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IMPACT OF YOGIC PRACTICES AND NEUROMOTOR TRAINING ON REACTION TIME AND HAND–EYE COORDINATION AMONG FEMALE STUDENTS

Mr. A. THOOYA ALEX*, Dr. C. DURAI**

*Research Scholar, **Assistant Professor,

Department of Physical Education and Sports, Manonmaniam Sundaranar University, Tirunelveli, 627012, Tamil Nadu. India.

thooyaalex@gmail.com & drcd@msuniv.ac.in

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ABSTRACT

Hand–eye coordination and reaction time are vital for both health and academic achievement in female undergraduate education college students, as they significantly influence motor learning and participation in physical activities (Schmidt & Lee, 2014). This study set out to assess how yogic practices and Neuromotor training affect these two key abilities in female undergraduate education students. A total of 48 female undergraduate students (aged 22–26 years) from education college were randomly assigned into three groups (n = 16 each): the Yogic Practice Group (YPG), the Neuromotor Training Group (NMTG), and the Control Group (CG). The YPG and NMTG participants underwent six weeks of their respective training interventions, while the CG received no structured intervention. Reaction time was assessed using the Ruler Drop Test, and hand–eye coordination was measured with the Alternate Hand Wall Toss Test. Data were analysed using ANCOVA, with pre-test scores as covariates. Results revealed that both the YPG and NMTG demonstrated significant improvements after six weeks; however, the NMTG exhibited significantly greater gains in both reaction time and hand–eye coordination compared to the YPG and CG. These findings suggest that neuromotor training is more effective than yogic practices for enhancing psychomotor performance in female undergraduate students of education.

INTRODUCTION

Reaction time and hand-eye coordination are fundamental components of motor performance that influence both daily functioning and athletic efficiency. Among female students, Reaction time and hand-eye coordination abilities are particularly significant for enhancing academic performance, sports participation, and overall well-being (Gupta & Kumar, 2019). Yogic practices, which integrate physical postures, breathing techniques, and mindfulness, have been shown to improve neuromuscular control, attentional focus, and psychomotor skills (Sengupta, 2013; Tran et al., 2001). Similarly, neuromotor training, which emphasizes activities such as agility, and coordination drills, is recognized as a key element for improving proprioception, motor control, and functional movement (American College of Sports Medicine [ACSM], 2014).

The combined application of yogic practices and neuromotor training may provide a holistic approach to enhancing reaction time and hand-eye coordination, particularly in young female students, who often benefit from structured physical activity interventions for physical and psychological development (Nidhi et al., 2013). Investigating their impact can offer valuable insights for integrating traditional and modern training methodologies in educational and athletic settings. In the present study, our aim is to examine the impact of yogic practices and neuromotor training on reaction time and hand-eye coordination among female students.

Yogic practices and Neuromotor training in female students:

Psychomotor skills such as reaction time and hand-eye coordination is important for everyday functioning, learning, athletics, and professional tasks. They depend on efficient sensory perception, neural processing, and motor response. Female students, particularly in late adolescence and early adulthood, still show plasticity in these domains, and interventions may produce measurable improvements.

Yogic practices (including asana, pranayama, meditation) have been shown to improve reaction time, coordination, attention, and cognitive control. For example, a study by Pise et al. (2018) found that three months of yoga improved reaction time, eye-hand coordination, static balance, and agility among college students. Pise et.al (2018). Integrated yogic interventions also are associated with enhanced brain wave coherence, improved accuracy, and speed in tasks requiring reaction and sensory-motor integration. De & Mondal (2020) Another investigation showed that yogic relaxation (e.g. shavasana and makarasan) can reduce auditory and visual reaction times. Mirdha & Sharma (2022).

Neuromotor training (or training focusing on coordination, proprioception, agility, perceptual-action coupling) has also been demonstrated to improve motor reaction times and coordination. Recent work in neuromuscular and proprioceptive training shows improvements in reaction time and movement control. Concha et.al (2025) For instance, studies using light-based perception-action training devices in athletes report significant reductions in reaction times and gains in movement speed. Mancini et.al (2024). Comparative work between these approaches, especially in female students in non-athletic settings, is sparse. Thus, a study comparing yogic practice and neuromotor training specifically on reaction time and hand-eye coordination in this demographic will fill a gap in the literature. It may help inform educational or wellness curricula to enhance psychomotor performance, with potential downstream effects on learning, sport, and health.

Methodology

To achieve the purpose of the study forty-eight women students were selected as subjects from St. Joseph College of Education in Vaikalipatti Tenkasi District, Tamil Nadu, India. Their age ranged

between 22 to 26 years. They were randomly divided into three equal groups and each group consists of sixteen subjects. Experimental Group I Yogic practices group, Experimental Group II Neuro motor training group, and III Control Group was not exposed to any training for a period of six weeks. All the subjects were informed about the nature of the study and their consent was obtained to co-operate. The following variables Reaction Time (Ruler Drop test) and Hand-Eye Coordination (Alternate Hand Wall Toss Test) were analysed the data by following statistical techniques. Descriptive Statistics and Analysis of Covariance (ANCOVA) To determine the adjusted post-test mean differences among groups, controlling for baseline differences, with the Level of significance < 0.05 level.

