

CHAPTER IV

RESULTS AND DISCUSSIONS

4.1 OVERVIEW

In this chapter, the test of significance, level of significance, discussions on findings and discussion on hypothesis were presented. The purpose of the study was to find out the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on cognitive abilities, competitive anxiety, mood states, game skill variables and playing ability among intercollegiate hockey players.

Seventy five intercollegiate men hockey players from Chennai were randomly selected and their age ranged between 18 and 25 years. They were assigned into five equal groups. Each group consisted of fifteen subjects. Group one acted as Experimental Group I – (Progressive Muscular Relaxation), Group II acted as Experimental Group II – (Autogenic Training), Group III acted as Experimental Group III – (Meditation), Group IV acted as Experimental Group IV – (Mental Imagery) and Group V acted as Control Group.

Pre test was conducted for all the seventy five subjects on selected cognitive abilities namely concentration and attention, competitive anxiety variables namely cognitive anxiety, somatic anxiety and self-confidence and mood states variables namely tension, depression, anger, fatigue, vigor and confusion and game skill variables namely hit, flick and scoop. Playing ability was measured by subjective rating. This initial test scores formed as pre test scores of the subjects. Experimental Group I was exposed to progressive muscular relaxation training, experimental group II was exposed to autogenic

training, experimental group III was exposed to meditation, experimental group IV was exposed to mental imagery training and the control group was not exposed to any experimental training other than their regular hockey practice and daily activities. The duration of experimental period was 12 weeks. After the experimental treatment, all the seventy five subjects were measured on the selected cognitive abilities, competitive anxiety, mood states, game skill variables and playing ability. This final test scores formed as post test scores of the subjects. The pre test and post test scores were subjected to statistical analysis using Analysis of Covariance (ANCOVA) to find out the significance among the mean differences, whenever the 'F' ratio for adjusted test was found to be significant, scheffe's post hoc test was used. In all cases 0.05 level of significance was fixed to test hypotheses.

4.2 TEST OF SIGNIFICANCE

This is crucial portion to achieving the conclusion by examining the statistical hypotheses and either by accepting the null hypotheses or rejecting the same in accordance with the results obtained in relation to the level of significance fixed by the investigator.

The test was usually called the test of significance since the investigator tested whether the differences among five groups or within many groups scores were significant or not. In this study, if the obtained F-value were greater than the table value, the null hypotheses were rejected to the effect that there existed significant difference among the means of the groups compared, and if the obtained values were lesser than the required

values, then the null hypotheses were accepted to the effect that there existed no significant differences among the means of the groups under study.

4.3 LEVEL OF SIGNIFICANCE

The pre and post test scores of the experimental and control groups were analyzed to find out the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on cognitive abilities, competitive anxiety, mood states, game skill variables and playing ability among intercollegiate hockey players. The analysis of covariance (ANCOVA) was used to find out significant difference if any, between the groups on selected criterion variables separately. In all the cases, 0.05 level of confidence was fixed to test the significance which was considered as appropriate.

4.4 COMPUTATION OF ANALYSIS OF COVARIANCE AND POST HOC TEST

4.4.1 COGNITIVE ABILITIES

4.4.1.1 RESULTS OF CONCENTRATION WITHOUT DISTRACTION

The cognitive ability, concentration without distraction was measured through letter cancellation test. The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on concentration without distraction were presented in Table V.

TABLE V
COMPUTATION OF ANALYSIS OF COVARIANCE ON CONCENTRATION
WITHOUT DISTRACTION AMONG EXPERIMENTAL AND CONTROL
GROUPS OF INTERCOLLEGIATE HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	24.40	24.07	23.87	24.67	23.00	Between	24.40	4	6.10	1.43
						Within	299.60	70	4.28	
Post Test	29.07	29.07	34.67	31.33	22.80	Between	1128.85	4	282.21	81.99*
						Within	240.93	70	3.44	
Adjusted	29.15	29.08	34.64	31.47	22.60	Between	1134.13	4	283.53	85.38*
						Within	229.13	69	3.32	
Mean Gain	4.67	5.00	10.80	6.67	-0.20					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table V showed that the pre test mean scores of concentration without distraction of Progressive muscular relaxation group was 24.40, autogenic relaxation group was 24.07, meditation group was 23.87, mental imagery group was 24.67 and control group was 23.00. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and the mean values recorded were 29.07, 29.07, 34.67 and 31.33 respectively whereas the control group post test mean was 22.80.

The obtained F value on pre test scores 1.43 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference

between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 81.99 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 85.38 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on concentration without distraction.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table VI

TABLE VI
SCHEFFE'S POST HOC TEST ON CONCENTRATION WITHOUT
DISTRACTION

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
29.15	29.08	-	-	-	0.07	2.11
29.15	-	34.64	-	-	5.49*	2.11
29.15	-	-	31.47	-	2.32*	2.11
29.15	-	-	-	22.60	6.54*	2.11
-	29.08	34.64	-	-	5.56*	2.11
-	29.08	-	31.47	-	2.39*	2.11
-	29.08	-	-	22.60	6.48*	2.11
-	-	34.64	31.47	-	3.17*	2.11
-	-	34.64	-	22.60	12.04*	2.11
-	-	-	31.47	22.60	8.86*	2.11

*Significant

The multiple mean comparisons showed in Table VI proved that there existed significant differences between the adjusted means of progressive muscular relaxation with meditation, mental imagery and control group and autogenic group with meditation, mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference between progressive muscular relaxation and autogenic group.

The adjusted means on concentration without distraction were presented through bar diagram for better understanding of the results of this study in Figure-15.

4.4.1.1.1 DISCUSSIONS ON THE FINDINGS OF CONCENTRATION WITHOUT DISTRACTION

The results presented in Table V showed that obtained adjusted means on concentration without distraction among meditation group was 34.64 followed by mental imagery group with mean value of 31.47, progressive muscular relaxation group with mean value of 29.15, autogenic group with mean value of 29.08, and control group with mean value of 22.60. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.43, 81.99 and 85.38 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training improved concentration without distraction than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant difference between the experimental groups, clearly indicating that transcendental meditation training was significantly better than autogenic, progressive muscular relaxation and mental imagery trainings in improving the concentration without distraction of the inter collegiate hockey players.

The study conducted by Amit Kauts & Neelam Sharma (2012) proved that the concentration has improved due to yoga module which also includes meditation training.

4.4.1.2 RESULTS OF CONCENTRATION WITH DISTRACTION

The cognitive ability, concentration with distraction was measured through letter cancellation test. The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on concentration with distraction were presented in Table VII.

TABLE VII
COMPUTATION OF ANALYSIS OF COVARIANCE ON CONCENTRATION WITH DISTRACTION AMONG EXPERIMENTAL AND CONTROL GROUPS OF INTERCOLLEGIATE HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	19.87	19.47	19.27	17.07	18.33	Between	75.33	4	18.83	1.96
						Within	672.67	70	9.61	
Post Test	24.47	24.00	33.47	29.80	18.67	Between	1954.32	4	488.58	86.10*
						Within	397.20	70	5.67	
Adjusted	24.18	23.82	33.34	30.26	18.79	Between	1976.17	4	494.04	97.66*
						Within	349.07	69	5.06	
Mean Gain	4.60	4.53	14.20	12.73	0.33					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51
*Significant

Table VII showed that the pre test mean scores of concentration with distraction of Progressive muscular relaxation group was 19.87, autogenic relaxation group was 19.47, meditation group was 19.27, mental imagery group was 17.07 and control group was 18.33. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and the mean values recorded were

24.47, 24.00, 33.47 and 29.80 respectively whereas the control group post test mean was 18.67.

