

## EFFECT OF SELECTED PLYOMETRIC AND AKHADA EXERCISES ON BODY COMPOSITION

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### Abstract

This study was designed to examine the effect of Selected Plyometric and Akhada exercises on body composition. Sixty male college students in the age group of 19-24 years studying in Govt. PG College, Etah, were randomly selected as subjects for the study. All the subjects were divided randomly into two experimental groups (Group A & Group B) and a control group and each group have equal number of subjects. The Group A was trained with Plyometric exercises and Group B was trained with the Akhada exercises whereas control group did not participate in any training program for 8 weeks. Data collected was analyzed at 0.05 level of significance using the analysis of co-variance and revealed significant change in body composition. As calculated F-value for lean body mass was 15.43, fat percentage was 36.62 and total body mass was 23.22. Post hoc mean comparison showed plyometric group had significant difference with control group in case of lean body mass and total body mass whereas akhada group had significant difference with control group in case of lean body mass and fat percentage.

**Keywords:** Plyometric exercise, Akhada Exercise and Body composition

### Introduction

No matter how you define "good" most of us want to feel good about our appearance. In terms of physique this can mean being thin, lean, muscled, ripped, etc. So this has to be accepted as a valid goal. Maintain body mass while increasing, for example, bench press, squat, deadlift strength. This would require loss of fat and gain in muscle. The High Intensity Interval Training group lost over 3 times as much subcutaneous fat as the Endurance Training group despite expending less than half as many Calories (during exercise). A review of the literature suggests in order achieving significant fat loss with aerobic activity exercise or activity must be performed most days of the week. Progress to at least 45 minutes (60-90 minutes recommended). Aerobic exercise should be between 60 to 80% maximum heart rate for progressively longer durations.

Intense exercise (e.g. weight training, high intensity interval training, plyometrics, sprints) can increase metabolic rate for hours after the vigorous workout (3-14 hours: dependent upon intensity). The combination of anaerobic and aerobic activity results in faster fat loss than anaerobic or aerobic activity

alone. Aerobic exercise burns fat during exercise, but has little effect afterwards. Exercise (particularly weight training) develops muscle, restores muscle that had been lost due to years of a sedentary modern lifestyle. The principle of "a sound mind in a sound body" was not only accepted but also faithfully practiced. India has a tradition of physical culture that goes back at least 6000 years. Multiple factors have led to the decline of the once-cherished Akhadas but they haven't completely disappeared. Compared to the crowds at contemporary gyms with multi-purpose machines, those striving for fitness here are less. No modern machines like cross-trainers, no complex exercise regime for each body part like biceps and thighs, no air-conditioners or carpeted floors. The equivalent of a gym, the Akhada is the place wrestlers, popularly known as pahalwans, use traditional methods for daily exercises. Plyometrics consists of a rapid stretching of a muscle (eccentric action) immediately followed by a concentric or shortening action of the same muscle and connective tissue (Baechle and Earle, 2000). Plyometric exercises stimulate several different muscle groups at the same time. Although plyometric are generally used to improve athletic performance, they can also be used to improve fat loss, strength and endurance. Plyometric exercises are great for challenging your fast-twitch muscle fibers, coordination and agility. All these things work together to help transform fat into lean muscle while elevating your heart rate and igniting a caloric burn.

It is evident that wrestlers in India mainly perform the traditional types of exercises even today while some of them have started performing the isometric and isotonic exercises also. Body composition has become a major field of interest for many exercise and sport scientists as well as clinicians. Therefore the purpose of the study was to investigate the effect of plyometric and akhada exercises on body composition.

### Method and Materials

For the purpose of this study sixty male college students of Govt. PG College Etah were randomly selected as subjects for this study. A fitness certificate was taken from all the subjects, before beginning training program. The age of subjects ranging from 19-22 years and body weight 66 – 75 kg. All the subjects were divided randomly into two experimental groups (Group A & Group B) and control group, each group consisting of 20 subjects. The Group A performed

exercise like Dand – Bathak ,Wrestling with partner , Rope Climbing, Log pulling and Mudgal Swinging whereas Plyometric group performed exercises like Standing Broad Jump , Depth Jump, Medicine Ball throw, Bounding , push-ups with clap whereas control group did not participate in any exercise program except their daily life routine. Body Composition measurements were taken at the beginning and after eight weeks. Statistical analysis was completed using SPSS Version 17.0. Analysis of Co-variance (ANCOVA) was used at 0.05 level of significance to find out the significance difference of two types of exercise program on body composition.

## Result

To examine the significant difference of Akhada and Plyometric training on body composition of college students, the analysis of co-variance (ANCOVA) was employed at 0.05 level of significance. Further LSD post hoc means comparison was also used when F value was found significant. The data collected was analyzed by using descriptive statistics and scores of experimental groups and control group with regards to body composition of college students is presented in table-1.

