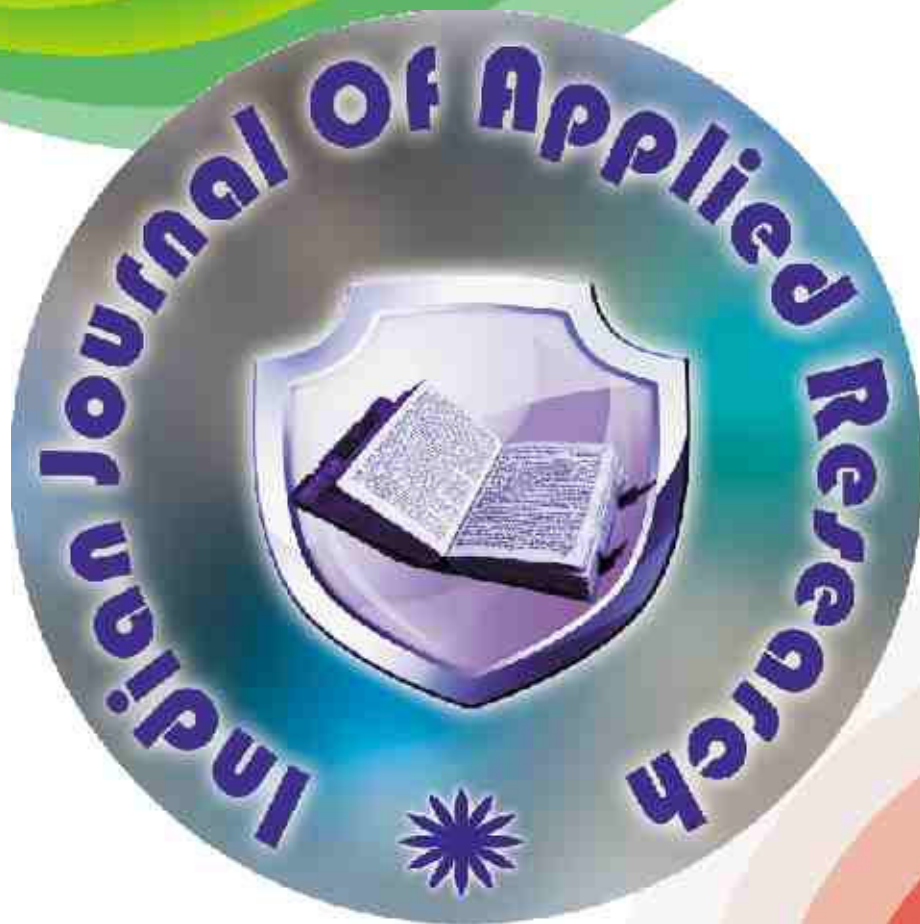


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Effect Of Yogic, Aerobic And Laughter Exercises On Body Composition (An experimental study)

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ABSTRACT

Body composition is the percentages of fat, bone and muscle in human bodies. It is the body's relative amount of fat to fat free mass. Because muscular tissue takes up less space in our body than fat tissue, our body composition, as well as our weight, determines leanness. Two people at the same height and same body weight may look completely different from each other because they have a different body composition. A high percentage of body fat can have a negative effect on overall well-being and linked to numerous health problems. It may increase risk for diseases, specifically surrounding the internal organs can damage the health and contribute to serious medical conditions. Those with optimal body composition are typically healthier, move more easily and feel better than those with less than ideal body composition. Achieving a more optimal body composition goes a long way towards improving the quality of life and overall wellness.

