



EFFECT OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION, PILATE AND BALLET EXERCISES ON FLEXIBILITY OF SCHOOL STUDENTS

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Abstract

The objective of the study was to investigate the effect of Proprioceptive Neuromuscular Facilitation (PNF), Pilate and Ballet Exercises on Flexibility variable of Physical Fitness of school students. Proprioceptive Neuromuscular Facilitation (PNF), Pilate and Ballet Exercises were considered as independent variable and Flexibility was considered as dependent variable in this research work. 150 school boys and girls between the age group of 11 to 14 years old were chosen for the study through purposive random sampling technique from Amritsar district, Punjab, India. There were five experimental groups, Group 1: Proprioceptive Neuromuscular Facilitation (PNF training program), Group 2: Pilates (Pilates exercise training program), Group 3: Ballet (Ballet exercise training program), Group 4: Composite Group (Combination of three exercise training programs) and 5: Control Group (no treatment given), each experimental group had thirty subjects (N= 15 boys and N= 15 girls). Experimental group were performed their training program for six months, 40 minute in a day for four days in a week. Arms Strength was measured by Johnson and Nelson test chin-ups for boys and modified push-ups for girls. To discover the difference

between pre-test scores and post-test scores on physical fitness and optimum health in all the five treatments (Proprioceptive Neuromuscular Facilitation, Pilate, Ballet, Composite and Control) ANCOVA was conducted as the statistical technique along with Post Hoc Test at 0.05 level of significance. The results of the investigation shows significant difference in Post-Test scores on Flexibility variables of Physical Fitness of school students taking different type of treatments as Proprioceptive Neuromuscular Facilitation, Pilate, Ballet and Composite training programs when compare to control group.

Keywords: Proprioceptive Neuromuscular Facilitation Exercises, Pilate Exercises, Ballet Exercises and Flexibility

Introduction

In present days many types of exercises came into existence for different reasons. Proprioceptive Neuromuscular Facilitation (PNF) techniques were designed for physically challenged people at the time of World War-II by Dr. Herman Kabat, Margaret Knott and Dorothy E. Voss in the 1940's and 1950's. The PNF stretching techniques are increasing active and passive joint's range of motion, muscular strength, endurance and dynamic



stability. These techniques commonly used in therapeutic treatments as rehabilitation mean for patients (Kisner, 2002). Pilate exercises were also developed for the rehabilitation program for the patient recovery from world war-1 and invented by German physical therapist Joseph H. Pilates around 1930's and 1940's in USA. These exercises were proposed to stretch, strengthen the muscles and improve the balance of the body and rehabilitate the injury and support them in their recovery period. Ballet exercises is dance based exercises basically developed for performing dance on stage with partner or without partner. These exercises improve the physical fitness level of an individual by performing in regular routine. PNF enhances the flexibility and reaction time (Balamurugan & Kannadasan, 2013). Tanvi et al. (2013) revealed that PNF improves the muscle endurance and helpful in reduction of pain in lumbo-pelvic. Pereira & Goncalves (2012) studied that PNF pattern make progress in balance. Pilate and ballet training enhances the dynamic and static balance of the body (Hyun et al., 2014), (Notarnicola et. al., 2014). Oliveira et al. (2016) examined that pilate training improve the muscular strength.

Methodology

The study was comprised of three exercises training programs to access the effect of PNF, Pilate and Ballet Exercises on Flexibility variable of Physical Fitness of school students. The samples were selected from three schools 1: DAV Public School, 2: Bhavan's SL Public School, 3: Prabhakar Sen Sec School from Amritsar district with age group up to 11 to 14 years old girls and boys along with composite training program and control group. Total 150 school students were selected through the

purposive random sampling technique divided into five groups: Group 1: PNF (PNF training program), Group 2: Pilates (Pilates exercise training program), Group 3: Ballet (Ballet exercise training program), Group 4: Composite Group (Combination of three exercise training programs) and 5: Control Group. In each group there were thirty subjects (15 girls and 15 boys). Pre-test was taken before the experiment and each group was performed specified exercises program for six months. Post-test was conducted at the end of the six months training program. The training session was lasted for 40 minutes in a week for four days. On the basis of three different training programs along with composite and control group, researcher had observed the effect of different type of trainings (PNF, Pilate, Ballet, Composite training) on Flexibility variable of Physical Fitness. To measure flexibility sit and reach test constructed by Johnson and Nelson.

Result and Discussion

Table 1
DESCRIPTIVE ANALYSIS ON FLEXIBILITY VARIABLE OF PHYSICAL FITNESS OF SCHOOL STUDENTS

Testing	Treatment	Mean	SD
Pre-Test	PNF	.72	5.49
	Pilate	1.05	4.14
	Ballet	2.54	5.24
	Composite	1.47	5.48
	Control	1.12	5.92
Post-Test	PNF	5.53	5.14
	Pilate	2.67	4.14
	Ballet	5.43	4.77
	Composite	3.38	5.54
	Control	1.00	5.91

Table 1 evidently point out the values of Mean and SD on Pre-Test and Post-Test scores for all the five treatments (PNF, Pilate, Ballet, Composite and Control) on Flexibility variable of Physical Fitness on school students. The observed mean and SD values are Pre-Test



Mean: PNF .72, Pilate 1.05, Ballet 2.54, Composite 1.47 and Control 1.12. Pre-Test SD: PNF 5.49, Pilate 4.14, Ballet 5.24, Composite 5.48 and Control 5.92. Post-Test Mean: PNF 5.53, Pilate 2.67, Ballet 5.43, Composite 3.38 and Control 1.00. Post-Test Mean: PNF 4.06, Pilate 5.86, Ballet 4.46, Composite 4.76 and Control 2.43. Post-Test SD: PNF 5.14, Pilate 4.14, Ballet 4.77, Composite 5.54 and Control 5.91, were respectively.