TABLE-1  
DESCRIPTIVE ANALYSIS OF DIFFERENT GROUPS

Group			Mean	SD	Minimum	Maximum
Plyometric Group	Fat Per	Pre test	13.72	2.24	10.00	18.75
		Post test	13.43	2.10	9.99	18.23
	Lean Body Mass	Pre test	54.18	4.79	47.18	61.77
		Post test	56.67	4.93	50.15	63.80
	Total Body Mass	Pre test	62.80	5.33	56.00	72.00
		Post test	65.45	5.30	58.00	74.00
Akhada Group	Fat Per	Pre test	13.76	2.18	10.00	18.75
		Post test	11.70	1.70	9.00	15.20
	Lean Body Mass	Pre test	51.17	5.02	43.50	60.06
		Post test	52.86	4.80	45.18	62.03
	Total Body Mass	Pre test	59.35	5.82	50.00	70.00
		Post test	59.89	5.59	51.34	71.00
Control Group	Fat Per	Pre test	13.27	2.32	10.00	18.20
		Post test	12.78	2.14	9.70	17.80
	Lean Body Mass	Pre test	56.53	5.03	48.44	62.64
		Post test	56.86	4.88	49.11	62.32
	Total Body Mass	Pre test	65.20	5.78	55.00	72.00
		Post test	65.22	5.76	56.00	71.23

Table 1 depicts mean scores, standard deviation and minimum & maximum scores of body Composition (fat percentage, lean body mass and total body mass) of experimental groups (plyometric and akhada group) and control group. Plyometric group , fat percentage pre-test

mean and standard deviation of subjects was  $13.72 \pm 2.24$  and minimum & maximum scores were 10.00 & 18.75 respectively, post-test mean and standard deviation of subjects was  $13.43 \pm 2.10$  and minimum & maximum scores were 9.99 & 18.75 respectively and lean body mass, pre-test mean and standard deviation of subjects was  $54.18 \pm 4.79$  and minimum & maximum scores were 47.18 & 61.77 respectively, post-test mean and standard deviation of subjects was  $56.67 \pm 4.93$  and minimum & maximum scores were 50.15 & 63.80 respectively and total body mass ,pre-test mean and standard deviation of subjects was  $62.80 \pm 5.33$  and minimum & maximum scores were 56.00 & 72.00 respectively, post-test mean and standard deviation of subjects was  $65.45 \pm 5.30$  and minimum & maximum scores were 58.00 & 74.00 respectively.

In case of Akhada group, fat percentage pre-test mean and standard deviation of subjects was  $13.76 \pm 2.18$  and minimum & maximum scores were 10.00 & 18.75 respectively, post-test mean and standard deviation of subjects was  $11.70 \pm 1.70$  and minimum & maximum scores were 9.00 & 15.20 respectively and lean body mass, pre-test mean and standard deviation of subjects was  $51.17 \pm 5.02$  and minimum & maximum scores were 43.50 & 60.06 respectively, post-test mean and standard deviation of subjects was  $52.86 \pm 4.80$  and minimum & maximum scores were 45.18 & 62.03 respectively and total body mass ,pre-test mean and standard deviation of subjects was  $59.35 \pm 5.82$  and minimum & maximum scores were 50.00 & 70.00 respectively, post-test mean and standard deviation of subjects was  $59.89 \pm 5.59$  and minimum & maximum scores were 51.34 & 71.00 respectively.

Similarly control group , fat percentage pre-test mean and standard deviation of subjects was  $13.27 \pm 2.32$  and minimum & maximum scores were 10.00 & 18.20 respectively, post-test mean and standard deviation of subjects was  $12.78 \pm 2.14$  and minimum & maximum scores were 9.70 & 17.80 respectively and lean body mass, pre-test mean and standard deviation of subjects was  $56.53 \pm 5.03$  and minimum & maximum scores were 48.44 & 62.32 respectively, post-test mean and standard deviation of subjects was  $56.86 \pm 4.88$  and minimum & maximum scores were 49.11 & 62.32 respectively and total body mass ,pre-test mean and standard deviation of subjects was  $65.20 \pm 5.78$  and minimum & maximum scores were 55.00 & 72.00 respectively, post-test mean and standard deviation of subjects was  $65.22 \pm 5.76$  and minimum & maximum scores were 56.00 & 71.23 respectively.

The result pertaining to the analysis of co-variance of body composition done for two experimental groups and control group are presented in Table -2.

TABLE-2  
ANALYSIS OF CO-VARIANCE OF ADJUSTED POST TEST MEANS IN  
BODY COMPOSITION VARIABLES AMONG EXPERIMENTAL  
GROUPS & CONTROL GROUP

Variables of Variance	Sum of Squares	df	Mean Square	F-Value
Lean Training	40.79	2	20.39	15.43*
Tissue Mass	74.02	56	1.32	
Fat Training	35.46	2	17.73	36.62*
Percentage	28.68	56	0.51	
Total Training	77.17	2	38.58	23.22*
Body Mass	93.06	56	1.66	

\* Significant at 0.05 level of significance, Tabulated value of (2, 56) is 3.16

Table-2 clearly revealed that there was a statistically significant difference among experimental groups (plyometric & akhada group) and control group as the calculated 'F' value of lean tissue mass 15.43, fat percentage 36.62 and total body mass 23.22 was found higher than tabulated 'F' value 3.16 at 0.05 level of significance.

