



Research Letter

Increasing cardiopulmonary aerobic activity improves motor cognitive response time: An inference from preliminary one-group pretest-posttest quasi-experimental study



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ABSTRACT

Motor cognitive response time (MCRT) is the time elapsed between presenting a stimulus and the time taken by that individual to respond to that stimulus through a motor performance. After completing aerobic exercise, there are various changes that takes place, one of which might be change in cognitive function. Whether cardiopulmonary aerobic activity/capacity has an impact on MCRT is not explored yet. © 2017 Published by Elsevier B.V. on behalf of Cardiological Society of India. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

To the Editor

Motor cognitive response time (MCRT) is expressed in terms of reaction time or response time, which assess the speed of information processing and the response of co-ordinated peripheral movements.¹ There are numerous factors that affects MCRT in normal healthy individuals. The major factors being exercise, fatigue, age, gender, distraction, involvement in two different types of tasks at a same time, breathing cycle, stress. The data regarding the influence of cardiopulmonary aerobic activity on MCRT is not yet documented. Hence, we intend to explore the changes in MCRT immediately after the cardiopulmonary aerobic activity.

The study protocol was approved by the Institutional Student Project Committee (MMIPR/SPC/2017/23) and was done according to the ethical guidelines for biomedical research on human subjects, Indian Council for Medical Research (ICMR), 2006. Sample size of 12 is sufficient to meet the sample size requirement for the pilot study.² Hence, 15 college going young males, aged between 19 and 25 years were recruited for this preliminary one-group pretest-posttest quasi-experimental study design. The healthy young adults without any recent injury or disease that can limit the capacity of individual for aerobic testing were recruited. The anthropometric measurements were taken prior to the test which included, height, weight and from them body mass index (BMI) was calculated. Purpose, method, related benefits and risks of the study was explained to the participants before the collection of the data, and assurance of confidentiality was given for the collected data. Informed consent was taken from each of the participant before their enrolment.

For assessing MCRT, Reflex App,³ compatible with Mobile based Android operating system, version 6.0, Marshmallow and higher was used. Cardiopulmonary aerobic capacity was determined by

the standardized 12 min run test (12MRT) using Copper's formula,³ Maximal Oxygen consumption (VO_2 Max ml/kg/min) = $[22.351 \times (\text{distance covered in kilometres}) - 11.288]$. MCRT recorded before and immediately after 12MRT were used for analysis.

Due to the normality of collected data, established by Shapiro Wilk test, descriptive statistics were expressed in mean \pm standard deviation and parametric test, paired t-test was used to compare pre-post MCRT changes. The mean age, height, weight and BMI of recruited 15 young college-going young males were, 22.5 ± 1.5 years, 173.4 ± 4.8 cm, 73.2 ± 6.7 and 24.3 ± 1.9 respectively. Mean VO_2 Max with 95% confidence interval (CI) is 35.4 ± 4.7 (32.8–38) ml/kg/min. The pre-post MRCT changes was displayed in Fig. 1. There exists significance difference, $p < 0.001$ between them. MCRT among the young college male is greater than reported by Reddy et al.⁴ (214 ± 18 ms) and Eckner et al.⁵ (247 ± 75 ms) in college athletes. This difference might attribute to the regular training session by the athletes. This also supports that regular training improves MCRT. Even the school-going children respond quicker (214.2 ms–248.8 ms) due to regular aerobic activity in schools.⁶ But our report contradicts the previous research on effects of acute exercise on response time.⁴ This warrants further research to support our preliminary report that MCRT decreases with increasing aerobic activity.

Author's contributions

RM, AD and VM conceived and designed the study, conducted research, provided research materials, collected and organized data and wrote initial draft of article. AJS and VPA conceived and designed the study, analyzed the data and provided content review for the prepared manuscript. All the contributing authors approved the final draft.

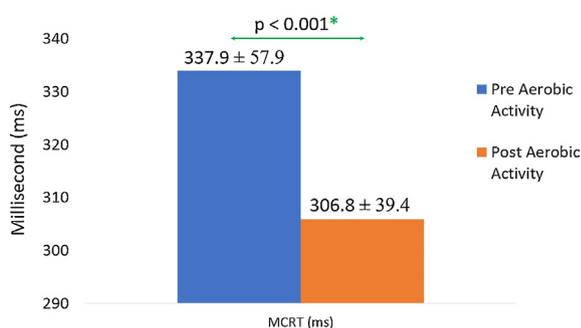


Fig. 1. Pre-post aerobic activity changes in motor cognitive response time (MCRT).

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Conflict of interest

None of the authors have conflict of interest to declare.

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