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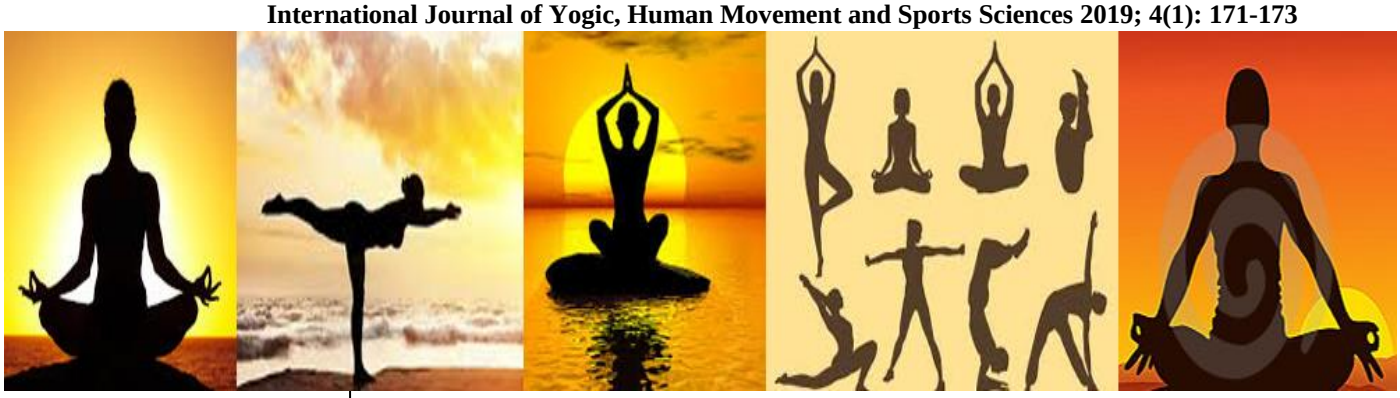

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Effects of yoga on the physical fitness components of the adolescent fencers

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Abstract
The aim of the present study is to assess effect of yoga exercises on the physical fitness components of the adolescent fencers. Total sixty male fencing players (n=60) belonging to Pune (Maharashtra, India), having age ranged from 14 –18 years were selected randomly. All the subjects were further divided equally into two groups viz; Group –A and Group B. Pre and post test physical fitness level was evaluated after 8 weeks of yoga exercises and fencing training for group A fencers and only fencing training for group B fencers. Result shows that the training intervention of yoga practices had statistically significant effects on selected physical fitness components. Further, yoga practices plays vital role in improving speed, coordination, balance, grip strength, agility and flexibility of the Fencing players.

Keywords: Fencing, yoga exercises, physical fitness, speed, coordination, balance, grip strength, agility and flexibility

Introduction
Fencing began as a form of combat and is known to have been practiced well before the birth of Christ. Fencing has a long tradition so far as human generation is concerned. It is played with bladed weapons and was included in Athens Olympics in 1896. Competitive fencing is divided into three categories viz., *the foil, the sabre and the epee*. This game demands physical power, agility and flexibility. To achieve success in fencing the training processes depend on developing physical, physiological and psychological aspects. The goal of special physical preparation in the sport of fencing is to improve the essential physical characteristics for this sport and to work on developing them to have the fencer reach higher levels of performance. The essential physical characteristics for the fencer include speed, muscular strength, endurance, flexibility, agility, coordination and accuracy. Looking at the physical aspects needed for fencers it was thought that yoga training program might be appropriate for improvement in fencing performance. In fact, earlier research reports indicate psycho-physiological improvement after practice of yoga in varied population (Cowen & Adams, 2005; Schure, Christopher & Christopher, 2008) [2, 5]. Yoga is an ancient Indian system which helps to keep person physically and mentally fit. It has been scientifically proved that yoga helps to improve physical fitness, muscle to mind coordination which is a key factor for achieving success in competitions. Potential effects of yoga for physical health are numerous; including improved physical fitness (Armstrong & Smedley, 2003; Gharote, 1976; Mandanmohan *et al*., 2003) [1, 3, 4] *and improved cardiovascular health.* Yogic practices include postures, controlled breathing and meditation which are commonly practiced as mind-body approach. In this study, therefore, researcher intends to see the efficacy of yoga training on physical fitness variables of adolescent epee fencers.

Methods
Selection of Subjects: Sixty male epee fencing players (n=60) belonging to Pune (Maharashtra, India), having age ranged from 14 –18 years were selected randomly. All the 60 subjects were divided randomly into two groups viz; Group –A (Selected yoga practices plus fencing practices) and Group – B (wait list control with Fencing practices only).

Research Design: The research study was conducted for 8 weeks in three stages i.e. First stage in which baseline data regarding various physical fitness tests viz. speed, coordination, balance, grip strength, agility and flexibility were recorded for both the groups. Second stage (Training or Treatment) in which both the groups were initially trained for fencing for about 40 min. then only Group A subjects were allowed to practice yogic exercises and each session of yoga practices was concluded with *om* chanting. The duration of each *asana* (posture), *pranayama* (breathing exercise) and *kriyas* (cleansing process) is 30 min. for 8 weeks., and in the last Third stage – III: Post test of physical fitness tests were again recorded for both the groups.

Statistical Technique: The baseline data and post test collected data were analysed using ANOVA & post hoc tests to find out the significant difference among the groups.

