Effects of a University Fitness Programme on Cardiorespiratory Fitness, Muscle Strength and Endurance, Body Composition, and Flexibility of Previously Sedentary Females.

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Abstract

Thirty-eight healthy females between the ages of 20 and 49 that had not undertaken any training for at least two months prior to the experiment were studied to determine the effects of six weeks of a combined circuit weight training and aerobic programme on estimated maximal oxygen consumption ($\dot{V}O_2max$), muscular strength, body composition and flexibility. Nineteen of the volunteers participated in the exercise programme while the remaining nineteen served as control subjects. Prior to the training programme each subject took part in two testing sessions. Further testing was conducted after 3 weeks (1 testing session) and at the conclusion of the training programme (two testing sessions). Estimated $\dot{V}O_2max$ was determined from heart rate and oxygen uptake during a submaximal test using a cycle ergometer. Muscular strength was determined from an estimated one repetition maximum and maximum number of repetitions for a set weight for the bench press, leg press, leg extension and abdominal crunches. Body composition was evaluated from the sum of the triceps, subscapular, suprailiac, abdomen, thigh and calf skinfolds. Flexibility was evaluated for the hamstrings muscle group (using the sit and reach test), gastrocnemius and soleus muscles and shoulders. The training programme consisted of three 25-40 minute sessions a week on The Massey University Recreation Centre Supercircuit. The supercircuit consisted of thirty-six 40-second exercises which include 11 aerobic exercises and a variety of weight training and calisthenic exercises. Data was analysed using regression analysis and one factor ANOVA. There was no significant increase in the mean estimated VO_2max following the training period. The estimated 1RM increased by 40% and the maximum number of repetitions for a set weight increased by 100% for the bench press. The estimated 1RM increased by 16% for the leg press and the maximum number of repetitions for a set weight increased by 52% for the leg extension. The number of abdominal crunches completed in one minute increased significantly. There was no significant change in body mass or the sum of the skinfolds. There was a signficant increase in the flexibility of the hamstring muscle group but not of the gastrocnemius and soleus muscles and shoulders. Over the six weeks of the study period subjects felt they had significantly improved in stamina, muscle tone, strength, flexibility and general well being and had made small improvements in body shape. It was concluded that the supercircuit at the Massey University Recreation Centre is an effective means of improving musclar strength in sedentary females but it may not be as effective at improving cardiorespiratory fitness and body composition as some other forms of exercise.

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List of Abbreviations

CWT	circuit weight training
Load	the mass (kg) or amount of resistance against which a muscle works.
Repetition	a single complete action of an exercise from starting position to completion and back to the starting position.
1RM	One repetition maximum; the maximum load that can be lifted for one repetition only.
5RM	Five repetition maximum: the maximum load that can be lifted for five repetitions only.
5-10RM	Five - ten repetition maximum: the maximum load that can be lifted for between five and ten repetitions only.
bpm	heart rate in beats per minute
HRmax	maximum heart rate
HRR	heart rate reserve
L/min	litres per minute
ml/kg/min	millilitres/kilogram /minute
ml/kg LBW/min	millilitres/kilogram lean body weight/minute
pre-exercise HR	heart rate prior to participating in the cycle ergometer test
RMR	resting metabolic rate
RPE	rating of perceived exertion
R-hamstring	right hamstring muscle group
L-hamstring	left hamstring muscle group
R+L hamstring	right plus left hamstring muscle group
SKF-2	sum of the suprailiac and abdominal skinfolds
SKF-6	sum of the triceps, subscapular, suprailiac, abdominal, thigh and calf skinfolds
VO_2max	maximal oxygen uptake
C	regression variable representing training status
T	regression variable representing time
CT	regression variable representing training status x time
Tsq	regression variable representing time squared
CTsq	regression variable representing training status x time squared
ANOVA	analysis of variance