
EFFECTS OF PNF STRETCHING AND OWN BODY EXERCISES ON COORDINATION AND MUSCULAR ENDURANCE VARIABLES AMONG SOFTBALL PLAYERS.

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INTRODUCTION

A sport consists of a physical and mentally competitive activity carried out with a recreational purpose for competition, for self-enjoyment, to attain excellence, for the development of a skill, or some combination of these. A sport has physical activity, side by side competition, self-motivation and a scoring system. The difference of purpose is what characterizes sport, combined with the notion of individual (or team) skill or prowess (Anaheim, 1987).

The concept of sports has been changed now a day. Due to the innovations brought by different sports sciences in the field of sports, now there are a number of scientific methods to improve each and every quality, which determines the performance in each games and sports. The same time development is according to the rate of demand of each games and sports. This is the main reason why the performance standards are going higher day by day.

HISTORY OF SPORT

The development of sports throughout history teaches us a great deal about social changes, and about the nature of sport itself. There are many modern discoveries in France, Africa and Australia of cave art for example, lascaux from prehistory which provides evidence of ritual ceremonial behaviour. Some of these sources date from over 30,000 years ago, as established by carbon dating. Although there is scant direct evidence of sport from this source, it is reasonable to extrapolate that there was some activity at these times resembling sport (Fish et.al. 2003).

DEFINITION OF SPORTS

A particular form of activity involving physical exertion and skill that is governed by a set of rules or customs and often undertaken competitively(Anaheim, 1987)

Sports, athletic games or tests of skill undertaken primarily for the diversion of those who take part or those who observe them. The range is great; usually, however, the term is restricted to any play, pastime, exercise, game or contest performed under given rules, indoors or outdoors, on an individual or a team basis, with or without competition, ;but requiring skill and some form of physical exertion.

OBJEVTIES OF THE STUDY

Thus, the objectives of the study were:

- To formulate suitable PNF stretching and own body exercises for the benefit of softball players.

- To determine the bio motor abilities such as coordination and muscular endurance variables
- To find out the effect of PNF stretching and own body exercises on selected biomotor abilities and cardio respiratory variables on softball players.
- To find out the differences if any existed between PNF stretching exercises and own body exercises in altering selected bio motor and cardio respiratory variables of softball players.

STATEMENT OF THE PROBLEM: The purpose of the study would be to find out the effects of PNF stretching and own body exercises on coordination and muscular endurance variables among softball players.

HYPOTHESIS

For the purpose of this research, the following would be hypothesized.

- The PNF stretching and own body exercises would significantly alter bio motor abilities, such as coordination compared to control group.
- The PNF stretching and own body exercises would significantly alter cardio respiratory fitness abilities, such as, muscular endurance consumption compared to control group.
- There would be no significant differences between PNF stretching and own body exercises on selected biomotor abilities and cardiorespiratory fitness variables among softball players.
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SIGNIFICANCE OF THE STUDY

The research would be significant in the following ways:

- The research would determine the influence of PNF stretching exercises on selected bio motor abilities, such as, coordination, fitness variables such as, muscular endurance of softball players.
- The research would determine the influence of own body exercises on selected bio motor abilities, such as coordination,, fitness variables such as, muscular endurance of softball players.
- The research would make a comparative study to determine the influence of two experimental treatments and high light which of the exercise protocol has more influence on selected bio motor, and cardio respiratory fitness variables of softball players.
- The research would add up existing knowledge in the field of training methods for softball players.

LIMITATIONS

Uncontrollable factors associated with the study were accepted as limitation and the following were considered as limitation of the research study:

- ✚ Certain factors like rational habits such as life style, daily routine, diet and climatic conditions were not taken into account in the study.
- ✚ The influence of vigorous academic activity of students could have discouraged or motivated the subjects during training and during testing period.

- ✚ The heterogeneous characters of the subjects in hereditary and environmental factors were recognized as a limitation.
- ✚ The subject's body type and socio economic status of the students were not taken into consideration.

DELIMITATIONS

- ❖ Softball players at school level alone were considered for the purpose of this study.
- ❖ Only softball players in the age group of 13 to 15 would be selected for this study.
- ❖ The influence of experimental treatments, namely, PNF stretching and own body exercises would be compared with control group to find out the influence of specific experimental treatment for this purpose, the randomly selected 60 school boys was divided into three groups, namely, experimental group I, experimental group II and control group consisting of 20 players in each group.
- ❖ The following dependent and independent variables were selected for this study:

Dependent Variables

A. Biomotor Abilities

- ❖ Coordination

B. Cardio respiratory Fitness

- ❖ Muscular endurance

Independent Variables

- ❖ 12 Weeks PNF stretching
- ❖ 12 Weeks Own Body Weight Exercises
- ❖

METHODOLOGY: In this chapter, the sources and selection of the subjects, selection of variables, experimental design, pilot study, training schedule, tester competency, subject reliability, test administration and statistical analysis have been explained.

