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Dr. Sourav Sengupta
PGT Physical Education,
DAV Public School, Kanyapur,
Asansol, West Bengal, India.

Correspondence
Dr. Sourav Sengupta
PGT Physical Education,
DAV Public School, Kanyapur,
Asansol, West Bengal, India.

Effect of post exercise application of different recovery means on motor performance capacity

Dr. Sourav Sengupta

Abstract
The purpose of the study was to compare the selected post exercise recovery means on motor performance capacity. The objective of the study was to discover the comparative effect of application of different recovery means on different components of motor performance capacity. Secondly these studies also find out the differences in the effectiveness of different recovery means on performance of individual motor component. Forty boys students from various schools of Bolpur subdivision, district Birbhum, West Bengal were selected as subjects for the present study. All subjects were in between the age of 15 to 18 years. The average age of the subjects was 17 years. The Motor Fitness variables i.e**.** Balance, Flexibility were calculated. For the purpose of the study three recovery means were selected namely massage, nutritional drinks and progressive muscles relaxation. In the administration of experimental factors nutritional group was given supplementary nutrition in the form of nutritional drinks, massage group received massage from qualified operator, the type of manipulation which may have influenced on the recovery of the subjects was selected in consultation with expert and lastly progressive muscles relaxation group was administered progressive muscles relaxation technique by an experienced person. Control group did not receive any treatment. Motor fitness capacity of the subjects was tested by applying Eurofit motor fitness test. In order to find out actual effect of treatment factors and significant differences among the four groups Analysis of Co – Variance was applied.

Keywords: Motor fitness, balance, flexibility

1. Introduction
In today's competitive sport environment, discovering effective recovery methods of facilitating optimal athletic performance is paramount to success. The recovery period is essential in maintaining athletes' physical and psychological well-being and crucial in the pursuit of intense physical training and satisfying performances. (Recovery for Performance in sport).

Motor fitness is defined as the ability of the neuromuscular system to perform specific tasks. Test items used to assess motor fitness include chin-ups, sit-ups, the 50-yard dash, the standing long jump, and the shuttle run (a timed run in which the participant dashes back and forth between two points). The primary physical characteristics measured by these tests are the strength and endurance of the skeletal muscles and the speed or power of the legs. These traits are important for success in many types of athletics. Muscular strength and endurance are also related to some aspects. In the present study more factors have been given consideration for assessment of motor fitness to make the approach more authentic and comprehensive. There are many different manifestations of fitness. Some examples include strength, stamina, speed, and flexibility. Certain types of fitness, such as an athlete's cardiac fitness level, are more important than others.

An athlete needs to be aware of the various types of fitness to develop an effective training program that focuses on weak or important areas. Motor fitness, or motor physical fitness, refers to how an athlete can perform at his or her sport, and involves a mixture of agility, coordination, balance, power, and reaction time.

In the competitive sports an athlete can experience numerous types of recovery means which are fulfil his/her lost energy store. But it is depend on the technical knowledge of coach/athlete to select proper recovery means.

List of suitable recovery means are given below:

- Sleep and rest
- Nutrition
- Periodization
- Warm-down
- Stretching
- Massage
- Hydrotherapy
- Compression garments
- Relaxation techniques

1.1 Review of literature

Bagherpour T *et al.* (2012) [1] conducted study on Effects of Progressive Muscles Relaxation and Internal Imagery on competitive state Anxiety Inventory – 2R among Tackwondo Athletes and the objective this study was designed to compare the effects of two different techniques, namely progressive muscle relaxation (PMR) and internal imagery on state anxiety among taekwondo players in Malaysia and Iran. The method was designed by eighty eight taekwondo players (Mean age: 12.79) were randomly assigned into 4 groups, 1) imagery exercise, 2) progressive muscle relaxation, (PMR) 3) combined imagery exercise and progressive muscle relaxation and 4) control group. The experimental sessions consisted of 2 times per week. CSAI-2R has been measured after the 8Th, 16Th, 24Thsession of intervention and the measurement was repeated after the completion of 24th session of follow up (without any intervention). Using 4 (groups) x 5 (trials) repeated measured ANCOVA, the results revealed significant difference in somatic anxiety in Malaysia. In somatic, cognitive anxiety and self confidence significant difference was found between experimental groups. Hence, it is concluded that these two techniques have effects on reduce somatic and cognitive anxiety and increase self confidence in Malaysian and Iranian taekwondo players.

1.2 Statement of the problem

The problem entitled as "Comparative effect of post exercise application of different recovery means on motor performance capacity".

