and consume food before the administration of *anuvasana basti*.
- *Sthanika abhyanga* with *Murchita tilataila and Sthanika swedana* by *Nadi sweda* to abdomen and buttock will be done.

PRADHANA KARMA

- Patient will be asked to lie in the left lateral position by keeping left leg straight and right leg flexed at the knee and hip joint.

- *Mustadi Yapana basti* will be administered in the dosage of 480 in *yoga basti* course where, three *basti* will be administered on the 2nd, 4th and 6th day in the morning on an empty stomach.
- Five *Anuvasana basti* with *murchita tila taila* 60ml will be administered on 1st, 3rd, 5th, 7th, 8th day in the afternoon, immediately after food.

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Anuvasana Basti	*Yapana Basti*	*Anuvasana Basti*	*Yapana Basti*	*Anuvasana Basti*	*Yapana Basti*	*Anuvasana basti*	*Anuvasana basti*

PASCHAT KARMA

- Patient will be advised to turn to supine position until he gets urges.
- Patient will be advised to pass the bowel after getting the urge.
- Patient will be advised to avoid *ashta mahadoshakara* bhavas.
- *Parihara kala* of 16 days.

Assessment criteria

Signs and symptoms of *pakshaghata* will be evaluated before treatment (1st day), after treatment (8th day) and on the day of follow up (24th day) based on subjective and objective parameters.

Subjective parameters

- *Samyak niruda lakshana*.
- Symptoms of *pakshaghata*.

Objective Parameters

- Muscle power - Medical Research Council (MRC) Scale
- Muscle tone - Modified Ashworth scale
- Deep tendon reflexes - NINDS grading of DTR
- Loss of Speech – NIH stroke scale
- Handgrip Power test
- Foot Pressure
- Walking time
- Spring Pulling Exercise
- Blood glucose levels – FBS, PPBS, HBA1C – on day 0, day 7 and day 14

- Blood pressure monitoring – 8th hourly

OBSERVATIONS

Total number of patients taken for the study – 30

Number of patients in group A -15

Number of patients in group B – 15

No of drop outs – nil

Some of the observations are as follows

Parameter	Observation	Max no of patients	percentage
Demographic observations			
Age	61-70years	13	43.33%
Gender	Male	19	63.33%
Diet	Mixed	20	66.66%
Habits	Alcohol and smoking	11	36.66%
Observations related to symptoms			
Affected side	Right	16	53.33%
Type of lesion	Infarct	21	70%
Karma kshaya/hani	Karmakshaya	21	70%
Ruk	Present	23	76.66%
Sankocha	Present	17	43.33%
Dysarthra/ dysphasia	Present	7	46.66%

RESULTS

In this study 30 patients were divided into two groups Group A having patients of Pakshaghatha associated with co-morbidities and Group B is patients of Pakshaghatha without co-morbidities. Both the groups were administered Mustadi Yapana Basti. Data pertaining to subjective and objective parameters were collected before treatment on day 1 (BT), after completion of treatment on day 8 (AT) & at the time of follow up on day 28 (AF).

As the data collected in the study were in ordinal scale non parametric tests were selected for the test of hypothesis. Among the Non-Parametric Tests, Wilcoxon Signed Rank Test was selected for the test of significance within the groups & Mann Whitney 'U' Test was used to compare the effect of treatment between the groups. For the Parametric data, Paired 't' test was used for the test of significance within the groups and Unpaired 't' test to compare between the groups.

Statistical Analysis was carried our using IBM SPSS VER 20.0 (Statistical Package for Social Science)

