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Effect of *Trataka* (A Yogic Cleansing Technique) on Post-Covid Cognitive Impairments in Elders

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ABSTRACT

Background: People who have survived COVID-19 frequently complain of cognitive dysfunction, which has been described as brain fog. Early reports describing a dysexecutive syndrome after COVID-19 and has considerable implications for occupational, psychological, and functional outcomes. It is well known that elders may be particularly susceptible to cognitive impairment after critical illness. *Trāṭaka* (a yogīc cleansing technique) is one of the *Yogā* practices which is considered to improve cognitive functions. The objective of this study was to determine whether *Trāṭaka* practice enhances the cognitive functions of the post covid elderly subjects. **Material and Methods:** Thirty elders who had enrolled in a thirty days Trāṭaka practice program. Their age ranged between 60 and 80 years (group average ±S.D., 68.5±6.3 years). Those who have any chronic illness and mental illness, and those who are not willing to participate were excluded. *Trāṭaka* intervention is given for 30 days, 1hour/day. At baseline and following thirty days, all participants completed DLST and SLCT. **Results:** *Trāṭaka* intervention showed significant change in DLST scores, increase (P-value< 0.000) in total attempted score, significant increase (P-value<0.000) in net score, significant reduction in wrongly attempted score (P-value<0.000). Significant change in SLCT scores, significant increase (P-value<0.000) in total attempted score, Similarly, significant increase (P-value<.000) in net score, significant reduction in wrongly attempted score (P-value<0.000). **Conclusion:** The thirty days *Trāṭaka* intervention was successful in enhancing the cognitive functions among post-covid elders.

Key words: *Cognitive function, Trāṭaka, COVID-19, SLCT, DLST.*

INTRODUCTION

Globally, COVID-19 has impacted several lives. People who have survived COVID-19 frequently complain of cognitive dysfunction, which has been described as brain fog. Early reports describing a dysexecutive syndrome after COVID-19[1] and has considerable implications for occupational, psychological, and functional outcomes. It is well known that elders may be particularly susceptible to cognitive impairment after critical illness.[2] It is speculated that the inflammatory status after SARS-CoV-2 infection may promote neuronal damage and accelerate the pathogenesis of neurodegenerative diseases.[3] While the exact mechanism underlying this association remains unclear, the causation of cognitive decline post-covid-19 infection is multifactorial. Acute and chronic systemic inflammation and immune dysregulation after SARS-CoV-2 infection might also cause damage to the brain and thus may lead to cognitive decline.[4] A potent mechanism underlying cognitive decline after covid-19 infection is hypoxia[2], because brain regions associated with cognitive functions, such as the hippocampus, are susceptible to hypoxia induced neuronal damage.[5,6] Oxygen deficiency at the acute disease stage and after recovery can cause damages to neurons, which are sensitive to hypoxia.[7] This mechanism might explain why older

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age was associated with an increased risk of cognitive impairment. A previous study demonstrated that cognitive sequelae occurred in patients who survived acute respiratory distress syndrome (ARDS), indicating that COVID-19 disease, which is commonly complicated by ARDS, might affect long-term cognitive performance.[8] Cognitive impairment following COVID-19 is a complex condition due to the cerebral micro-structural changes that have been identified in the hippocampus and multiple other brain areas.[9] These changes were correlated with deterioration in cognition, which can respond to an interprofessional approach. Its effects can be frustrating both for the patient and the care providers. In view of the multiple complications associated with brain fog, these elders present a complex mix of new and pre-existing disability, their response to rehabilitation may be diminished by frailty and cognitive impairment, and their ability to participate may be limited by environmental factors including social isolation and care dependency. A different, more integrated, approach to rehabilitation is required; geriatric rehabilitation is very challenging. Existing facilities of rehabilitation and resource has diminished during the pandemic.[10] *Yogā* an age-old healing tradition of India, has proven to improve different cognitive domains. such as remote memory, mental balance, attention and concentration, delayed and immediate recall, executive functions, verbal retention and recognition tests.[11] very few studies that have looked at the effect of *Yogā* on cognition in the elderly subjects. Further no study has looked at the effect of *Trāṭaka*, on post covid cognitive dysfunction of the elders there fore, in this study we attempted to use one of the *Yogā* techniques (*Trāṭaka*) in the elderly subjects. The aim of the study was to evaluate the efficacy of *Trāṭaka* (a *Yogīc* cleansing technique) in improving cognitive functions of the post covid elderly subjects.

