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INFLUENCE OF 12 WEEKS STRETCHING EXERCISE PROGRAM ON ABDOMINAL STRENGTH AND FLEXIBILITY

T. Vinoth, *Ph.D Scholar, TNPESU, Chennai*

Dr.A.S.Nageswaran
Associate Professor, Dept. of Physical Education, Health Education and Sports, H.H.The Rajah's College, Pudukkottai.

ABSTRACT

The purpose of the present study was to find out the influence of 12 weeks stretching exercise program on abdominal strength and flexibility among school children. To achieve the purpose of the study, 30 school students were selected from the Government Higher Secondary School, Thuvarankurichy, Trichy District at random. The age of the subjects ranged from 14 - 17 years. The selected subjects were divided into two equal groups. Group I underwent stretching exercise program for over a period of twelve weeks (six days in a week) and Group II acted as control group. Abdominal strength - Sit ups test, lower back & hamstring flexibility – Sit & reach test (ROM) were selected as dependent variables. The collected data from the two groups prior to and immediately after the training program on selected criterion variables were statistically analyzed with paired sample 't' test and analysis of covariance (ANCOVA). In all the cases 0.05 level of confidence was fixed. The result of the study reveals that there was significant improvement on selected dependent variables due to the effect of training and there was significant difference between experimental and control groups of football players and there was no change in the control group on the development of abdominal strength and flexibility of school students.

KEYWORDS: *Static and dynamic stretching, Abdominal strength, lower back & hamstring flexibility, sit ups test and sit and reach test.*

Introduction

Training and regular physical fitness are known to have favourable effects on growth, maturation and physical aptitude of children and young adults. The development of motor skills in children is often related to their body characteristics, especially body mass and height, taking into account the biological and physical maturity as crucial points.

Muscular flexibility is an important aspect of normal human function. Limited flexibility has been shown to predispose a person to several musculoskeletal overuse injuries and

significantly affect a person's level of function. Musculoskeletal overuse injuries resulting from decreased lower-extremity flexibility range from stress fractures and shin splints to patella femoral pain syndrome and muscle strains. Research work by McNair (2000) and Knudson (2001) suggests that the use of static stretches is more appropriate for the cool down. By contrast, dynamic stretches - slow controlled movements through the full range of motion - are the most appropriate exercises for the warm up. Strength and power have importance in many types of sports. They are the key factors involved in weight lifting, throwing, jumping, and sprinting events. A high level of strength and power is usually associated with a greater ability to accelerate the body mass or propel external objects (MacDougall, Wenger & Green, 1982). McBride *et al.* studied acute effects of stretching on muscle activity (evaluated by electromyography) and muscle strength during isometric knee extension and squat in moderately active university students. Subjects in the stretching group significantly ($p \leq 0.05$) differed in muscle strength compared to control subjects. The activity of the *biceps femoris* significantly ($p \leq 0.05$) decreased in the stretching group during knee extension and during squat.

In practice, there are 4 different protocols for flexibility training – static, ballistic and dynamic stretching, and proprioceptive neuromuscular facilitation. Static stretching, or slow movements that gradually lengthen muscles to an elongated position, hold for 15 to 60 s, are the most widely used protocol. The primary goal of warm-ups prior to exercise is to increase core body Temperature. In most cases "warm ups" include static stretching, in which minimal Movement is being done, thus generating minimal thermal activity to heat up the body. The perceived need for stretching can be attributed to tradition and lack of knowledge of what stretching does to the body. Stretching has been shown to increase range of Motion (ROM), help prevent injury and increase performance. Zachezeweski Has defined muscle flexibility as "the ability of a muscle to lengthen, allowing one joint (or more than one joint in a series) to move through a range of motion (ROM)" and a loss of muscle flexibility as "a decreased in the ability of the muscle to deform," resulting in decreased ROM about a joint.

Static stretching or slow movements that gradually lengthen muscles to an elongated position, Hold for 15 to 60 s, is the most widely used protocol. The aim of the present study was to determine the influence of 12 weeks stretching exercise program on abdominal strength and flexibility of school students.

Materials and Methods

Thirty school students not involving in any physical activity before this experiment was volunteered for this study, they were selected from the Government Higher Secondary School, Thuvarankurichy, Trichy District at randomly They were assigned in to two equal group of 15 players, namely training group (n = 15) and Control Group (n =15) (Table 1).

Table 1

Descriptive group data

Subject details	Experimental group	Control group
Number	15	15

Height (cm)	165 ± 10.6	164 ± 5.5
Mass(kg)	52 - 62	52 - 62
Age (yr)	14 - 17	14 – 17

Abdominal strength - Sit ups test and Lower back & hamstring flexibility – Sit & reach test (ROM) are the two variables selected as a testing protocol of this study.

