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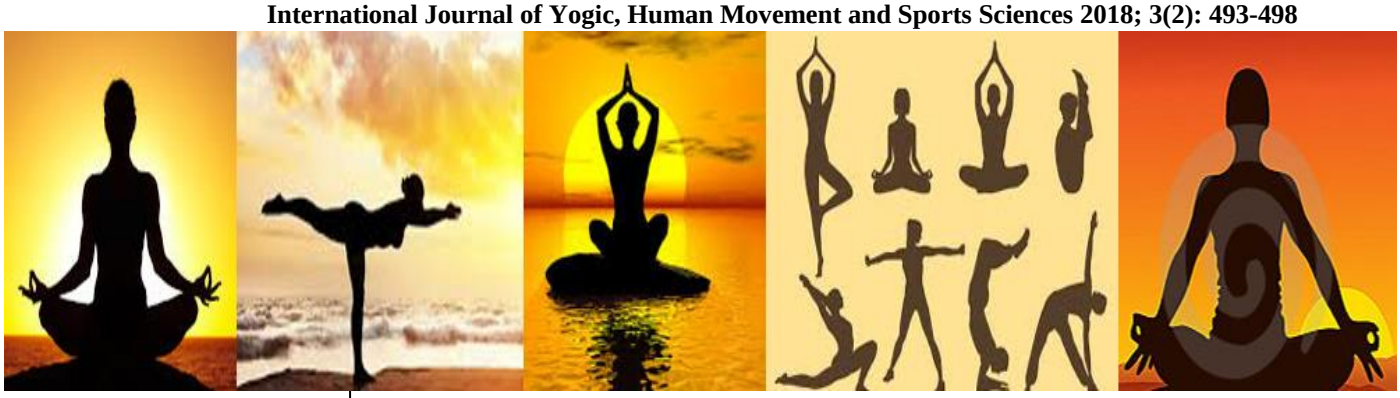

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Effect of physical training on players upper body strength and endurance

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Abstract
The need of physical training in today's rest less life and unhealthy environment is very vital. Therefore, the effect of specific fitness training on body is to be reexamined considering the current working conditions. This study aimed to understand the role played by understanding the effect of training on Upper Body Strength and Endurance through experimental design. The Upper strength was measured with the help of soft ball throwing and endurance was measured with 12 minute Cooper test in pre-training and post-training. 8-week training was offered to 60 participants each. Results showed that endurance was improved in experimental group and upper body strength was also improved. The findings were discussed followed by relevant implications.

Keywords: Experiment, physical training, upper body strength, endurance, soft ball throw, cooper test, t-test

1. Introduction
Physical education and sports nowadays has been transformed in a contemporary way than an old era. As of now, due to such development, there is a raising interest among all stakeholders in the knowledge of this field. Competitive games have taken sincere change. Hence, developing methods for physical fitness have undergone drastic transformation and therefore regained as a separate stream of research. Various methods of training are beneficial to an individual for playing games and carrying a load as well.

Physical Efficiency could be defined as a functional personality of player developed through training. Scientific method of training would be beneficial for an individual in developing physical efficiency. Most of the time, internal training is an ideal one to develop the endurance capacity of player.

It has been proved by various training method and related literature that physical workout is really helpful in maintaining overall fitness. Every sport requires energy to perform well. A player has to be very active during an entire match or in a game. Medium pace exercise is known as an Aerobic exercise or Aerobic Efficiency. Maximum level of oxygen needed in this kind of activities. In last couple of years, science of physical fitness has witnessed rapid progress. It is necessary to have central training of various games to make it more powerful. Today, to get higher rank in various games, sports trainer and guides should apply scientific approach in each training modules for all various games.

Factors which matters a lot in performing well are like a muscle power, toughness and stiffness of muscle, flexibility of muscle, energy, accuracy, delicateness, speed, frequency matching, blood circulation and breathing etc. Advance coaching and training method has put more attention on developmental activities.