The obtained F value on pre test scores 1.96 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 86.10 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 97.66 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on concentration with distraction.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table VIII

TABLE VIII

SCHEFFE'S POST HOC TEST ON CONCENTRATION WITH DISTRACTION

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
24.18	23.82	-	-	-	0.36	2.60
24.18	-	33.34	-	-	9.16*	2.60
24.18	-	-	30.26	-	6.08*	2.60
24.18	-	-	-	18.79	5.39*	2.60
-	23.82	33.34	-	-	9.52*	2.60
-	23.82	-	30.26	-	6.44*	2.60
-	23.82	-	-	18.79	5.03*	2.60
-	-	33.34	30.26	-	3.08*	2.60
-	-	33.34	-	18.79	14.55*	2.60
-	-	-	30.26	18.79	11.47*	2.60

*Significant

The multiple mean comparisons showed in Table VIII proved that there existed significant differences between the adjusted means of progressive muscular relaxation with meditation, mental imagery and control group and autogenic group with meditation, mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference between progressive muscular relaxation and autogenic group.

The adjusted means on concentration with distraction were presented through bar diagram for better understanding of the results of this study in Figure-16.

4.4.1.2.1 DISCUSSIONS ON THE FINDINGS OF CONCENTRATION WITH DISTRACTION

The results presented in Table VII showed that obtained adjusted means on concentration with distraction among meditation group was 33.34 followed by mental imagery group with mean value of 30.26, progressive muscular relaxation group with mean value of 24.18, autogenic group with mean value of 23.82, and control group with mean value of 18.79. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.96, 86.10 and 97.66 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training improved concentration with distraction than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant difference between the experimental groups, clearly indicating that transcendental meditation training was significantly better than autogenic, progressive muscular relaxation and mental imagery training in improving the concentration with distraction of the inter collegiate hockey players.

The study conducted by Amit Kauts & Neelam Sharma (2012) proved that the concentration has improved due to yoga module which also includes meditation training.

4.4.2 ATTENTION

4.4.2.1 RESULTS OF ATTENTION (TMT A)

The cognitive ability, attention (TMT A) was measured through Trail Making test. The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on attention (TMT A) were presented in Table IX.

TABLE IX
COMPUTATION OF ANALYSIS OF COVARIANCE ON ATTENTION (TMT A)
AMONG EXPERIMENTAL AND CONTROL GROUPS OF
INTERCOLLEGIATE HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	48.35	48.29	51.94	46.80	49.44	Between	218.63	4.00	54.66	1.54
						Within	2480.51	70.00	35.44	
Post Test	37.66	38.08	26.49	31.66	47.82	Between	3832.70	4.00	958.18	37.06*
						Within	1810.03	70.00	25.86	
Adjusted	37.82	38.26	25.71	32.23	47.70	Between	3939.94	4.00	984.99	41.48*
						Within	1638.44	69.00	23.75	
Mean Gain	10.69	10.21	25.45	15.14	1.62					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table IX showed that the pre test mean scores of attention (TMT A) of Progressive muscular relaxation group was 48.35 seconds, autogenic relaxation group was 48.29 seconds, meditation group was 51.94 seconds, mental imagery group was 46.80 and control group was 49.44 seconds. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and the

mean values recorded were 37.66, 38.08, 26.49 and 31.36 in seconds respectively whereas the control group post test mean was 47.82.

The obtained F value on pre test scores 1.54 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 37.06 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 41.48 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on attention (TMT A).

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table X

TABLE X

SCHEFFE'S POST HOC TEST ON ATTENTION (TMT A)

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
37.82	38.26	-	-	-	0.43	5.64
37.82	-	25.71	-	-	12.12*	5.64
37.82	-	-	32.23	-	5.60	5.64
37.82	-	-	-	47.70	9.87*	5.64
-	38.26	25.71	-	-	12.55*	5.64
-	38.26	-	32.23	-	6.03*	5.64
-	38.26	-	-	47.70	9.44*	5.64
-	-	25.71	32.23	-	6.52*	5.64
-	-	25.71	-	47.70	21.99*	5.64
-	-	-	32.23	47.70	15.47*	5.64

*Significant

The multiple mean comparisons showed in Table X proved that there was significant differences exists between the adjusted means of progressive muscular relaxation with meditation and control group and autogenic group with meditation, mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference between progressive muscular relaxation with autogenic and mental imagery group.

The adjusted means on attention (TMT A) were presented through bar diagram for better understanding of the results of this study in Figure-17.

4.4.2.1.1 DISCUSSIONS ON THE FINDINGS OF ATTENTION (TMT A)

The results presented in Table IX showed that obtained adjusted means on attention (TMT A) among meditation group was 25.71 followed by mental imagery group with mean value of 32.23, progressive muscular relaxation group with mean value of 37.82, autogenic group with mean value of 38.26, and control group with mean value of 47.70. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.54, 37.06 and 41.48 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training has improved attention (TMT A) than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant difference between the experimental groups, clearly indicating that transcendental meditation training was significantly better than autogenic, progressive muscular relaxation and mental imagery training in improving the attention (TMT A) of the inter collegiate hockey players.

The study conducted by Zeidan et al. (2010) proved that the attention has improved due to meditation training.

4.4.2.2 RESULTS OF ATTENTION (TMT B)

The cognitive ability, attention (TMT B) was measured through Trail Making test. The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on attention (TMT B) were presented in Table XI.

TABLE XI
COMPUTATION OF ANALYSIS OF COVARIANCE ON ATTENTION (TMT B)
AMONG EXPERIMENTAL AND CONTROL GROUPS OF
INTERCOLLEGIATE HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	152.82	141.47	146.21	142.06	152.79	Between	1846.65	4	461.66	1.47
						Within	22008.83	70	314.41	
Post Test	90.53	90.71	70.97	80.48	148.94	Between	55907.21	4	13976.80	217.51*
						Within	4498.09	70	64.26	
Adjusted	90.62	90.62	70.96	80.41	149.03	Between	54563.34	4	13640.84	209.48*
						Within	4493.04	69	65.12	
Mean Gain	62.29	50.76	75.23	61.57	3.85					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table XI showed that the pre test mean scores of attention (TMT B) of Progressive muscular relaxation group was 152.82 seconds, autogenic relaxation group was 141.47 seconds, meditation group was 146.21 seconds, mental imagery group was 142.06 and control group was 152.79 seconds. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and

the mean values recorded were 90.53, 90.71, 70.97 and 80.48 in seconds respectively whereas the control group post test mean was 148.94.

The obtained F value on pre test scores 1.47 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 217.51 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 209.48 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on attention (TMT B).

