

EFFECTS OF HYDRAULIC RESISTANCE CIRCUIT TRAINING ON INDIAN SEDENTARY FEMALE POPULATION

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ABSTRACT

The present study is devoted to the effect of six weeks of hydraulic resistance circuit training selected physical and physiological parameters of women, 30 healthy, sedentary females not taking medications that effect their physical and physiological condition, between the ages of 25-45 years has been taken as the Experimental group. The subjects were tested twice for physical and physiological variables (weight, anthropometric measurements – chest, waist, hip and thigh, BMI, FM and physical condition). Pre-test before the start of the training program and post test was conducted after the six weeks of hydraulic resistance circuit training. The training program was implemented five days in a week, from Monday to Friday for 30 minutes of duration, in the morning sessions. The six week of 30 minute hydraulic resistance circuit training has shown a remarkable improvement in selected physical and physiological variables of women. During the 6 weeks of hydraulic resistance training program all the 30 subjects has improved their weight, anthropometric measurements – chest, waist, hip and thigh, BMI, FM and physical condition. But the improvement level for each individual differs from each other.

Key words: Hydraulic Resistance, Circuit Training, Body Mass Index, Body fat

INTRODUCTION:

Physical fitness is defined differently by different people. Participation in physical activities can improve these fitness components often required certain motor skills. Consequently, motor skills (such as agility, balance, coordination, power, speed and reaction time) are often included in physical fitness programme. One can develop the basic components of physical fitness without achieving proficiency in various motor skills. For that reason, someone who is not a natural athlete can still be extremely fit. Physical Activity has also been associated with improved psychological health by reducing levels of stress, anxiety and depression. This is particularly important for women who demonstrate an incidence of depression that is reported

to be almost double that of men in both developed and developing countries. It has also been suggested that physical activity can contribute to building self-esteem and confidence and can provide a vehicle for social integration and equality for women in society. Despite this, physical inactivity is generally more prevalent among girls and women than their male counterparts. Women in India are busy at home, at work, doing hundreds of chores daily for the whole family. Being in good health can add years to your life and being in good shape improves self-esteem. Plus we set a healthy example for our children to follow. According to statistics, one in every six women in India is overweight. Regular physical activity will not only help reduce weight but will also enable you to avoid ailments like Diabetes, Breast cancer, High BP, Thyroid disorders, PCOD, arthritis, varicose veins, etc.

Physical exercise for 30 minutes: prevention from all diseases

Today we are facing lifestyle disease epidemic in our country and physical exercises are the only way to fight it. A good exercise routine will involve resistance training and aerobic training. Resistance training or weight training will involve working out the major muscles group in the body. When we work out the muscles, we activate the muscles and give the body a mechanism to burn more calories even when we are stationary. This actually improves the metabolism. Another benefit of resistance training is it helps in increasing the bone density levels. This is especially good for women who invariably start losing bone mass after certain age.

The length of the period of exercise training also plays a major role. Although some effects from exercise can be seen after a surprisingly short time of one to a few weeks, the effects are considerably greater if training continues for several months to years. For physical activity to have maximum performance and health effects, it must be pursued often and regular. A common recommendation with regard to the duration of physical activity is 30 minutes per day. Good health related effects can be achieved at low intensity activity levels but higher intensity may be required for maintaining fitness results.

The various means of fitness development are:

CYCLING: It is very popular for maintenance and development of physical fitness. It is an acrostic exercise.

AEROBIC ACTIVITIES: Aerobic activities involve close interaction of various body systems which include the heart, blood vessels, lungs and the muscles. Aerobic activities like running, aerobic dancing, swimming, etc. involve large muscle groups and these muscle movements should be rhythmic and continuous in nature.

CALISTHENICS: Calisthenics exercise can be done either with free hand or with apparatus. Calisthenics exercise can also be done with partners or with others support. The main purpose of this exercise is to develop the muscle or the muscle group. It also affects the various systems of the body.