It has been observed in sports fraternity that they are not much serious about their career. In sports, fitness is most important parameter to perform well. However sportsmen do not know their actual ability. Because of that, they miss the opportunity to participate in multiple events simultaneously or it become difficult for them to prove their fitness. It is much needed that players come to know about the importance of the physical training in their career. Physical training helps them to manage the long career. Present study aims to contribute in the area of physical training by highlighting improvement for physical training. Study is really important from physical fitness point view because importance of fitness training has been discussed

through experiment between experiment and control group with the help of Soft Ball Throw test and 12 minute Cooper Run test. The research objectives of this study are as under:

- To know the importance of physical fitness for players
- To measure the importance of physical fitness in improving endurance capacity
- To compare control group (no physical fitness training) and experiment group (with eight week of training program)
- To understand the difference in aerobic endurance in 12 minute copper run test among control group and experiment group
- To understand the difference in force of hand muscles(upper body strength) in softball throw among control group and experiment group

2. Literature Review

The aim of this study was to measure the effectiveness of physical training in developing upper body strength and endurance. For researchers, it is really important to understand and prepare synthesis of past literature. In present study, all previous studies on physical fitness have been referred carefully. Literature review has been done separately for each dimensions of the study. The section finishes with research gap of the study. The literature review has been done through published research articles, books and other relevant sources on physical fitness. Past literature indicated importance of physical training in number of ways.

Bose (1989) conducted a study on comparative effects of three types of training loads on jumping ability. Subjects were equated in three experimental groups and one control group, each consisting of twenty subjects. The training load was administered to three experimental groups three days a week for a period of 12 weeks, while no special program was imparted to control groups. Load distribution for the experimental group was as follows:

Group A: Strength 50%; Speed 25%; Endurance 25%;
Group B: Strength 40%; Speed 35%; Endurance 25%;
Group C: Strength 30%; Speed 45%; Endurance 25%;

The data was analyzed by applying 't' ratio test to find out significant difference between pretest and posttest means. The experimental Group B and C registered significant improvement whereas experimental group A could not prove significant result in running broad jump performance.

Jones (1999) [5] after an intensive study of motor performance in adolescent boys concluded that height correlated very well with muscular strength and physical ability when closely associated with the variables of weight. in a study involving college women found a general tendency for the subjects classified as mesomorphic ectomorphs to perform in a more efficient manner on physical fitness test. The ecto-endomorph group was consistently low in all test items.

In a relationship study of anthropometric measurement and body composition to the performance in selected sports on twenty subjects each, from the discipline of inter-collegiate football, basketball and volleyball, concluded that calf girth showed significant relationship to the playing ability in football, whereas weight, sitting height, upper arm girth and chest girth did not show significant relationship to playing ability in football.

Abraham (2005) [2] investigated the effects of six weeks training programs on selected physiological variables (haemoglobin, pulse rate, vital capacity, cardio-vascular endurance and peak expiratory rate flow) of professional college students. The data was collected before and after the experiment and analysed with the help of 't' test. The study concluded that cardio-vascular endurance and peak expiratory flow rate improved due to training. There was a significant reduction in resting pulse rate. There was no significant changes in haemoglobin content and vital capacity after six weeks of training.

Stamp (2012) [1] studied the effect of an interval running program on selected physiological variables in which pulse rate was one of the variables. The work load consisted of running bout on a graded treadmill with a specified interval rest period. Statistical analysis of data indicated significant lowering of heart rate. Based on afore mentioned discussion, the variables emerged through this comprehensive literature search were body endurance, upper body strength and the specific physical training such as running, warm-up, stretching, circuit training, different types of throw etc. and following hypotheses were developed:

H_1: There is a change in the force of hand muscles in softball throw among control group and experiment group in case of pre-training.

H_2: There is a change in the force of hand muscles in softball throw among control group and experiment group in case of post-training.

H_3: There is a change in the force of hand muscles in softball throw among experiment group in case of pre-training and post-training.

H_4: There is a change in the aerobic endurance in 12 minute copper run test among control group and experiment group in case of pre-training.

H_5: There is a change in the aerobic endurance in 12 minute copper run test among control group and experiment group in case of post-training.

H_6: There is no change in the aerobic endurance in 12 minute copper run test among experiment group in case of pre-training and post-training.

3. Research Methods

In this study, all samples are divided into two groups. Among which one group will be prepared by giving them training and another group will not be trained. Group which will be selected will be given the training till to the eight weeks. There are sixty samples are to be taken from selected group.

For any research, it is really difficult to include entire population in the study, so samples are used to generalize the results and also to predict the outcome based on it. There are two types of sampling methods 1. Probability sampling and 2. Non Probability sampling. This study has collected samples by using probability sampling method. The 60 students are selected from constituent institutes from Ganpat University on the basis of random sampling method.