The purpose of this study is to know the effect of yogic, aerobic and laughing exercises on body composition of High school boys. For this study 14 to 15 years 8th and 9th standard 120 School boys were selected. The test was conducted with the help of digital skin fold caliper and weighing machine. The birth dates of the subject's were collected from the school admission records. The exact age of each subject from the date of test was converted the present age into decimal age. Further they were divided in to four groups with 30 subjects in each group, such as yogic, aerobic, laughing and control group. Pre-test was conducted for all the groups before training. After completion of eight weeks training all the subjects were re-tested to collect post-test data to determine the cause and effect of training. Hence the difference between mean of four groups in the pre-test had to be taken into account during the analysis of the post-test difference between the mean. This was achieved by the application of the analysis of co-variance, where the final mean were adjusted for difference in the initial means and the adjusted means were tested for significance. When the adjusted post-test means were significant at 0.05 levels, the Bonferroni's post-hoc test was administered to find out the paired means significant difference. The study proved that body composition was significantly reduced in experimental group when compared to control group.

Keywords : Yoga, Aerobic, Body Composition

Introduction

The scientific and technological progress all over the globe has made man highly sensitive, critical and also creative. Sharp to the core, his intellect has gained tremendous power of analysis. The left side of his brain is highly developed, helping him to unravel the general laws of nature. Automation and computers have brought great speed and sophistication in all our interactions. The theoretical knowledge of science is made practical and useful in the form of new machinery, gadgets and appliances to reduce human labour and help man towards a more comfortable and enjoyable life.

Physical activity engaged in as a child can encourage fitness throughout the lifespan. Educational programmes within the schools should make accessible to all children the opportunity to exercise at a level that is conducive for lifelong health. Well designed physical activities can effect on

children by decreasing health problems. The body uses more calories efficiently by helping in maintenance of health. It can also increase basal metabolic rate and helps to reduce body fat. The physical and recreational activities are essential for the development of wholesome personality of the child, which depends upon the opportunity provided for the development of physical, mental, social and spiritual aspects.

Now a day's the urban area children have facing various health related problems because lack of adequate play fields and physical activities. The youths are asset of the nation and we should cultivate a physical culture in educational institutions to keep the children healthy and active. Plenty of physical activities are available but yoga and aerobic activities have gained tremendous popularity all over the world at a faster pace. Similarly the laughter exercises also getting popularity day by day are attracting more and more people towards laughter clubs around the world. Mainly yoga, aerobic and laughter exercises are not required more space and expensive equipment and it can be performed in indoor or outdoor also.

Yoga being originated from a Sanskrit word 'Yuj' means union, control, to yoke. Yoga is a science that consists of ancient theories, observations, principles about the body and mind which is now being proved by modern science. Yoga makes the body more flexible and helps to relax even in the midst of a stress stricken environment. This is one of the foremost reasons people practicing yoga to feel more energetic, happy and peaceful.

Aerobic is the continuous exercise consisting locomotor movement and dance steps performed to music with efficient intake and utilization of oxygen over an extended period of time. Aerobic exercise is one of the most effective ways to improve and maintain health through increase strength, stamina, agility, flexibility, balance and coordination.

Laughing exercise is not a new idea in ancient scriptures we find references of hasya yoga as a cure for several diseases. Laughing is a part of human behaviour regulated by the brain. It helps to relieve pain through the release of endorphin and drops the level of stress hormones. Laughing is a technique for cure without drugs and a balm for ailments caused by modern stressful lifestyles. Laughter yoga was developed by Dr. Madan Kataria, after some research he learnt that fake laughing or laughing for no reason produced similar benefits as real laughter and introduced this to the laughter club

The body composition test estimates the percentage of body fat by measuring skinfold thickness at specific locations on the body. This includes the abdominal area, the sub scapular region, arms, buttocks and thighs. The thickness of these folds is a measure of the fat under the skin, also called subcutaneous adipose tissue. The skinfold measurement is generally taken at the right side of the body with skinfold caliper to measure the skinfold thickness in millimeters. Three measurements are recorded and average is considered.

Body fat includes essential fats, such as lipids and nonessential body fats. These fats make up around 5 % of total body weight for men and up to 12 % for women. Nonessential fat is found mainly within fat cells and adipose tissue below the skin and surrounding major organs. The amount of nonessential fat stored in the body is different among individuals on factors such as age, gender and diet. Excess nonessential fat can normally be attributed to consuming more food energy than what is burned through metabolic functions and activity.