1.3 Selection of the subjects

Total forty school going boys of various school of Bolpur sub division, were selected as subjects for the study. The average age of the subjects were 17 years ranging from 15 to 18 years. Forty students were randomly distributed to four groups ten in each. Group- A was termed as Massage group, Group-B was termed as Nutritional group, Group- C termed as Progressive muscles relaxation group and Group- D termed as Control group.

1.4 Significance of the study

- The result of the study will highlight the effects of different recovery means used in sports training.
- The result of the study will guide physical education teacher and coaches to select suitable recovery means for their athletes.
- The result of the study will inform the physical education teacher, coaches about various recovery means and their procedure of application.
- The result of the study will also highlight the significance of utilization of additional recovery means and their procedure of application.
- The result of the study will help to select suitable recovery means relevance to particular type of motor performance.

1.5 Methodology

Eurofit motor fitness testing battery

The Eurofit Motor Fitness Test Battery was a set of nine physical fitness tests Covering flexibility, speed, endurance, agility and strength. The standardized test battery was devised by the Council of Europe for children of school age and had been used in many European schools since 1988. The series of tests were designed so that they could perform within 35 to 40 minutes, using very simple equipment.

A similar Eurofit for adults was published in 1995 which was adopted and utilized by the research scholar for the purpose of the present study.

Reliability of Subjects

All the subjects selected for the study were informed and explained all the details regarding the study and about the test and provided more than one chance where possible. They were requested to explore their best possible performance for various tests to make the study reliable.

Criterion measure of motor performance capacity

To evaluate the Motor Performance Capacity Eurofit test was applied. Motor Fitness tests were designed with four different dimensions i.e. Balance and flexibility. To measure these components following tests were recommended.

1. Flamingo Balance Test was applied to assess the Single Leg Balance and recorded the number of fall in one minute.
2. Sit and Reach Test was applied to assess trunk flexibility and recorded in nearest centimeter.

Statistical procedure

In order to find out actual effect of treatment factors and significant differences among the four group Analysis of Co – Variance was applied. In case of significant difference LSD post hoc test was employed to find out which of the difference between adjusted group means were statistically significant. The level of significant set at 0.05 level.

Table 1: Analysis of Co – Variance of the means of three experimental groups and control group in relation to flamingo balance performance

Means	Groups				Sum of Squares		DF	Means Sum of Squares	'F'Ratio
	Massage	Sports Drinks	Pmr	Control					
Pre Test	3.9	3.6	4.8	4.9	A	12.60	3	4.20	0.184
					W	821.80	36	22.828	
Post Test	1.2	2.7	1.6	4.1	A	50.60	3	16.87	1.637
					W	371	36	10.31	
Adjusted Post Test	1.4	3.06	1.35	3.79	A	44.79	3	14.93	3.306*
					W	158.2	35	4.52	

Significant at 0.05 level of significance N=40, A=Among 40, A=Among Means Variance, W=With in Group Variance F=Ratio needed for Significance at 0.05 level of Significance= DF (3, 36) =2.86

Table shows that there were a significant difference among three experimental group and control group in Flamingo Balance performance as 'F' value 3.30 is higher than the tabulated 'F' value 2.86 at 0.05 level.

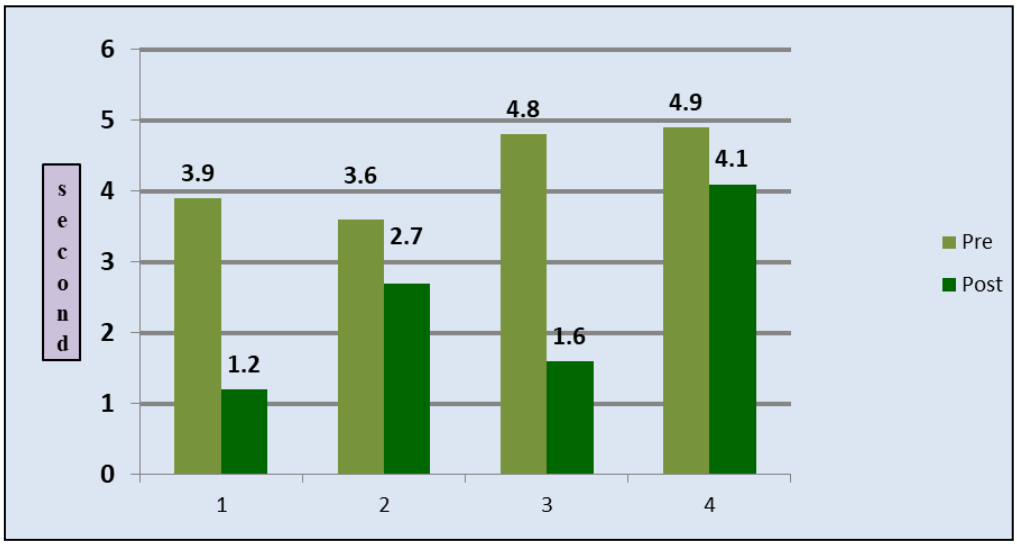

Diagram 1: Pre and Post Test means of flamingo balance performance

Table 2: Paired adjusted final means and difference between means for the three experimental group and control group in relation to examine balance performance