3.1 Pretest-Posttest Control Group Design

In present study, Pretest-Posttest Control Group Design has been used. In the pretest-posttest control group design, test units are randomly assigned to either the experimental or the control group, and pretreatment measure is taken on each group. Only the experimental group is exposed to the treatment, but posttest measures are taken on both groups. This design is symbolized as

EG:	R	O_1	X	O_2
CG:	R	O_3		O_4

The treatment effect (TE) is measured as $(O_2 - O_1) – (O_4 - O_3)$ This design controls for most extraneous variables. Selection bias is eliminated by randomization.

3.2 Tool to measure effectiveness

Softball Throws

The objective of this test is to check the power of upper body and evaluating the throw in terms of distance. To perform this test, standard weighted softball is needed along with measure tape. It is also essential to have open outdoor ground to perform this test. As per the standard procedure, it is necessary to mark a line from where subject can be asked to throw the ball. To begin with, subjects are asked to throw the ball without crossing the starting line. Best of three throws are taken for final results. Maximum distance among the three chances will be measured in meters and it will be noted.

Cooper 12 min race /walk test

The cooper 12 minute walk/race is most widely used test to measure endurance force. The aim of this test is to check the development of the athlete's aerobic endurance. In this test, 400 meter track will be used. The players are allowed if they need to walk. After the completion of the 12 minuets the distance travelled will be noted. The distance travelled by the players will be noted in meter.

4. Data Analysis

In present study, independent sample t-test and paired sample t-test have been used to compare mean of different groups and same group in two different time period respectively. Here, t-test helps to assesses that whether the means of two conditions or groups are statistically different from one other or not. The t-test is considered as more powerful tests then other forms of non- parametric test. In experimental research design, t-tests give more results of comparing means of two groups.

As mentioned in research methodology chapter, the study employs the pre-test and post-test control group experiment research design to test the hypothesis. The subsequent part talks about hypothesis testing one by one. Each hypothesis are mentioned in both types, null hypothesis and alternate hypothesis

Table 1: Group Statistics for softball throw among control group and experiment group in case of pre-training

	Pre_Group	N	Mean	Std. Deviation	Std. Error Mean
Pre_CGEG	Control group	60	47.12	3.899	.503
	Experiment group	60	47.18	4.010	.518

From the table 1, it can be revealed that mean score of the participants in non-fitness condition (control group) is around 47.12 and mean score of participants with pre fitness training condition is around 47.18 (experiment group). It reveals no major change in the force of hand muscles in softball throw among control group and experiment group in case of pre-training. In addition, it can be seen that the standard deviation for pre test control group (SD=3.899) is quite similar to standard deviation of pre test experiment group (SD=4.01).

Table 2: Independent Samples Test for softball throw among control group and experiment group in case of pre-training

Levene's Test for Equality of Variances				t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Pre_CGEG	Equal variances assumed	.111	.740	-.077	118	.939	-.056
	Equal variances not assumed			-.077	117.907	.939	-.056

As a part of full filling assumption while performing independent sample t-test, Levene's Test of Equality of Variances was assessed. From the table 2, it can be postulated that the assumption is not violated or in other words it can be said that the assumption of homogeneity has been met. Significant result (p= 0.740 indicates p>0.05) variability of scores for both of the groups is similar. Significance value for Levene's test is greater than >0.05 so it suggest to use the first line in the table 4.2 with Equal variance assumed. However if significance value for Levene's test is lesser or equal to 0.05 (Sig. value < or =0 .05), it is suggested to use the second line in the table which says that Equal variance not assumed.

In same vein, t-score/t-test statistics from table 2 indicated that the larger the value of t, it suggest the lesser the possibility/probability that the results have been occurred by chance (t-score =0.077). To comment of difference between two groups (CG-EG), significance level (two tailed p-value) tells us the likelihood that our results have occurred by chance. The greater the value of p>0.05 indicate that it support the null hypothesis by supporting the fact the no change in the force of hand muscles in softball throw among control group and experiment group in case of pre-training. There is a support for our null hypothesis, here $t_{(df\ =118)} = 0.077$, p = 0.939>0.005).