Materials and Methods

Thirty elders with post covid status were recruited for this study. Their ages ranged between 60 and 80 years (group average ± S.D., 68.5 ± 6.3 years). We have fully explained the potential risks and benefits in the study before written informed consent was provided by elders; the study was approved by the ethics committee of the institution, Lakulish Yoga University, located in Ahmadabad, Gujarat, India. The selection criteria included: Post covid elders Age between-60-80 yrs, Education: 5thstd and above, willing to participate by giving a written informed consent and those knowing English were included. Those having neurological and psychiatric disorders (based on case history), those who have practiced Yoga for the last 3 months and those who have major eyesight problems (in vision) were excluded from the study. In this study we adopted a purposive sampling to recruit subjects from the residential societies in Ahmedabad, thirty days *Trāṭaka* intervention was provided in the society premises, a single group pre-post design was used. The 30 days study was successfully completed by 30 subjects.

Design and Setting

The trial was a single group, pre-post trial. Subjects were assessed on day 1 and day 30 of the thirty days *Trāṭaka* practice, when the assessment was completed, respondents were appreciated for their time and cooperation. The practice was conducted in the premises of a residential society in Ahmadabad, Gujarat, India.

Intervention

The procedure used for *Trāṭaka* session was adapted from the book *Yogā* for promotion of positive health'.[12]

Preparatory eye exercises: *Trāṭaka* has many steps to be followed. First are the preparatory eye exercises. For this, the first step is the up and down or vertical movement of the eyes. In all the practices one has to open the eyes and move the eyeballs gently. It has to be smooth and continuous without any jerky movement. This has to be repeated for ten rounds. After this practice, to relax the eyes, simple palming is instructed (that is, rub the palms and then make a cup of it and cover the eyeballs). The second step is right and left or horizontal movements of eyeballs. Here,

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after opening the eyes one has to move the eyeballs to left and right. Again, this also has to be repeated for ten rounds. Here too simple palming is provided at the end of the exercise. The next step is diagonal movement of the eyeballs. Here the eye balls have to be moved to the extreme right up and extreme left down for ten rounds. Subsequently press and release palming is provided (as one inhales press the palms around the eyes and as one exhale release the pressure). It has to be continued for 5 rounds. Fourth practice is diagonal movement in the opposite direction. The relaxation is conducted using the same press and release palming exercise as before. Next step is the rotational movement of the eyeballs that is clockwise and anticlockwise. Here after the practice for relaxation the constant pressure palming is provided (press constantly around the eyeballs with the palms with inhalation and release with exhalation).

***Jyoti Trāṭaka*:** After the preparatory exercises, the next practice is *Jyoti Trāṭaka*, and it has three steps. The first is focusing, that is effortless gazing or focusing at a flame. One has to look at it for 30 seconds. At the end of the practice for relaxing the eyes, press and release palming is provided. Next step is intensive focusing at the tip of the wick of the flame. Here constant pressure palming is provided at the end of this step. The next step is de-focusing. The procedure includes first looking at the flame, then slowly widening the vision and defocusing the gaze on the flame with expansive awareness and collecting the details of the flame. After one minute again focusing on the flame followed by slowly closing the eyes and visualizing the flame between the eyebrows, collecting all the details with eyes closed is instructed. When the image disappears, palming with chanting of *Bhrāmari* is instructed. The last step is silence. The participants are instructed to feel the silence and relax for a while. After sufficient relaxation, they are asked to gently drop down their hand, sit quietly for some time and feel the deep comforting effect of the practice. They are asked to be aware of the changes taking place inside, recognize that the mind has become completely calm and that the concentration, willpower and sharpness of eyesight have improved.[12] (Appendix-1)

Assessments

SLCT - Cancellation tests require visual selectivity and a repetitive motor response. A six-letter cancellation test was administered to assess functions such as selective and focused attention, visual scanning, and the activation and inhibition of rapid responses. The six letter cancellation test has been used in similar type of design on Indian population.[13] The six letter cancellation task worksheet consists of an array of random alphabets, A-Z, in 14 rows and 22 columns. Participants were asked to sit with the worksheet distributed to each one. The instructions are given asking them to cancel as many target digits as possible in the specified time. They are asked to cancel as their wish whether horizontally, vertically, or selecting a particular letter one at a time randomly in the row. Finally, after knowing the test instructions they are asked to start the test, each test was conducted for 90 seconds on a standard stopwatch.