Parameter	Group	Comparison	Negative Ranks	Positive Ranks	Ties	Total	Z Value	P Value	Inference
Shoulder Abduction	A	AT-BT	0	8	7	15	-2.82	0.005	S
		AF-BT	0	11	4	15	-3.12	0.002	S
	B	AT-BT	0	11	4	15	-3.20	0.002	S
		AF-BT	0	14	1	15	-3.39	0.001	HS
Shoulder Adduction	A	AT-BT	0	8	7	15	-2.82	0.005	S
		AF-BT	0	11	4	15	-3.12	0.002	S
	B	AT-BT	0	11	4	15	-3.12	0.002	S
		AF-BT	0	14	1	15	-3.39	0.001	HS
Elbow Flexion	A	AT-BT	0	9	6	15	-3.00	0.003	S
		AF-BT	0	10	5	15	-3.87	0.000	HS
	B	AT-BT	0	12	3	15	-3.46	0.001	HS
		AF-BT	0	14	1	15	-3.63	0.000	HS
Elbow Extension	A	AT-BT	0	9	6	15	-3.00	0.003	S
		AF-BT	0	15	0	15	-3.87	0.000	HS
	B	AT-BT	0	12	3	15	-3.46	0.001	HS
		AF-BT	0	14	1	15	-3.63	0.000	HS
Wrist Flexion	A	AT-BT	0	6	9	15	-2.44	0.014	S
		AF-BT	0	7	8	15	-2.64	0.008	S
	B	AT-BT	0	6	9	15	-2.44	0.014	S
		AF-BT	0	7	8	15	-2.64	0.008	S
Wrist Extension	A	AT-BT	0	6	9	15	-2.44	0.014	S
		AF-BT	0	7	8	15	-2.64	0.008	S
	B	AT-BT	0	6	9	15	-2.44	0.014	S
		AF-BT	0	7	8	15	-2.64	0.008	S
Hip Flexion	A	AT-BT	0	10	5	15	-3.16	0.002	S
		AF-BT	0	12	3	15	-3.27	0.001	HS
	B	AT-BT	0	11	4	15	-3.31	0.001	HS
		AF-BT	0	14	1	15	-3.49	0.000	HS
Hip Extension	A	AT-BT	0	9	6	15	-3.00	0.003	S
		AF-BT	0	15	0	15	-3.87	0.000	HS
	B	AT-BT	0	12	3	15	-3.46	0.001	HS
		AF-BT	0	14	1	15	-3.63	0.000	HS
Knee Flexion	A	AT-BT	0	12	3	15	-3.27	0.001	HS
		AF-BT	0	14	1	15	-3.44	0.001	HS
	B	AT-BT	0	10	5	15	-3.16	0.002	S
		AF-BT	0	13	2	15	-3.31	0.001	HS
Knee Extension	A	AT-BT	0	12	3	15	-3.27	0.001	HS
		AF-BT	0	14	1	15	-3.44	0.001	HS
	B	AT-BT	0	10	5	15	-3.16	0.002	S
		AF-BT	0	13	2	15	-3.31	0.001	HS
Ankle Dorsiflexion	A	AT-BT	0	6	9	15	-2.44	0.014	S
		AF-BT	0	9	6	15	-3.00	0.003	S
	B	AT-BT	0	6	9	15	-2.44	0.014	S

		AF-BT	0	9	6	15	-3.00	0.003	S
Ankle Plantarflexion	A	AT-BT	0	6	9	15	-2.44	0.014	S
		AF-BT	0	9	6	15	-3.00	0.003	S
	B	AT-BT	0	6	9	15	-2.44	0.014	S
		AF-BT	0	9	6	15	-3.00	0.003	S
Biceps Reflex	A	AT-BT	4	0	11	15	-2.000	0.046	S
		AF-BT	2	0	13	15	-1.414	0.157	NS
	B	AT-BT	3	0	12	15	-1.732	0.083	NS
		AF-BT	2	0	13	15	-1.414	0.157	NS
Triceps Reflex	A	AT-BT	2	0	13	15	-1.414	0.157	NS
		AF-BT	3	1	11	15	-1.000	0.317	NS
	B	AT-BT	3	0	12	15	-1.732	0.083	NS
		AF-BT	2	0	13	15	-1.414	0.157	NS
Brachioradialis Reflex	A	AT-BT	4	0	11	15	-2.000	0.046	S
		AF-BT	2	0	13	15	-1.414	0.157	NS
Patellar Reflex	A	AT-BT	2	0	13	15	-1.414	0.157	NS
		AF-BT	3	1	11	15	-1.000	0.317	NS
Ankle Reflex	A	AT-BT	3	0	12	15	-1.732	0.083	NS
		AF-BT	2	0	13	15	-1.414	0.157	NS
Muscle Tone of Upper Limb	A	AT-BT	0	8	7	15	-2.82	0.005	S
		AF-BT	0	11	4	15	-3.12	0.002	S
Muscle Tone of Lower Limb	A	AT-BT	0	7	8	15	-2.64	0.008	S
		AF-BT	0	9	6	15	-3.00	0.003	S
Loss of Speech	A	AT-BT	0	8	7	15	-2.82	0.005	S
		AF-BT	0	11	4	15	-3.12	0.002	S
Walking Time	A	AT-BT	0	7	8	15	-2.64	0.008	S
		AF-BT	0	9	6	15	-3.00	0.003	S
Hand Grip Power	A	AT-BT	0	6	9	15	-2.44	0.014	S
		AF-BT	0	8	7	15	-2.82	0.005	S
Foot Pressure	A	AT-BT	0	5	10	15	-2.24	0.025	S
		AF-BT	0	7	8	15	-2.64	0.008	S
Spring Pulling Test	A	AT-BT	0	6	9	15	-2.44	0.014	S
		AF-BT	0	7	8	15	-2.64	0.008	S
	B	AT-BT	0	7	8	15	-2.64	0.008	S
		AF-BT	0	9	6	15	-3.00	0.003	S