CIRCUIT TRAINING: Circuit training is a form of conditioning combining resistance training and high-intensity aerobics. It is designed to be easy to follow and target strength building as well as muscular endurance. An exercise "circuit" is one completion of all prescribed exercises in the program. When one circuit is complete, one begins the first exercise again for another circuit. Traditionally, the time between exercises in circuit training is short, often with rapid movement to the next exercise.

FUNDAMENTALS: Morgan and Anderson's original circuit format included nine to 12 stations. Today, this number varies according to the design of the circuit. The program may be performed with exercise machines, hydraulic equipment, hand-held weights, resistance, calisthenics or any combination. Themed circuits are possible, for example with boxing exercises (box-exercise). A 15-second to three-minute aerobics station is placed between each station, allowing this method to improve cardio-respiratory and muscle endurance during the workout.

A simpler form the exercise consists of a group running round a gym with a trainer simply calling, for example, "ten push-ups", "ten sit-ups" at intervals.

Studies at Baylor University and The Cooper Institute show that circuit training is the most time efficient way to enhance cardiovascular fitness and muscle endurance. Studies show that circuit

training helps women to achieve their goals and maintain them longer than other forms of exercise or diet.

HYDRAULIC RESISTANCE

Resistance training has two different meanings. A broader meaning that refers to any training that uses a resistance to the force of muscular (better termed strength training), and elastic or hydraulic resistance, which refers to a *specific type* of strength training that uses elastic or hydraulic tension to provide this resistance. This article discusses the more limited definition of *elastic/hydraulic* resistance training.

Resistance training is a form of strength training in which each effort is performed against a specific opposing force generated by resistance (i.e. resistance to being pushed, squeezed, stretched or bent). Exercises are isotonic if a body part is moving against the force. Exercises are *isometric* if a body part is holding still against the force. Resistance exercise is used to develop the strength and size of skeletal muscles. Properly performed, resistance training can provide significant functional benefits and improvement in overall health and well-being.

Hydraulic Machine

They are machinery and tools that use liquid fluid power to do simple work. Heavy equipment is a common example.

In this type of machine, hydraulic fluid is transmitted throughout the machine to various hydraulic motors and hydraulic cylinders and which becomes pressurized according to the resistance present. The fluid is controlled directly or automatically by control valves and distributed through hoses and tubes.

Hydraulic machinery is operated by the use of hydraulics, where a liquid is the powering medium.

Height, weight and BMI

Height: At adult age, height is also relatively stable, although aging entails some height reduction. Of course, the yardstick used to measure height should be checked and no measurement taken with shoes.

Weight: Weight is generally used to assess body mass which at a given point of time indicates the present nutritional status. The relationship between body weight and mortality has been widely investigated with both lean and obese people showing an increased mortality (Jarrett et al., 1982; Wannamethee & Shaper, 1989, 1990).

In the present study, *ordinary bathroom scale* with a sensitivity of 0.5 kg was used for recording the weight as it was quiet convenient to be used in the field. The scale was calibrated with the standard weights (50kg and 60kg). The subjects were weighed barefooted and with minimum clothing (Jellife et al., 1989).

Body Mass Index (BMI): Obesity and overweight are commonly defined by measurements of BMI. It has been used by most of the studies as an index of body fatness to report increase in adiposity in women and has been recommended as the best measurement for monitoring overweight in individuals in female population (Prentice, 1998). Body weight not only correlates with body fat, but also with height. Therefore, BMI (weight adjusted for height squared) is a useful index to assess overweight and is a consistent surrogate for obesity. It correlates with the measures of body fatness in female and can be used as a reliable tool to assess fatness. (Dietz et al., 1999). BMI cutoff points are used clinically to identify high risk individuals for screening and identifying individuals for absolute risk assessment (World Health Organization, 2004a). Thus, BMI was used as a useful tool for the initial screening of overweight, obesity and associated risk factors.