Methodology

- For this study 120 subjects were selected randomly and divided in to yogic, aerobic, laughing and control group.
- The age of the subjects is 14 to 15 years.
- Before training pre-test were conducted for all the groups.
- The experimental group were underwent yogic, aerobic and laughing exercise training for the duration of 45 minutes a day, 5 days a week and a period of 8 weeks.
- The control group did not undergo any training.
- After completion of eight weeks training, all the subjects were re-tested to collect post-test data to determine the cause and effect of training on selected variables.

The list of exercises and training schedule for yogic, aerobic and laughing exercises are given in details in table A. B. C.

Administration of Test:

The test was conducted for all subjects, before the test all subjects were assembled at the testing venue. The purpose of the test was explained and all sorts of efforts were made to ensure accuracy and uniformity in administration of the test.

Purpose: To measure the body fat percentage and lean body mass.

Equipment: The calibrated digital calliper and weighing machine.

Table A: The Training Schedule For Selected Yogic Exercises

List of Asanas	Week	Training Load Dynamics	Number of Repetitions
Suryanamaskara: Relax With Shavasana Standing posture: Thadasana, Ardakati chakrasana, Trikonasana, Vriksasana, Relax With Shavasana Sitting posture: Padmasana, Parvathasana, Ushtrasana, Janusirasana, Vajrasana, Relax with Shavasana Prone Posture: Bhujangasana, Dhanurasana, Shalabhasana, Relax with Makarasana Supine Posture: Sarvangasana, Hal asana, Mastyasana, Chakrasana, Relax with Shavasana Pranayama: Bramari, Omkar (A.U.M) Relax With Shavasana	1	Medium	2
	2	Considerable	3
	3	Optimum	5
	4	Optimum	5
	5	Considerable	3
	6	Sub maximum	4
	7	Sub maximum	4
	8	Medium	2

Table B : List Of Selected Aerobic Exercises And Training Schedule

List of Aerobics Exercises	Week	Training Load Dynamics	Number of Repetitions
Common exercises include hands forward and sideward's, alternate knee lifts, leg lift single leg stretch, single straight leg stretch and both leg stretch, single leg kicks, side leg kicks, sidekicks up and down, side kick small circles, walk out and walk back with clap, trunk circle, chest expansion, squat straddle jump, lunges, step up step down, moving forward sideward, jumping jack, jumping jack squat, circle hop turning towards right full circle leg kick, grapevines, push ups, reverse push ups, calisthenics and various dance movements. Warming up and cool down: The aerobic training programme was starts with a minimum five minutes of warming up with a variety of exercises and at the end of each day training a systematic cool down exercises was followed.	1	Medium	2
	2	Considerable	3
	3	Optimum	5
	4	Optimum	5
	5	Considerable	3
	6	Sub maximum	4
	7	Sub maximum	4
	8	Medium	2

Table C : The Training Schedule For Selected Laughter Exercises

List of Laughter Exercises	Week	Training Load Dynamics	Number of Repetitions
Greeting Laughter, Hearty Laughter One-meter Laughter, Milkshake Laughter Cell Phone Laughter, Lion Laughter Silent Laughter (without sound) Humming Laughter (with mouth closed) Argument Laughter, Appreciation Laughter Forgiveness/Apology Laughter, Gradient Laughter Kannada Alphabetical Laughter, Dancing Laughter Heart to Heart Laughter (intimacy laughter) Warming up and Cool down Laughing training programme starts with a variety of warming up exercises for a minimum of five minutes. Similarly at the end of each days training was concluded with appropriate cool down programme.	1	Medium	2
	2	Considerable	3
	3	Optimum	5
	4	Optimum	5
	5	considerable	3
	6	Sub maximum	4
	7	Sub maximum	4
	8	Medium	2

Organisation and Description of the test:

- The measurements were taken on the right side of the subject's body.
- Calliper was placed 1 cm away from thumb and finger, perpendicular to skin fold and halfway between crest and base fold.

