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## Combine effect of concurrent training and yogic activities on the physiological and performance parameters of 10 meter air pistol shooters

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### Abstract

The aim of the study was to test the hypothesis that a combine concurrent training yogic activities regimen may enhance performance ability of air pistol shooters. 40 male shooters age between 18-25 years were selected as samples for the study from Jammu and Kashmir by purposive sampling and were randomized into two groups i.e. experimental and control group. Single group pretest posttest group design was used to assess physiological and fitness parameters, and equivalent group pretest posttest was used to assess performance parameter. The selected physiological and performance parameter were vital capacity, cardio-vascular endurance, stability, strength, reaction time and individual match score. The said parameters were measured by Spiro meter, Harvard step test, Stroke static test, push-ups test, Nelson hand reaction time test and individual score through matches. Concurrent training and Yogic activities was given on alternate day's means three days for concurrent and three days for yogic activities every week for six weeks. Pretest and posttest was taken before and after training program. Physiological variables mean and standard deviation of pretest was (467.00±52.92, 65.74±18.28, 23.32±7.77, 19.30±6.94, 0.198±0.0279) respectively, mean and standard deviation of posttest was (505.50±60.652, 76.98±17.85, 30.35±6.746, 24.95±7.66, 0.195±0.027) respectively and the calculated 't' value of subject was 11.00 for vital capacity, 't' value for cardio-vascular endurance was 11.184, 't' value for stability was 9.249, 't' value for strength was 11.839, and the 't' value for reaction time was 3.594. Whereas the change in performance mean and standard deviation of experimental group was (20.50±6.151), while the change in performance mean and standard deviation of control group was (1.60±3.45). The calculated 't' value of performance was 11.980. All the calculated 't' values for respective physiological and performance parameters were found statistically significant at 0.05 level ( $p = 0.001$ ). From the above results it can be concluded that six week combine concurrent and yogic activities training program was effective to improve the physiological and performance parameters which ultimately enhance the shooting skill of 10 meter air pistol shooters.

**Keywords:** combine training and selected physiological and performance parameters

### Introduction

Sports offer many opportunities for people to make the best use of their abilities, to become part of a cooperative team effort, to experience the joy, and sometimes the misery, of losing along with enjoyable victory. In the present world, Sports have become extremely competitive. It is not mere participation or practice that makes an individual victorious. Qualitative sports life is affected by various factors like physiology, biomechanics, sports training, sports medicine, sociology and coaching, computer application and psychology and so on. To achieve top level performance in the international arena one must have a fitness regimen and systematic execution. To win medals, in the Olympics, there should be spotting of talent, systematic and scientific method of training, competitive exposure, etc. It is not only because of training, but also because of psychological, and physiological aspects that goals are achieved. Experts in the field of sports have put their mind into it and made tremendous efforts to find out ways and means to achieve top level performance. Shooting originated as a means of survival, and it was practiced in order to hunt game for food. As the industrial revolution made hunting for food less necessary for many people, shooting evolved into a sport. Sport shooting has been a competitive sport in a variety of forms since the mid-1800s. Shooting is an Olympic sport.

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The International Sport Shooting Federation, ISSF, is the governing body for shooting competitions throughout the world.

There are 19 different categories of shooting competitions of shooting recognized at the Olympic game. The objective of sports shooting is to deliver a number of perfectly executed shots to a target usually within a given time limit. Concerning the discipline "10 Meter Air Pistol" is an Olympic shooting event governed by the International Shooting Sport Federation (ISSF). The air pistol event was introduced on the World Championship level in 1970 and on the Olympic programmed in 1988. The distance from floor level to the centre of the target is 1400mm +/- 100mm. The air pistol range is the same as the air rifle range, giving each shooter a table, a 1 meter wide firing point, and a 10 meter distance between the firing line and the target line. The current rules require ranges to be built indoors with specified minimum requirements for artificial lighting. The target, 17 by 17 cm (6.7 by 6.7 in), is traditionally made of light-colored cardboard upon which scoring lines, and a black aiming mark consisting of the score zones 7 through 10, are printed. The pistols used are gas-driven with a caliber of 4.5 mm (.177 in). The pistol must be operated by only one hand from a standing position, and may only be loaded with one pellet at a time. For the 10 meter air pistol and air rifle disciplines match diabolic pellets are used. These pellets have wad cutter heads, meaning the front is (nearly) flat, that leave clean round holes in paper targets for easy scoring. To facilitate maximum performance out of various air guns the leading match pellet manufacturers produce pellets with graduated "head sizes", which means the pellets are offered with front diameters from 4.48 mm up to 4.51 mm.