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XII

TABLE XII
SCHEFFE'S POST HOC TEST ON ATTENTION (TMT B)

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
90.62	90.62	-	-	-	0.01	9.34
90.62	-	70.96	-	-	19.66*	9.34
90.62	-	-	80.41	-	10.21*	9.34
90.62	-	-	-	149.03	58.41*	9.34
-	90.62	70.96	-	-	19.66*	9.34
-	90.62	-	80.41	-	10.22*	9.34
-	90.62	-	-	149.03	58.40*	9.34
-	-	70.96	80.41	-	9.45*	9.34
-	-	70.96	-	149.03	78.07*	9.34
-	-	-	80.41	149.03	68.62*	9.34

*Significant

The multiple mean comparisons showed in Table XII proved that there was significant differences exists between the adjusted means of progressive muscular relaxation with meditation, mental imagery and control group and autogenic group with meditation, mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference between progressive muscular relaxation and autogenic group.

The adjusted means on attention (TMT B) were presented through bar diagram for better understanding of the results of this study in Figure-18.

4.4.2.2.1 DISCUSSIONS ON THE FINDINGS OF ATTENTION (TMT B)

The results presented in Table XI showed that obtained adjusted means on attention (TMT B) among meditation group was 70.96 followed by mental imagery group with mean value of 80.41, progressive muscular relaxation group with mean value of 90.62, autogenic group with mean value of 90.62, and control group with mean value of 149.03. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.47, 217.51 and 209.48 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training has improved attention (TMT B) than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant differences between the experimental groups, clearly indicating that transcendental meditation training was significantly better than autogenic, progressive muscular relaxation and mental imagery training in improving the attention (TMT B) of the inter collegiate hockey players.

The study conducted by Zeidan et al. (2010) proved that the attention has improved due to meditation training.

4.4.3 COMPETITIVE ANXIETY

4.4.3.1 RESULTS OF COGNITIVE ANXIETY

The cognitive anxiety was measured through Competitive state anxiety inventory-2 (CSAI - 2). The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on cognitive anxiety were presented in Table XIII.

TABLE XIII
COMPUTATION OF ANALYSIS OF COVARIANCE ON COGNITIVE ANXIETY AMONG EXPERIMENTAL AND CONTROL GROUPS OF INTERCOLLEGIATE HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	28.47	30.87	28.93	30.67	30.13	Between	67.92	4.00	16.98	1.65
						Within	721.47	70.00	10.31	
Post Test	16.87	17.00	18.07	22.13	30.53	Between	2007.39	4.00	501.85	57.58*
						Within	610.13	70.00	8.72	
Adjusted	16.76	17.09	17.99	22.20	30.56	Between	2007.73	4.00	501.93	57.22*
						Within	605.24	69.00	8.77	
Mean Gain	11.60	13.87	10.87	8.53	0.40					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table XIII showed that the pre test mean scores of cognitive anxiety of Progressive muscular relaxation group was 28.47, autogenic relaxation group was 30.87, meditation group was 28.93, mental imagery group was 30.67 and control group was 30.13. The post test means showed differences due to progressive muscular relaxation,

autogenic, meditation and mental imagery and the mean values recorded were 16.87, 17.00, 18.07 and 22.13 respectively whereas the control group post test mean was 30.53.

The obtained F value on pre test scores 1.65 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 57.58 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 57.22 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on cognitive anxiety.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XIV

TABLE XIV
SCHEFFE'S POST HOC TEST ON COGNITIVE ANXIETY

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
16.76	17.09	-	-	-	0.33	3.43
16.76	-	17.99	-	-	1.24	3.43
16.76	-	-	22.20	-	5.45*	3.43
16.76	-	-	-	30.56	13.80*	3.43
-	17.09	17.99	-	-	0.91	3.43
-	17.09	-	22.20	-	5.12*	3.43
-	17.09	-	-	30.56	13.47*	3.43
-	-	17.99	22.20	-	4.21*	3.43
-	-	17.99	-	30.56	12.57*	3.43
-	-	-	22.20	30.56	8.36*	3.43

*Significant

The multiple mean comparisons showed in Table XIV proved that there was significant differences exists between the adjusted means of progressive muscular relaxation with mental imagery and control group and autogenic group with mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference exists between progressive muscular relaxation with autogenic and meditation group and autogenic with meditation group.

The adjusted means on cognitive anxiety were presented through bar diagram for better understanding of the results of this study in Figure-19.

4.4.3.1.1 DISCUSSIONS ON THE FINDINGS OF COGNITIVE ANXIETY

The results presented in Table XIII showed that obtained adjusted means on cognitive anxiety among progressive muscular relaxation group was 16.76 followed by autogenic group with mean value of 17.09, meditation group with mean value of 17.99, mental imagery group with mean value of 22.20, and control group with mean value of 30.56. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.65, 57.58 and 57.22 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training has reduced cognitive anxiety than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant difference between the experimental groups, clearly indicating that progressive muscular relaxation, autogenic, meditation was significantly better than mental imagery training group in reducing the cognitive anxiety of the inter collegiate hockey players.

The study conducted by Tahereh Bagherpour et al. (2012) proved that there was reduction in cognitive anxiety due to progressive muscular relaxation and internal imagery training.

The study conducted by Vallimurugan, Swaminathan & Suresh Kumar. (2011) and Navaneethan & Soundararajan (2010) proved that there was an improvement in competitive anxiety (cognitive anxiety, somatic anxiety and self-confidence) due to Psychological Skills training (PST).

The study conducted by George Mamassis and George Doganis (2004) proved that there was an increase in the cognitive anxiety due to mental training program (MTP).

The study conducted by Shalini Hurgobin (2006) proved that there was a reduction anxiety due to Autogenic training (AT).

4.4.3.2 RESULTS OF SOMATIC ANXIETY

The somatic anxiety was measured through competitive state anxiety inventory – 2 (CSAI-2). The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on cognitive anxiety were presented in Table XV.

TABLE XV
COMPUTATION OF ANALYSIS OF COVARIANCE ON SOMATIC ANXIETY
AMONG EXPERIMENTAL AND CONTROL GROUPS OF
INTERCOLLEGIATE HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	30.87	32.47	29.87	30.47	30.73	Between	56.05	4	14.01	1.42
						Within	691.87	70	9.88	
Post Test	16.00	16.20	17.67	22.20	30.33	Between	2195.25	4	548.81	42.52*
						Within	903.47	70	12.91	
Adjusted	16.00	16.10	17.73	22.23	30.34	Between	2194.62	4	548.65	42.02*
						Within	900.93	69	13.06	
Mean Gain	14.87	16.27	12.20	8.27	0.40					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51
 *Significant

Table XV showed that the pre test mean scores of somatic anxiety of Progressive muscular relaxation group was 30.87, autogenic relaxation group was 32.4, meditation group was 29.87, mental imagery group was 30.47 and control group was 30.73. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and the mean values recorded were 16.00, 16.20, 17.67 and 22.20 respectively whereas the control group post test mean was 30.33.