Parameter	Mean (BT)	Mean (AT)	Mean (AF)	Mean Difference	SD	SE	T	P	Inference
FBS Group A	99.65	99.67	96.77	-0.0133 (BT-AT), 2.88 (BT-AF)	20.56	5.31	-0.0025, 0.625	0.99, 0.54	NS
FBS Group B	93.56	94.23	95.36	0.669 (BT-AT), -1.80 (BT-AF)	19.25	4.97	1.87, -0.371	0.89, 0.71	NS
PPBS	183.70	170.61	176.86	-13.09 (BT-	36.13	9.33	1.40,	0.18,	NS

Group A				AT), -6.84 (BT-AF)			0.55	0.58	
PPBS Group B	182.56	178.25	178.89	-4.31 (BT-AT), -3.67 (BT-AF)	33.20	8.57	0.50, 0.366	0.62, 0.71	NS
SYS Group A	154.66	152.66	144.66	-2 (BT-AT), -10 (BT-AF)	21.45	5.54	0.361, 1.840	0.723, 0.087	NS
SYS Group B	137.33	147.33	142.00	10 (BT-AT), 4.6 (BT-AF)	20.35	5.26	-1.902, -0.834	0.077, 0.418	NS
DIA Group A	83.33	84.00	83.33	0.66 (BT-AT), 0 (BT-AF)	10.997	2.84	-0.234, 0	0.817, 1.00	NS
DIA Group B	84.66	84.66	81.33	0 (BT-AT), -3.33 (BT-AF)	11.95	3.09	0, 1.233	1.00, 0.237	NS

DISCUSSION

Pakshaghata is one of the most debilitating diseases classified under Vata Vyadhi in Ayurveda. This condition aligns closely with modern descriptions of a stroke or cerebrovascular accident, characterized by loss of motor and sensory functions, especially on one side of the body (hemiplegia). This can occur following ischemia caused by blockage (thrombosis, arterial embolism), or haemorrhage of intracranial blood vessels in central nervous system. Risk factors of the stroke include old age, hypertension, diabetes mellitus, hypercholesterolemia, tobacco smoking or chewing, alcohol consumption, atrial fibrillation & obesity etc. Hypertension and diabetes mellitus are significant comorbidities that worsen stroke severity, prognosis, and recovery. Hypertension increases the risk of both ischemic and haemorrhagic strokes, leading to more severe neurological damage and higher chances of recurrence, complicating recovery efforts. Similarly, diabetes contributes to vascular issues like atherosclerosis, increasing stroke risk and resulting in poorer outcomes due to impaired nerve regeneration and delayed healing. These conditions prolong recovery, heighten the risk of recurrent strokes, and require meticulous management. Post-stroke treatment must be comprehensive and individualized to address both the neurological damage and these comorbidities to optimize rehabilitation and prevent complications.

