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Comparison of three methods of training and on hand steadiness of teenagers

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Abstract
Objective of the study was to find out if there is any significant difference exists between the three methods of training namely yoga asana, aerobics and general relaxation training by comparing the hand steadiness performances of teenagers with mean age 16.5 years. To test the hypothesis that the three methods have non-significant differences on hand steadiness variable namely number of errors committed, 96 male and female (48 male and 48 female) sportspersons in the age group of 15 to 18 years were being randomly divided into 3 groups, yoga asana group, aerobics and general relaxation group. Each sports person was given three trials and the average value of all the three trials was recorded on Hand steadiness tester machine. ANCOVA using SPSS 23 statistical package was applied to get and analyze the results. There was a significant difference found between yoga asana and aerobics group (M=-2.975, SE=1.133) as also significant difference between General relaxation and aerobics groups (M=-2.825, SE=1.155). No any significant difference was seen upon comparing the general relaxation and yoga asana groups (M=-.150, SE=1.404).The null hypothesis that there would be no significant difference between the three groups was therefore partially rejected.

Keywords: Hand steadiness, sports persons, ANCOVA, General relaxation

Introduction
The medical doctors require high level of precision and hand steadiness while performing check up and surgeries. In the medical studies persons with exposure to manganese and smokers show lack of hand steadiness. Sports activities also place different degrees of demand on an individual's mental and physical capacity during high level fatigue conditions, pressure and probably such similar condition instigates the sports person to take performance enhancing drugs for better steadiness and calmness. It is well documented that people who have undergone systematic, scientific trainings for several years develop substantial performance improvement with most of the modern day sports require adequate and sometimes high level mental abilities for elite performance.

Sports psychologists use various means methods to identify, nurture and train focus and concentration of the talented sports persons besides the players having other physical and other favorable genetic endowments. In this study an effort was made to study an important human performance factor namely Hand Steadiness" which plays an important role in aiming sports such as shooting, pistol, archery etc. Hand Steadiness is the ability to hold one's arm and hand in a steady position without tremors or undesirable movement for a relatively short period of time. This psychomotor phenomenon relies upon not only the muscular caliber of an individual but also on the mental ability to concentrate on the target. Factors affecting hand steadiness could vary from exposure, gender, medical condition, age. (Clark, 1986 [1]. Heyward et al., 1986 [2] in their study found that physical strength is the cause for males being better in hand steadiness as compared to the females. In contrast to this study (Hudgens et al., 1988 [3] reported that females performed better than the males on arm hand steadiness. Factors that can affect arm-hand steadiness could be individual's Kinanthropometric parameters such as weight, height, length of upper limb, age, smoking, sleep pattern and many other that affect brain function temporarily or permanent brain disorders that are beyond the scope of present study. As with aging process there may or may not be a decline in psychomotor functions of the body as we see some of the best shorts and golfers who are well above 45 years. Hand steadiness being a psychomotor function, it can be influenced by various psychological factors

and anything that will affect the psychomotor system will hence affect hand steadiness. Various drugs like central nervous system stimulants or depressants, artificial hormones like oral contraceptives, alter the performance of psychomotor tasks as do the changes of physiological parameters in the body or the environmental conditions e.g. change of temperature, noise level, humidity etc. Testing procedure itself can produce anxiety, nervousness. Other psychological parameters like depression, lack of concentration or disturbance of sleep-wake cycle can affect the score of an individual. Various health-impairing habits have a direct impact on health, as well as performance of various tasks. Smoking, caffeine intake in the form of tea\coffee\soft drinks and alcohol consumption has direct impact on the hand steadiness. Psychomotor performances are affected by the use of various drugs in the body be it a therapeutic drug or a substance of abuse have been shown to increase the tremor in the limbs thereby negatively affecting the hand steadiness and generally speaking the overall performance. Present study has been undertaken in order to compare the increasingly prevalent and upcoming performance enhancing techniques of yoga and relaxation that have been found potentially very useful for proving them insight, improving certain aspects of sportspersons like confidence, concentration and focus with a view to replicating their improved clinical performances on the field.

Methodology

Sample: Total 48 males and 48 females (N=96) from 3 different groups-Yoga asana (16 male and 16 female), Aerobics (16 male and 16 female) and General relaxation (16 male and 16 female) who had no prior medical condition in the age group of 15 to 18 years studying in school were randomly assigned to the 3 groups.

Tools: Hand steadiness tester - The subject sat comfortably in front of the tester. Initially the subject was told to insert the metal stylus into the hole number give of the metal plate. The instrument has been designed to measure one aspect of the psychomotor phenomena of steadiness. The subject's aim was to hold the stylus in the hole without touching the side. The level of difficulty for the five number hole is considered as moderate. The subject holds the stylus in the hole in the hole for duration of one minute without taking and elbow support with the use of dominant hand (right or left). The number of errors within the stipulated time were recorded digitally. Audio feedback in the form of a beep as and when the stylus would touch the wall of the circle was being given automatically to the sports person being tested. Each subject was given three trials and the average of the three trials was recorded. The above-mentioned instrument was being used twice on pre and post intervention days of testing and responses of all the 3 group of sports persons were recorded on day 1 and after 30 days.

Training procedure

A. General relaxation training: Lie quietly in a comfortable position with eyes closed. Subjects were told to relax as much as possible on their own. Body parts are relaxed deeply, starting from the top (fore head) up to the feet

Following phrases were used while providing the general relaxation

1. Concentrate on your forehead muscles only and Relax your forehead muscles
2. Concentrate on your jaw muscles only and Relax your jaw muscles
3. Concentrate on your shoulder muscles only and Relax your shoulders
4. Concentrate on your arms muscles only and Relax your arms
5. Concentrate on your chest muscles only and Relax your chest muscles
6. Concentrate on your stomach muscles only and Relax your stomach muscles
7. Concentrate on your hip muscles only and Relax your hip muscles
8. Concentrate on your feet muscles only and Relax your feet
9. It was emphasized to breathe naturally through nose
10. The duration of general relaxation was 35 minutes.