TABLE 2
ANALYSIS OF CO-VARIANCE FOR THE POST-TEST DATA ON FLEXIBILITY VARIABLE OF PHYSICAL FITNESS OF SCHOOL STUDENTS

Source of Variation	Sum of Squares	df	Mean Square	F	(P-Value) Sig.
Within Subjects	641.86	4	160.46	177.25	0.00
Between Subjects	130.36	144	.90		

* Indicates the significant difference at 0.05 significance.

Table 2 shows the F-value for comparing the adjusted means in five treatments (PNF, Pilate, Ballet, Composite and Control) during post testing on Flexibility variable of Physical Fitness on school students. The p-value for the F-Statistic is 0.00, which is less than 0.05, therefore significant difference is found; hence hypothesis "There exists significant effect of different type of treatments (Proprioceptive Neuromuscular Facilitation, Pilates, Ballet and Composite training program) on Flexibility variable of Physical Fitness on post-test scores of school students" has been accepted.

As the F-statistic is significant, post hoc comparison has been made for the adjusted means of the five treatments (PNF, Pilates, Ballet, Composite and Control) respectively during post testing on Flexibility of school students, which is shown in Table 3.

TABLE 3
POST HOC COMPARISON FOR THE GROUP MEANS IN POST MEASUREMENT ADJUSTED WITH THE INITIAL DIFFERENCE ON FLEXIBILITY VARIABLE OF PHYSICAL FITNESS OF SCHOOL STUDENTS

Pair wise Comparisons: Flexibility			
(I) Treatment	(J) Treatment	Mean Difference (I-J)	Sig.
PNF	Pilate	4.56*	0.00
	Ballet	3.22*	0.00
	Composite	4.24*	0.00
	Control	6.29*	0.00
Pilate	Ballet	1.33*	0.00
	Composite	.31	1.00
	Control	1.72*	0.00
Ballet	Composite	1.02*	0.001
	Control	3.06*	0.00
Composite	Control	2.04*	0.00

* Indicates the significant difference

Table 3 disclosed the sig. value for the mean difference between all five treatments (PNF, Pilate, Ballet, Composite, Control) on Flexibility variable of Physical Fitness on school students.

Comparison of Groups with Significant Difference: The p-value for the mean difference between training groups PNF and Pilate is 0.00, PNF and Ballet is 0.00, PNF and Composite is 0.00, PNF and Control is 0.00, Pilate and Ballet is 0.00, Pilate and Control is 0.00, Ballet and Composite is 0.001, Ballet and Control is .000, Composite and Control is 0.000. Since p-value is less than .05, all these mean differences are significant at 5% level. Thus the following conclusion can be drawn:

There is significant difference found between the adjusted means of PNF and Pilate Training, PNF and Ballet Training, PNF and Composite Training, PNF and Control Training, Pilate and Ballet Training, Pilate and Control Training, Ballet and Composite Training, Ballet and Control Training, Composite and Control Training.



Comparison of Groups with Insignificant Difference: The p-value for the mean difference between training groups Pilate and Composite is 1.00. Since p-value is greater than .05, the mean difference is insignificant at 5% level. Thus the following conclusion can be drawn:

There is insignificant difference found between the adjusted means of Pilate and Composite.

To find out best treatment among all the five treatments (Proprioceptive Neuromuscular Facilitation, Pilates, Ballet Composite and Control) on Flexibility variable of Physical Fitness Adjusted Mean is presented in Table 4.

TABLE 4
ADJUSTED MEAN ON FLEXIBILITY VARIABLE OF PHYSICAL FITNESS AMONG FIVE TREATMENTS (PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION, PILATES, BALLET COMPOSITE AND CONTROL) OF SCHOOL STUDENTS

Measure : Flexibility	
Treatments	Adjusted Mean
PNF	7.27
Pilate	2.70
Ballet	4.04
Composite	3.02
Control	0.97

Table 4 evidently point out the values of Pre-Test, Post-Test and Adjusted Mean for all the five treatments (PNF, Pilate, Ballet, Composite and Control) on Flexibility variable of Physical Fitness on school students. The observed Adjusted Mean values are: PNF 7.27, Pilate 2.70, Ballet 4.04, Composite 3.02 and Control .97, were respectively. Thus it may be concluded that flexibility of the PNF, Pilate, Ballet and Composite group is significantly greater than that of the control group. Hence it may be inferred that all the groups were equally effective in improving flexibility among the subjects with comparison of control group.

Conclusion

Within the restriction of the present study, the following conclusions were drawn:

In conclusion the present study discovered that 40 minutes Proprioceptive Neuromuscular Facilitation, Pilate and Ballet training, 4 days in a week can improve the Flexibility variable of Physical Fitness of healthy school students with the age of 11 to 14 years old.

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