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Impact of 60 Days Fitness Training Program on Body Composition and Cardiovascular Variables among Match Factory Workers

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Abstract:

The purpose of this study was to assess the impact of a fitness training program on body composition and cardiovascular endurance among overweight middle aged cement factory workers. 30 workers out of the total number of 150 workers in a Match factory around, Elayirampannai for the study. The 30 subjects were randomly assigned to either Control Group ('CON', No: 15, Age: 40.33±2.72, Height:1.68±0.07, Weight: 70.67±7.29, BMI: 25.22±2.74) or Experimental group, ('EXP'No: 15, Age: 40.80±3.05, Height: 1.71± 0.06, Weight: 75.73±10.85, BMI: 26.1± 4.36). The height, weight, pulse rate, systolic pressure, diastolic pressure and Cardiovascular Endurance were measured 24 hours prior

(Pre) and 24 hours after (Post) the training duration. The 'Exp' Group underwent a fitness training program of 25 to 55 min duration, 3 to 5 sessions per week for eight weeks with a gradual increase in training duration and number of sessions per week, while the 'Con' group maintained their daily activities.

Keywords: Cardiovascular Endurance, Fitness training, Blood Pressure

Introduction:

Physical inactivity is a waste of human potential for health and well-being and its high prevalence is a cause for concern. The health effects of regular physical activity across a variety of chronic disease areas, including cardiovascular disease, are now well established (Leon et al., 1987, Paffenbarger et al., 1986, Powell, et al., 1987). Moderate-intensity activity performed by previously sedentary individuals results in significant improvement in many health-related outcomes. Physical activity is associated with cardio respiratory fitness and with other CHD risk factors and exercise can improve lipoprotein profile, can lower blood pressure, and is an important component of weight control. Exercise may favorably modify the natural history of a number of chronic diseases. It confers increased physical abilities and improves the quality of life (Bassey, 1985). Studies of physical activity and health provide substantial evidence that increasing physical activity should be recommended to all sedentary adults.

Endurance training is well known for increasing fat oxidation during exercise, (Holloszy and Coyle, 1984) and weight reduction is a desired quality for CHD risk reduction (Katzel, 1995). The most functional cardiovascular responses involve generation of the appropriate arterial blood pressure and blood flow to various organs (Waldrop TG., ,1996, Wathen, 1994). The central nervous system responds immediately to physical activity by increasing the efferent activity of the sympathetic nervous system to the heart and blood vessels while withdrawing parasympathetic activity (Kajiura, 1995, Rowell, 1993).

Methods:

Thirty match factory workers out of the total number of 30 workers in a match factory around Elayirampannai to act as subjects of this study and their informed consent was obtained. A written explanation of the experimental procedure

and potential risk factors were given to each worker. The age of the subjects were ranging from 37 to 48. The 30 subjects were randomly assigned to either Control Group ('CON', No: 15, Age: 40.33±2.72, Height: 1.68±0.07, Weight: 70.67±7.29, BMI: 25.22±2.74) or Experimental group, ('EXP' No: 15, Age: 40.80±3.05, Height: 1.71±0.06, Weight: 75.73±10.85, BMI: 26.1±4.36). Physical examination and medical check up at the initiation of the study yielded normal results in all the subjects and none of the subjects received any medication during the period of the study. The Height, Weight, Pulse rate, Systolic pressure, and Diastolic pressure and Cardiovascular Endurance were measured 24 hours prior (Pre) and 24 hours after (Post) the training program. All the measurements were performed in the erect position by the researcher. The Body Mass Index (BMI) was computed as the weight (Kgs) divided by the height square (m^2) and the cardiovascular endurance was measured using Cooper 12 min run Test. The experimental design adopted in the study was similar to a random group design involving 30 volunteers who were selected from a population of 78. They were randomly assigned to equal groups-Experimental group (N: 15) and Control group (N: 15). The experimental group underwent a Fitness Training Programme for a period of 8 weeks, whereas the control group maintained their regular routine activities. The subjects of both groups were tested on selected physical and physiological variables before and after the period of experimentation. The criterion variables selected for this study were Body weight, Body Mass Index (BMI), Systolic Blood Pressure, Diastolic Blood Pressure, Pulse rate and Cardiovascular Endurance.

Training Programme:

The training protocol was planned keeping in the mind the subject's age, fitness level, and the environmental and climatic conditions. It is well documented that endurance activity will improve cardiovascular endurance and the type of activities included in this basic fitness training program comprises of 5 min warm up, 15-30 min jogging, 10-15 min free hand exercise, stretching, rotation activities and 5 min of warm down. Even though no intensity was fixed, the subjects were asked to do their best within their safer limits and this process was repeated on a broader basis. Every training session started with instructions and motivation aiming towards getting the best results from the subjects. The duration of the training sessions were planned in such a way that there is a gradual increase in the training

duration as the programme progresses. At the start of the programme it was 35 min and at end of the programme it was 55 min per session including a 5 min warm up and flexibility routine and a 5 min warm down phase. So excluding this 10 min the duration of training session ranged from 25 min through 45 min during the 8 weeks periods of experimentation. The volume rather than the intensity of the training program was considered of prime importance to induce beneficial changes in the subjects. It is recommended a frequency of 3 training sessions per week to evoke significant training effects (Ken-ichi Iwaski et al, 2003, Sunami et al, 1999). But to achieve marked increase in cardiovascular fitness the activity was extended up to 5 sessions per week during the later half of the training program.