Analysis and Interpretation of Data

The table presents the Analysis of Covariance on Reaction Time of Neuromotor Training Group, Yogic Practices Group and Control Group have been analysed and presented in following Table.

Analysis of Covariance on Reaction Time among Yogic Practices Group, Neuromotor Training Group and Control Group

Adjusted Post Test Means			Source of Variance	Sum of Square	Df	Means Square	F-ratio	Sig
YPG	NMTG	CG						
0.132	0.118	0.159	Between	.012	2	.006	**52.104***	**0.00**
			With in	.005	44	.001		

*Significant at 0.05 level. The table value required for significance at 0.05 level with df=2 *and 44 is 3.21*.

Table 1 shows that the adjusted post-test means of YPG, NMTG and CG are 0.132, 0.118 and 0.159 respectively. The obtained F-ratio value is 52.104 which are greater than the table value 3.21 with df 2 and 44 required for significance at 0.05 level. Since the value of F-ratio was greater than the table value, it indicates that there was a significant difference among the adjusted post-test means of two experimental groups and control group.

As the obtained 'F' ratio was statistically significant, Scheffe's post hoc test was conducted to examine the paired mean differences, and the findings are presented in the below table 2.

The Scheffe's Test for the Difference between Paired Means on Reaction Time

YPG	NMTG	CG	MD	CI
0.132	0.118	-	**0.15***	
				0.07
-	0.118	0.159	**0.41***	
0.132	-	0.159	**0.26***	

**Significant at 0.05 level of confidence.*

The table 2 shows that the mean difference values between YPG & NMTG, NMTG & CG, YPG & CG, are 0.15*, 0.41*, and 0.26* respectively which are greater than the confidence interval value .07 at 0.05 level of confidence.

The results reveals that both Yogic Practices and Neuromotor Training group shows significant improvement on reaction time among female students. However, the mean value of Neuromotor Training group has a better improvement than the Yogic Practices group and Control Group on Reaction Time.

The pre and post means values of YPG, NMTG and CG on Reaction Time was graphically represented.

Pre and post Test Mean values between Yogic Practices Group, Neuromotor Training Group and Control Group on Reaction Time

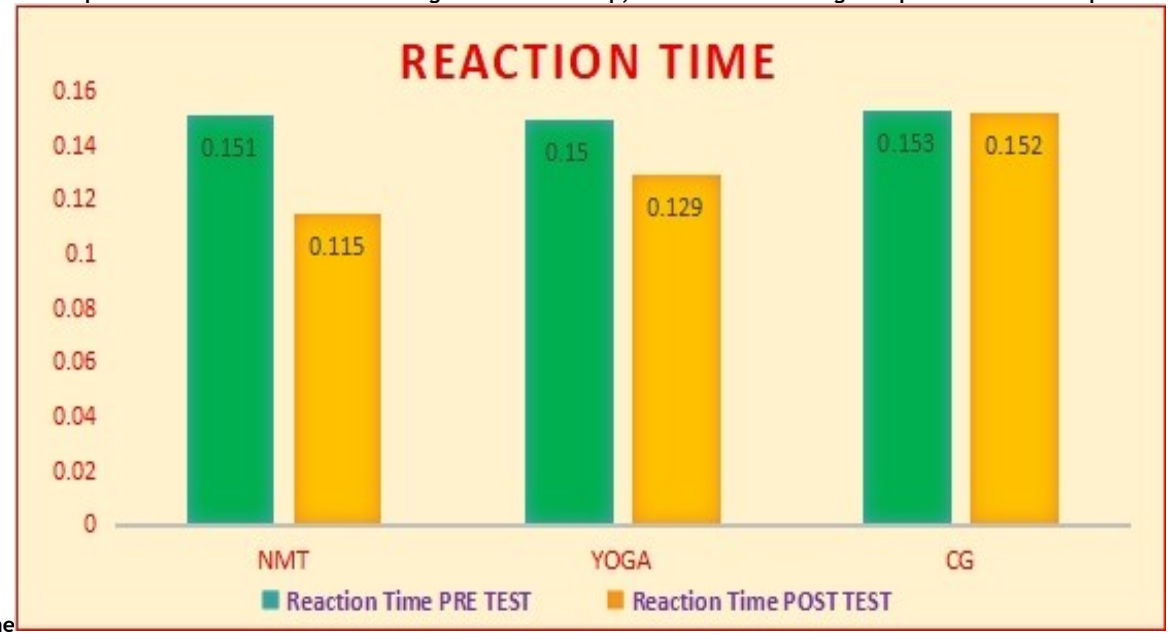


Table 3 presents the Analysis of Covariance on Hand Eye Coordination of Neuromotor Training Group, Yogic Practices Group and Control Group have been analysed and presented in following Table.