SELECTION OF SUBJECTS: The purpose of the study is to find out the effect of PNF stretching and own body exercises on selected bio motor abilities and cardio respiratory fitness variables of softball players. For this purpose school softball players who participated at inter-school competitions were selected. 60 inter school softball players in the age group of 13 to 15 were randomly selected as subjects for this study. The subjects were randomly divided into three groups, namely, experimental group I, experimental group II and control group consisting of 20 in each.

The subjects were oriented for the purpose of the study and all the subjects volunteered to undergo the treatments as the research would further enhance their abilities and contribute for the training methods.

EXPERIMENTAL DESIGN: The study was formulated as a true random group design consisting of a pre-test and post test. The subjects (N=60) were randomly assigned to three equal groups of twenty. The selected subjects were divided into three groups randomly. Experimental Group I was considered as PNF stretching exercises group, experimental group II was considered as own body exercises group and control group was not involved in any special treatment. Pre test was conducted for experimental Groups I and II and the control group on all

the variables selected for the study, namely, Coordination and Muscular Endurance Experimental groups underwent the respective training for 12 weeks. Immediately after the completion of 12 weeks training, all the subjects were measured of their post test scores on the selected criterion variables. The differences between the initial and final scores were considered the effect of respective treatments. To find out statistical significance of the results obtained, the data were subjected to statistical treatment using ANCOVA. In all cases 0.05 levels was fixed to test the significance of the study.

CRITERION MEASURES: The tests used to assess the selected bio motor abilities, cardio respiratory fitness variables and the units of measures are given in Table I-Tests Used To Assess the Bio motor Abilities, Cardio respiratory Variables

S.No	Variables	Tests	Units of Measure
1	Bio Motor Abilities Coordination	Scott Motor Coordination	Seconds
2	Bio Motor Abilities Muscular Endurance	Sit ups	Numbers

The intraclass correlation coefficient obtained for test-retest data are presented in Table II.

Table II: Intra Class Correlation between Test and Retest for Tester Reliability

S.No	Variables	Tests	Obtained' Value
1	Bio Motor Abilities Coordination	Scott Motor Coordination	0.88*
2	Bio Motor Abilities Muscular Endurance	Sit ups	0.83*

Required table value at 0.01 with 8 degrees of freedom 0.811 * Significant at 0.01 level

STATISTICAL TECHNIQUE: The data obtained were analyzed by analysis of variance (ANOVA) and analysis of covariance (ANCOVA). The analysis of variance was used to assess the significance of difference between the pre-test and post-test, for each of the variables on the PNF stretching and own body exercises groups separately.

Analysis of covariance (ANCOVA) was computed for any number of experimental groups, the final means were adjusted for differences in the means were tested for significance. The analysis of variance was first computed to find out the difference between the initial and final means. The Analysis of Covariance was computed from the same population and is devoid of sampling bias. The obtained 'F' ratio compared with critical F value for significance, will provide confidence that the critical samples came from the same population and are devoid of sampling bias.

RESULTS ON MOTOR COORDINATION : The statistical analysis comparing the initial and final means of Motor Coordination due to PNF stretching exercises and own body weight exercises among softball players is presented in Table-III-

ANCOVA RESULTS ON EFFECT OF PNF STRETCHING EXERCISES AND OWN BODY WEIGHT EXERCISES COMPARED WITH CONTROLS ON MOTOR COORDINATION

	PNF STRETCHING	OWN BODY WEIGHT EXERCISES	CONTROL GROUP	SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARES	OBTAINED F
Pre Test Mean	22.94	22.00	22.71	Between	9.57	2	4.79	2.62
				Within	104.04	57	1.83	
Post Test Mean	21.46	20.69	22.39	Between	29.17	2	14.58	7.59*
				Within	109.55	57	1.92	
Adjusted Post Test Mean	21.12	21.16	22.25	Between	16.44	2	8.22	15.32*
				Within	30.07	56	0.54	
Mean Diff	-1.48	-1.32	-0.31					

Table F-ratio at 0.05 level of confidence for 2 and 57 (df) =3.16, 2 and 56 (df) =3.16.

*Significant

As shown in Table III, the obtained pre test means on Motor Coordination on PNF stretching exercises group was 22.94, Own body weight exercises group was 22.00 and control group was 22.71. The obtained pre test F value was 2.62 and the required table F value was 3.16, which proved that there was no significant difference among initial scores of the subjects.

