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Sahera Khatun
Student of MPEd-IV, Department of Physical Education and Sport Science, Vinaya Bhavana, Visva-Bharati, Santiniketan, West Bengal, India

Dr. Sentu Mitra
Assistant Professor, Department of Physical Education and Sport Science, Vinaya Bhavana, Visva-Bharati, Santiniketan, West Bengal, India

Dr. Arup Gayen
Assistant Professor, Saheed Anurup Chandra Mahavidyalaya, Burul, Nodakhali, West Bengal, India

Corresponding Author:
Dr. Sentu Mitra
Assistant Professor, Department of Physical Education and Sport Science, Vinaya Bhavana, Visva-Bharati, Santiniketan, West Bengal, India

Effect of different recovery programs on blood lactic acid removal of Basketball players

Sahera Khatun, Dr. Sentu Mitra and Dr. Arup Gayen

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Abstract
The objective of the study was to find out the effect of different recovery programs on blood lactic acid removal of basketball players. For the study nine inter- university level basketball players were selected from Visva-Bharati University, Santiniketan, Birbhum, West Bengal, India as the subjects. They were purposively divided into three groups with equal strength in each group-Dynamic Recovery Exercise Group (n-3), Massage Group (n-3) and Control Group (n-3). Blood Lactic acid level was selected as the variable for the study. Immediately after a match, blood samples were collected to check lactic acid level as pre-test data. 2nd day after match and 15 minutes recovery programs i.e. dynamic recovery exercise program and massage program, blood samples of all the 3-groups was collected to check the post test data. To calculate the data descriptive statistics, Analysis of Co-variance (ANCOVA) and LSD post-hoc and were used. The result revealed the significant effect of recovery programs (F-6.021) and the mean difference was found significant between the DE group and Control group (MD-0.16) and between the Massage group and control group (MD-0.17) which were higher than the critical value i.e. 0.041 at 0.05 level of significance. No significant difference was found between the two experimental groups.

Keywords: Recovery, dynamic exercise, massage, lactic acid

Introduction
In sports training, the term training load and recovery go side by side. Effective recovery plays a crucial role in maintaining the athletes' physical, physiological and psychological well-being and helps them to overcome from fatigue and give their optimal level of performance. When the lactic acid accumulates in the muscles and blood vessels and reaches its high-level, temporary muscular fatigue results. Basketball players are often exposed to demanding training and competition schedules, which may include repeated, high-intensity exercise sessions performed on consecutive days, multiple times per week. Excessive volumes of intense training and competition, with reduced recovery time results in great physiological demands on the musculoskeletal, nervous, immune, and metabolic systems that potentially causing a negative effect on subsequent exercise performance, and making players prone to overload injuries especially during a congested fixture period where players have competed and train repeatedly over a short time frame.
Lactic acid is a collective term used to describe the lactate and hydrogen ions that are by-product of anaerobic glycolysis process. It appears in the blood because of anaerobic metabolism when oxygen release to the tissues is insufficient to support metabolism. Massage is the scientific mode of treating certain form of diseases by systematic manipulations. Abhyanga is the most popular massage in Ayurveda traditional system of medicine from India. During the competitive situation, the rate of lactic acid formation varies over the course of event an event. The trained athletes produce less amount lactic acid during sub maximal exercise; during maximal levels of exercise the trained subjects produce a greater amount of lactic acid. The reason for such change is, a greater availability of muscles glycogen stores for breakdown in to lactic acid tolerance capacity especially at maximal rates of work, due to training include physiological and psychological.
There are a few researches on lactic acid removal of basketball players applying different recovery programs. With this background and less availability of research work on basketball players on selected parameters after application of dynamic recovery exercise and Abhyanga massage, this study was undertaken.

Methodology

Subjects: For the purpose of the study nine inter-university level men basketball players were selected purposively from Visva-Bharati University, Santiniketan, Birbhum, West Bengal, India as the subject. They were divided into two-experimental group i.e. Dynamic Exercise Recovery Group (n-3) Massage Group (n-3) and control group (n-3).

Variable: Blood lactic acid level was selected as the variable for the study.

Test and Criterion Measure: To measure the blood lactic acid level of the three groups of the basketball players, pathological test was conducted by technical expert. The score of the subject on blood lactic acid level was recorded in mmol/l.

Collection of Data

Immediately after a match, Pre-test data were collected from all the three groups. On 2nd day, two different recovery programs- Dynamic Exercise Recovery Program and Massage Recovery Program were administered immediately after a full duration basketball match, and then the post-test data of all the three groups were collected.