All subjects agreed not to change or increase their regular activity during the course of the Study. A set of static & dynamic stretching exercise program was applied for the training group over the period of 12-weeks(six days in a week).The training program performing a variety of exercises designed for the full structure of the Body(from the toe to the head). While the control group did not participate in any exercises. The intensity and volume of training was tapered so that fatigue would not be a factor during post-testing. During the training, all subjects were under direct supervision and were instructed on how to perform each exercise.

The pre test and post test randomized control group design was used as an experimental design. The collected data from the three groups prior to and immediately after the training programme on selected criterion variables was statistically analyzed with paired sample‘t’ test was used to find out significant improvement and analysis of covariance (ANCOVA) was used to find out the significant difference among experimental and control groups. In all the cases 0.05 level of confidence was fixed to test the hypothesis.

Analysis of data

Table II

Computation of Mean, SD and ‘T’ Ratio of Pre & Post Tests of Training & control Groups on Abdominal strength and Lower back & hamstring flexibility of football players

Criterion Variables	Group	test	Mean	SD	t’- Ratio
Abdominal strength	Training	Pre test	17.4	1.8822	18.33*
		Post test	23.8	2.5411	
	Control	Pre test	17.2	1.4736	0.51
		Post test	17.4	1.7238	
Lower back & hamstring flexibility	Training	Pre test	5.46	0.4085	15.86*
		Post test	7.62	0.5046	
	Control	Pre test	5.48	0.4296	0.62
		Post test	5.49	0.425	

Significant at 0.05 levels. Degrees of freedom n-1=14 is 2.14.

Table II shows that the obtained’t’ ratio value of experimental groups on *abdominal strength and lower back & hamstring flexibility* Are 18.33* and 15.86*which are higher than the table value of 2.14 with df 14 at 0.05 level of significance. Therefore, the results of the study indicate that there was significant improvement between pre and post test means of experimental group on the development of abdominal strength and lower back & hamstring flexibility of school children. The results of the study also indicate that there was no

significant improvement between the pre and post test means of control group on the development of abdominal strength and lower back & hamstring flexibility of school children.

Table III

ANALYSIS OF COVARIANCE ON CRITERION VARIABLES OF EXPERIMENTAL GROUPS

Criterion Variables	Adjusted post test means		Source of variance	Sum of Squares	df	Mean Squares	'F'- Ratio
	Training group	Control group					
Abdominal strength	23.7	17.5	B W	287.92 57.89	1 27	287.92 2.14	134.29*
Lower back & hamstring flexibility	7.63	5.49	B W	34.36 3.59	1 27	34.36 0.13	258.44*

*Significant at 0.05 level of confidence.

(The table value required for significance at 0.05 levels with df 1 and 27 is 4.21).

From the table III, the obtained F- ratio of *abdominal strength and lower back & hamstring flexibility* for adjusted post test means were 134.29* and 258.44* respectively which are more than the table value of 4.21 for df 1 and 27 required for significant at .05 level of confidence. The results of the study indicate that there is significant difference among the adjusted post test means of training and control groups on abdominal strength and lower back & hamstring flexibility due to the effect of training.

Ligia G.dos et al. Investigated To compare two exercise training modes on the physical fitness of 10 year-old children. A sample of 60 schoolboys aged 10 years were randomly divided into 3 groups: Traditional (TG), trained according to the Brazilian national curricular parameters, Maturational (MG), in which the degree of difficulty of the activities was adjusted to the level of maturity of subjects, and Control group (CG). The Greulich- Pyle protocol was used to assess biological maturity. The following fitness tests were applied: 5×10 m shuttle run (SHR), Burpee's test (BCT), goniometric (LABIFIE) measurement of shoulder joint flexibility (SAA), horizontal shoulder flexion (HSF), shoulder joint abduction (SJA), lumbar spine flexion (LSF), hip joint extension (HJE) [10], Sargent's Jump Test (SJT), endurance shuttle run (ESR) and 50-m run. The TG and MG groups trained 16 weeks, twice weekly. The only significant ($p<0.05$) between-group differences were found for SJA (TG >MG) and LSF (TG >CG). Despite the lack of clear-cut results, biological maturation combined with chronological age should be considered when applying various methodological approaches in order to encourage the engagement in physical exercises as this would have favourable carry-over effects.

Findings: The present findings of the study confirmed with that abdominal strength and lower back & hamstring flexibility of school children was significantly improved on training group due do the influence of 12 weeks of stretching exercise program, but there was no significant improvement on control group.

Conclusion: On the basis of the findings it was concluded that 12 weeks of stretching exercise program produced favourable changes in abdominal strength and lower back & hamstring flexibility of school children.

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