Table 3: Group Statistics for softball throw among control group and experiment group in case of post-training

	Post_GROUP	N	Mean	Std. Deviation	Std. Error Mean
Post_CGEG	CONTROL GROUP	60	41.64	4.265	0.551
	EXPERIMENTGROUP	60	59.11	6.328	0.817

From the table 3, it can be revealed that mean score of the control group in case of softball throw is around 41.64 and mean score of participants with pre-test experiments group is around 59.11. It reveals major change in the force of hand muscles in softball throw among control group and experiment group in case of post-training. In addition, it can be seen that the standard deviation for post-test control group (SD=4.26) is quite less to standard deviation of post-test experiment group (SD=6.32).

Table 4: Independent Samples Test for Softball throw among control group and experiment group in case of post-training

Levene's Test for Equality of Variances				t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Post_CGEG	Equal variances assumed	9.076	0.003	-17.739	118	0.000	-17.476
	Equal variances not assumed			-17.739	103.435	0.000	-17.476

As a part of full filling assumption while performing independent sample t-test, Levene's Test of Equality of Variances was assessed. From the table 4, it can be postulated that the assumption is violated or in other words it can be said that the assumption of homogeneity has not been met. Significant result (p= 0.003 indicates p<0.05) variability of scores for both of the groups is not similar. Significance value for Levene's test is smaller than < 0.05 so it suggest to use the second line in the table 4.4 with Equal variance not assumed. However if significance value for Levene's test is greater or equal to 0.05 (Sig. value > or =0 .05), it is suggested to use the first line in the table which says that Equal variance assumed.

In same vein, t-score/t-test statistics from table 4 indicated that the larger the value of "t", it suggest the lesser the possibility/probability that the results have been occurred by chance (t-score =17.73). To comment of difference between two groups (CG-EG) in post, the significance level (two tailed p-value) tells us the likelihood that our results have not occurred by chance. The lesser value of p <0.05 indicate that it fail to accept/support the null hypothesis by supporting the fact the there is a change in the force of hand muscles in softball throw among control group and experiment group in case of post-training. There is a support for our hypothesis, here $t_{(118)}$ =17.73, p = 0.000<0.005).

To test relationship between before the intervention (Pre fitness training- pre-test experiment group) and after the intervention in a within participants design (Post fitness training/ post-test experiment group), paired-samples or also widely known as repeated measures t-test was used in the present study. The paired sample t-test is suitable when participants give data for each and every level (Pre-post) or condition of the independent variable in a within-participants design. The results of the paired sample t-test is presented in tables 5-6-7.

Table 5: Paired Samples Statistics for Softball throw among control group and experiment group in case of post-training

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre_EG	47.18	60	4.010	0.518
	Post_EG	59.11	60	6.328	0.817

From the table 5, it can be revealed that mean score of the participants in Pre-test experiment group is 47.18 and mean score of participants with post fitness training condition or in other words post-test experiment group is around 59.11. It reveals change in the force of hand muscles in softball throw among experiment group in case of pre-training and post-training. In addition, it can be seen that the standard deviation for pre-test experiment group (SD=4.01) is quite less to standard deviation of post-test experiment group (SD=6.32).

Table 6: Paired Samples Correlations for Softball throw among control group and experiment group in case of post-training

		N	Correlation	Sig.
Pair 1	Pre_EG & Post_EG	60	0.554	0.000

From the table 6, it can be revealed that there is good co-relation between pre test experiment group and post test experiment group (Correlation value is 0.554 and Significant value p<0.136).

Table 7: Paired Samples Test for Softball throw among control group and experiment group in case of post-training

		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	Pre_EG - Post_EG	-11.935	5.292	0.683	-17.469	59	0.000

In same vein, t-score/t-test statistics from table 7 indicated that the larger the value of "t", it suggest the lesser the possibility/probability that the results have been occurred by chance (t-score =17.46). To comment on force of hand muscles in softball throw among experiment group in case of pre-training and post-training, significant value of paired sample t-test in Table 7 reveled that there is a lesser value of p=0.000. The lesser value of p <0.05 indicate that it fail to accept/support the null hypothesis by supporting the fact the there is a difference in force of hand muscles in softball throw among experiment group in case of pre-training and post-training. There is a support for our hypothesis, here t(df-59)=17.46, p = 0.000<0.005).