Vata is the pradhana dosha involved in pakshaghata and Basti Chikitsa is regarded as prime line of treatment for Vata dosha. According to Sushruta one can treat vataja, pittaja, kaphaja & raktaja disorders either alone or in combination with the help of basti.[10] Further, he mentions multi-dimensional therapeutic effect of basti which can be achieved by using different drugs in combinations. Yapana Basti is a type of niruha basti which can be given irrespective of Kala or Ritu without any adverse effects.[11] Here Mustadi yapana basti is planned as it is considered to be Ubhayarthakari because they serve as both Shodhana and

Shamana, sadhyobala janana and rasayana and also balamamsa vardhaka.[12] It is also described as nirupadrava, meaning without complications this makes it suitable for administration even in individuals who are considered alpa bala rogi, vruddha or sukumara.

During the course of the study following observations were made, majority of patients were aged 61-70 years, aligning with the higher incidence of CVA in older populations. Males comprised 63.33% of cases, and broader data also suggest men are at higher stroke risk. Most patients (66.66%) belonged to Anupa Desha, reflecting regional demographics.66.66% followed a mixed diet, with non-vegetarian food increasing risk factors like hyperlipidemia and atherosclerosis. Alcohol and smoking (36.66%) were strongly associated with stroke risk, while other habits like tea, coffee, and tobacco had varying impacts. Right-sided hemiparesis was slightly more common (53.33%). Infarction accounted for 70% of cases, consistent with stroke epidemiology. 23.33% had dysarthria/dysphasia, 6.66% had aphasia, and 46.66% had no speech deficits. Vata-Pitta dominance (43.33%) suggests susceptibility to Vataja disorders. Common complaints included karma kshaya (70%), vaksthambha (53.33%), sankocha (43.3%), ruja (76.66%), and shotha (53.3%). Among Samyak Nirudha Lakshana, Malashodhana improved from 53.33% on day 2 to 90% on day 6, Mutrashodhana was achieved in all patients, Agnideepana and ruchi showed significant improvement, indicating improved digestion. Ashaya laghuta increased over treatment days, reinforcing Basti's effectiveness in Vata disorders. Rogopashanti & Prakrutisthata were not observed within the study duration, as Pakshaghata is a chronic and challenging condition.

The study assessed the effects of treatment on neuromuscular function, mobility, and metabolic parameters. Significant improvement was observed Speech quality in both groups, with notable progress after follow-up. No immediate change was noted in Walking time, but significant improvement was seen after follow-up.

Neuromuscular functions in upper limb - Hand grip power and spring pulling test showed significant improvement after treatment, with further progress after follow-up. Both groups showed a considerable reduction in muscle tone, with no significant difference between them. Muscle power in Shoulder, elbow, and wrist movements showed significant improvement, especially after follow-up. Between-group differences were generally not significant, except for shoulder movements, where follow-up results showed notable differences.

In lower limbs, Foot pressure improved significantly in both groups after treatment and follow-up. Considerable reduction in muscle tone was observed in both groups, with no major differences between them. Muscle power when assessing Hip, knee, and ankle movements showed significant improvement, particularly after follow-up. Some movements exhibited minor between-group differences after follow-up.

No major changes were observed in deep tendon reflexes, though minimal improvement was noted after follow-up, with slightly better results in Group A. Fasting and postprandial blood sugar levels showed slight reductions, but the changes were not significant. Systolic and diastolic pressure remained largely unchanged in both groups.

CONCLUSION

Mustadi Yapana Basti being a Yapana Basti acts as Shodhana as well as Brimhana which is beneficial in both Dhatukshayaja and Margavaranajanya Pakshaghata. It is Sadyobalajanana, Vataghna, and Rasayana. Yapana basti is considered Nirupadrava and also has lower dose than Niruha basti and hence a fitting choice in durbala and avirechya Pakshaghata patients. Statistically highly significant improvement in parameters like Muscle power in flexion extension of elbow, shoulder, hip and knee, spring pulling test, foot pressure was seen. Statistically significant result in wrist and ankle power, muscle tone, loss of speech, hand grip. Meanwhile no significant difference in the FBS, PPBS, Systolic or diastolic pressure and deep tendon reflexes. In conclusion, Mustadi Yapana Basti showed equally significant improvements across both groups in terms of primary outcomes. However, the therapy did not show a statistically significant effect on blood glucose or blood pressure levels throughout the course of the study. However, further large-scale studies with extended treatment duration and larger sample might yield substantial findings.

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