DLST - Digit letter substitution test contains flexibility at mind level, visual scanning, attention and psychomotor speed of processing information. It is used with same type of design on Indian population.[13] DLST worksheet consists a row of random digits, 1-9, in 8 rows and 12 columns. The coding sheet contains instructions about the test with example of substituting a specific letter for specific digit 1-9, the same code is applicable to entire test. Subjects were instructed to make their choice of letter substitution process, whether horizontally, vertically, or selecting a particular digit randomly in the row one at a time. In given time of 90 seconds substitute as many target digits as possible.

Data analysis

The data taken on the last day and on the first day of the *Trāṭaka* were compared with t-test and Wilcoxon signed rank test for paired using SPSS version 16.0.

RESULTS

A total of 30 subjects were participated in the study 30 subjects completed the study, which was conducted at the end of thirty days of *Trāṭaka* practice; Mean values and standard deviation for total scores, wrong

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substitutions, and net scores of six-letter cancellation task and digit-letter substitution task.

SLCT: Six Letter Cancellation Test

After thirty days of *Trāṭaka* practice it showed that 37.4% significant increase (P< 0.000, paired samples t-test) in total attempted (TA) score on SLCT. Similarly, there was 53.7% significant increase (P = 0.000, paired samples t-test) in NS. However, there was 100.9% decrease in wrongly attempted (WA) score which was highly significant (P = 0.000, Wilcoxon Signed Ranks Test) [Table 1].

Table 1: SLCT Changes after 30 days *Trāṭaka* practice

SLCT scores	Before	After	% increase↑	P value
TA	28.64 ±11.43	41.85 ± 7.99	37.4%↑	0.000***
WA	5.77 ± 1.73	1.9± 0.40	100.9%↓	0.000***
NS	22.87 ± 10.60	39.74 ±6.94	53.7%↑	0.000***

*significant at P<0.05, ** significant at P<0.01, ***significant at P<0.00 (paired sample test and Wilcoxon Signed Ranks Test), SLCT: Six Letter Cancellation Test, TA: Total attempted, WA: Wrongly attempted, NS: Net scores.

DLST : Digit letter substitution test

After 30 days *Trāṭaka* practice it showed that 49.48% significant increase (P< 0.000, paired samples t-test) in total attempted (TA) score on DLST. Similarly, there was 36.3% significant increase (P = 0.000, paired samples t-test) in NS. However, there was 122.3% decrease in wrongly attempted (WA) score which was highly significant (P = 0.000, Wilcoxon Signed Ranks Test) [Table 2].

Table 2: DLST Changes after 30 days *Trāṭaka* practice

DLST scores	Before	After	% increase↑	P value
TA	34.29 ± 11.74	44.32 ±8.13	49.48%↑	0.000***
WA	8.76 ± 4.15	2.11 ±1.32	122.3%↓	0.000**
NS	25.53 ± 7.96	42.21 ± 5.32	36.3%↑	0.000***

*significant at P<0.05, ** significant at P<0.01, ***significant at P<0.00 (paired sample test and Wilcoxon Signed Ranks Test), DLST: Digit letter substitution test, TA: Total attempted, WA: Wrongly attempted, NS: Net scores.

Discussion

Yogā is an art of living and has various health benefits including ability to improve cognitive functions. Many scientific studies have proven that *Yogā* is effective to improve cognitive functions in multiple clinical conditions.[14] It is a well-established fact that aging is associated with a gradual decline of cognitive functions. But the inflammation and immune dysregulation after SARS-CoV-2 infection might also cause damage to the brain and thus may lead to accelerated cognitive decline.[4] Number of *Yogā* studies looking at the cognitive functions of the elderly is limited. *Trāṭaka* is one of the *Yogā* practices which are considered to improve cognitive functions. But its effect on cognitive functions in post covid status has not been studied. As this study has not been conducted earlier, the aim of this study was to test the effect of *Trāṭaka* on cognitive impairment in post covid elders. Completion of this practice was associated with overall significant improvement in measures of executive functions. Substitution tests are essentially speed-dependent tasks that require the subject to match particular signs – symbols, digits, or letters - to other signs within a specified time period. Substitution tasks involve visual scanning, mental flexibility, sustained attention, psychomotor speed, and speed of information processing.[15,16] *Trāṭaka* practice involves various steps like preparatory eye exercises, focusing, defocusing, chanting and silence during relaxation. Each component or all of them together could have been responsible for the improvement in the cognitive functions. Dharana or focusing improves concentrative attention.[17] Focused Attention (FA) is the attention which is restricted to a specific focus[18] such as the breath or the candle flame (*Trāṭaka*). Earlier studies have shown that Intense FA meditation effects cortical engagement, as reflected by a concomitant reduction in ERD (event related desynchronization) to target