Hypotheses testing for 12 minute Cooper Test

Table 8: Group Statistics for Copper run test among control group and experiment group in case of pre-training

	Pre_GROUP	N	Mean	Std. Deviation	Std. Error Mean
Pre_CGEG	CONTROL GROUP	60	2252.50	260.935	33.687
	EXPERIMENT GROUP	60	2246.67	264.874	34.195

From the table 8, it can be revealed that mean score of the participants in control group is around 2252.50 and mean score of participants with pre fitness training condition is around 2246.67. It reveals the no change among two groups (Pre-test CG and Pre-test EG). In addition, it can be seen that the standard deviation for pre-test control group (SD=260.93) is quite similar to standard deviation of pre-test experiment group (SD=264.87).

Table 9: Independent Samples Test for Copper run test among control group and experiment group in case of pre-training

Levene's Test for Equality of Variances				t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Pre_CGEG	Equal variances assumed	.055	0.815	0.122	118	0.903	5.833	48.001
	Equal variances not assumed			0.122	117.974	0.903	5.833	48.001

As a part of full filling assumption while performing independent sample t-test, Levene's Test of Equality of Variances was assessed. From the table 9, it can be postulated that the assumption is not violated or in other words it can be said that the assumption of homogeneity has been met. Significant result (p= 0.815 indicates p>0.05) variability of scores for both of the groups is similar. Significance value for Levene's test is greater than >0.05 so it suggest to use the first line in the table 9 with equal variance assumed. However if significance value for Levene's test is lesser or equal to 0.05 (Sig. value < or =0 .05), it is suggested to use the second line in the table which says that Equal variance not assumed.

In same vein, t-score/t-test statistics from table 9 indicated that the larger the value of t, it suggest the lesser the possibility/probability that the results have been occurred by chance (t-score =0.122). To comment of difference between two groups (CG-EG), The significance level (two tailed p-value) tells us the likelihood that our results have occurred by chance. The greater the value of p >0.05 indicate that it support the null hypothesis by supporting the fact the there is a change in the aerobic endurance in 12 minute copper run test among control group and experiment group in case of pre-training. There is support for our hypothesis, here t (df-118) = 0.122, p = 0.903>0.005).

Table 10: Group Statistics for copper run test among control group and experiment group in case of post-training

	Post_GROUP	N	Mean	Std. Deviation	Std. Error Mean
Post_CGEG	CONTROL GROUP	60	2125.00	232.434	30.007
	EXPERIMENT GROUP	60	2704.67	246.208	31.785

From the table 10, it can be revealed that mean score of the participants in post-test control group is around 2125.00 and mean score of participants with post-test experiment is around 2704.67. It reveals the major change among two groups (post-test CG and post-test EG). In addition, it can be seen that the standard deviation for post-test control group (SD=232.43) is quite lesser to standard deviation of post-test experiment group (SD=246.208).

Table 11: Independent Samples Test for copper run test among control group and experiment group in case of post-training

Levene's Test for Equality of Variances				t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Post_CGEG	Equal variances assumed	.375	0.542	-13.261	118	0.000	-579.667	43.712
	Equal variances not assumed			-13.261	117.611	0.000	-579.667	43.712

As a part of full filling assumption while performing independent sample t-test, Levene's Test of Equality of Variances was assessed. From the table 11, it can be postulated that the assumption is not violated or in other words it can be said that the assumption of homogeneity has been met. Non-significant result (p= 0.542 indicates p>0.05) variability of scores for both of the groups is similar. Significance value for Levene's test is greater than > 0.05 so it suggest to use the first line in the table 11 with Equal variance assumed. However if significance value for Levene's test is lesser or equal to 0.05 (Sig. value < or =0 .05), it is suggested to use the second line in the table which says that Equal variance not assumed.

In same vein, t-score/t-test statistics from table 11 indicated that the larger the value of "t", it suggest the lesser the possibility/probability that the results have been occurred by chance (t-score =13.26). To comment of difference between two groups (CG-EG) in post, the significance level (two tailed p-value) tells us the likelihood that our results have not occurred by chance. The lesser value of p <0.05 indicate that it fail to accept/support the null hypothesis by supporting the fact the there is change in the aerobic endurance in 12 minute copper run test among control group and experiment group in case of post-training. There is a support for our hypothesis, here t(118)=13.26, p = 0.000<0.005).

