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EFFECT OF ISOKINETIC TRAINING PROGRAMME ON VITAL CAPACITY IN HIGH SCHOOL STUDENTS

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ABSTRACT

The purpose of this study was to examine the effect of an 10- week isokinetic training program on vital capacity in high school students. For these purpose 10 male subjects aged 15 to 18 years participated in the study. They were assigned into 2 groups: isokinetic (C; n=5), and subjected to control (IK; n=5) training lasting 10 weeks, 3 days a week. Isokinetic exercises consisted of 3 sets of extensions/flexions (both knees) at 180°/s, spaced by 1 minute intermissions. HUMAC NORM testing & rehabilitation system; CYBEX (CSMI Norm Isokinetic System) through VOLANT TECHNOGY COMPANY was used in the study. The selected dependent variable (vital capacity) was assessed using standard test and procedure, before and after the training regimen. Vital capacity was measured in liters with the help of spirometry test. The data was analyzed by applying one way analysis of variance (ANCOVA). After the intervention, there is a significant difference was found among the treatment and the control group. The analysis of data revealed that 10-weeks of isokinetic training had significant impact on vital capacity.

KEYWORDS: *Isokinetic Training, Heart Rate, High School Students.*

INTRODUCTION:

Throughout the world, sports have a popular appeal among people of all ages and both sexes (Tudor O. Bompa).

When repeated periods of exercise occur over a time certain physiological changes occur in the body, including changes in the respiratory, cardiovascular and muscular system, which allows better and improved performance. The amount of changes depends on the length of the exercise period as well as the intensity of the exercise and how often exercise occurs. Research also suggested that the training needs to be specific to get the adaption a performer wants to achieve (Billat, 2001).

Isokinetic muscle training is a type of contraction where the speed of movement is fixed and resistance varies with the force exerted. Isokinetic exercises are performed with a specialized apparatus, which provides variable resistance to a movement. This ensures that no matter how much effort is exerted, the movements take place at a constant speed. They are often used to test and improve muscular strength and endurance, more so after an injury. They work on the idea that the highest degree of muscle contraction is to be achieved, but at the same time, there should be free range of movements in the limbs. (Melissa Behr, 2009).

The HUMAC NORM is the latest product from CSMI in the isokinetic range. Developed for the Exercise Science Lab and perfected in the Physical Therapy Clinic and Athletic Training Room the HUMAC NORM Isokinetic Extremity System is the machine of choice across all disciplines and around

the world. Fixing the speed allows maximum neuromuscular contraction. Add the ability to test concentric and eccentric contractions coupled with numerous training capabilities and you have a winning combination that will keep your patients on a direct path to fulfill their performance capabilities (CSMiSolutions.htm, 2015).

OBJECTIVE:

The purpose of this study was to determine the effect of isokinetic training programme on vital capacity in high school students.

SIGNIFICANCE:

• The study may be of immense benefit for coaches, trainers and cricketers for preparing the training programme.
• This study may add to the guidelines and information about means and methods suitable for developing vital capacity.

LIMITATIONS:

• Certain factors like habits, life style, routine work, diet, etc. might have affected the result of this investigation, was considered as limitation for the study.
• The emotional stages of the subjects and motivational factors which might have had influence on the result of the study were also considered as limitation.

METHODOLOGY:

A total of 10 male high school students, aged 15 to 18 years took part in the study. They were volunteered participate in the training. Pre-test and post-test randomized group design was adopted for this study as all subjects were randomly selected and divided into two groups i.e. one experimental and one control group. An isokinetic training program was applied to the subjects 3 days a week for 10 weeks i.e. Tuesday, Thursday and Saturday. Prior to every field training session, the experimental groups had a ten minute warm-up exercise, which included jogging, stretching and the like. The selected dependent variables were assessed using standard tests and procedures, before and after the training regimen. The load was gradually increases among the students. Vital capacity was measured in liters with the help of spirometry test.