The obtained post test means on Motor Coordination on PNF stretching exercises group was 21.46, Own body weight exercises group was 20.69 and control group was 22.39. The obtained post test F value was 7.59 and the required table F value was 3.16, which proved that there was significant difference among post test scores of the subjects.

Taking into consideration of the pre test means and post test means adjusted post test means were determined and analysis of covariance was done and the obtained F value 15.32 was greater than the required value of 3.16 and hence it was accepted that there was significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table IV

Multiple Comparisons of Paired Adjusted Means and Scheffe's Confidence Interval Test Results on Motor Coordination

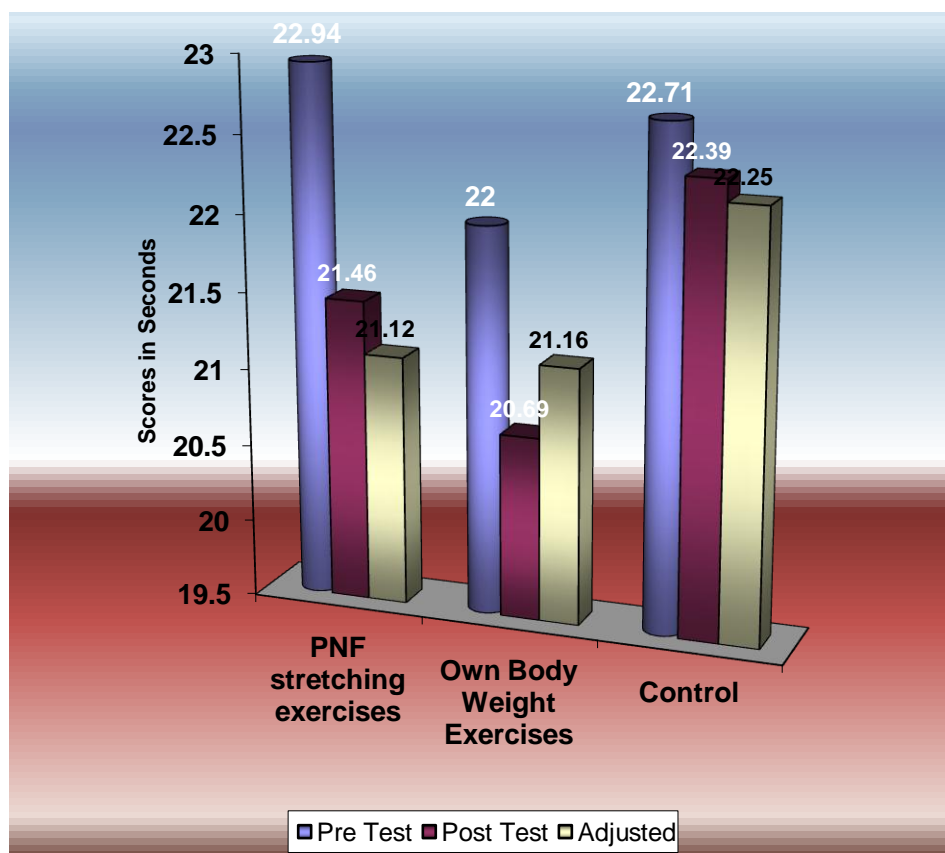
MEANS				Control Group	Mean Difference	Required C I
PNF stretching exercises Group	Own body weight exercises Group	Group	Group			
21.12	21.16			-0.05	0.58	
21.12			22.25	-1.14*	0.58	
	21.16		22.25	-1.09*	0.58	

* Significant

The post hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between PNF stretching exercises group and control group (MD: -1.14). There was significant difference between Own body weight exercises group and control group (MD: -1.09). There was no significant difference between treatment groups, namely, PNF stretching exercises group and Own body weight exercises group. (MD: -0.05).

The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure I-

BAR DIAGRAM SHOWING PRE TEST, POST TEST AND ORDERED ADJUSTED MEANS ON MOTOR COORDINATION



RESULTS ON MUSCULAR ENDURANCE : The statistical analysis comparing the initial and final means of Muscular Endurance due to PNF stretching exercises and own body weight exercises among softball players is presented in **Table –V**

Ancova Results On Effect OfPnf Stretching Exercises And Own Body Weight Exercises Compared With Controls On Muscular Endurance

	PNF STRETCHING EXERCISES	OWN BODY WEIGHT EXERCISES	CONTROL GROUP	SOURCE OF VARIANCE	SUM OF SQUARES	df	MEAN SQUARES	OBTAINED F
Pre Test Mean	42.20	41.45	41.30	Between	9.30	2	4.65	0.34

				Within	782.35	57	13.73	
Post Test Mean	45.00	45.85	41.50	Between	212.63	2	106.32	7.49*
				Within	809.55	57	14.20	
Adjusted Post Test Mean	44.50	46.03	41.82	Between	181.62	2	90.81	32.71*
				Within	155.46	56	2.78	
Mean Diff	2.80	4.40	0.20					

\Table F-ratio at 0.05 level of confidence for 2 and 57 (df) =3.16, 2 and 56 (df) =3.16.