- The pinch was maintained while reading the calliper.
- Duplicate measurements were taken at each site and retested duplicate measurements did not fall within 1 to 2 mm.
- Rotate the measurement sites to regain normal texture and thickness.
- For each skin fold sites three measurements were taken and the average of those three was recorded.

Biceps : The superior side of the upper arm, a vertical skin fold was lifted with thumb and forefinger and the calliper was applied one centimetre below the finger and the grip of the calliper was slowly released so that a full tension of the calliper was applied on the skin fold.

Triceps: The posterior side of the upper arm, a vertical skin fold was lifted with thumb and forefinger, the calliper was applied one centimetre below the finger and the grip of the calliper was slowly released, a full tension of the calliper was applied on the lifted skin fold.

Suprailiac: At this site a vertical skin fold was lifted with thumb and forefinger just superior to the iliac crest at the mid auxiliary line, the calliper was applied one centimetre below the finger and the grip of the calliper was slowly released, so that the full tension of the calliper was applied on the lifted skin-fold.

Sub-Scapular : A diagonal fold, inclined approximately 450 from horizontal, in the natural cleavage of the skin, was picked up in the inferior angle of the scapular. The subject was comfortably erect with the arms relaxed at the sides of the body. The calliper jaws were applied one centimetre below the finger and the grip of the calliper was slowly released, so that a full tension of the calliper was applied on the lifted skin fold.

Body weight: The body weight of the subjects was taken on a portable weighting machine, the subjects were asked to wear only under clothing and be bare footed. The accuracy of the weighting machine was checked at intervals with standard weights. Before taking the measurements, care was taken to see that the pointer of weighting machine stood at zero when there was no weight on it. The measurement of body weight was recorded to nearest half a kilogram.

Scoring: The subject age, body weight, and four sites of skinfold measurements has entered in to Durnin and Wimberley online body fat percentage calculator, body fat percentage and lean body mass scores were obtained.

Figure 1: Measuring Body Composition By Skin Fold Calliper



Analysis of Data and Result:

- Descriptive statistics like mean, standard deviation, minimum and maximum were computed.
- Graphical representation of mean in pre-test, post-test and adjusted (for pre-test) were done using multiple bar plots.
- Analysis of Covariance (ANCOVA) statistical technique was used to find out significant difference in mean among four (three experimental and one control) group.
- To tease out the source of significant difference, if any in the previous step, the Bonferroni's post-hoc test was carried.
- Profile plots were plotted.

The difference between mean of four groups in the pre-test had to be taken into account during the analysis of the post-test difference between the mean. This was achieved by the application of the analysis of co-variance, where the final mean were adjusted for difference in the initial mean were significant at 0.05 level, the Bonferroni's post hoc test was administered to find out the paired means significant difference.

The following tables and figures illustrate the statistical result

Table 1: Descriptive Statistics Of Body Fat Percentage For Four Groups (Scores in millimeters)

Group	Tests	Min	Max	Mean	Std. Error (mean)	Std. Dev
Yogic	Pre	9.43	15.57	12.54	0.27	1.47
	Post	7.72	13.07	10.10	0.21	1.16
Aerobic	Pre	10.45	15.57	12.43	0.23	1.28
	Post	8.32	11.87	09.27	0.13	0.72
Laughing	Pre	9.43	15.57	12.54	0.27	1.47
	Post	9.43	14.26	11.41	0.24	1.30
Control	Pre	9.43	15.57	12.50	0.33	1.78
	Post	9.43	15.57	12.45	0.32	1.78

