



EFFECT OF YOGIC MUDRAS ON NEUROMUSCULAR COORDINATION OF SPORTS PLAYERS

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Abstract: This research paper explores the effect of yogic mudras on neuromuscular coordination in sports players. Yogic mudras are physical exercises used in yoga practice believed to influence physiological functions by stimulating nerve endings and energy flow mentioned as per Gheranda Samhita. Neuromuscular coordination is crucial for athletes as it impacts movement precision, efficiency, and overall performance. This study aims to provide empirical evidence on how practicing specific mudras for 4 weeks may enhance neuromuscular coordination, thereby potentially benefiting sports players. The sample population consist of 30 male sports individuals who participated voluntarily for the research. To test the neuromuscular coordination Lafayette's steadiness testing Instrument for eye hand coordination and Plate Tapping Test to assess the speed and the coordination of limb movement. To see the effect ANCOVA as a statistical tool was employed and the level of significance was set at 0.05. The findings of the present study revealed that there was insignificant effect of practicing yogic mudras on neuromuscular coordination as there was no significant difference between pre and posttest of sports players. On the basis of the findings, it was concluded that due to less duration of the treatment there was no significant improvement of Neuromuscular Coordination of sports players. The researcher recommends to increase the duration for the significant effect as Yogic practices consist of pure natural energy which takes time for proper and visible improvement.

Index Terms - Yogic mudras, Sports Players, neuromuscular coordination.

INTRODUCTION

Neuromuscular coordination, the ability to efficiently coordinate muscle groups to perform movements, is critical in sports. Improved neuromuscular coordination can enhance performance, reduce the risk of injury, and speed up recovery. Yogic mudras, part of traditional yogic practices, involve specific exercises believed to influence physical and mental states. The objective of this paper is to explore the scientific basis of yogic mudras, to examine the impact of yogic mudras on neuromuscular coordination and to assess the applicability of yogic mudras in sports training.

Literature Review

Neuromuscular Coordination in Sports

Neuromuscular coordination involves the interaction between the nervous system and muscles, facilitating smooth, efficient movements. Key factors influencing neuromuscular coordination includes Motor Learning (The process by which athletes improve their movements through practice), Proprioception (The body's ability to sense its position in space) and Muscle Memory (The consolidation of motor tasks into memory through repetition).

The Gheranda Samhita is one of the principal texts of Hatha Yoga, attributed to Sage Gheranda, who expounded a comprehensive system of yoga practice. Among its various teachings, the text outlines the practice of mudras—symbolic hand gestures and physical seals that are believed to direct and enhance the flow of prana (life energy) within the body. These mudras play a crucial role in achieving physical, mental, and spiritual benefits.

Significance of Mudras

In the context of the Gheranda Samhita, mudras are seen as powerful techniques that complement other yoga practices such as asanas (postures), pranayama (breathing techniques), and dhyana (meditation). They are considered essential for awakening the dormant energies within the body, especially the kundalini energy, which is believed to reside at the base of the spine. The practice of mudras aids in stabilizing the mind, regulating bodily functions, and achieving higher states of consciousness.

Key Mudras in Gheranda Samhita

The Gheranda Samhita lists several important mudras, each with its unique benefits and significance. Here are some of the key mudras described in the text:

- 1) **Maha Mudra (The Great Seal):** This mudra involves a combination of specific postures, breath control, and concentration. It is said to harmonize the body's energies, purify the nadis (energy channels), and improve digestion and vitality.
- 2) **Maha Bandha (The Great Lock):** By combining the three major bandhas (Mula Bandha, Uddiyana Bandha, and Jalandhara Bandha), this mudra helps in channeling prana upward through the spine, aiding in the awakening of the kundalini and promoting mental clarity.
- 3) **Maha Vedha (The Great Piercer):** Performed in conjunction with Maha Bandha, this mudra involves rhythmic movements that stimulate the flow of prana. It is believed to destroy diseases, grant strength, and enhance vitality.
- 4) **Khechari Mudra (The Space-Permeating Gesture):** This advanced mudra involves rolling the tongue back to touch the soft palate. It is said to facilitate the flow of amrita (divine nectar), providing longevity and spiritual awakening.
- 5) **Viparita Karani Mudra (The Inverted Pose):** By reversing the natural flow of blood and prana, this mudra is believed to rejuvenate the body, improve mental functions, and balance the endocrine system.
- 6) **Yoni Mudra (The Source Gesture):** This mudra imitates the female reproductive organ and is practiced to attain a state of withdrawal of the senses (Pratyahara). It helps in calming the mind, reducing distractions, and deepening meditation.