*Significant

As shown in Table V- the obtained pre test means on Muscular Endurance on PNF stretching exercises group was 42.20, Own body weight exercises group was 41.45 was and control group was 41.30. The obtained pre test F value was 0.34 and the required table F value was 3.16, which proved that there was no significant difference among initial scores of the subjects.

The obtained post test means on Muscular Endurance on PNF stretching exercises group was 45.00, Own body weight exercises group was 45.85 was and control group was 41.50. The obtained post test F value was 7.49 and the required table F value was 3.16, which proved that there was significant difference among post test scores of the subjects.

Taking into consideration of the pre test means and post test means adjusted post test means were determined and analysis of covariance was done and the obtained F value 32.71 was greater than the required value of 3.16 and hence it was accepted that there was significant differences among the treated groups.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in **Table VI**

Multiple Comparisons of Paired Adjusted Means and Scheffe's Confidence Interval Test Results on Muscular Endurance

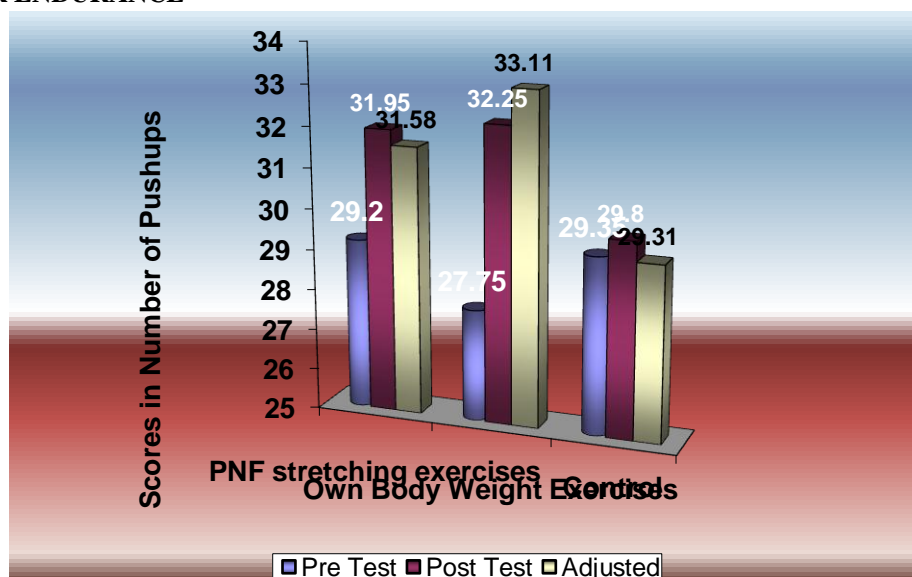
MEANS				Required C I
PNF stretching exercises Group	Own body weight exercises Group	Control Group	Mean Difference	
44.50	46.03		-1.54*	1.31
44.50		41.82	2.68*	1.31
	46.03	41.82	4.21*	1.31

* Significant

The post hoc analysis of obtained ordered adjusted means proved that there was significant differences existed between PNF stretching exercises group and control group (MD: 2.68). There was significant difference between Own body weight exercises group and control group (MD: 4.21). There was significant difference between treatment groups, namely, PNF stretching exercises group and Own body weight exercises group. (MD: -1.54).

The ordered adjusted means were presented through bar diagram for better understanding of the results of this study in Figure I-

BAR DIAGRAM SHOWING PRE TEST, POST TEST AND ORDERED ADJUSTED MEANS ON MUSCULAR ENDURANCE



CONCLUSIONS: Within the limitations and delimitations of the study, the following conclusions were drawn.

- It was concluded that bio motor ability, such as, coordination can be improved through PNF stretching and own body exercises compared to control group. It was also found that there was no significant differences in improving coordination between treatment groups.
- It was concluded that bio motor ability, such as, muscular endurance can be improved through PNF stretching and own body exercises compared to control group. It was also found that own body exercises was better than PNF stretching in improving muscular endurance of the softball players.

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