To test relationship between before the intervention (Pre fitness training- pre test experiment group) and after the intervention in a within participants design (Post fitness training- post test experiment group), paired-samples or also widely known as repeated measures t-test was used in the present study. The paired sample t-test is suitable when participants gives data for each and every level (Pre-post) or condition of the independent variable in a within-participants design. The results of the paired sample t-test is presented in tables 12-13-14.

Table 12: Paired Samples Statistics for 12 minute copper run test among experiment group in case of pre-training and post-training

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre_EG	2246.67	60	264.874	34.195
	Post_EG	2704.67	60	246.208	31.785

From the table 12, it can be revealed that mean score of the participants in Pre-test experiment group 2246.67 and mean score of post-test experiment group is around 2704.67. It reveals the more change in aerobic endurance in 12 minute copper run test among experiment group in case of pre-training and post-training. In addition, it can be seen that the standard deviation for pre-test experiment group (SD=264.87) is quite higher to standard deviation of post-test experiment group (SD=246.20).

Table 13: Paired Samples Correlations for 12 minute copper run test among experiment group in case of pre-training and post-training

		N	Correlation	Sig.
Pair 1	Pre_EG & Post_EG	60	.376	.003

From the table 13, it can be revealed that there is no stronger co-relation between pre test experiment group and post-test experiment group (Correlation value is 0.376 and Significant value P>0.003).

Table 14: Paired Samples Test for 12 minute copper run test among experiment group in case of pre-training and post-training

		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	Pre_EG - Post_EG	-458.000	285.911	36.911	-12.408	59	0.000

In same vein, t-score/t-test statistics from table 14 indicated that the larger the value of "t", it suggest the lesser the possibility/probability that the results have been occurred by chance (t-score =12.40). To comment on change in the aerobic endurance in 12 minute copper run test among experiment group in case of pre-training and post-training, significant value of paired sample t-test in Table 4.14 reveled that there is a lesser value of p=0.000. The lesser value of p <0.05 indicate that it fail to accept/support the null hypothesis by supporting the fact the there is a change in the aerobic endurance in 12 minute copper run test among experiment group in case of pre-training and post-training. There is a support for our hypothesis, here t(df-59)=12.40, p = 0.000<0.005).

5. Discussion, implications and conclusion

The study aims to understand the effect of organized training on player's ability, line tolerance, and aggressiveness. Physical fitness training was taken as independent variable and measured through four training methods: (a) soft ball throw to measure power of upper body, (b) Cooper's 12 minute test to measure endurance. Experimental study was set to investigate the cause and effect relationship taking pre-test and post-test observations. Data was collected from 60 volunteers of 18 to 20 years of age and studying in various programs of Ganpat University, Mehsana, Gujarat.

The hypotheses of study were developed in line with study's objectives. To test hypotheses, independent samples t-test was performed to compare pre-test observations, and post-test observations while paired sample t-test was performed to compare pre-test and post-test observations. The results are shown in table 15.

Table 15: Summary of findings of hypothesis

Hypothesis	Result
difference in soft ball throw in pre observations in control group compared to pre observations in experimental group	Not supported
difference in soft ball throw in post observations in control group compared to post observations in experimental group	Supported
difference in soft ball throw in pre observations compared to post observations in experimental group participants	Supported
difference in 12 minute Cooper's test in pre observations in control group compared to pre observations in experimental group	Not supported
difference in 12 minute Cooper's test in post observations in control group compared to post observations in experimental group	Supported
difference in 12 minute Cooper's test in pre observations compared to post observations in experimental group participants	Supported

This study tested the hypothesis related to soft ball throw measured in meter in pre-observations among participants who have taken training and those who have not taken training. Findings showed that both participants are matched on their capacities and therefore the results of the study can be generalized with higher confidence. That simply means, both group participants are alike.

Further comparing soft ball throw performance measured in distance traveled by ball in meter in post observation in experimental group and control group, it was found that training effectively improve the performance of player in experimental group. Training related to long throw drills help players to understand the importance of release compared to the players who have not trained. Further, it was found that physical training creates positive effect on endurance among experimental group participants in 12 minute Cooper run test. There was no difference in control group for pre-observations and post-observations for run test.

Any study does not stand without limitations. In this study, only male students have been considered. If there is an individual difference, then also it is not being considered. If some endurance force affecting the test, then it is not being checked. There is no control over the encouragement from home or any other person for an inspiration. Training program was scheduled for eight weeks only. In this study, training will be utilized for the purpose of developing physical capability.

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