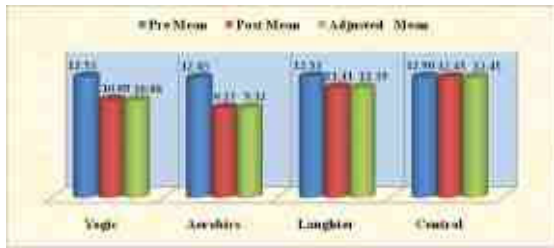
The table-1 reveals the descriptive statistics like minimum (min), maximum (max), mean, standard error (Std. Error) of mean, and standard deviation (Std. Deviation) of Body Fat Percentage for four groups. The minimum (min) Body Fat Percentage in post-test is less in aerobic and yogic group, and is equal in laughing and control groups, when compared with the minimum (min) Body Fat Percentage in respective groups of pre-test. The maximum (max) Body Fat Percentage in post-test is less in experimental group and equal in control group when compared with the maximum (max) Body Fat Percentage in the pre-test. The Std. Error (of mean) is less in post-test when compared to pre-test in the respective groups. Similarly the Std. Deviation in the post-test is lesser then the pre-test in experimental group and equal in control group.

Table 2 : Mean Scores Of Body Fat Percentage For Four Groups

Group	Pre-Test Mean	Post-Test Mean	Adjusted post-test Mean
Yogic	12.53	10.10	10.08
Aerobics	12.43	09.27	09.32
Laughing	12.53	11.41	11.39
Control	12.50	12.45	12.45

The table- 2 describes the pre, post and adjusted (for pre-test) mean body fat percentage among the experimental group and control group. The pre-test mean of body fat percentage is 12.53 in yogic group, 12.43 in aerobic group, 12.53 in laughing group, and 12.50 in control group. The post-test mean of body fat percentage is 10.10 in yogic group, 9.27 in aerobic group, 11.41 in laughing group, and 12.45 in control group. The adjusted (for pre-test) mean of body fat percentage is 10.08 in yogic group, 9.32 in aerobic group, 11.39 in laughing group, and 12.45 in control group.

Figure 1 : Multiple Barplot For Means Of Body Fat Percentage Among Four Groups



The mean scores in the table -2 are represented graphically in the multiple bar plot figure -1. It clearly indicates that, there is a reduction in the adjusted post-test mean body fat percentage, when compared with mean body fat percentage in pre-test among experimental groups.

Table 3 : Analysis Of Covariance For Body Fat Percentage Among Four Groups

Source of variance	Sum of Squares	df	Mean Square	F-ratio	p-value
Pre- body fat percentage	116.62	1.00	116.62	172.90*	0.00
Between Groups	173.70	3.00	57.90	85.84*	0.00
With in Groups	77.57	115.00	0.68	-	-

* indicates significant (<0.05)

The table -3 indicates the post-test body fat percentage has decreased significantly across groups. Since the effect of treatment is significant, post hoc test was employed to find out the source of the significance. The results are as shown in the table-4

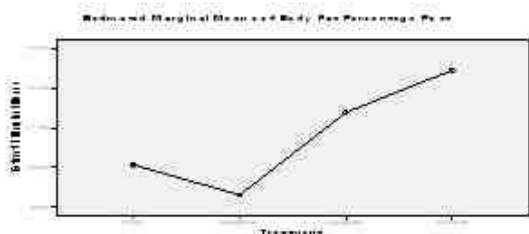
Table 4 : Post Hoc Test Mean Difference Of Body Fat Percentage Between Four Groups

Group				Mean Difference	p-value	95% confidence Interval for Difference	
Yogic	Aerobics	Laughing	Control			Lower Bound	Upper Bound
10.08	9.32			0.76*	0.00	0.19	1.33
10.08		11.39		-1.31*	0.00	-1.88	-0.74
10.08			12.49	-2.37*	0.00	-2.94	-1.80
	9.32	11.39		-2.07*	0.00	-2.64	-1.50
	9.32		12.49	-3.13*	0.00	-3.70	-2.56
		11.39	12.49	-1.06*	0.00	-1.63	-0.49

* indicates significant (<0.05)

The table-4 reveals the experimental group has significant difference in adjusted post-test Body Fat Percentage. The adjusted post-test mean of aerobic group is significantly lesser than the yogic, laughter and control group. The post-test mean of yogic group is significantly lesser than the laughing and control-group. Similarly the post-test mean of laughing group is significantly lesser than the control group.