OBJECTIVES:

The purpose of the study was to see the effect of 6 weeks hydraulic resistance circuit training method on various physical and physiological parameters of sedentary women in NCT Delhi, India. To see whether this training would help one to acquire a totally worked body and to continue to be able to "burn" fat mass, increase muscle mass and keep the metabolism high.

RESEARCH METHODOLOGY:

For the purpose of the present study 30 females were randomly selected from Delhi age ranged from 25 to 35 years comprised of group of sedentary women who are not under any medications. The Physical and physiological parameters for the study were selected for the study. The criterion measures for the study was weight, height, Chest-thigh-hip-waist measurements, body fat percentage and physical condition. A hydraulic resistance circuit training program was administered for 6 weeks on the experimental group. The group was exposed to 30 minutes circuit training (10 hydraulic resistance machines) for minimum 5 days in a week. The pre and post data was collected for 6 weeks training program for the selected physical and physiological parameters and physical condition of the subject. The data was analyzed by employing t-test' at 0.05 level to observe the difference in between the pre and post test scores of weight, anthropometric measurements (Chest, waist, hip and thigh), BMI, FM and pre and post test scores of physical condition was analyzed by percentage method.

RESULTS AND DISCUSSION OF FINDINGS:

The values of paired sample statistics of physical and physiological variables are shown in tables.

TABLE 1
VALUES OF STATISTICS OF WEIGHT

Variable	Mean	N	Std. Deviation	Std. Error mean	t	df
WEIGHT PRE TEST	78.5633	30	13.74739	2.50992		
WEIGHT PODT- TEST	76.9533	30	13.70844	2.50281	5.688*	29

* Significant at 0.05 level of significance.

t.05 (29) = 1.699

Table 1 indicates the Mean and Standard Deviation Values of Pre Test of weight and Post Test of weight which were found to be 78.5633 and ± 13.74739 and 76.9533 and ± 13.70844 respectively.

Table 1 also indicates the value of paired sample t-test of weight, which shows that there was a significant difference in the pre and post test values of the variable weight. The calculated value of 't' was found to be 5.688 at 0.05 level of significance, which was higher than the tabulated value of 't' i.e. 1.699 at .05 level of significance.

TABLE 2

VALUES OF STATISTICS OF WAIST MEASUREMENT

Variable	Mean	N	Std. Deviation	Std. Error mean	t	df
PRE-TEST WAIST MEASUREMENT	93.2167	30	11.48438	2.09675		
POST-TEST WAIST MEASUREMENT	88.8000	30	11.53002	2.10508	7.008*	29

* Significant at 0.05 level of significance.
 t.05 (29) = 1.699

Table 2 indicates the Mean and Standard Deviation of pre – test and post - test of waist measurement which were found 93.2167 and ± 11.48438 and 88.8000 and ± 11.53002 to be respectively. Table 2 also depicts the value of paired sample t-test of waist measurement, which shows that there was a significant difference in the pre and post test values of the variable waist measurement. The calculated value of 't' was found to be 7.008 at 0.05 level of significance, which was higher than the tabulated value of 't' i.e. 1.699 at .05 level of significance.

TABLE 3

VALUES OF STATISTICS OF HIP MEASUREMENT

Variable	Mean	N	Std. Deviation	Std. Error mean	t	Df
PRE-TEST HIP MEASUREMENT	1.1390E2	30	9.93982	1.81475		
POST-TEST HIP MEASUREMENT	1.1085E2	30	10.28654	1.87806	8.122*	29

Table 3 indicates the Mean and Standard Deviation, pre- test post - test, which were found to be 1.1390E2 and ± 9093982 and 1.1085E2 and ± 10.28654 respectively.

Table 3 also demonstrates the value of paired sample t-test of hip measurement, which shows that there was a significant difference in the pre and post test values of the variable hip measurement. The calculated value of 't' was found to be 8.122 at 0.05 level of significance, which was higher than the tabulated value of 't' i.e. 1.699 at .05 level of significance.

