

Identifying the cognitive functions using reaction time – a futuristic approach

S. Prashanth¹, S. Priyanka², K. Maheshkumar³

¹ Government Yoga and Naturopathy Medical College and Hospital, Department of Yoga Philosophy, Chennai, India

² Government Yoga and Naturopathy Medical College and Hospital, Department of Yoga, Chennai, India

³ Government Yoga and Naturopathy Medical College and Hospital, Department of Physiology and Biochemistry, Chennai, India

Letter to Editor

Dear Editors,

We read the article of Ghuntla, T.P., & Dholakiya, J.R. (2023) entitled *A meta-analysis of influence of yoga activities on reaction time as a component of skill related fitness* with great interest and gathered knowledge. They included five relevant articles, with yoga activities showing a standardized mean difference (SMD) of 3.06 (95% CI: -0.66–6.78, $p < 0.01$) for VRT and 2.86 (95% CI: -0.37–6.09, $p < 0.01$) for ART. These results highlight the potential of yoga as an effective means to enhance reaction times, with implications for sports performance and skill-related tasks.¹ The limited number of studies included in the meta-analysis may be attributed to the lack of portable reaction time (RT) devices. However, a recent development device called the PC 1000 Hz portable RT device has been validated² for estimating both visual reaction time (VRT) and auditory reaction time (ART),² and the findings are consistent. Several studies have utilized this device in various yoga interventions, reporting significant changes and affirming its simplicity, user-friendliness, and reliability. These findings pave the way for future research on yoga-related studies, leveraging this innovative technology.³⁻⁵

Keywords

- yoga
- reaction time
- cognitive functions

Corresponding author

K. Maheshkumar, BNYS, PhD

e-mail: doctor.mahesh1985@gmail.com
Government Yoga and Naturopathy Medical
College and Hospital
Department of Physiology & Biochemistry
Arumbakkam, Chennai-600106
tel.: +91 988 459 17 39

Article info

Article history

- Received: 2024-03-29
- Accepted: 2024-04-18
- Published: 2024-05-28

Publisher

University of Applied Sciences in Tarnow
ul. Mickiewicza 8, 33-100 Tarnow, Poland

User license

© by Authors. This work is licensed under
a Creative Commons Attribution 4.0
International License CC-BY-SA.

Conflict of interest

None declared.

Financing

This research did not received any grants
from public, commercial or non-profit
organizations.

We know that cognitive functions are influenced by language proficiency, attention span, information processing rate, age, gender, BMI, education, socioeconomic status, hormone problems, and concurrent diseases.³ Reaction time (RT) is a crucial component of information processing, used to measure an individual's sensory-motor performance. The human body reacts differently to stimuli, like auditory stimuli are reacted to more quickly than visual ones,⁴ RT is the time taken to perceive, process, and respond to sensory stimuli.^{4,6} RT measures the central nervous system's function, determining cortical arousal, performance, and motor-sensory connection, assessing a person's ability to quickly react to even the smallest changes.⁶

It is used as an indirect measure of the central nervous system's (CNS) capacity for perceptual cognitive processing.⁴ RT and critical flicker fusion frequency (CFFF) are widely used tests for assessing cognitive processes in learning and performance, often used in therapeutic settings due to affordability, simplicity, validity, and reliability.³ Yoga is a popular mind-body practice⁷ that focuses on breathing, meditation, and postures, it enhances cognitive abilities, affecting memory, learning, planning, and perception. Its breathing methods aid in processing visual and aural information, and improved reaction time is crucial for athletes, skilled workers, and surgeons to perform at their best.¹ The OM meditation and ujjayi pranayama, has been proven to enhance hearing and visual abilities in healthy individuals by reducing visual and auditory response times⁸ also can boost resilience and self-awareness.⁹ Mind body practices cognitive benefits, including enhanced sensory processing, highlight its role in optimizing performance and well-being.

References

- [1] Ghuntla TP, Dholakiya JR. A meta-analysis of influence of yoga activities on reaction time as a component of skill related fitness. *Health Prom Phys Act.* 2023;24(3):50-55. doi: 10.55225/hppa.535.
- [2] Kumar AP, Kumar KM, Padmavathi R, Maruthy KN, Sundareswaran. Validation of PC 1000 Hz reaction timer with biopac[®] MP 36 for recording simple reaction time. *Indian J Physiol Pharmacol.* 2019;63(2):138-144.
- [3] Prabu Kumar A, Omprakash A, Kuppusamy M, et al. How does cognitive function measured by the reaction time and critical flicker fusion frequency correlate with the academic performance of students? *BMC Med Educ.* 2020;20(1):507. doi: 10.1186/s12909-020-02416-7.
- [4] Kuppusamy M, Kamaldeen D, Pitani R, et al. Effect of Bhramari pranayama practice on simple reaction time in healthy adolescents – a randomized control trial. *Int J Adolesc Med Health.* 2020;33(6):547-550. doi: 10.1515/ijamh-2019-0244.
- [5] Sekar L, Niva W, Maheshkumar K, et al. Effect of Mahamantra chanting on autonomic and cognitive functions – an interventional study. *J Clin Diagn Res.* 2019;13(5):1-9. doi: 10.7860/JCDR/2019/41236.12877.
- [6] Bargal S, Nalgirkar V, Patil A, Langade D. Evaluation of the effect of left nostril breathing on cardiorespiratory parameters and reaction time in young healthy individuals. *Cureus.* 2022;14(2):e22351. doi: 10.7759/cureus.22351.
- [7] Gothe NP, Hayes JM, Temali C, Damoiseaux JD. Differences in brain structure and function among yoga practitioners and controls. *Front Integr Neurosci.* 2018;12:26. doi: 10.3389/fnint.2018.00026.
- [8] Chobe S, Bhargav H, Raghuram N, Garner C. Effect of integrated Yoga and Physical therapy on audiovisual reaction time, anxiety and depression in patients with chronic multiple sclerosis: A pilot study. *J Complementary Integr Med.* 2016;13(3):301-309. doi: 10.1515/jcim-2015-0105.
- [9] Hakkim A, Jagannathan A, Bhargav H, Jasti N, Varambally S, Gangadhar BN. Development and feasibility testing of a brief yoga module on well-being and cognition of postgraduate mental healthcare students in tertiary settings. *Int J Yoga.* 2021;14(3):229. doi: 10.4103/ijoy.ijoy_87_21.