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tones in the beta (13-30 Hz) frequency band. Reductions in beta ERD after practice of external tasks is due to the decreased cognitive efforts.[18] There is enhanced processing of task-related auditory inputs during FA meditation. FA meditation training is thought to improve one's ability to remain vigilant and monitor distractors without losing focus. FA meditation which could be considered a state of dhyana, the regulative attention skills are invoked less frequently, and the ability to sustain focus thus be-comes progressively "effortless".[19] *Dhyana* is associated with reduced sympathetic activity and increased vagal tone.[20] The defocused phase of *Trāṭaka* could be similar to the benefits of *Dhyana* phase of meditation. Multiple studies show that meditation may affect multiple pathways that could play a role in brain aging and mental fitness.[21] Meditation processes are linked to GABAergic cortical inhibition, a mechanism implicated in improved cognitive performance and enhanced emotional regulation.[22] Relaxation techniques have shown to reduce anxiety and improve memory[23] as well as attention.[24] It is already known that reduced anxiety can improve the performance on tasks requiring attention and memory.[25] So, the improved performance could also be attributed to the reduced anxiety after *Trāṭaka*. The findings of this study establish that *Trāṭaka* could be a potential tool to combat post covid cognitive impairment in elderly. The *Trāṭaka* intervention is easy to learn, implement and adhere. Further *Trāṭaka* after the initial few sessions, can be practiced independently by the elders. This study could provide a substantial base for conducting future trials to test the efficacy of *Trāṭaka* in controlled experiments.

Table 3: Details of *Trāṭaka* practice

SN	Name of the Practice	Duration
1.	**Starting Prayer**	**1 min**
2.	**Preparatory eye exercises**	**9 mins**
	Up and down or vertical movements-10 rounds	30 secs
	Simple palming	1 min
	Right and left or horizontal movements-10 rounds	30 secs
	Simple palming	1 min
	Diagonal movements -Right up-left down-10 rounds	30 secs
	Press and release palming	1 min
	Diagonal movements -Left up-right down-10 rounds	30 secs
	Press and release palming	1 min
	Rotational movements-clockwise-10 rounds	30 secs
	Constant pressure palming	1 min
	Rotational movements-Anticlockwise-10 rounds	30 secs
	Constant pressure palming	1 min
3.	***Jyoti Trāṭaka***	
	Effortless gazing or Focusing	4 mins
	'A'kara chanting	1 min
	Intensive focusing	4 mins
	'U'kara chanting	1 min
	BREAK	1 min
	De-focussing	4 mins
	Bhramari	1 min
	Silence	4 mins
4.	**Closing prayer**	**1 min**

CONCLUSION

The thirty days *Trāṭaka* practice was successful in improving sustain attention, working memory capacity among post-covid elders, a longer follow-up period will enable researchers to thoroughly examine neuro-cognitive changes. Although this was limited by small sample size, lack of heterogeneous population, these

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findings suggest rigorous systematic approaches and advanced imaging techniques to examine *Trāṭaka* practice as a means to enhance executive function among post-covid elders.