The obtained F value on pre test scores 1.42 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 42.52 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 42.02 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on somatic anxiety.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XVI

TABLE XVI
SCHEFFE'S POST HOC TEST ON SOMATIC ANXIETY

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
16.00	16.10	-	-	-	0.10	4.18
16.00	-	17.73	-	-	1.73	4.18
16.00	-	-	22.23	-	6.22*	4.18
16.00	-	-	-	30.34	14.34*	4.18
-	16.10	17.73	-	-	1.62	4.18
-	16.10	-	22.23	-	6.12*	4.18
-	16.10	-	-	30.34	14.24*	4.18
-	-	17.73	22.23	-	4.50*	4.18
-	-	17.73	-	30.34	12.61*	4.18
-	-	-	22.23	30.34	8.12*	4.18

*Significant

The multiple mean comparisons showed in Table XVI proved that there was significant differences exists between the adjusted means of progressive muscular relaxation with mental imagery and control group and autogenic group with mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference exists between progressive muscular relaxation with autogenic and meditation group and autogenic with meditation group.

The adjusted means on somatic anxiety were presented through bar diagram for better understanding of the results of this study in Figure-20.

4.4.3.2.1 DISCUSSIONS ON THE FINDINGS OF SOMATIC ANXIETY

The results presented in Table XV showed that obtained adjusted means on cognitive anxiety among progressive muscular relaxation group was 16.00 followed by autogenic group with mean value of 16.10, meditation group with mean value of 17.73, mental imagery group with mean value of 22.23, and control group with mean value of 30.34. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.42, 42.52 and 42.02 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training has reduced somatic anxiety than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant difference between the experimental groups, clearly indicating that progressive muscular relaxation, autogenic, meditation was significantly better than mental imagery training group in reducing the somatic anxiety of the inter collegiate hockey players.

The study conducted by Tahereh Bagherpour et al. (2012) proved that there was reduction in somatic anxiety due to progressive muscular relaxation and internal imagery training.

The study conducted by Vallimurugan, Swaminathan & Suresh Kumar. (2011) and Navaneethan & Soundararajan (2010) proved that there was an improvement in competitive anxiety (cognitive anxiety, somatic anxiety and self-confidence) due to Psychological Skills training (PST).

The study conducted by George Mamassis and George Doganis (2004) proved that there was an improvement in the somatic anxiety due to mental training program (MTP).

The study conducted by Shalini Hurgobin (2006) proved that there was a reduction in anxiety due to Autogenic training (AT).

4.4.3.3 RESULTS OF SELF-CONFIDENCE

The Self-confidence was measured through Competitive state anxiety inventory – 2 (CSAI - 2). The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on cognitive anxiety were presented in Table XVII.

TABLE XVII
COMPUTATION OF ANALYSIS OF COVARIANCE ON SELF-CONFIDENCE
AMONG EXPERIMENTAL AND CONTROL GROUPS OF
INTERCOLLEGIATE HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	17.13	17.00	17.40	19.67	17.80	Between	70.93	4	17.73	1.44
						Within	863.07	70	12.33	
Post Test	32.87	32.47	32.33	27.93	18.00	Between	2397.39	4	599.35	75.77*
						Within	553.73	70	7.91	
Adjusted	32.96	32.58	32.39	27.68	18.00	Between	2413.04	4	603.26	77.39*
						Within	537.89	69	7.80	
Mean Gain	15.73	15.47	14.93	8.27	0.20					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table XVII showed that the pre test mean scores of Self-confidence of Progressive muscular relaxation group was 17.13, autogenic relaxation group was 17.00, meditation group was 17.40, mental imagery group was 19.67 and control group was 17.80. The post test means showed differences due to progressive muscular relaxation,

autogenic, meditation and mental imagery and the mean values recorded were 32.87, 32.47, 32.33 and 27.93 respectively whereas the control group post test mean was 18.00.

The obtained F value on pre test scores 1.44 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 75.77 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 77.39 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on Self-confidence.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XVIII

TABLE XVIII
SCHEFFE'S POST HOC TEST ON SELF-CONFIDENCE

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
32.96	32.58	-	-	-	0.38	3.23
32.96	-	32.39	-	-	0.57	3.23
32.96	-	-	27.68	-	5.28*	3.23
32.96	-	-	-	18.00	14.96*	3.23
-	32.58	32.39	-	-	0.19	3.23
-	32.58	-	27.68	-	4.89*	3.23
-	32.58	-	-	18.00	14.58*	3.23
-	-	32.39	27.68	-	4.71*	3.23
-	-	32.39	-	18.00	14.39*	3.23
-	-	-	27.68	18.00	9.68*	3.23

*Significant

The multiple mean comparisons showed in Table XVIII proved that there was significant differences exists between the adjusted means of progressive muscular relaxation with mental imagery and control group and autogenic group with mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference exists between progressive muscular relaxation with autogenic and meditation group and autogenic with meditation group.

The adjusted means on Self-confidence were presented through bar diagram for better understanding of the results of this study in Figure-21.

4.4.3.3.1 DISCUSSIONS ON THE FINDINGS OF SELF-CONFIDENCE

The results presented in Table XVII showed that obtained adjusted means on Self-confidence among progressive muscular relaxation group was 32.96 followed by autogenic group with mean value of 32.58, meditation group with mean value of 32.39, mental imagery group with mean value of 27.68, and control group with mean value of 18.00. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.44, 75.77 and 77.39 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training has increased the Self-confidence than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant difference between the experimental groups, clearly indicating that progressive muscular relaxation, autogenic, meditation was significantly better than mental imagery training group in increasing the Self-confidence of the inter collegiate hockey players.

The study conducted by Tahereh Bagherpour et al. (2012) proved that there was an improvement in self-confidence due to progressive muscular relaxation and internal imagery training.

The study conducted by Vallimurugan, Swaminathan & Suresh Kumar. (2011) and Navaneethan & Soundararajan (2010) proved that there was an improvement in competitive anxiety (cognitive anxiety, somatic anxiety and self-confidence) due to Psychological Skills training (PST).

The study conducted by George Mamassis and George Doganis (2004) proved that there was an increase in the self-confidence due to mental training program (MTP).

4.4. 4. MOOD STATES

4.4.4.1 RESULTS OF TENSION

The mood states, tension was measured through Brunel Mood Scale (BRUMS). The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on tension were presented in Table XIX.

TABLE XIX
COMPUTATION OF ANALYSIS OF COVARIANCE ON TENSION AMONG
EXPERIMENTAL AND CONTROL GROUPS OF INTERCOLLEGIATE
HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	70.07	68.47	72.27	68.40	68.07	Between	184.45	4	46.11	1.48
						Within	2186.13	70	31.23	
Post Test	49.20	49.73	56.73	62.73	69.60	Between	4553.20	4	1138.30	47.18*
						Within	1688.80	70	24.13	
Adjusted	49.13	49.84	56.42	62.85	69.75	Between	4576.78	4	1144.20	47.50*
						Within	1662.07	69	24.09	
Mean Gain	20.87	18.73	15.53	5.67	1.53					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table XIX showed that the pre test mean scores of tension of Progressive muscular relaxation group was 70.07, autogenic relaxation group was 68.47, meditation group was 72.27, mental imagery group was 68.40 and control group was 68.07. The post test means showed differences due to progressive muscular relaxation, autogenic,

meditation and mental imagery and the mean values recorded were 49.20, 49.73, 56.73 and 62.73 respectively whereas the control group post test mean was 69.60.