### Background of the Study

Shooting is an Olympic sport, with different categories. Standing Air Rifle and Pistol Shooting are among the most technical of these, with both disciplines requiring extreme precision for success. From a standing position, the shooter must aim at a target located 10 meters away which, in the case of rifle shooting, has a "bull's eye", 1mm wide. The bullet must touch this ring to score a 'ten', allowing for an angular movement of the gun of only  $0.016^\circ$  (Zatsiorski and Aktov, 1990). Not surprisingly then, the smallest of movements will significantly affect shooter's score. To successfully compete in this demanding sport, an intensive training of the correct technique is necessary. Once each part of the correct technique is learned and can be properly executed by the shooter, all these elements are to be used in a coordinated and systematically way, otherwise there will be no expected and wished output. Five important coordination elements taken in consideration for the proper use of the technique are; taking the correct shooting position, pulling the trigger, coordination between triggering and aiming, follow through, and breathing. Air pistol is a great teacher of pistol shooting fundamentals, to properly score a maximum value shot, a shooter must correctly perform all areas of their shooting process. Accurate shooting requires calm, discipline, and a degree of physical fitness. Two major factors affecting accuracy are the heart rate and breathing. The sport of target shooting involves three factors-heart rates, breathing, and calm nerves are of paramount importance in all shooting sport. All fundamentals of pistol shooting such as position, grip, sight alignment, breath control, trigger control, physical condition, and psychology of shooting, when perfected, simply enables the shooter to perform. In order for a shot to be accurate, it is

necessary to make sure that the pistol will be held as motionless as possible to do so during the time that the shot is being fired the stance used by the shooter must provide the greatest stability possible for both the shooter's body and the pistol. In order to keep the pistol as immobile as possible the shooter must hold the breath for the length of time required to deliver an accurate shot. Some of this movement is physiological tremor. Tremor size has a demonstrable inverse correlation with shooting performance. Consequently, factors which affect tremor size should affect shooting ability. So as to control physiological tremor physical condition requirements for shooting involves the precise coordination of mental, muscle, eye, and nervous system functions at the same time is also very important to keep all the body functions as calm as possible in order to prevent the body from moving or wobbling, as to attainment of the minimum arc of movement. When the shooter is first getting his sight alignment and has not yet had time to settle his body and pistol, the extent of the movement is relatively great. As the body becomes balanced and the aiming is more precise, the arc of movement minimizes. After a certain length of time, the minimum arc of movement begins to increase, because the muscles begin to fatigue, and the shooter does not have enough air in his lungs to continue holding his breath. To help the shooter acquire the necessary knowledge to master all the factors that controls his shooting. A training program is required to tone the shooter physically as well as mentally to withstand the rigor of shooting sports.

**Concurrent Training-** Concurrent training is a method that consists of training multiple qualities at equal amounts of focus within the same training phase and often within the same workout. Concurrent training is training for both strength and endurance, in an effort to achieve the ultimate physical fitness and optimum athletic performance on both aspects of training. Different types of training (for example, aerobic training and strength training) carried out during the same training session. Aerobic system to maintain a lower resting heart rate and ensures shooter can perform at their best for extended periods, by concurrent method.

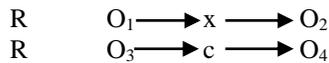
**Isometric Training-** Isometric exercises, also known as static strength training, involve muscular actions in which the length of the muscle does not change and there is no visible movement at the joint. The term 'static contraction training' is sometimes used to describe isometrics. However, 'contraction' signifies a change in length (shortening) of the muscle belly, which does not occur during static strength training. The term 'static action' is preferred to static contraction. Isometric exercises can be used for general strength conditioning.

