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Unlocking Precision: A Yogic Exploration of Arm-Hand Steadiness in Intercollegiate Female Fencers

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Abstract: This study aimed to investigate the impact of specific yogic asanas on the arm-hand steadiness of female intercollegiate-level fencers. Thirty intercollegiate level female players from various colleges in Thrissur District, Kerala, India were randomly assigned to either the Experimental/Yoga Group and the Control Group, with each group comprising 15 players. The Yoga Group engaged in 60 min training sessions, three times a week for six consecutive weeks, focusing on selected asanas known for their positive effects on the parasympathetic system. Conversely, the Control Group did not undergo any yoga training. Participants were assessed using a standard laboratory 9-hole steadiness tester, measuring their ability to hold a stylus in a series of holes ranging from 10 mm to 2.5 mm without touching the hole sides. The number of errors made within the specified time frame was digitally recorded. Each participant underwent three trials, and the average number of errors across these trials was documented. The testing instrument was utilized both before and after the intervention, and the responses from the experiment and control groups were meticulously documented. After a study period of six weeks, both groups underwent evaluation, employing a paired sample t-test to assess arm-hand steadiness. The study's findings, acknowledging its limitations, indicated a significant difference between the experimental and control groups, suggesting that the yoga group experienced improvements in their arm-hand steadiness.

Keywords: Arm Hand Steadiness, Yogic Asanas, Sports Participation, Fencing

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Introduction

Participating in sports presents a multitude of challenges that test an individual's mental and physical capabilities, especially in the face of increased fatigue and psychological stress.

Extensive research consistently highlights the positive impact of systematic and scientifically designed training over extended periods, showcasing notable improvements in both mental

and physical abilities. In the contemporary landscape of sports, elevated mental acuity is essential for achieving success at the elite level. This study seeks to delve into a pivotal aspect of human performance – "Arm-Hand Steadiness," a critical element in precision sports such as shooting, pistol, archery, fencing, and analogous disciplines.

Steadiness plays a pivotal role in activities that demand precision and immobility, such as shooting, pistol marksmanship, archery, dart throwing, fencing, and various games. Hand steadiness specifically refers to the ability to maintain one's arm and hand in a particular position for a relatively short duration, constituting a psychomotor phenomenon. Psychomotor relates to the connection between movement or muscular activity and mental processes, signifying the capability to engage the human body in response to stimuli involving movement.

As sports and athletic activities in physical education are rooted in fundamental human skills, an individual's proficiency in psychomotor skills becomes evident in their performance in sports and games. Previous studies have highlighted the correlation between psychomotor skills and sports performance. Sports skills involve a combination of psychological processes and motor events of the body, impacting success in events like archery, shooting, and racket sports (Chmura *et al.*, 2002).

Asanas, commonly known as yoga postures, hold a pivotal role in the intricate fabric of yoga, constituting the third step in the eightfold path of Ashtanga Yoga as outlined by the Patanjali Yoga Sutras. The essence of Yogasana is encapsulated in the phrase 'Sthiram Sukham Asanam,' emphasizing the importance of a yoga pose embodying both steadiness and comfort. Yoga Asanas encompass a diverse array of postures, ranging from meditative poses to those meticulously designed to enhance strength, balance, and stability. Beyond their spiritual significance, each asana imparts specific health

benefits. These postures transcend typical physical exercises by placing the body in positions that cultivate awareness, relaxation, and concentration.

At its core, yoga is an art that involves channelling the mind exclusively toward an object and sustaining unwavering focus without succumbing to distractions. The amalgamation of stability and ease, as articulated in the definition of asanas, necessitates deliberate intention. It surpasses mere physical alignment, requiring purposeful guidance of the mind to unite steadiness, and ease. Recognizing the pivotal role of specific postures and breath control in achieving stability and concentration, yoga emerges as a crucial element in sports performance where stability is paramount (Table 1). The mindful practice of yoga extends beyond the physical realm, contributing to enhanced concentration and poise, rendering it an invaluable asset in the domain of sports and performance.

Surprisingly, no research to date has focused on the influence of selected yogic asanas on arm-hand steadiness in female fencers, particularly within the college-going population. Given the critical role arm and hand steadiness play in fencing, affecting precision, control, and overall effectiveness, this study aims to investigate the impact of specific yogic asanas on the arm-hand steadiness of female intercollegiate level fencers.

It is crucial to acknowledge that various factors, such as kinanthropometric parameters (weight, height, length of the upper limb, age), lifestyle choices (smoking, sleep patterns), and other variables, can potentially influence an individual's arm-hand steadiness. However, it is important to note that these factors lie beyond the scope of the current study.

The purpose of the study were- (i) to know the effect of selected yogic asanas on the arm-hand steadiness of female members of the intercollegiate fencing team; (ii) to find out whether there is a significant difference between

Table 1: Yogic Asanas for Steadiness

1	Tadasana (Mountain Pose)	6	Ustrasana (Camel Pose)
2	Vrikshasana (Tree Pose)	7	Paschimottanasana (Seated Forward Bend)
3	Garudasana (Eagle Pose)	8	Uttanasana (Standing Forward Bend)
4	Natarajasana (Dancer Pose)	9	Virabhadrasana (Standing Back Arch to Asymmetrical Forward Bend)

the pre-test scores of the experimental and controlled groups; (iii) to find out whether there is any significant difference between the pre and post-test scores of the experimental group; and (iv) to find out whether there is any significant difference between the post-test scores of experimental and controlled groups.