Sports Drink Group	Massage Group	PMR Group	Control Group	Mean Difference	C.D at 5% level
3.06	1.40			1.66	1.92
	1.40	1.35		0.05	
	1.40		3.79	2.39*	
3.06		1.35		1.71	
3.06			3.79	0.73	
		1.35	3.79	2.44*	

Table shows that there were significant difference between the Massage & Control Groups and PMR & Control Group as the mean differences 2.39 and 2.44 respectively are greater than the critical difference value 1.92 required to be significant at 0.05 level.

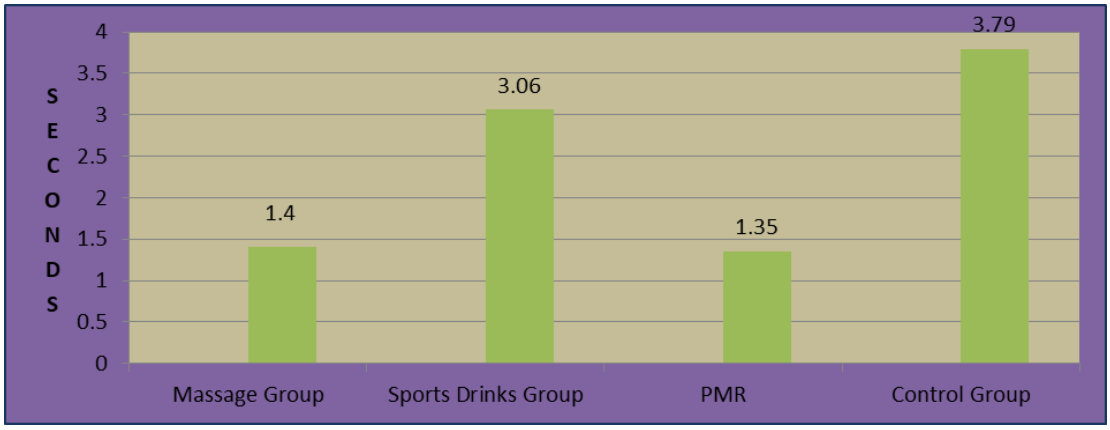

Diagram 2: Shows the adjusted final means of three experimental groups and control group in Flamingo Balance performance. In these diagram measurement taken in seconds

Table 3: Analysis of Co – Variance of the Means of three Experimental Groups and Control Group in Relation to examine flexibility

Mean	Group				Sum of scores		DF	Means of Sum of Squares	'F' Ratio
	Massage Group	Sports Drinks Group	PMR Group	Control Group					
Pre Test	12.05	10.73	6.26	11.62	A	212.42	3	70.808	1.423
					W	1791.23	36	49.756	
Post Test	14.79	11.45	9.63	11.74	A	137.34	3	45.78	1.014
					W	1624.49	36	45.12	
Adjusted Post Test	13.13	10.95	13.08	10.45	A	57.6	3	19.20	2.941*
					W	228.55	35	6.53	

Significance at 0.05 level of significance

N =40, A =Among Means Variance, W = Within Group Variance

F = Ratio needed for Significance at 0.05 level of Significance = DF (3, 36) =2.86

Table shows that there is significant difference among three experimental groups and control group in Sit and Reach performance as 'F' value 2.94 is higher than the tabulated 'F' value 2.86 at 0.05 level.