TABLE 4
VALUES OF STATISTICS OF THIGH MEASUREMENT

Variable	Mean	N	Std. Deviation	Std. Error mean	t	df
PRE-TEST THIGH MEASUREMENT	68.0167	30	5.57316	1.01751		
POST-TEST THIGH MEASUREMENT	65.2667	30	5.57973	1.01871	8.056*	29

* Significant at 0.05 level of significance.

t.05 (29) = 1.699

Table 4 indicates the Mean and Standard Deviation, thigh pre – test and post- test of thigh measurement, which were found to be 68.0167 and ± 5.57316 and 65.2667 and ± 5.57973 respectively.

Table 4 also depicts the value of paired sample t-test of thigh measurement, which shows that there was a significant difference in the pre and post test values of the variable thigh measurement. The calculated value of 't' was found to be 8.056 at 0.05 level of significance, which was higher than the tabulated value of 't' i.e. 1.699 at .05 level of significance.

TABLE 5
VALUES OF STATISTICS OF CHEST MEASUREMENT

Variable	Mean	N	Std. Deviation	Std. Error mean	t	Df
PRE-TEST CHEST MEASUREMENT	1.0261E2	30	9.04867	1.65205		
POST-TEST CHEST MEASUREMENT	99.8333	30	8.56852	1.56439	7.233*	29

* Significant at 0.05 level of significance.

$t_{.05} (29) = 1.699$

Table 5 indicates the Mean and Standard Deviation of pre- test and post – test of chest measurement , which were found to be 1.0261E2 and ± 9.04867 and 99.8333 and ± 8.56852 respectively.

Table 5 also indicates the value of paired sample t-test of chest measurement, which shows that there was a significant difference in the pre and post test values of the variable chest measurement. The calculated value of t' was found to be 7.233 at 0.05 level of significance, which was higher than the tabulated value of t' i.e. 1.699 at .05 level of significance.

TABLE 6
VALUES OF STATISTICS OF BMI

Variable	Mean	N	Std. Deviation	Std. Error mean	t	Df
PRE-TEST BMI	30.0990	30	4.87162	.88943		
PRE-TEST BMI	29.5423	30	4.80449	.87718	4.789*	29

* Significant at 0.05 level of significance.

$t_{.05} (29) = 1.699$

Table 6 indicates the Mean and Standard Deviation of pre- test and post – test of bmi, which were found to be 30.0990 and ± 4.87162 and 29.5423 and ± 4.80449 respectively.

Table 6 also indicates the value of paired sample t-test of bmi measurement, which shows that there was a significant difference in the pre and post test values of the variable chest measurement. The calculated value of t' was found to be 4.789 at 0.05 level of significance, which was higher than the tabulated value of t' i.e. 1.699 at .05 level of significance.

TABLE 7
VALUES OF STATISTICS OF FM

Variable	Mean	N	Std. Deviation	Std. Error mean	t	Df
FM PRE - TEST	46.9367	30	8.31063	1.51731		
FM POST - TEST	44.9200	30	7.69655	1.40519	3.654*	29

* Significant at 0.05 level of significance.

$t_{.05} (29) = 1.699$

Table 7 indicates the Mean and Standard Deviation off pre- test and post- test of fm, which were found to be 46.9367 and ± 8.31063 and 44.9200 and ± 7.69655 respectively.

Table 7 also indicates the value of paired sample t-test of fm measurement, which shows that there was a significant difference in the pre and post test values of the variable chest measurement. The calculated value of t' was found to be 3.654 at 0.05 level of significance, which was higher than the tabulated value of t' i.e. 1.699 at .05 level of significance.

CONCLUSION:

On the basis of the results obtained it was concluded that, there is a significant improvement in the selected physical and Physiological parameters (weight, anthropometric measurements – chest, waist, hip and thigh, BMI, FM and physical condition.) following six weeks of 30 minutes hydraulic resistance circuit.

Thus, a feasible exercise program consisting of resistance exercise and cardio exercise in a circuit form can provide beneficial physiological changes in sedentary females or not.

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