The obtained F value on pre test scores 1.48 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 47.18 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 47.50 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on tension.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XX

TABLE XX
SCHEFFE'S POST HOC TEST ON TENSION

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
49.13	49.84	-	-	-	0.71	5.68
49.13	-	56.42	-	-	7.29*	5.68
49.13	-	-	62.85	-	13.72*	5.68
49.13	-	-	-	69.75	20.62*	5.68
-	49.84	56.42	-	-	6.58*	5.68
-	49.84	-	62.85	-	13.01*	5.68
-	49.84	-	-	69.75	19.91*	5.68
-	-	56.42	62.85	-	6.43*	5.68
-	-	56.42	-	69.75	13.33*	5.68
-	-	-	62.85	69.75	6.90*	5.68

*Significant

The multiple mean comparisons showed in Table XX proved that there existed significant differences between the adjusted means of progressive muscular relaxation with meditation, mental imagery and control group and autogenic group with meditation, mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference between progressive muscular relaxation and autogenic group.

The adjusted means on tension were presented through bar diagram for better understanding of the results of this study in Figure-22.

4.4.4.1.1 DISCUSSIONS ON THE FINDINGS OF TENSION

The results presented in Table XIX showed that obtained adjusted means on tension among progressive muscular relaxation group was 49.13 followed by autogenic group with mean value of 49.84, meditation group with mean value of 56.42, mental imagery group with mean value of 62.85, and control group with mean value of 69.75. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.48, 47.18 and 47.50 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training has reduced tension than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant difference between the experimental groups, clearly indicating that progressive muscular relaxation and autogenic, groups were significantly better than meditation and mental imagery training group in reducing the tension of the inter collegiate hockey players.

The study conducted by Hairul Anuar Hashim & Hazwani Hanafi@Ahmad Yusof (2011) proved that there was reduction in tension due to progressive muscular relaxation and autogenic training.

4.4.4.2 RESULTS OF DEPRESSION

The mood states, depression was measured through Brunel Mood Scale (BRUMS). The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on depression were presented in Table XXI.

TABLE XXI
COMPUTATION OF ANALYSIS OF COVARIANCE ON DEPRESSION
AMONG EXPERIMENTAL AND CONTROL GROUPS OF
INTERCOLLEGIATE HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	80.80	84.13	85.60	81.20	85.00	Between	292.85	4	73.21	1.13
						Within	4518.13	70	64.54	
Post Test	54.93	55.13	55.40	66.47	84.53	Between	9899.81	4	2474.95	39.32*
						Within	4405.73	70	62.94	
Adjusted	54.36	55.31	55.90	65.99	84.90	Between	10043.40	4	2510.85	41.45*
						Within	4179.75	69	60.58	
Mean Gain	25.87	29.00	30.20	14.73	0.47					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table XXI showed that the pre test mean scores of depression of Progressive muscular relaxation group was 80.80, autogenic relaxation group was 84.13, meditation group was 85.60, mental imagery group was 81.20 and control group was 85.00. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and the mean values recorded were 54.93, 55.13, 55.40 and 66.47 respectively whereas the control group post test mean was 84.53.

The obtained F value on pre test scores 1.13 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 39.32 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 41.45 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on depression.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XXII

TABLE XXII
SCHEFFE'S POST HOC TEST ON DEPRESSION

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
54.36	55.31	-	-	-	0.95	9.01
54.36	-	55.90	-	-	1.54	9.01
54.36	-	-	65.99	-	11.62*	9.01
54.36	-	-	-	84.90	30.54*	9.01
-	55.31	55.90	-	-	0.59	9.01
-	55.31	-	65.99	-	10.68*	9.01
-	55.31	-	-	84.90	29.59*	9.01
-	-	55.90	65.99	-	10.08*	9.01
-	-	55.90	-	84.90	29.00*	9.01
-	-	-	65.99	84.90	18.92*	9.01

*Significant

The multiple mean comparisons showed in Table XXII proved that there was significant differences exists between the adjusted means of progressive muscular relaxation with mental imagery and control group and autogenic group with mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference exists between progressive muscular relaxation with autogenic and meditation group and autogenic with meditation group.

The adjusted means on depression were presented through bar diagram for better understanding of the results of this study in Figure-23.

4.4.4.2.1 DISCUSSIONS ON THE FINDINGS OF DEPRESSION

The results presented in Table XXI showed that obtained adjusted means on depression among progressive muscular relaxation group was 54.36 followed by autogenic group with mean value of 55.31, meditation group with mean value of 55.90, mental imagery group with mean value of 65.99, and control group with mean value of 84.90. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.13, 39.32 and 41.45 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training has reduced depression than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant difference between the experimental groups, clearly indicating that progressive muscular relaxation, autogenic and meditation groups were significantly better than mental imagery training in reducing depression of the inter collegiate hockey players.

The study conducted by Hairul Anuar Hashim & Hazwani Hanafi@Ahmad Yusof (2011) proved that there was reduction in depression due to progressive muscular relaxation and autogenic training.

4.4.4.3 RESULTS OF ANGER

The mood states, anger was measured through Brunel Mood Scale (BRUMS). The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on anger were presented in Table XXIII.

TABLE XXIII
COMPUTATION OF ANALYSIS OF COVARIANCE ON ANGER AMONG
EXPERIMENTAL AND CONTROL GROUPS OF INTERCOLLEGIATE
HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	80.20	80.53	80.07	80.47	83.93	Between	159.15	4	39.79	1.24
						Within	2241.73	70	32.02	
Post Test	58.80	58.93	59.07	67.67	82.87	Between	6535.33	4	1633.83	48.47*
						Within	2359.33	70	33.70	
Adjusted	58.89	58.99	59.17	67.73	82.57	Between	5963.22	4	1490.81	44.05*
						Within	2335.06	69	33.84	
Mean Gain	21.40	21.60	21.00	12.80	1.07					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51
*Significant

Table XXIII showed that the pre test mean scores of anger of Progressive muscular relaxation group was 80.20, autogenic relaxation group was 80.53, meditation group was 80.07, mental imagery group was 80.47 and control group was 83.93. The post test means showed differences due to progressive muscular relaxation, autogenic,

meditation and mental imagery and the mean values recorded were 58.80, 58.93, 59.07 and 67.67 respectively whereas the control group post test mean was 82.87.

The obtained F value on pre test scores 1.24 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as obtained F value 48.47 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 44.05 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on anger.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XXIV

TABLE XXIV
SCHEFFE'S POST HOC TEST ON ANGER

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
58.89	58.99	-	-	-	0.10	6.73
58.89	-	59.17	-	-	0.28	6.73
58.89	-	-	67.73	-	8.84*	6.73
58.89	-	-	-	82.57	23.68*	6.73
-	58.99	59.17	-	-	0.18	6.73
-	58.99	-	67.73	-	8.74*	6.73
-	58.99	-	-	82.57	23.58*	6.73
-	-	59.17	67.73	-	8.56*	6.73
-	-	59.17	-	82.57	23.40*	6.73
-	-	-	67.73	82.57	14.84*	6.73

*Significant

The multiple mean comparisons showed in Table XXIV proved that there was significant differences exists between the adjusted means of progressive muscular relaxation, autogenic and meditation with mental imagery and control group and mental imagery group with control group. There was no significant difference exists between progressive muscular relaxation with autogenic and meditation group and autogenic with meditation group.