Practical Application and Benefits

The mudras described in the Gheranda Samhita are not merely symbolic gestures but involve intricate physical movements and concentration techniques. Their regular practice is said to confer a multitude of benefits:

- 1) **Physical Health:** Mudras help in detoxifying the body, improving digestion, and enhancing overall vitality.
- 2) **Mental Clarity:** They stabilize the mind, reduce stress, and improve concentration and focus.
- 3) **Spiritual Growth:** By directing prana and awakening kundalini, mudras facilitate spiritual awakening and higher states of consciousness.

The Gheranda Samhita presents mudras as integral components of a holistic yoga practice, emphasizing their importance in achieving a balanced and harmonious state of being. Through dedicated practice, mudras can lead to profound physical, mental, and spiritual transformations. Their enduring relevance in the modern world highlights the timeless wisdom encapsulated in ancient yogic traditions.

Scientific Basis of Mudras

Research suggests that mudras can impact the autonomic nervous system, influencing heart rate variability and promoting relaxation. Studies have shown that mudras can enhance cognitive functions, reduce stress, and improve mood, which are indirectly related to neuromuscular coordination. Yogic exercises, traditionally rooted in ancient Indian spiritual practices, have gained global popularity for their numerous health benefits. These exercises encompass physical postures (asanas), breathing techniques

(pranayama), and meditation practices (dhyana). Modern science has increasingly explored these practices, providing a scientific basis for their efficacy. This research delves into the scientific underpinnings of yogic exercises, highlighting their physiological, psychological, and neurological impacts.

Physiological Benefits

1. **Musculoskeletal Health:** Asanas, the physical postures in yoga, improve flexibility, strength, and balance. Studies have shown that regular practice of yoga can enhance muscle tone, improve joint health, and increase overall physical fitness. For instance, a study by Tran et al. (2001) found that yoga practitioners exhibited improved muscle strength and flexibility after an eight-week yoga program.
2. **Cardiovascular Health:** Yoga has been shown to positively affect cardiovascular health by reducing blood pressure, improving lipid profiles, and enhancing overall heart function. A study by Prasad et al. (2006) demonstrated significant reductions in blood pressure and heart rate among participants practicing yoga regularly, indicating improved cardiovascular health.
3. **Respiratory Function:** Pranayama, or yogic breathing exercises, significantly enhance respiratory efficiency and lung capacity. Research by Khanam et al. (1996) indicated that regular practice of pranayama improves respiratory muscle strength and increases vital capacity, leading to better overall respiratory health.

Psychological Benefits

1. **Stress Reduction:** Yoga is renowned for its stress-relieving properties. The practice of asanas, combined with pranayama and meditation, has been shown to reduce cortisol levels (the primary stress hormone) in the body. A study by Sharma et al. (2003) found that participants who practiced yoga regularly exhibited lower stress levels and better coping mechanisms compared to non-practitioners.
2. **Mental Health:** Yoga has been associated with improvements in mental health, including reductions in anxiety and depression. In a meta-analysis by Balasubramaniam et al. (2013), yoga interventions were found to significantly reduce symptoms of anxiety and depression across multiple studies, indicating its efficacy as a complementary treatment for mental health disorders.
3. **Cognitive Function:** Regular yoga practice has been linked to enhanced cognitive functions such as memory, attention, and executive functioning. Gothe et al. (2013) reported that yoga practitioners exhibited better performance on cognitive tasks compared to those who did not practice yoga, suggesting that yoga enhances cognitive abilities through its calming and focusing effects.