Results

Table 1: Central Tendency and Dispersion of the Groups in Physical Fitness Components in Adolescent Fencing Players (M & SD)

Variables	Groups			
	Yoga practices plus fencing Group (Experimental Group)		Fencing practice Group (Control Group)	
	Pre-test	Post-test	Pre-test	Post-test
Speed (Sec.)	7.15 (±0.46)	6.46 (±0.38)	7.13 (±0.32)	7.02 (±0.29)
Coordination (Pts.)	17.45 (±3.57)	25.13 (±3.93)	17.25 (±4.57)	18.53 (±3.98)
Balance (Sec)	17.37 (±2.09)	25.40 (±2.36)	17.32 (±2.54)	17.42 (±2.70)
Grip Strength (Kg.M.)	39.33 (±2.93)	48.80 (±3.86)	37.73 (±4.12)	38.38 (±3.15)
Agility (Sec.)	17.37 (±1.12)	15.26 (±0.95)	17.52 (±1.14)	18.11 (±0.95)
Flexibility (Cms.)	25.37 (±1.95)	29.81 (±1.88)	24.55 (±1.84)	24.18 (±1.72)

The results in Table 1 shows the means and standard deviations of the pre-test performance scores of the Experimental group and Control group in Physical fitness variables Viz. speed, coordination, balance, grip strength, agility and flexibility. This result indicates that the pre-test means of both the experimental and Control group in all the physical fitness variables were more or less similar. However, post-test performance scores of the Experimental group and Control group (Fencing practice & regular physical activities) in all the physical fitness variables were different.

Table 2: Result of Analysis of Variance (ANOVA) for Physical Fitness components of Adolescent Fencing players

Source of Variation	SS	df	MS	F- Value
Physical Fitness Variables(A)	1570.64	5	523.54	26.16**
Groups (B)	476.31	1	476.31	21.98**
Interaction	2579.72	11	227.10	10.48*

* $p<0.05$, ** $p<0.01$

Table 2 shows inferential statistics applied on physical fitness components, the result of 2 x 2 x 6 Factorial ANOVA revealed that the physical fitness variables got significant changes (F=25.26, $p<0.01$). Further, statistically significant changes are also evident in case of experimental and control groups (F=19.98, $p<0.01$) and even in interaction (F=9.48, $p<0.05$). It seems the training intervention of yoga practices had statistically significant effects on selected physical fitness components. These changes, therefore, have been discriminated further by using post hoc analysis.

Table 3: Scheffe's Post Hoc Test for Difference between Pairs of Ordered Means in Various Physical Fitness Variables of Adolescent Fencing players

Fitness Variables		Pre	Post	Pre
Speed (Sec.)		**Group B Pre (3)**	**Group A Post (2)**	**Group A Pre (1)**
	Group B Post (4)	0.10	0.25*	0.08
	Group B Pre (3)	--	0.18	0.11
	Group A Post (2)	--	--	0.32*
Coordination (Pts.)				
	Group B Post (4)	0.15	0.28*	0.11
	Group B Pre (3)		0.23*	0.13
	Group A Post (2)			0.33*
Balance (Sec)				
	Group B Post (4)	0.13	0.35*	0.10
	Group B Pre (3)		0.28*	0.09
	Group A Post (2)			0.47**
Grip Strength (Kg.M.)				
	Group B Post (4)	0.18	0.29*	0.16
	Group B Pre (3)		0.21*	0.12
	Group A Post (2)			0.39*
Agility (Sec.)				
	Group B Post (4)	0.13	0.21*	0.14
	Group B Pre (3)		0.18	0.11
	Group A Post (2)			0.28*
Flexibility (Cms.)				

	Group B Post (4)	0.16	0.32*	0.19
	Group B Pre (3)		0.24*	0.15
	Group A Post (2)			0.38*

* p < 0.05, ** p < 0.01

Post hoc results shows that Group A showed significant improvement in Speed (CD=0.32, $p<0.05$), in Coordination (CD=0.33, $p<0.05$), in Balance (CD=0.47, $p<0.01$), in Grip Strength(CD=0.39, $p<0.05$), in agility (CD=0.28, $p<0.05$) and in flexibility(CD=0.38, $p<0.05$) of the adolescent fencers and Group A showed significant superiority over the Group B in improving Speed (CD=0.25, $p<0.05$), Coordination (CD=0.28, $p<0.05$), Balance (CD=0.35, $p<0.05$), Grip Strength (CD=0.29, $p<0.05$), Agility (CD=0.21, $p<0.05$) and flexibility(CD=0.32, $p<0.05$).of the fencing players.

Discussion on findings

The statistical analysis showed that the physical fitness components which includes speed, coordination, balance, grip strength, agility and flexibility of the adolescent fencing players is improved in the experimental group due to eight weeks of half an hour yoga practices along with their fencing training program.

Conclusion

Following conclusions were drawn in the light of the present study

- Experimental (Yoga practices plus fencing practice) group showed significant superiority over the control in improving Speed of the fencing players.
- Experimental group" showed significant superiority over the Control in improving Coordination of the Fencing players.
- Experimental group" showed significant superiority over the Control in improving Balance of the Fencing players.
- Experimental group showed significant superiority over the Control in improving Balance of the Fencing players.
- Experimental group showed significant superiority over the Control in improving Balance of the Fencing players
- Experimental group showed significant superiority over the Control in improving flexibility of the Fencing players.
- Finally the results of the present study indicates that the training intervention of yoga practices had statistically significant effects on selected physical fitness components. Yoga practices plays vital role in improving speed, coordination, balance, grip strength, agility and flexibility of the Fencing players.

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