B. Yoga Asana training

1. 3 times recitation of öm"
2. Warming up-neck flexion, arm exercise, elbow exercise, shoulder movement, hip flexion, ankle rotation.
3. Lying down asana- pawanmuktasana, markatasana, suptatadasana, setubandhasana
4. Sitting asana-vajrasana, gyan mudra, suptavajrasana, shashankasana
5. Standing postures- tadasana, tiryak tadasana, pad hastasana, ardha chandra asana
6. Pranayama - Anulom vilom, bhramari
7. 3 times "om recitation
8. It was emphasized to breathe naturally through nose. \
9. The duration of yoga asana was 35 minutes.

C. Aerobics training(moderate intensity without apparatus)

1. Warm up and mobility exercises for neck, shoulders, waist, thighs, calfs, ankle
2. Jogging on the spot, steppers, straight leg jumping on the spot, mule kicks, high knee, sideways swing, knee up with the jump, jumping jacks,
3. Cooling down with low intensity jog, jump, balancing postures
4. Stretching –passive and active
5. It was emphasized to breathe naturally.
6. The duration of yoga asana was 35 minutes.

Results and discussion

The Descriptive Statistics table shows mean, standard deviation, number of participants on the dependent variable, post, for the 3 different methods of training. These values do not include any adjustments made by the use of a covariate in the analysis.

Table 1: Showing mean, standard deviation, number of participants on the dependent variable, post, for the 3 different methods of training

Descriptive Statistics			
Dependent Variable: post-intervention hand steadiness score			
Method/Group	Mean	Std. Deviation	N
Yoga Asana	11.94	3.715	32
Aerobics	13.78	5.655	32
General Relaxation	9.69	3.084	32
Total	11.80	4.569	96

Table 2: Showing ANCOVA results for the main section of Tests of Between-Subjects Effects

Tests of Between-Subjects Effects						
Dependent Variable: post-intervention hand steadiness score						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	382.413[a]	3	127.471	7.326	.000	.193
Intercept	1569.283	1	1569.283	90.187	.000	.495
Hole5PRE	113.393	1	113.393	6.517	.012	.066
Method	179.750	2	89.875	5.165	.007	.101
Error	1600.826	92	17.400			
Total	15355.000	96				
Corrected Total	1983.240	95				
a. R Squared = 193 (Adjusted R Squared = 167)						

Above table -2 shows there was an overall statistically significant difference, F (2,92) = 5.16 p<05) in post-intervention hand steadiness scores (post) between the different intervention methods once their means had been adjusted for pre-intervention hand steadiness scores (pre).

Table 3: Showing Estimates in order to get a better understanding of how the covariate has adjusted the original post group means.

Method/Group				
Dependent Variable: post-intervention hand steadiness score				
Method	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Yoga Asana	10.761[a]	.870	9.033	12.488
Aerobics	13.735[a]	.738	12.270	15.200
General Relaxation	10.910[a]	.879	9.164	12.657
a. Covariates appearing in the model are evaluated at the following values: Hole5PRE = 13.18.				

It is noteworthy in table-3 how the mean values have changed compared to those found in the Descriptive Statistics table, above. These new values represent the adjusted means (i.e., the original means adjusted for the covariate). The yogasana group shows best results ((M=10.761) for the hand steadiness in comparison to the other 2 groups with General relaxation group staying very close to the yoga asana group (M=10.910). This can be attributed to emphasis on concentrating on the posture and sequence of mental activities as in general relaxation and most of the yoga asana procedure rather than on physical aspect unlike it is done in aerobics which is of a cardio and muscular endurance activity. Now that we know there is a statistically significant difference between the adjusted means, we will want to know where the differences lie. This is reported in the Pair wise Comparisons table as shown below:

Table 4: Pair wise comparison using LSD Post hoc test

Pair wise Comparisons using LSD						
Dependent Variable: post-intervention hand steadiness score						
(I) Method		Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
Yoga Asana	Aerobics	-2.975*	1.133	.010	-5.225	-.724
	General Relaxation	-.150	1.404	.915	-2.938	2.639
Aerobics	Yoga Asana	2.975*	1.133	.010	.724	5.225
	General Relaxation	2.825*	1.155	.016	.531	5.119
General Relaxation	Yoga Asana	.150	1.404	.915	-2.639	2.938
	Aerobics	-2.825*	1.155	.016	-5.119	-.531
Based on estimated marginal means						
*. The mean difference is significant at the 05 level.						
b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).						

Table-4 above shows that there was a significant difference between yoga asana and aerobics group (M=-2.975, SE=1.133), significant difference between General relaxation and aerobics groups (M=-2.825, SE=1.155). no any significant difference was seen upon comparing the general relaxation and yoga asana groups (M=-.150, SE=1.404).

K. Jayachandran (2015) [4] in his study entitled Influence of Exact Sports Skill Training Programme on the Special Psychomotor Variables of School Cricket Players" found that there was a significant difference on hand steadiness in experimental group as a result of six weeks of selected specific skill training programme. Whereas the control groups showed insignificant difference on hand steadiness of cricket players.

Gaganpreet Kaur *et al.*, (2007) [5] in their study entitled Comparison of Arm-Hand Steadiness for Shooting Perfection in Armed Forces and Punjab Police" on 300 normal, healthy subjects aged between 18-35 years and 100 subjects each from Armed Forces, Punjab Police and Civilians (control) found that the armed forces were steadier than the Punjab Police personnel and females were found to steadier than males.

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