FIGURE-1
HUMAC NORM testing & rehabilitation system

SCHEDULE OF THE TRAINING PROGRAM

Training programme	Time
Warm up	10 minutes
Training	20 minutes
Cooling down	10 minutes
Total	40 minutes

STATISTICAL TECHNIQUE:

In order to examine the hypothesis of the study, descriptive statistics such as mean and standard deviation was used. To determine the effect of isokinetic training programme onvital capacity in high school students, the analysis of covariance (ANCOVA) was employed and the level of significance was set at 0.05. The SPSS statistical package was used for statistical calculations.

RESULTS:

For the analysis of data, the following results were drawn. The descriptive statistics of vital capacity is shown in table-1.

TABLE-1
MEAN AND STANDARD DEVIATION OF VITAL CAPACITY OF SUBJECTS

Treatment groups	Mean	Std. Deviation	N
Isokinetic	3.38	0.41	5
Control	3.29	0.51	5

*significant at 0.05 level of significance

Table-1 shows the mean (adjusted post-test mean) and standard deviation of the variable i.e. vital capacity of subjects between the experimental and control group i.e. mean and standard deviation are 3.38 and 0.41 for experimental group and mean and standard deviation are 3.29 and 0.51 for control group respectively.

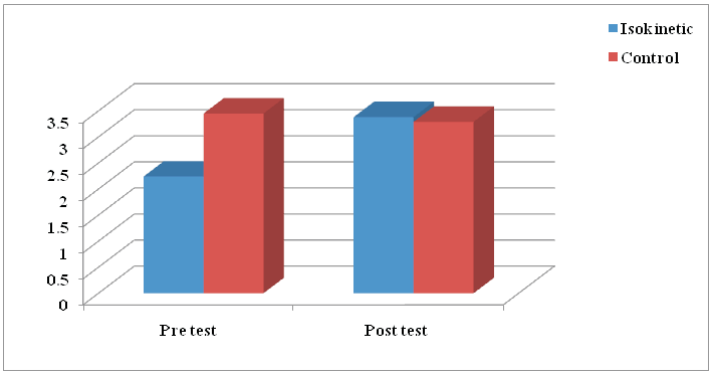
TABLE-2
ANCOVA TABLE FOR THE POST-TEST DATA ON VITAL CAPACITY

Source	Sum of Squares	df	Mean Square	F	Sig.
Pre Vital Capacity	1.74	1	1.74	11.47	.006
Treatment Groups	2.86	2	1.43	9.42	.004
Error	1.67	11	0.15		
Corrected Total	6.27	14			

*significant at 0.05 level of significance

Table-2 shows that there is significant difference between the treatment group and the control group with regards to vital capacity, as the p-value is 0.004 which is less than the 0.05, thus the null hypothesis of no difference among the adjusted means for the data on criterion variable in the experimental group may be rejected at 5% level.

FIGURE-2
GRAPHICAL REPRESENTATIONS OF THE PRE TEST MEAN SCORES AND POST TEST MEAN SCORES OF VITAL CAPACITY ON DIFFERENT GROUPS FOR TEN WEEKS



DISCUSSIONS-

Findings of the present study showed that there is significant difference in the vital capacity after the ten weeks of the isokinetic training program was found in high school students. Vital capacity refers to the maximum amount of air the person is capable of expelling from their lungs after maximum inhalation. Exercising will increase vital capacity because the muscles require additional nutrients when they perform tough exercise, which requires the lungs to take in more oxygen. The lungs will need to expand further to take in this extra oxygen which will increase vital capacity. Consistent exercises can improve the overall health of your lungs.

However, the subjects in the training group increased their VC and TLC, which indicates an increased ability of the inspiratory muscles to expand the thorax following training. The increase in these lung volumes also may result from a greater contribution of the upper thorax and neck muscles to the inspired volume after training. When corrected for lung volume, the training group still demonstrated increases in diaphragm thickness. This increase in diaphragm thickness may result in increased inspiratory muscle efficiency or improved pulmonary mechanics, or both. The training intervention in this study was successful in achieving a sustained training intensity, which is consistent with the overload principle. Ten weeks of isokinetic training on HUMAC NORM testing & rehabilitation system has caused improvement in vital capacity.

RECOMMENDATIONS:

- The study may be conducted on subjects of different age groups and sex.
- A similar study may be conducted for athletes of different levels and with larger samples.

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