Table - I: Training Protocol with Weekly Load of Training

Weeks	No. of Training Sessions	Training duration of the session (min)	Weekly Load of Training (WLT) min
1	3	35	105
2	3	35	105
3	3	40	120
4	4	45	180
5	4	50	200
6	4	55	220
7	5	55	275
8	5	55	275
Total	31		**1480 min.**

Mean training duration per session = 47.74 min

Statistical Method:

The data collected from Experimental and Control groups prior to and after completion of the training period on selected variables were statistically examined for significant differences if any, by applying Analysis of Covariance (ANCOVA). The data was analyzed in the computer using 'SPSS' statistical package. The level of confidence was fixed at .05 level of significance as the number of subjects was limited and also as the selected variables might fluctuate due to various extraneous factors.

Table - II: ANACOVA of the Selected Variables among Experimental & Control Groups

			Exp. Group	Control Group	S O V	Sum of Squares	df	M.S	F-Ratio
Body weight	Pre Test	Mean	75.73	70.67	B	192.53	1	192.53	2.26
		SD	10.85	7.29	W	2390.27	28	85.37	
	Post Test	Mean	73.07	70.47	B	50.70	1	50.70	0.732
		SD	9.35	7.16	W	1940.67	28	69.31	
	Adjusted Post Test	Mean	70.80	72.74	B	26.23	1	26.23	38.74*
					W	18.28	27	0.68	
BMI	Pre Test	Mean	26.10	25.22	B	5.81	1	5.81	0.44
		SD	4.36	2.74	W	371.56	28	13.27	
	Post Test	Mean	25.07	25.14	B	0.028	1	0.028	0.002
		SD	3.99	2.61	W	318.90	28	11.39	
	Adjusted Post Test	MEAN	24.67	25.55	B	5.61	1	5.61	36.44*
					W	4.15	27	154	
Cardiovascular Endurance	Pre Test	Mean	1880	1893.3	B	1333.33	1	1333.3	0.015
		SD	300.48	288.39	W	2428333	28	86726.2	
	Post Test	Mean	2273.3	1896.7	B	1064083	1	1064083	11.54*
		SD	296.33	310.80	W	2581667	28	92202.4	
	Adjusted Post Test	MEAN	2279.86	1890.14	B	1138466	1	1138466	120.83*
					W	255567	27	9465.46	
Pulse rate	Pre Test	Mean	77.66	76.54	B	9.63	1	9.63	1.21
		SD	2.55	3.06	W	223.07	28	7.97	
	Post Test	Mean	76.00	76.2	B	0.30	1	0.30	0.05
		SD	1.60	3.10	W	170.40	28	6.09	
	Adjusted Post Test	MEAN	75.57	76.64	B	8.24	1	8.24	5.75*
					W	38.7	27	1.43	
Systalic Blood Pressure	Pre Test	Mean	122.73	122.13	B	2.70	1	2.70	0.08
		SD	4.88	6.73	W	966.67	28	34.52	
	Post Test	Mean	119.60	122.53	B	64.53	1	64.53	1.92
		SD	4.34	6.95	W	939.33	28	33.55	
	Adjusted Post Test	Mean	119.33	122.80	B	90.21	1	90.21	15.46*
					W	157.53	27	5.84	
Dystalic Blood Pressure	Pre Test	Mean	80.20	80.13	B	0.03	1	0.03	0.002
		SD	4.71	4.64	W	612.3	28	21.86	
	Post Test	Mean	79.13	80.53	B	14.70	1	14.70	0.88
		SD	3.10	4.87	W	465.47	28	16.62	
	Adjusted Post Test	Mean	79.11	80.56	B	15.75	1	15.75	3.21
					W	132.40	27	4.90	

The table value for 0.5 level of confidence with degrees of freedom 1 & 28 and 1 & 27 are 4.20 and 4.21 respectively.

Discussion:

The adjusted post test means of body weight among experimental (70.80) and control groups (72.74) resulted in an F - ratio of 38.74 that is significant at .05 level of confidence and hence there is a significant change in body weight in experimental group when compared with the control group. The adjusted post test means of BMI among experimental (24.67) and control groups (25.55) resulted in an F - ratio of 36.44 that is significant at .05 level of confidence and hence there is a significant change in BMI in experimental group when compared with the control group. The adjusted Post Test means of Pulse Rate among Experimental group (75.57) and Control group (76.64) resulted in F - ratio of 5.75 which again is significant at .05 level of confidence and hence there is a significant change in the Pulse Rate in Experimental group when compared with the Control group. The adjusted Post Test means of Systolic blood pressure among Experimental group (119.33) and Control group (122.80) resulted in F - ratio of 15.46 is significant at .05 level of confidence. This indicates that there is a significant change in Systolic blood pressure in Experimental group when compared with the Control group. The Post Test means of diastolic pressure between Experimental (79.13 ± 3.10) and Control group (80.53 ± 4.87) resulted in an F - ratio of 0.88, which indicates no significant difference at .05 level of confidence. The adjusted Post Test means of Experimental group (79.11) and Control group (80.56) resulted in F - ratio of 3.21 that again is not significant at .05 level of confidence. This indicates that there no significant change in Diastolic blood pressure in Experimental group when compared with the Control group. The Post Test means of Cardiovascular Endurance among the Experimental (2273.33 ± 296.33) and Control group (1896.67 ± 310.80) resulted in an F - ratio of 11.54 that indicates a significant difference at .05 level of confidence. The adjusted Post Test means of Experimental group (2279.86) and Control group (1890.14) resulted in F - ratio of 120.28 that again is significant at .05 level of confidence. This indicates that there is a significant change in the Cardiovascular Endurance in Experimental group when compared with the Control group.

Conclusion:

After going through the results, it was concluded that Fitness Training Programme has significantly reduced the body weight, BMI, Pulse rate, Systolic Blood Pressure, increased Cardiovascular Endurance while doesn't alter Diastolic Blood Pressure among middle aged Match Factory workers.

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