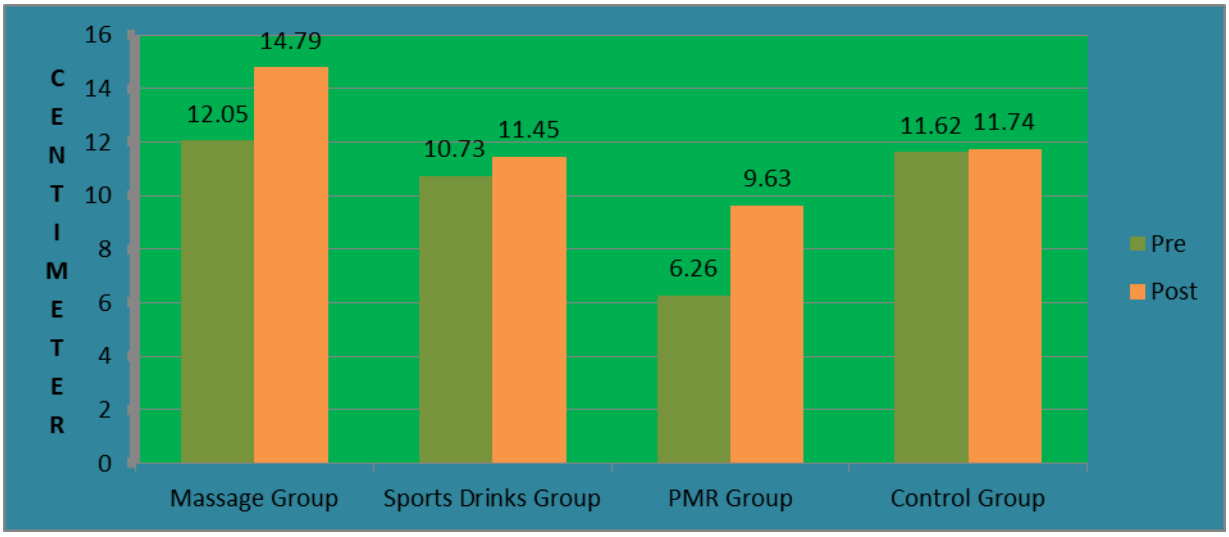

Diagram 3: Showed the pre and post- test means of three experimental groups and control group in sit and reach test performance. In these test measurement taken in centimeter

Table 4: Paired adjusted final means and difference between means for the three experimental group and control group in performance of flexibility

Massage Group	Sports Drink Group	PMR Group	Control Group	Means Difference	C.D at 5% level
13.13	10.95			2.18	2.30
13.13		13.08		0.05	
13.13			10.45	2.68*	
	10.95	13.08		2.13	
	10.95		10.45	0.5	
		13.08	10.45	2.63*	

Significant at 0.05 level

Table 3 Shows there were significant difference between the Massage Group and Control Group and PMR Group and Control Group as the mean differences 2.68 and 2.63 respectively are greater than the critical difference value 2.30 required for significance at 0.5level.

Diagram 4: Showed that adjusted final means of three experimental groups and control group in Sit and Reach test

Discussion

Table no 6 shows that Scientific Massage and PMR are proved to be effective means of recovery for activities where balance ability is a predominant factor. Balance is severely associated with individual neurological conditions. Exercise or physical activity induces fatigue which temporally affect the muscular and nervous system. Progressive Muscles Relaxation technique, Application of Massage relaxes neuromuscular

system and as a result both the group showed better performance in balance.

Table 9 shows that application of PMR and Massage manipulation are effective recovery means for restoring flexibility after fatigue. Flexibility is highly determined by the relaxation of the antagonist muscles or a smooth co-ordination between agonist and antagonist muscles respectively. Individual with core coordination or an inability to relax the antagonist muscles show low flexibility. Progressive Muscles Relaxation and Massage manipulation are effective means for inducing relaxation is well establishing phenomenon.

Conclusion

On the bases of the present study following conclusion are down:

- Additional fatigue recovery means are always helpful for recovery of the athletes after physical and physiological fatigue or exhaustion.
- PMR, Massage and Nutritional Drinks are effective recovery means for performance in different motor components.
- Massage is an effective recovery means for balance and flexibility
- Progressive Muscles Relaxation is found to be an effective recovery means for performance related to balance and flexibility

The standardized test battery was devised by the council of Europe, for children of school age and has been used in many European schools since 1988. The main aim of these test to engage the subjects within 35 to 40 minutes, using very simple equipment. To analyze the motor performance capacity Eurofit motor fitness test was applied and test items i.e, flamingo balance test, sit.

In order to investigated the balance performance table 1clearly gave an idea that there was a significant differences among three experimental group and control group as ‘F’ value 3.30 was higher than the tabulated ‘F’ value 2.86 at 0.05 level.

Hence table 2 also clearly indicated that there were significant difference between the massage and control group and progressive muscles relaxation and control group for the performance of balance parameter of the subjects.

For analyzing the performance of flexibility component of the subjects table 3 indicated that there was a significant difference among three experimental group and control group in sit and reach test performance parameter as ‘F’ value 2.94 was higher than tabulated ‘F’ value 2.86 at 0.05 level.

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