Statistical Analysis

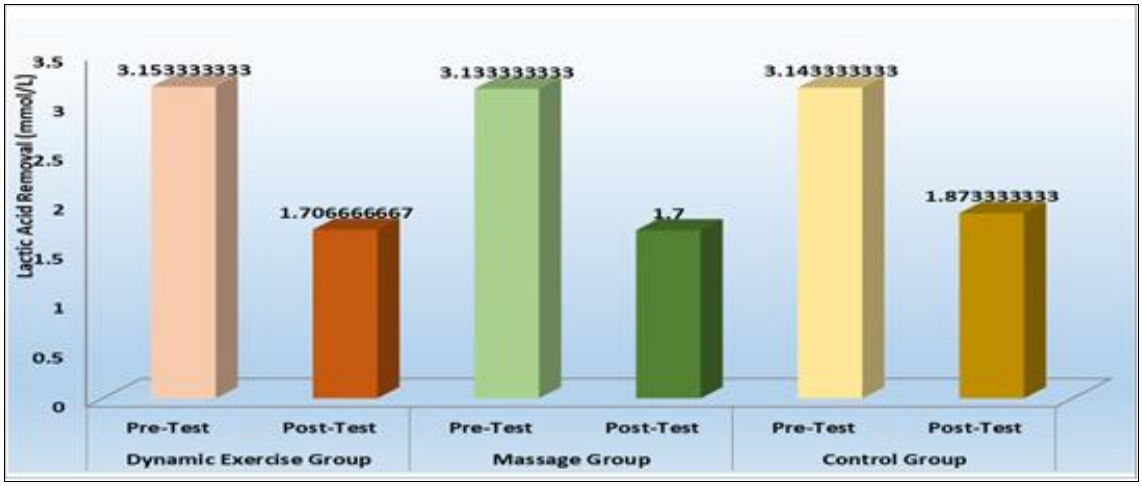
To find out the effect of different recovery programs on blood lactic acid removal of basketball players, descriptive statistics, Analysis of covariance (ANCOVA) and LSD post-hoc test were applied. The level of significance was set at 0.05 level.

Result and Discussion

Table 1: Descriptive statistics on lactic acid removal of selected groups

Groups		Mean	SD	SEM	Minimum Value	Maximum Value	Skewness
DEG	Pre-Test	3.153333333	0.07571878	0.043716	3.1	3.24	1.597097
	Post-Test	1.706666667	0.07023769	0.040552	1.64	1.78	0.4232732
MG	Pre-Test	3.133333333	0.05033223	0.029059	3.08	3.18	-0.5855827
	Post-Test	1.7	0.08717798	0.050332	1.6	1.76	-1.6300592
CG	Pre-Test	3.143333333	0.06658328	0.038442	3.07	3.2	-1.0558319
	Post-Test	1.873333333	0.02309401	0.013333	1.86	1.9	1.7320508
Abbreviation: SEM = Standard Error of Mean, SD = Standard Deviation							

Table 1 describes the mean, standard deviation, Standard error, Skewness, Maximum score and Minimum score of subjects in blood lactic acid removal of both of the treatment groups and the control group.



Graph 1: Graphical Representation of Lactic Acid Removal of Selected Groups

Graph-1 showed the graphical representation of lactic acid removal of different selected groups in pre-test and post-test phase.

Table 2: Shapiro-Wilk Test

Group	Shapiro-Wilk		
	Statistic	df	Sig.
DRE Pre-Test	.855	3	.253
DRE Post-Test	.993	3	.843
MG Pre-Test	.987	3	.780
MG Post-Test	.842	3	.220
CG Pre-Test	.953	3	.583
CG Post-Test	.750	3	.000

Table-2 expressed the normal distribution of the data through Shapiro-Wilk test as the result of the pre-test data of DRE, MG, and CG were 0.780, 0.253 and 0.583 respectively which were greater than 0.05.

Table 3: ANCOVA for Distinct Groups on Lactic Acid Removal for Pre-Test and Post-Test Data

Source	df	Sum of Squares	Mean Square	f-value
Treatment Groups	2	0.058	0.029	6.021
Error	5	0.024	0.005	
Total	7	0.082		
Table Value of F (2, 5) = 5.79 Significant at the .05 level				

Table no -3 shows the significant difference among the groups as the F-value was found 6.021, which was higher than the tabulated, value i.e. 5.79 at 0.05 level of significance.

Table-4: Pairwise Comparisons of Distinct Groups of Adjusted Means on Lactic Acid Removal Obtained in Pre-Test and Post-Test Data

Dynamic Exercise Group	Massage Group	Control Group	Mean Difference	Critical Difference
	1.7	1.87	0.17*	0.041
1.71	1.7		0.01	
1.71		1.87	0.16*	
*. The mean difference is significant at the .05 level				

Table No-4 shows the Pairwise Comparisons of Distinct Groups of Adjusted Means on Lactic Acid Removal obtained in Pre-Test and Post-Test Data. Here the mean difference was found significant between the DRE group and Control group (MD-0.16) and between the Massage group and control group (MD-0.17) which were higher than the critical value i.e. 0.041 at 0.05 level of significance.

There were no significant difference was found between the DE group and Massage group as their mean difference was found 0.01, which was lower than the CD-0.041.

The result of the study might be due to immediate application of two different recovery programs on the removal of blood lactic acid of basketball players. The result was supported by the. study of Wiltshire *et al*., (2010) [6] who showed that massage impairs lactic acid (La -) and hydrogen ion (H+) removal from muscle after a strenuous exercise by mechanically impeding blood flow.

The study of Micklewright *et al*., (2003) [5] expressed that the combined massage- active recovery might be favourable to actively recovery since it more energy efficient and less uncomfortable.

The study of Kaur**,** R. *et al*. (2008)) [4] showed a more significant decrease in the blood lactate concentration after moderate to high intensity dynamic exercise protocol.

Conclusion

Within the limitations of the present study and based on the findings it was concluded that the different recovery programs i.e. dynamic recovery exercise and massage have significant effect on blood lactic acid removal of basketball players.

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