Neurological Benefits

1. **Brain Structure and Function:** Neuroimaging studies have shown that yoga can lead to structural changes in the brain. A study by Villemure et al. (2015) found increased gray matter volume in regions associated with emotional regulation and self-awareness in long-term yoga practitioners. This suggests that yoga may enhance brain plasticity and promote healthier brain aging.
2. **Neurotransmitter Activity:** Yoga has been shown to influence neurotransmitter activity in the brain, particularly increasing levels of gamma-aminobutyric acid (GABA), a neurotransmitter associated with relaxation and reduced anxiety. Streeter et al. (2010) demonstrated that yoga practice increased GABA levels in the brain, which is linked to its anxiolytic effects.
3. **Autonomic Nervous System Regulation:** Yoga promotes balance in the autonomic nervous system, which controls involuntary bodily functions. Pranayama and meditation practices stimulate the parasympathetic nervous system, leading to a state of relaxation and reduced sympathetic activity (associated with the 'fight or flight' response). This balance contributes to improved stress resilience and overall health.

The scientific basis of yogic exercises is well-supported by numerous studies highlighting their physiological, psychological, and neurological benefits. Asanas, pranayama, and meditation collectively contribute to improved physical health, mental well-being, and enhanced brain function. Integrating these practices into daily routines can lead to a holistic improvement in quality of life. As research continues to explore the depths of yoga's benefits, its relevance and applicability in modern health and wellness contexts become increasingly evident. Due to such a huge impact of yogic sciences the researcher tends to

RESEARCH METHODOLOGY

The study involved 30 sports players from various disciplines, aged 18-30, with at least three years of training experience. Participants were divided into two groups:

1. **Control Group:** Continued their regular training.
2. **Experimental Group:** Incorporated specific yogic mudras into their training.

For the purpose of the study, Random Group Design was chosen. The initial test represented as the pre-test and also as the covariate.

Intervention

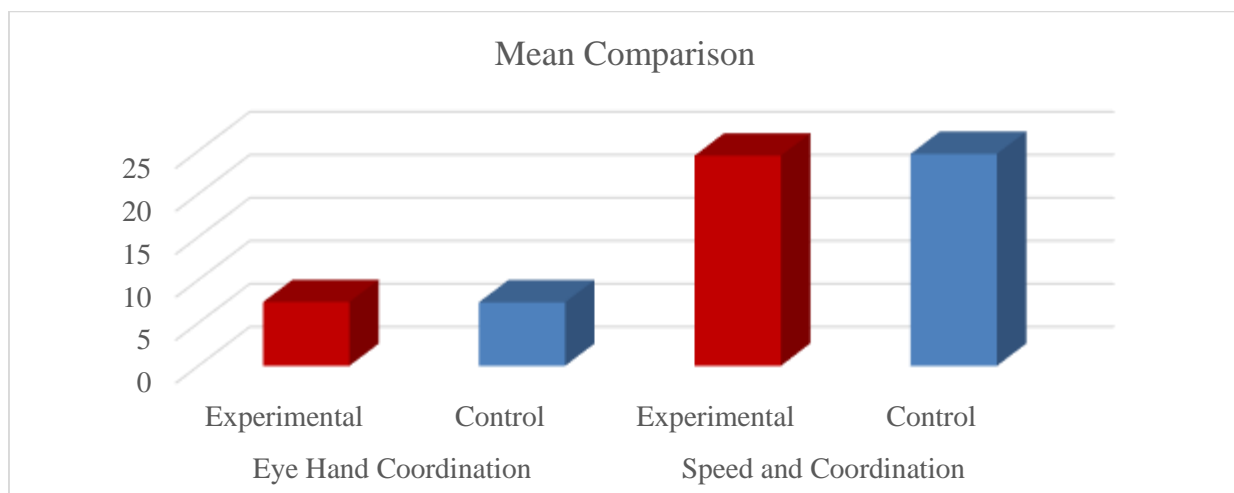
The experimental group practiced selected mudras (Maha Mudra, Maha Bandha, Maha Vedha, Khechari Mudra, Viparita Karani Mudra and Yoni Mudra) for 15 minutes daily for four weeks, along with their regular training. The Assessments was done of Neuromuscular Coordination Test. To test the neuromuscular coordination Lafayette's steadiness testing Instrument for eye hand coordination and Plate Tapping Test to assess the speed and the coordination of limb movement was used. The first observation (pre-test) was taken of Control and Experimental Group from the selected variables and the second observation (post-test) was taken at the end of experimental period of 4 weeks. After the collection of scores, they were analyzed statically by employing One-Way Analysis of Covariance (ANCOVA). In all cases to test the significance, level of significance was set at 0.05. The scores were analyzed by computer using IBM-SPSS (Version 26).