Figure 2 : Profile Plot Of The Estimated Marginal Mean Body Fat Percentage.



The profile plots in the figure -2, shows the decrease in adjusted post-test body fat percentage in experimental group when compared to the control group. Further it also reveals the reduction of body fat percentage in aerobic group is greater than yogic and laughing group. Between the yogic and laughing group, the reduction of adjusted body fat percentage in yogic group is greater.

Table 5 : Descriptive Statistics Of Lean Body Mass For Four Groups

(Scores in millimeters)

Group	Tests	Min	Max	Mean	Std. Error (mean)	Std. Dev
Yogic	Pre	30.13	30.13	34.67	0.62	3.37
	Post	31.09	31.09	35.73	0.61	3.34
Aerobics	Pre	28.82	42.54	34.67	0.72	3.96
	Post	30.12	44.16	36.57	0.73	4.00
Laughing	Pre	30.13	41.87	34.67	0.72	3.96
	Post	30.13	42.03	36.57	0.73	4.00
Control	Pre	0.13	41.87	34.67	0.62	3.37
	Post	30.13	42.03	34.29	0.61	3.35

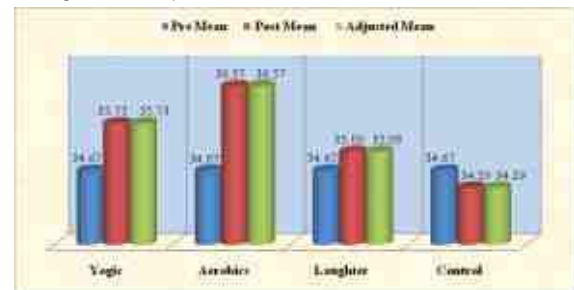
The table-5 reveals the descriptive statistics like minimum (min), maximum (max), mean, standard error (Std. Error) of mean, and standard deviation (Std. Deviation) to make statistical observations of Lean Body Mass of four groups. The minimum (min) lean body mass in post-test is greater in aerobic and yogic group and is equal in laughing and control group, when compared with pre-test. The maximum (max) lean body mass in the post-test is higher when compared with pre-test. Further the Std. Error (of mean) is high in post-test of aerobic and laughing group, less in yogic and control group in post-test when compared to pre-test. Similarly the Std. Deviation of post-test is higher in aerobic and laughing group and less in yogic and control group when compared to pre-test.

Table 6 : Mean Scores Of Lean Body Mass For Four Groups

Group	Pre-Test Mean	Post-Test Mean	Adjusted post-test Mean
Yogic	34.67	35.73	35.73
Aerobics	34.67	36.57	36.57
Laughing	34.67	35.09	35.09
Control	34.67	34.29	34.29

The table-6 confirms the pre, post and adjusted (for pre-test) mean of Lean Body Mass among the experimental and control group. The pre-test mean lean body mass is 34.67 in yogic group, 34.67 in aerobic group, 34.67 in laughing group, and 34.67 in control group. The post-test mean lean body mass is 35.73 in yogic group, 36.57 in aerobic group, 35.09 in laughing group, and 34.29 in control group. The Adjusted (for pre-test) mean lean body mass is 35.73 in yogic group, 36.57 in aerobic group, 35.09 in laughing group, and 34.29 in control group.

Figure 3 : Multiple Bar Plot For Means Of Lean Body Mass Among Four Groups



The mean scores in the table-6 are represented graphically in multiple bar plot figure -3 It denotes the increase in adjusted (for pre-test) post-test mean lean body mass when compared with pre-test mean in experimental group and decrease in control group when compared with pre-test.