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REFERENCES

1. Helms J, Kremer S, Merdji H, et al. Neurologic features in severe SARS-CoV-2 infection. N Engl J Med. 2020;382(23):2268-2270. doi:10.1056/NEJMc2008597
2. Pandharipande PP, Girard TD, Jackson JC, et al; BRAIN-ICU Study Investigators. Long-term cognitive impairment after critical illness. N Engl J Med. 2013;369(14):1306-1316.
3. Marshall M. The lasting misery of coronavirus long-haulers. Nature. 2020;585:339–41.
4. Merkler AE, Parikh NS, Mir S, Gupta A, Kamel H, Lin E, Lantos J, Schenck EJ, Goyal P, Bruce SS, et al. Risk of ischemic stroke in patients with coronavirus disease 2019 (COVID-19) vs patients with influenza. JAMA Neurol. 2020;77:1–7.
5. Duvernoy Henri M, CF. Risold Pierre-Yves: The human hippocampus-functional anatomy, vascularization and serial sections with MRI. 2013;14.
6. DeTure MA, Dickson DW. The neuropathological diagnosis of Alzheimer's disease. Mol Neurodegener. 2019;14:32.
7. Sharma RA, Varga AW, Bubu OM, Pirraglia E, Kam K, Parekh A, Wohlleber M, Miller MD, Andrade A, Lewis C, et al. Obstructive sleep apnea severity affects amyloid burden in cognitively normal elderly. a longitudinal study. Am J Respir Crit Care Med. 2018;197:933–43.
8. Hopkins RO, Weaver LK, Collingridge D, Parkinson RB, Chan KJ, Orme JF Jr. Two-year cognitive, emotional, and quality-of-life outcomes in acute respiratory distress syndrome. Am J Respir Crit Care Med. 2005;171:340–7.
9. Lu Y, Li X, Geng D, et al. Cerebral micro-structural changes in COVID-19 patients — an MRI-based 3-month follow-up study. EClinicalMedicine 2020; Aug 3; 25:100484.
10. Grund S, Gordon AL, Bauer JM, Achterberg WP, Schols JMGA. The COVID rehabilitation paradox: why we need to protect and develop geriatric rehabilitation services in the face of the pandemic. Age Ageing. 2021;50(3):605–607.
11. Chattha R, Nagarathna R, Padmalatha V, Nagendra H. Effect of yoga on cognitive functions in climacteric syndrome: a randomized control study. BJOG. 2008;115:991–1000.
12. Nagendra HR, Nagrathana R. Promotion of Positive Health. Bangalore: Swami Vivekananda Yoga Prakashana; 2001.
13. Natu, MV., Agarawal, AK. (1997). Testing of stimulant effects of coffee on the psychomotor performance: an exercise in clinical pharmacology. Indian Journal of Pharmacology, 29(1), 11–14.
14. McDonnell MN, Smith AE, Mackintosh SF. Aerobic exercise to improve cognitive function in adults with neurological disorders: a systematic review. Arch Phys Med Re-habil. 2011;92(7):1044-52.
15. Lezak, MD. (1995). Neuropsychological Assessment 3rd ed, New York: Oxford U.P.
16. Van Hoof, JJ., Jogems-Kosterman, BJ., Sabbe, BG., Zitman, FG., & Hulstijn, W. (1998). Differentiation of cognitive and motor slowing in the Digit Symbol Test (DST): Differences between depression and schizophrenia. J Psychiatr Res, 32, 99-103.
17. Taimini IK. The science of yoga. Madras: The Theosophical Publishing House, 2005: 275–278.
18. Jha AP, Krompinger J, Baime MJ. Mindfulness training modifies subsystems of attention. Cognitive, Affective, & Behavioral Neuroscience. 2007;7(2):109-119
19. Telles S, Naveen KV, Balkrishna A. Meditation and attention: a comment on a re-cent article. Perceptual and Motor Skills. 2010;111:918-920.
20. Telles S, Bhat RR, Visweswaraiah N, Nandi KM, Kumar S, Pailoor S. Changes in Autonomic Variables Following two Meditative States Described in Yoga Texts. The journal of alternative and complementary medicine. 2012;0(0):1–8.
21. Lutz A, Slagter HA, Rawlings NB, Francis AD, Greischar LL, Davidson RJ. Mental Training Enhances Attentional Stability: Neural and Behavioral Evidence. The Journal of Neuroscience. 2009;29(42):13418 –13427.

ISSN: 2456-3110 **ORIGINAL ARTICLE** August 2022

22. Telles S, Bhat RR. Neurophysiological Changes in Meditation Correlated with Descriptions from the Ancient Texts. 2011;39(2).
23. Feng Z, Zhang JT. Protective effect of melatonin on beta-amyloid-induced apoptosis in rat astroglioma c6 cells and its mechanism. Free Radic Biol Med. 2004;37(11):1790-801.
24. Solberg EE, Holen A, Ekeberg O, Osterud B, Halvorsen R, Sandvik L. The effects of long meditation on plasma melatonin and blood serotonin. Med Sci Monit. 2004;10(3):CR96-101.
25. Sarang SP, Telles S. Immediate effect of two yoga-based relaxation techniques on performance in a letter-cancellation task. Perceptual and Motor Skills. 2007;105:379-385.

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