**Yogic Activities-** Yoga enables one to attain the pure state of consciousness and to realize the inner self. It is the knowledge of knowledge alone that enables an intellectual whose mind is at peace to discriminate between good and evil and to steer the course of his life skillfully. Yoga means the integration of personality. Yoga improves the function of respiratory, circulatory, digestion, and hormonal system. Yoga also brings emotional stability and clarity of mind. The practices enjoined in yogic literature and handed down in different traditions are called the yogic practices. These may be classified as asanas, pranayamas, Bandhas and Mudras, Kriyas, and meditation.

### Methodology

As researcher wanted to study combine effect of concurrent

training and yogic activities on the physiological and performance parameter of 10 meter air pistol shooters, the study was conducted by experimental method. For the present study pretest-posttest equivalent group design was used to measure performance parameter



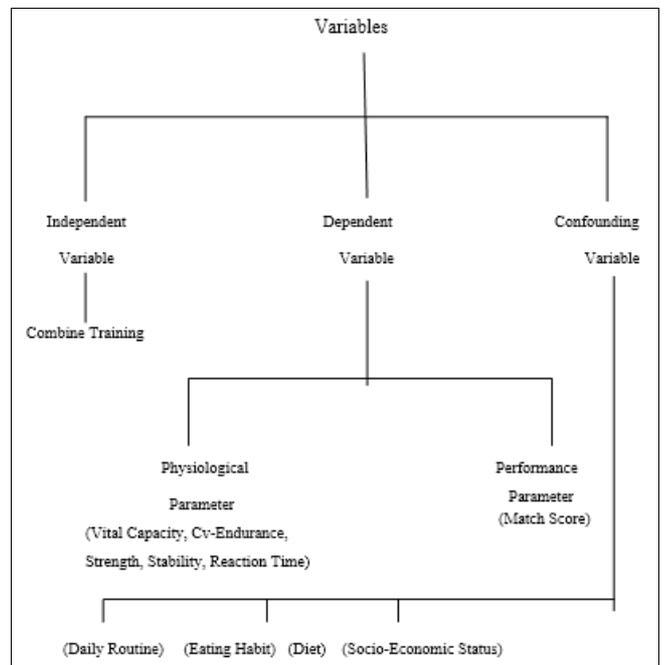
pretest-posttest equivalent group design in which 'X' were experiment group and 'c' was control group and the treatment and O<sub>1</sub> and O<sub>3</sub> represents the pretest and O<sub>2</sub> and O<sub>4</sub> assess posttest respectively. The difference between the pre test and posttest scores were taken as an index of the treatment condition. Whereas, for measuring physiological parameters single group pre test-post test experimental design was used.



Single group pretest-posttest design in which, X, is the treatment and O<sub>1</sub> and O<sub>2</sub> represents the pretest and posttest assessments respectively.

A group of research participants were measured on the dependent variable, O<sub>1</sub>, prior to administration of treatment condition. The independent variable, X, was then administrated, and the dependent variable, O<sub>2</sub>, was again measured. The difference between the pretest and posttest scores were taken as an index of the treatment condition.

All the air pistol shooters between age group 16-25 years of Jammu and Kashmir were the population of the study(N=100). To achieve the purpose of the study, purposively sampling technique was used. A sample of 40 male subjects was selected with the help of purposively sampling as subject for the present study. Subjects were further dispersed in two groups randomly i.e. 20 in experimental and 20 in control group. Variables are the conditions or characteristics that the experimenter manipulates, controls or observes.



The researcher selected 40 male students of 16-25 years old using purposive sampling technique, and subjects were randomly selected for control and experimental groups. After grouping, matches were conducted for pre-test score of performance of control and experimental group. Then the physiological variables of only experimental group were pre-tested. The six week training program was conducted on experimental group; training was given on six days in a week. Concurrent training and Yogic activities was conducted on alternate days. After the completion of six week training program the physiological parameters under the study was post- tested for experimental group only. Then the performance matches of both experimental and control group were held for post-test score. The data collected was analyzed by using SPSS and results were drawn.