Data Analysis

Data were analyzed using statistical software to compare pre- and post-intervention results between the control and experimental groups. The descriptive statistics in pre and post-test showed the minimal improvement of the experimental group. This mean difference didn't show statistical improvement, but there was a slight improvement as comparing between pre and post-test with respect to experimental group.

Descriptive Statistics			
Variables	Group	Mean	Std. Deviation
Eye Hand Coordination	Experimental	7.4273	0.44244
	Control	7.3873	0.46768
Speed and Coordination	Experimental	24.4493	1.41580
	Control	24.6587	1.08739

In the above table there is a comparison of experimental and control group of both variables where the mean difference with respect to Eye Hand Coordination is 0.04 and Speed and Coordination is 0.209.



Tests of Between-Subjects Effects of Eye Hand Coordination						
Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5.761 ^a	2	2.880	1451.220	0.000	0.991
Intercept	.003	1	0.003	1.268	0.270	0.045
Pre-test	5.749	1	5.749	2896.394	0.000	0.991
Group	0.008	1	0.008	3.892	0.059	0.126
Error	0.054	27	0.002			

a. R Squared = 0.991 (Adjusted R Squared = 0.990)

In the above table it was observed that there was no significant effect of the treatment which was found to only 12.6 % of improvement due to the effect size 0.126 where the f-value is 3.892.

Tests of Between-Subjects Effects of Speed and Coordination						
Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	44.008 ^a	3	14.669	406.804	0.000	0.979
Intercept	0.181	1	0.181	5.033	0.034	0.162
Pre-test	42.263	1	42.263	1172.026	0.000	0.978
Group	0.176	1	0.176	4.893	0.036	0.158
Error	0.938	26	0.036			

a. R Squared = 0.979 (Adjusted R Squared = 0.977)

In the above table it was observed that there was significant effect of the treatment which was found to 15.8% of improvement due to the effect size 0.158 where the f-value is 4.893.

RESULTS AND DISCUSSION

Neuromuscular Coordination

Participants in the experimental group showed significant improvements in Eye Hand Coordination compared to the control group and no significant effect in Speed and Coordination. The four-week duration might be insufficient to induce changes in eye hand coordination.

Discussion

The findings suggest that yogic mudras can positively influence neuromuscular coordination in sports players. The improvements may be attributed to the enhanced mental focus and physiological regulation promoted by mudras. The increase in heart rate variability indicates better autonomic regulation, contributing to improved neuromuscular function.

Implications for Sports Training

Incorporating yogic mudras into sports training programs could be a cost-effective, low-risk strategy to enhance neuromuscular coordination and overall performance. Further research with larger sample sizes and diverse sports disciplines is needed to generalize the findings.

CONCLUSION

Yogic mudras have the potential to improve neuromuscular coordination in sports players by enhancing mental focus, reducing stress, and regulating physiological functions. This study provides a foundation for integrating yogic practices into athletic training to optimize performance and well-being. Great concerned is related towards the duration of performing mudras and which will have significant effect on sports and motor variables but it will help for the maintenance and sustenance if practiced regularly.

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