Analysis of Covariance on Hand Eye Coordination of Experimental Groups and Control Group

Adjusted Post Test Means			Source of Variance	Sum of Square	Df	Means Square	F-ratio	Sig
YPG	NMTG	CG						
24.653	27.886	18.523	Between	478.415	2	239.208	**73.171***	**.000**
			With in	143.843	44	.589		

**Significant at .05 level. The table value required for significance at 0.05 level with df 2 and 44 is 3.21.*

Table 3 shows that the adjusted post-test means of two experimental group and control groups are 24.653, 27.886 and 18.523 respectively. The obtained F-ratio value is 73.171 which are greater than the table value 3.21 with df 2 and 44 required for significance at 0.05 level. Since the value of F-ratio was greater than the table value, it indicates that there was a significant difference among the adjusted post-test means of two experimental and control groups.

As the obtained 'F' ratio was statistically significant, Scheffe's post hoc test was conducted to examine the paired mean differences, and the findings are presented in the below table 4.

The Scheffe's Test for the Difference Between Paired Means on Hand Eye Coordination

YPG	NMTG	CG	MD	CI
24.653	27.886	-	**3.233***	1.90
-	27.886	18.523	**9.363***	
24.653	-	18.523	**6.130***	

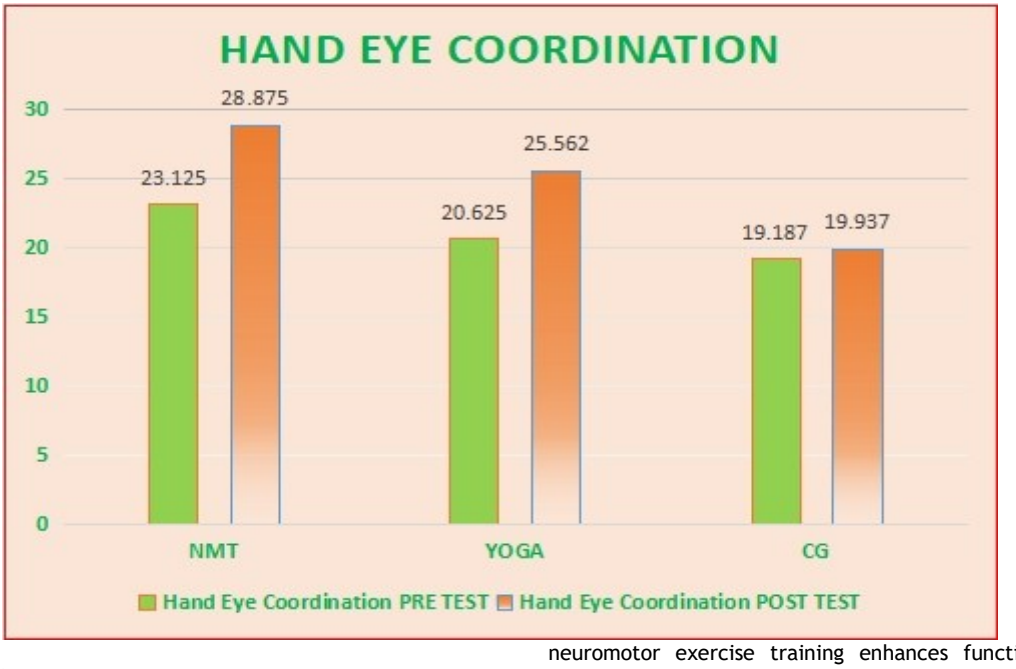
*Significant at 0.05 level of confidence.

Table 4 shows that the mean difference values between YPG & NMTG, NMTG & CG, YPG & CG, are 3.233, 9.363, and 6.130 respectively which are greater than the confidence interval value 1.90 at 0.05 level of confidence.

In the results of the study reveals that both yogic practices and Neuromotor Training increase the Hand Eye Coordination of the female undergraduate Education students. However, the mean value of NMT Group have a better count than the Yoga group and Control Group on Hand Eye Coordination.

The pre, post and adjusted post- test means values of NMTG, Yogic Practices and Control Groups on Hand Eye Coordination was graphically represented in the following Figure.

Pre and post Test Mean values between Yogic Practices Group, Neuromotor Training Group and Control Group on Hand Eye Coordination



Discussion on findings:

The findings of the present study are consistent with previous research, as the results demonstrated significant differences in the adjusted post-test means of the two experimental groups compared to the control group in both reaction time and hand-eye coordination. A similar study by Bushman (2012) reported that neuromotor exercise training enhances functional fitness by improving motor skills such as balance, coordination, gait, agility, and proprioception. The mean values in the present study indicated that the Neuromotor Training Group (NMTG) shows significant improvement when compare to Yogic Practice Group (YPG) and the Control Group (CG) on reaction time and hand-eye coordination

CONSLUSION

The result of the present study suggests that neuromotor training serves as an effective strategy for enhancing key components of functional fitness, particularly reaction time and hand–eye coordination, thereby underscoring its broader applicability in promoting overall motor performance and daily functional capacity.

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