Table 7 : Analysis Of Covariance For Lean Body Mass Among Groups

Source of variance	Sum of Squares	df	Mean Square	F-ratio	p-value
Pre-Lean body mass	1405.42	1	1405.42	3809.16*	0.00
Between Groups	84.49	3	28.16	76.33*	0.00
With in Groups (Error)	42.43	115	0.37		

* indicates significant (<0.05)

The table-7 indicates the post-test lean body mass is increased significantly across groups and also a significant relationship exists between pre and post-test lean body mass. When the pre-test is statistically controlled, the treatment has influence on post-test. Since the effect of treatment is significant, Post-hoc test was employed to find out the source of the significance. The results are as shown in the table-8.

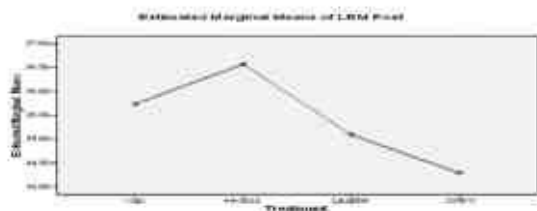
Table 8 : Post-Hoc Test Mean Difference Of Lean Body Mass Between Groups

Group				Mean Difference	p-value	95% confidence Interval for Difference	
Yogic	Aerobics	Laughing	Control			Lower Bound	Upper Bound
35.73	36.57			-0.84*	0.00	-1.26	-0.43
35.73		35.09		0.64*	0.00	0.22	1.06
35.73			34.29	1.45*	0.00	1.02	1.87
	36.57	35.09		1.48*	0.00	1.06	1.90
	36.57		34.29	2.29*	0.00	1.86	2.71
		35.09		0.80*	0.00	0.38	1.22

* indicates significant (<0.05)

The table-8 reveals the experimental group has significant difference in adjusted post-test Lean Body Mass. The adjusted post-test mean of lean body mass in aerobic group is significantly different than the yogic, laughing and control group. The post-test mean of lean body mass in yogic group is significantly diverse from laughing and control group. Similarly the post-test mean of lean body mass in laughing group is significantly different from control group.

Figure 4 : Profile Plot Of Estimated Marginal Mean For Lean Body Mass Of Four Groups



The figure- 8 shows the increase of adjusted post-test lean body mass in experimental group when compared with control group. The increase of adjusted post-test lean body mass in aerobic group is greater than yogic and laughing group. Between the yogic and laughing group, the increase of adjusted lean body mass in yogic group is greater.

Discussion of Findings:

The body composition was significantly improved among experimental group when compared with the control group due to the influence of eight weeks of training. The results have been shown in tables, 1,2,3,4 and 5,6,7,8 figures, 1, 2 and 3, 4. The findings related to body composition revealed the following results between yogic, aerobic and laughing groups.

Aerobics: The eight weeks of aerobic training were influenced significantly on body composition in comparison to yoga and laughing group, because aerobic exercise comprise the moderate level of intensity over a relatively longer period of time. It strengthens all types of muscles throughout the body, improves pumping efficiency and enlarges the heart muscles. It may be definitely due to the continuous and repetitive activities carried out by the different muscles and organs of the body in aerobic training group the body fat percentage was significantly decreased and lean body mass was increased.

Yogic: The body composition was also virtually observed as significant in yogic group due to the influence of eight weeks of yogic exercise. Because it is the only form of physical activity that provides complete exercise to the body and massage all the internal organs and glands. Yoga is postural pattern, these patterns are to be achieved slowly, maintained for some time steadily and released again in a slow and smooth manner. It may be also due to the various muscular contraction and kinesiological movements experienced by the subjects of yoga group.

Laughing: The laughing group did show a significant influence of eight weeks laughing exercises on reduction in the body fat percentage and increase of lean body mass but much lesser than aerobic and yogic group. It might be due to the nature of specific segmental muscular movements experienced by subjects of laughing group.

It is further justified that aerobic activities are dynamic at sub maximal level of physical capacity, whereas the other two experiments may be desired longer period of training. It is quite transparent that aerobic activity influences considerably consumption of energy and burning of calories. This process will surely systematise reduction of body fat percentage and increase lean body mass.

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