This proved that there was a significant difference among the means due to eight weeks of plyometric and akhada training on lean tissue mass, fat percentage and total body mass.

As the calculated 'F' value was found to be significant at 5% level in case of body composition, a post hoc comparison test was applied by using LSD test. The result of the post hoc test is shown in table-3

TABLE -3  
PAIRED ADJUSTED FINAL MEANS AND DIFFERENCES  
BETWEEN MEANS AMONG THE EXPERIMENTAL  
GROUPS AND CONTROL GROUP OF  
BODY COMPOSITION

Var.	Plyometric Group	Akhada Group	Control Group	MD	CD
Fat Per	13.312	11.558		-1.753*	0.377
	13.312		13.035	0.277	
		11.558	13.035	-1.476*	
Lean Body Mass	56.459	55.527		-0.932*	0.601
	56.459		54.400	1.127*	
		55.527	54.400	2.058*	
Total Body Mass	65.115	62.854		-2.261*	0.680
	65.115		62.587	2.528*	
		62.854	62.587	0.268	

\* Significant at 5% level of significance

Table-3 shows adjusted post-test means of experimental groups & control group. In case of fat percentage, the adjusted means of plyometric group, akhada group and control group were 13.312, 11.558 & 13.035 respectively whereas the mean difference between plyometric group and akhada group (1.753) while the mean difference between experimental groups (plyometric & akhada group) and control group were (0.277 & 1.476) respectively.

The LSD critical value was 0.377 hence there was the significant difference among plyometric group and akhada

group whereas significant difference was also found between akhada group and control group. As no significant difference was found between plyometric group and control group it means akhada training program was more effective to produce significant difference in case of fat percentage as compare to plyometric training program.

In case of lean body mass, the adjusted means of plyometric group, akhada group and control group were 56.459, 55.527 & 54.4 respectively whereas the mean difference between plyometric group and akhada group (0.932) while the mean difference between experimental groups (plyometric & akhada group) and control group were (1.127 & 2.058) respectively.

The LSD critical value was 0.601 hence there was the significant difference among experimental groups & control group whereas significant difference was also found between plyometric group & akhada group. As significant difference was found between plyometric and akhada group it means plyometric training program was more effective than akhada training program because mean value (56.459) of plyometric group was higher than mean value (55.527) of Akhada group.

In case of total body mass, the adjusted means of plyometric group, akhada group and control group were 65.115, 62.854 & 62.587 respectively whereas the mean difference between plyometric & akhada group (2.261) while the mean difference between experimental groups (plyometric group, akhada group) and control group were (2.528 & 0.268) respectively.

The LSD critical value was 0.68 hence there was the significant difference among plyometric group and akhada group whereas significant difference was also found between plyometric group and control group. As no significant difference was found between akhada group and control group it means plyometric training program was more effective to produce significant difference in case of total body mass as compare to akhada training program.

### Findings

The purpose of the study was to investigate the effect of plyometric training and akhada training on body composition (fat percentage, lean body mass and fat percentage) of college students. The finding of the study exposed that there was a significant change in body composition between experimental groups (plyometric and akhada group) and control group at 0.05 level of significance.

It may be concluded that regular exercise program, decrease the body fat and enhance the lean body mass. Lean tissue mass burn more calories than fat even at rest. The literature indicates that one kilogram of muscle expands 3-5 times more calories than one kilogram of fat. Exercise increases the amount of muscle and the more muscle increased the basal metabolic rate and increased basal metabolic rate help the body to consumed more calories at rest as a result of which significant change occur in body composition. Finding of this study are in support of study conducted by Wing (2002) reported physical exercise alone reduced 1-2 kg body weight. Leser et al. (2002) reported that self-reported physical activity was inversely correlated ( $r = -0.53$ ) with weight regain at a 3-

year follow-up to a very-low-calorie diet intervention for weight loss. Slentz et al. (2004) reported that physical activity resulted in a modest decrease in body weight and measures of body fatness, whereas control subjects not participating in physical activity had a modest increase in body weight.

Post hoc result showed that fat percentage of akhada group significantly reduced as compared to plyometric group and control group. As the paired adjusted mean value of akhada group was lowest among all the group. It may be attributed because akhada exercises are aerobic in nature and involve large number of muscles of the body at a time thus activating a greater number of muscle fibers. Activation of a higher number of fibers means more calories burned. More the calories will burn more fat will burn. As the fat percentage reduction is more in akhada group directly related to more reduction of total body mass in compare to plyometric group and control group.

Lean body mass increased more in plyometric group because plyometric exercise was anaerobic in nature, resulted less burning of calories and increased the lean tissue mass in compared to akhada group and control group. Increasing lean muscle tissue and reducing stored body fat helps lower percentage of body fat and exercises have the ability to improve body composition. Improving body composition can improve overall health and quality of life. Lee et al.(1994) reported five months of basic military training resulted in an average body mass loss of 12.5 kg in 17- to 19-year-old obese male recruits.

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