**Tools for data collection**

Variables Physiological	Tools	Units
Cardio-vascular endurance	Harvard step test	Pulse counts per minute.
Vital capacity	Spiro meter	Maximum O <sub>2</sub> consumption (ml/kg/min).
Stability	Static balance test	Time in seconds.
Strength	Push-up test(1- minute)	Number of push-ups.
Reaction time	Nelson hand reaction time	Seconds.
Performance Variables	Tools	Units
Performance	40 shots match	Total scores out of 400. (each shot 10 scores)

**Results and Discussion**

For testing the hypothesis of homogeneity of group mean gains, as well as significance of differences of pairs of group means, the level of significance was set at 0.05 level of confidence, which was considered adequate for the purpose of this study. The obtained results were presents in the following tables which represents the result of descriptive analysis, correlation and comparison.

**Analysis of Vital Capacity**

Paired Sample Test of vital capacity

t	df	Sig. (2-tailed)	Mean difference	Std.Error Difference
11.00	19	0.001	38.50	3.50

Mean difference for vital capacity of pretest and posttest of

subjects was 38.50 this difference when tested by Paired Samples 't' test, 't' value was found 11.00 Which was statistically significant at 0.05 (p=0.001) significance level for 19 degree of freedom. This shows that there was statistically significant improvement in vital capacity of subjects due to treatment.

**Analysis of Change in Cardio-Vascular Endurance**

Paired Samples Test of cardio-vascular endurance

t	df	Sig. (2-tailed)	Mean difference	Std. Error Difference
1.184	19	0.001	11.23	1.00

Mean difference for cardio-vascular of pretest and posttest of subjects was 11.23 This difference when tested by Paired Samples Test, 't' value was found 11.18 Which was

statistically significant at 0.05 ( $p=0.001$ ) significance level for 19 degree of freedom. This shows that there was statistically significant improvement in cardio-vascular endurance of subjects due to treatment.

**Analysis of Change in Stability**

Paired Samples Test stability

t	df	Sig. (2-tailed)	Mean difference	Std. Error Difference
9.24	19	0.001	7.03	0.76

Mean difference for stability of pretest and posttest of subjects was 7.03 This difference when tested by Paired Samples Test, 't' value was found 9.24 Which was statistically significant at 0.05 ( $p=0.001$ ) significance level for 19 degree of freedom. This shows that there was statistical significant improvement in stability of subjects due to treatment.

**Analysis of Change in Strength**

Paired Samples Test of Strength

t	df	Sig. (2-tailed)	Mean difference	Std. Error Difference
11.83	11.83	0.001	5.65	0.47

Mean difference for strength of pretest and posttest of subjects was 5.65 This difference when tested by Paired Samples Test, 't' value was found 11.83 Which was statistically significant at 0.05 ( $p=0.001$ ) significance level for 19 degree of freedom. This shows that there was statistical significant improvement in strength of subjects due to treatment.

Levene's Test for Equality			t-test for Equality of Means of Variances		
F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
3.75	0.06	11.980	38	0.001	18.90

The Leven's test for equality of variance when applied to the change in performance of 10 meter air pistol shooters scale for experimental group and control group, the F value was found to be 3.75 which were not statistically significant. Hence variance of change in experimental group and control group were equal.

The mean of change in performance of experimental and control group were compared with independent t-test.

The mean difference was 18.90 and 't' value was 11.98 with degree of freedom 38 which was statistically significant at 0.05significance level ( $p=0.001$ ).This indicates that there was significant effect of 6 weeks combine concurrent training and yogic activities on the performance and physiological parameter of Experimental group.

**Discussions on Findings**

From the above analysis and interpretation of data following findings may be drawn.

- Combine concurrent training and yogic activities improve vital capacity significantly.
- Combine concurrent training and yogic activities improve cardio-vascular endurance significantly.
- Combine concurrent training and yogic activities improve strength significantly.
- Combine concurrent training and yogic activities improve balance significantly.
- Combine concurrent training and yogic activities improve reaction time, although statistically it shows a downward

**Analysis of Reaction Time**

Paired Samples Test of Reaction Time

t	df	Sig. (2-tailed)	Mean difference	Std.Error Difference
3.594	19	0.002	0.0032	0.000890

Mean differences for Reaction Time of pretest and posttest of subjects was 0.00320 This difference when tested by Paired Samples Test,

't' value was found 3.594 Which was statistically significant at 0.05 ( $p=0.002$ ) significance level for 19 degree of freedom. This shows that there was significant improvement in reaction time of subjects due to treatment.