The adjusted means on fatigue were presented through bar diagram for better understanding of the results of this study in Figure-24.

4.4.4.3.1 DISCUSSIONS ON THE FINDINGS OF ANGER

The results presented in Table XXIII showed that obtained adjusted means on anger among progressive muscular relaxation group was 58.89 followed by autogenic group with mean value of 58.99, meditation group with mean value of 59.17, mental imagery group with mean value of 67.73, and control group with mean value of 82.57. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.24, 48.47 and 44.05 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training has reduced anger than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant differences exist between the experimental groups, clearly indicating that progressive muscular relaxation, autogenic and meditation groups were significantly better than mental imagery training in reducing anger of the inter collegiate hockey players.

The study conducted by Thirumalaikumar (2003) proved that there was an improvement in the Anger Dimensions due to Physical Education Programme which also includes Progressive muscular relaxation training.

4.4.4.4 RESULTS OF VIGOR

The mood states, vigor was measured through Brunel Mood Scale (BRUMS). The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on vigor were presented in Table XXV.

TABLE XXV
COMPUTATION OF ANALYSIS OF COVARIANCE ON VIGOR AMONG
EXPERIMENTAL AND CONTROL GROUPS OF INTERCOLLEGIATE
HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	39.20	36.80	39.00	41.53	40.07	Between	178.85	4	44.71	1.09
						Within	2881.47	70	41.16	
Post Test	80.20	77.13	80.07	76.80	39.53	Between	18418.99	4	4604.75	154.88*
						Within	2081.20	70	29.73	
Adjusted	80.20	77.07	80.06	76.86	39.55	Between	18331.10	4	4582.77	152.07*
						Within	2079.39	69	30.14	
Mean Gain	41.00	40.33	41.07	35.27	0.53					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51
*Significant

Table XXV showed that the pre test mean scores of vigor of Progressive muscular relaxation group was 39.20, autogenic relaxation group was 36.80, meditation group was 39.00, mental imagery group was 41.53 and control group was 40.07. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and the mean values recorded were 80.20, 77.13, 80.07 and 76.80 respectively whereas the control group post test mean was 39.53.

The obtained F value on pre test scores 1.09 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 154.88 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 152.07 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on vigor.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XXVI

TABLE XXVI
SCHEFFE'S POST HOC TEST ON VIGOR

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
80.20	77.07	-	-	-	3.13	6.35
80.20	-	80.06	-	-	0.14	6.35
80.20	-	-	76.86	-	3.34	6.35
80.20	-	-	-	39.55	40.64*	6.35
-	77.07	80.06	-	-	2.99	6.35
-	77.07	-	76.86	-	0.21	6.35
-	77.07	-	-	39.55	37.52*	6.35
-	-	80.06	76.86	-	3.20	6.35
-	-	80.06	-	39.55	40.51*	6.35
-	-	-	76.86	39.55	37.30*	6.35

*Significant

The multiple mean comparisons showed in Table XXVI proved that there was significant differences exists between the adjusted means of progressive muscular relaxation, autogenic, meditation and mental imagery group with control group. There was no significant difference exists between progressive muscular relaxation, autogenic and meditation with mental imagery group and autogenic with progressive muscular relaxation and meditation group.

The adjusted means on vigor were presented through bar diagram for better understanding of the results of this study in Figure-25.

4.4.4.4.1 DISCUSSIONS ON THE FINDINGS OF VIGOR

The results presented in Table XXV showed that obtained adjusted means on vigor among progressive muscular relaxation group was 80.20 followed by meditation group with mean value of 80.06, autogenic group with mean value of 77.07, mental imagery group with mean value of 76.86, and control group with mean value of 39.55. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.09, 154.88 and 152.07 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training has increased vigor than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was no significant differences between the experimental groups in increasing the vigor of inter collegiate hockey players.

The study conducted by Lim and Balbir (2009) proved that there was an increase in vigor due to Psychological intervention strategies.

4.4.4.5 RESULTS OF FATIGUE

The mood states, fatigue was measured through Brunel Mood Scale (BRUMS). The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on fatigue were presented in Table XXVII.

TABLE XXVII
COMPUTATION OF ANALYSIS OF COVARIANCE ON FATIGUE AMONG
EXPERIMENTAL AND CONTROL GROUPS OF INTERCOLLEGIATE
HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	71.67	73.80	72.80	72.53	73.20	Between	37.73	4	9.43	1.06
						Within	620.27	70	8.86	
Post Test	51.00	51.07	51.73	61.07	72.20	Between	5184.99	4	1296.25	42.30*
						Within	2145.20	70	30.65	
Adjusted	50.80	51.24	51.73	61.02	72.27	Between	5203.10	4	1300.78	42.21*
						Within	2126.49	69	30.82	
Mean Gain	20.67	22.73	21.07	11.47	1.00					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table XXVII showed that the pre test mean scores of fatigue of Progressive muscular relaxation group was 71.67, autogenic relaxation group was 73.80, meditation group was 72.80, mental imagery group was 72.53 and control group was 73.20. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and the mean values recorded were 51.00, 51.07, 51.73 and 61.07 respectively whereas the control group post test mean was 72.20.

The obtained F value on pre test scores 1.06 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 42.30 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 42.21 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on fatigue.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XXVIII

TABLE XXVIII
SCHEFFE'S POST HOC TEST ON FATIGUE

Means					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
50.80	51.24	-	-	-	0.44	6.42
50.80	-	51.73	-	-	0.93	6.42
50.80	-	-	61.02	-	10.22*	6.42
50.80	-	-	-	72.27	21.47*	6.42
-	51.24	51.73	-	-	0.49	6.42
-	51.24	-	61.02	-	9.78*	6.42
-	51.24	-	-	72.27	21.03*	6.42
-	-	51.73	61.02	-	9.29*	6.42
-	-	51.73	-	72.27	20.54*	6.42
-	-	-	61.02	72.27	11.25*	6.42

*Significant

The multiple mean comparisons showed in Table XXVIII proved that there was significant differences exists between the adjusted means of progressive muscular relaxation, autogenic and meditation with mental imagery and control group and mental imagery group with control group. There was no significant difference exists between progressive muscular relaxation with autogenic and meditation group and autogenic with meditation group.

The adjusted means on fatigue were presented through bar diagram for better understanding of the results of this study in Figure-26.

4.4.4.5.1 DISCUSSIONS ON THE FINDINGS OF FATIGUE

The results presented in Table XXVII showed that obtained adjusted means on fatigue among progressive muscular relaxation group was 50.80 followed by autogenic group with mean value of 51.24, meditation group with mean value of 51.73, mental imagery group with mean value of 61.02, and control group with mean value of 72.27. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.06, 42.30 and 42.21 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of progressive muscular relaxation, autogenic, meditation and mental imagery training has reduced fatigue than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant differences exist between the experimental groups, clearly indicating that progressive muscular relaxation, autogenic and meditation training were significantly better than mental imagery training in reducing fatigue of the inter collegiate hockey players.