Materials and Methods

The research involved 30 female players from various colleges in Thrissur District, Kerala, India. These participants were randomly divided into two equal groups comprising an Experimental/Yoga Group and a Control Group, each consisting of 15 players. The Yoga Group underwent training sessions lasting 60 min, three times a week, for a consecutive period of 6 weeks. The training regimen focused on specific asanas known for their stimulating effects on the parasympathetic system.

Procedure

Participants were instructed to sit in front of an adjustable wooden table, aligning the apparatus (Fig. 1) with shoulder height and positioning the outer edge in line with the dominant hand's shoulder edge. The session comprised individual trials for each hole, starting from the largest and progressing to the smallest. Hole diameters ranged from 10 to 2.5 mm for holes 1-9, respectively. Upon a signal, participants inserted the probe's tip into the hole, reaching a depth of approximately 5 mm, and were directed to maintain it in place without touching the hole's sides until a stop signal was given after 30 sec. A 30 sec interval separated each hole. The number of errors within the designated time frame was digitally recorded. Automated audio feedback, in

the form of a beep, was triggered whenever the stylus touched the circle's wall. Each participant underwent three trials, and the average number of errors across these trials was documented. This testing instrument was applied twice, both on pre and post-intervention days, with responses from the experimental and control groups meticulously documented. Throughout the study period, the control group refrained from engaging in any yoga training. Following a one-and-a-half-month duration, both the experimental and control groups underwent a re-evaluation, during which arm-hand steadiness was measured using a dependent t-test. Despite the acknowledged limitations of the study, the findings indicated a noteworthy disparity between the experimental and control groups, showcasing a substantial improvement in arm-hand steadiness within the yoga group.

Statistical Analysis

Statistical analysis was conducted utilizing the SPSS package. To assess the means between the control and experimental groups, a paired sample t-test was employed for comparison.

Results and Discussion

This study investigated the effect of selected yogic asanas on arm-hand steadiness of female members of the intercollegiate fencing team. Table 2 shows the mean and SD of pre- and post-test scores of arm-hand steadiness for the experimental as well as control group. In the experimental group, it is clear that the mean scores of the post-test were lower (4.566 ± 4.057) which indicates an improved performance than the pre-test scores (10.900 ± 8.087). In the case of the control group, there was not much difference



Fig. 1: Hand Steadiness Testing tool.

Table 2: Descriptive statistics arm-hand steadiness

<i>Finger Dexterity test (Number of Failures)</i>	Experimental Group(Fencing group) N=15		Control Group N=15	
	Mean	SD	Mean	SD
PRE-TEST	10.900	8.087	28.500	11.39797
POST-TEST	4.566	4.057	28.167	10.541

Low score indicates better performance

Table 3: Paired sample T-test of Arm-Hand Steadiness

	Mean Difference	t- value	Sig
Experimental group (n=15)	6.333	6.827	0.001
Control group (n=15)	0.333	0.356	0.724

between the pre- (28.500 ± 11.397) and post-test scores (28.167 ± 10.541).

Table 3 indicates the results of the paired t-test conducted on the pre-post test scores of arm-hand steadiness of the training group and the control group. It is seen that in the case of the Fencing group significant difference ($P < 0.01$) exists between the pre- and post-group indicating the positive effect of the training program. The score of the control group shows no significant difference in any of the selected variables ($P > 0.001$).

The result of the present study indicated that the arm hand steadiness scores of the experimental group improved significantly. The credit for this significant result can be given to the training with the selected yogic asanas which

has a stimulating effect on parasympathetic system. The breath plays an important role in the Asanas. Correct breathing is fundamental for the body's optimum metabolic function. With regular practice, the Full Yoga Breath becomes the habitual and natural way of breathing. Slower and deeper breaths improve circulation, nerve function and one's whole physical condition. While doing the selected asanas with somatic awareness, altering the breathing rhythm, to felicitate the relaxed awareness optimal level of focus and attention can be developed. This study has achieved the expected and fruitful result which has been assumed by the researcher that is a positive effect of selected yogic asanas on Arm Hand Steadiness. So, addition of such treatment to the training schedule would be helpful to increase the performance of the fencing players.

In a study (Kaur *et al.*, 2007), the arm-hand steadiness variations among individuals with different training conditions and explore potential gender differences in performance were investigated. The results indicated that Armed Forces personnel exhibited greater steadiness compared to Punjab Police personnel, attributed to strict selection criteria and consistent training. Additionally, females displayed greater steadiness than males, linked to the absence of alcohol and drug abuse. Practical implications include validating stringent selection criteria and psychomotor tests in armed forces recruitment. The study suggests an increased representation of females in roles requiring heightened arm-hand steadiness, emphasizing the importance of a diverse workforce in such tasks.

In another study (Sahu, 2013), it was found that there exists a significant correlation between concentration and hand steadiness in lawn tennis players. This connection is attributed to the nature of racket sports where players must accurately, forcefully, and efficiently hit the ball, making hand steadiness a crucial variable. Concentration plays a vital role in these sports, enabling athletes to screen out distractions and maintain focus on the ball.

Conclusion

The positive result found in the present study can be applied to all the games that use psychomotor skills like arm-hand steadiness, finger dexterity, manual dexterity, reaction time, etc. A few minutes of daily practice may help to increase the focus level of mind which is required for better performance.

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