**Analysis of Change in Performance**

Descriptive Statistic of Performance of Experimental and Control Groups

Group	N	Mean(score)	Std.	Std. Error Mean
Experimental	20	20.50	6.15	1.37
Control	20	1.60	3.45	0.77

Table shows that there were 20 subjects each in experimental and control group. The mean gain in Performance scale for experimental group was 20.50 with standard deviation of 6.15 similarly, for the control group the mean gain in similar variable was 1.60 with standard deviation of 0.77

Independent Samples Test of change in performance of air pistol shooters of Experimental and Control Group.

trend, which indicates that there was an improvement in shooters reaction time. Thus, the response to once stimuli improves statistically as compare to pretest and posttest of subjects.

- Combine concurrent training and yogic activities improve performance of 10 meter air pistol shooters.

The aim of the present study was to evaluate the effect of the training program. It was observed from the findings that a statistical significant effect was seen due to the combine concurrent training and yogic activities on the physiological parameters of the air pistol shooters which ultimately results in enhancing their performance in matches. The results of the study indicates that the experimental group namely concurrent training and yogic activities has significantly differs from the selected dependent variables namely cardio vascular endurance, strength, balance, reaction time, and vital capacity from pre-test and post-test. It is also found that the improvement in performance as a mean of score causes by concurrent training and yogic activities was greater when compared with the control group. The combine effect of concurrent and yogic activities on vital capacity, cardio-vascular endurance, stability, strength, reaction time and performance was statistically significant in pretest and posttest of subjects. It is known fact that the yogic activities and concurrent training is best suited for developing physical fitness, mental alertness and concentration. It also increases the physiological profile. The present study also revealed that the above finding of the study was supported by Zanjani F.S,

Cengiz A, Gaeini A.A, Tarssi Z, Rahbar B. compare sequence in the concurrent training with strength and endurance training alone and determine parameters that effect the changes in maximum power, body composition, and aerobic power and concluded that sequence and its application in the form of strength-endurance [SE] training will create the best effect. The study of Hakkinen K, Kraemer W.J, Gorostiaga E, suggest that even the low-frequency concurrent strength and endurance training leads to interference in explosive strength development mediated in part by the limitations of rapid voluntary neural activation of the trained muscles. Chromiak J.A, Mulvaney R.D examined the Effects of Combined Strength and Endurance Training on Strength Development recommended that the training of athletes takes into account the physiological demands of the sport and unique needs of the individual athlete in designing a training program in order to optimize performance. According to Nelson A G, Arnall D A, Loy S F, Silvester LJ, simultaneous training may inhibit the normal adaptation to either training program when performed alone. The extent of the interference probably depends on the nature and intensity of the individual training program. Gillett and Elsenman in their study determined the effect of 16 weeks aerobic dance programme. Random assignment was given to experimental group and was concluded that a significant improvement was found in the physiological variables such as breath holding time and heart rate.

### Recommendation

On the basis of conclusion of the study, the following recommendations and suggestions for further studies are drawn.

1. It is recommended that similar study may be conducted on female shooters.
2. It is recommended that study may be conducted on the biomechanical aspect of shooting.
3. It is recommended that similar study may be conducted on archery.
4. It is recommended that similar study may be conducted on specific skills of different sports men.
5. It is recommended that similar study may be conducted on different age group of subjects.
6. It is recommended that similar study may be conducted on different physiological variables.
7. To make the study more detailed and valid the study may repeated on large sample.
8. It is recommended that the study may be conducted to evaluate the maximal effect of these variables individually.
9. This study also proved that combine training increases the muscle fitness parameters, physiological and skill performance variables of shooters. Hence the shooting coaches must use this combine training in the conditioning and training program to increase the performance of shooters.
10. Combine training proves to be effective in developing the fitness variables and skill performance, the coaches can utilize this training strategy for better performance of the players.

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