The study conducted by Hairul Anuar Hashim & Hazwani Hanafi@Ahmad Yusof (2011) proved that there was reduction in fatigue due to progressive muscular relaxation and autogenic training.

4.4.4.6 RESULTS OF CONFUSION

The mood states, confusion was measured through Brunel Mood Scale (BRUMS). The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on confusion were presented in Table XXIX.

TABLE XXIX
COMPUTATION OF ANALYSIS OF COVARIANCE ON CONFUSION AMONG
EXPERIMENTAL AND CONTROL GROUPS OF INTERCOLLEGIATE
HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	84.80	85.07	85.33	80.53	83.80	Between	233.55	4	58.39	1.47
						Within	2788.80	70	39.84	
Post Test	61.87	62.00	50.80	72.33	85.40	Between	10191.65	4	2547.91	37.03*
						Within	4817.07	70	68.82	
Adjusted	61.70	61.79	50.54	72.95	85.42	Between	10255.15	4	2563.79	37.44*
						Within	4724.85	69	68.48	
Mean Gain	22.93	23.07	34.53	8.20	1.60					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table XXIX showed that the pre test mean scores of confusion of Progressive muscular relaxation group was 84.80, autogenic relaxation group was 85.07, meditation group was 85.33, mental imagery group was 80.53 and control group was 83.80. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and the mean values recorded were 61.87, 62.00, 50.80 and 72.33 respectively whereas the control group post test mean was 85.40.

The obtained F value on pre test scores 1.47 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 37.03 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 37.44 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on confusion.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XXX

TABLE XXX
SCHEFFE'S POST HOC TEST ON CONFUSION

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
61.70	61.79	-	-	-	0.08	9.57
61.70	-	50.54	-	-	11.16*	9.57
61.70	-	-	72.95	-	11.24*	9.57
61.70	-	-	-	85.42	23.72*	9.57
-	61.79	50.54	-	-	11.25*	9.57
-	61.79	-	72.95	-	11.16*	9.57
-	61.79	-	-	85.42	23.63*	9.57
-	-	50.54	72.95	-	22.41*	9.57
-	-	50.54	-	85.42	34.88*	9.57
-	-	-	72.95	85.42	12.47*	9.57

*Significant

The multiple mean comparisons showed in Table XXX proved that there was significant differences exists between the adjusted means of progressive muscular relaxation with meditation, mental imagery and control group and autogenic group with meditation, mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference between progressive muscular relaxation and autogenic group.

The adjusted means on confusion were presented through bar diagram for better understanding of the results of this study in Figure-27.

4.4.4.6.1 DISCUSSIONS ON THE FINDINGS OF CONFUSION

The results presented in Table XXIX showed that obtained adjusted means on confusion among meditation group was 50.54 followed by progressive muscular relaxation group with mean value of 61.70, autogenic group with mean value of 61.79, mental imagery group with mean value of 72.95, and control group with mean value of 85.42. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.47, 37.03 and 37.44 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of meditation, progressive muscular relaxation, autogenic, and mental imagery training has reduced confusion than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant differences exist between the experimental groups, clearly indicating that meditation training was significantly better than mental imagery, autogenic and progressive muscular relaxation training in reducing confusion of the inter collegiate hockey players.

The study conducted by Hairul Anuar Hashim & Hazwani Hanafi@Ahmad Yusof (2011) proved that there was reduction in confusion due to progressive muscular relaxation and autogenic training.

4.4.5. GAME SKILLS

4.4.5.1 RESULTS OF HIT

The game skill variable, hit was measured through Munjal's Hockey Skill Test Battery. The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on hit were presented in Table XXXI.

TABLE XXXI
COMPUTATION OF ANALYSIS OF COVARIANCE ON HIT AMONG
EXPERIMENTAL AND CONTROL GROUPS OF INTERCOLLEGIATE
HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	4.20	4.60	4.27	4.27	3.47	Between	10.48	4	2.62	2.30
						Within	79.60	70	1.14	
Post Test	7.27	7.20	6.00	8.47	3.53	Between	209.95	4	52.49	55.00*
						Within	66.80	70	0.95	
Adjusted	7.25	7.05	5.96	8.43	3.78	Between	171.18	4	42.80	51.72*
						Within	57.09	69	0.83	
Mean Gain	3.07	2.60	1.73	4.20	0.07					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table XXXI showed that the pre test mean scores of hit of Progressive muscular relaxation group was 4.20, autogenic relaxation group was 4.60, meditation group was 4.27, mental imagery group was 4.27 and control group was 3.47. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and

mental imagery and the mean values recorded were 7.27, 7.20, 6.00 and 8.47 respectively whereas the control group post test mean was 3.53.

The obtained F value on pre test scores 2.30 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 55.00 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 51.72 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on hit.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XXXII

TABLE XXXII
SCHEFFE'S POST HOC TEST ON HIT

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
7.25	7.05	-	-	-	0.21	1.05
7.25	-	5.96	-	-	1.29*	1.05
7.25	-	-	8.43	-	1.18*	1.05
7.25	-	-	-	3.78	3.48*	1.05
-	7.05	5.96	-	-	1.08*	1.05
-	7.05	-	8.43	-	1.38*	1.05
-	7.05	-	-	3.78	3.27*	1.05
-	-	5.96	8.43	-	2.47*	1.05
-	-	5.96	-	3.78	2.19*	1.05
-	-	-	8.43	3.78	4.65*	1.05

*Significant

The multiple mean comparisons showed in Table XXXII proved that there was significant differences exists between the adjusted means of progressive muscular relaxation with meditation, mental imagery and control group and autogenic group with meditation, mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference between progressive muscular relaxation and autogenic group.

The adjusted means on hit were presented through bar diagram for better understanding of the results of this study in Figure-28.

4.4.5.1.1 DISCUSSIONS ON THE FINDINGS OF HIT

The results presented in Table XXXI showed that obtained adjusted means on hit among mental imagery group was 8.43 followed by progressive muscular relaxation group with mean value of 7.25, autogenic group with mean value of 7.05, meditation group with mean value of 5.96, and control group with mean value of 3.78. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 2.30, 55.00 and 51.72 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of mental imagery, progressive muscular relaxation, autogenic and meditation group has improved hitting than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant differences exist between the experimental groups, clearly indicating that mental imagery training was significantly better than meditation, autogenic and progressive muscular relaxation training in improving hitting skill of the inter collegiate hockey players.

The study conducted by Bakker & Kayser (1994) proved that there was an improvement in penalty stroke performance due to mental training programme.

The study conducted by Manoj Kumar (2012) and Jayachitra (2010) proved that there was an improvement in game skills (namely: passing, shooting, dribbling, and kicking) due to psych-up strategies.

4.4.5.2 RESULTS OF SCOOP

The game skill variable, scoop was measured through Munjal's Hockey Skill Test Battery. The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on scoop were presented in Table XXXIII.

TABLE XXXIII
COMPUTATION OF ANALYSIS OF COVARIANCE ON SCOOP AMONG
EXPERIMENTAL AND CONTROL GROUPS OF INTERCOLLEGIATE
HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	4.73	4.60	3.87	4.47	4.47	Between	6.61	4	1.65	1.94
						Within	59.73	70	0.85	
Post Test	7.53	7.47	5.93	8.53	4.53	Between	148.13	4	37.03	46.40*
						Within	55.87	70	0.80	
Adjusted	7.45	7.42	6.08	8.52	4.52	Between	140.75	4	35.19	46.75*
						Within	51.93	69	0.75	
Mean Gain	2.80	2.87	2.07	4.07	0.07					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51
*Significant

Table XXXIII showed that the pre test mean scores of scoop of Progressive muscular relaxation group was 4.73, autogenic relaxation group was 4.60, meditation

group was 3.87, mental imagery group was 4.47 and control group was 4.47. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and the mean values recorded were 7.53, 7.47, 5.93 and 8.53 respectively whereas the control group post test mean was 4.53.

The obtained F value on pre test scores 1.94 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 46.40 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 46.75 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on scoop.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XXXIV

TABLE XXXIV
SCHEFFE'S POST HOC TEST ON SCOOP

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
7.45	7.42	-	-	-	0.03	1.00
7.45	-	6.08	-	-	1.38*	1.00
7.45	-	-	8.52	-	1.07*	1.00
7.45	-	-	-	4.52	2.93*	1.00
-	7.42	6.08	-	-	1.35*	1.00
-	7.42	-	8.52	-	1.10*	1.00
-	7.42	-	-	4.52	2.90*	1.00
-	-	6.08	8.52	-	2.45*	1.00
-	-	6.08	-	4.52	1.55*	1.00
-	-	-	8.52	4.52	4.00*	1.00

*Significant

The multiple mean comparisons showed in Table XXXIV proved that there was significant differences exists between the adjusted means of progressive muscular relaxation with meditation, mental imagery and control group and autogenic group with meditation, mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference between progressive muscular relaxation and autogenic group.

The adjusted means on scoop were presented through bar diagram for better understanding of the results of this study in Figure-29.

4.4.5.2.1 DISCUSSIONS ON THE FINDINGS OF SCOOP

The results presented in Table XXXIII showed that obtained adjusted means on scoop among mental imagery group was 8.52 followed by progressive muscular relaxation group with mean value of 7.45, autogenic group with mean value of 7.42, meditation group with mean value of 6.08, and control group with mean value of 4.52. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.94, 46.40 and 46.75 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of mental imagery, progressive muscular relaxation, autogenic and meditation group has improved scooping than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant differences exist between the experimental groups, clearly indicating that mental imagery training was significantly better than meditation, autogenic and progressive muscular relaxation training in improving scooping skill of the inter collegiate hockey players.

The study conducted by Bakker & Kayser (1994) proved that there was an improvement in penalty stroke performance due to mental training programme.

The study conducted by Manoj Kumar (2012) and Jayachitra (2010) proved that there was an improvement in game skills (namely: passing, shooting, dribbling, and kicking) due to psych-up strategies.

4.4.5.3 RESULTS OF FLICK

The game skill variable, flick was measured through Munjal's Hockey Skill Test Battery. The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on flick were presented in Table XXXV.

TABLE XXXV
COMPUTATION OF ANALYSIS OF COVARIANCE ON FLICK AMONG
EXPERIMENTAL AND CONTROL GROUPS OF INTERCOLLEGIATE
HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	4.93	4.40	4.67	4.47	3.93	Between	8.19	4	2.05	2.22
						Within	64.53	70	0.92	
Post Test	7.60	7.33	5.87	8.80	4.07	Between	198.67	4	49.67	38.63*
						Within	90.00	70	1.29	
Adjusted	7.47	7.36	5.81	8.80	4.22	Between	178.96	4	44.74	36.42*
						Within	84.75	69	1.23	
Mean Gain	2.67	2.93	1.20	4.33	0.13					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table XXXV showed that the pre test mean scores of flick of Progressive muscular relaxation group was 4.93, autogenic relaxation group was 4.40, meditation group was 4.67, mental imagery group was 4.47 and control group was 3.93. The post

test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and the mean values recorded were 7.60, 7.33, 5.87 and 8.80 respectively whereas the control group post test mean was 4.07.

The obtained F value on pre test scores 2.22 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 38.63 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 36.42 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on flick.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XXXVI

TABLE XXXVI
SCHEFFE'S POST HOC TEST ON FLICK

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
7.47	7.36	-	-	-	0.11	1.28
7.47	-	5.81	-	-	1.66*	1.28
7.47	-	-	8.80	-	1.33*	1.28
7.47	-	-	-	4.22	3.25*	1.28
-	7.36	5.81	-	-	1.54*	1.28
-	7.36	-	8.80	-	1.45*	1.28
-	7.36	-	-	4.22	3.13*	1.28
-	-	5.81	8.80	-	2.99*	1.28
-	-	5.81	-	4.22	1.59*	1.28
-	-	-	8.80	4.22	4.58*	1.28

*Significant

The multiple mean comparisons showed in Table XXXVI proved that there was significant differences exists between the adjusted means of progressive muscular relaxation with meditation, mental imagery and control group and autogenic group with meditation, mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference between progressive muscular relaxation and autogenic group.

The adjusted means on flick were presented through bar diagram for better understanding of the results of this study in Figure-30.

4.4.5.3.1 DISCUSSIONS ON THE FINDINGS OF FLICK

The results presented in Table XXXV showed that obtained adjusted means on scoop among mental imagery group was 8.80 followed by progressive muscular relaxation group with mean value of 7.47, autogenic group with mean value of 7.36, meditation group with mean value of 5.81, and control group with mean value of 4.22. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 2.22, 38.63 and 36.42 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of mental imagery, progressive muscular relaxation, autogenic and meditation group has improved flicking than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant differences exist between the experimental groups, clearly indicating that mental imagery training was significantly better than meditation, autogenic and progressive muscular relaxation training in improving flicking skill of the inter collegiate hockey players.

The study conducted by Bakker & Kayser (1994) proved that there was an improvement in penalty stroke performance due to mental training programme.

The study conducted by Manoj Kumar (2012) and Jayachitra (2010) proved that there was an improvement in game skills (namely: passing, shooting, dribbling, and kicking) due to psych-up strategies.

4.4.6. PLAYING ABILITY

4.4.6.1. RESULTS OF PLAYING ABILITY

The playing ability was measured through subjective rating. The results of the effect of progressive muscular relaxation, autogenic, meditation and mental imagery training on playing ability were presented in Table XXXVII.

TABLE XXXVII
COMPUTATION OF ANALYSIS OF COVARIANCE ON PLAYING ABILITY
AMONG EXPERIMENTAL AND CONTROL GROUPS OF
INTERCOLLEGIATE HOCKEY PLAYERS

Test	Mean					Source of Variance	Sum of Square	Degrees of freedom	Mean Square	Obtained 'F'
	PMR	Autogenic	Meditation	Mental Imagery	Control Group					
Pre test	41.93	40.67	41.67	37.40	41.40	Between	206.99	4	51.75	1.88
						Within	1926.80	70	27.53	
Post Test	75.47	74.87	64.47	84.20	41.27	Between	16387.25	4	4096.81	202.45*
						Within	1416.53	70	20.24	
Adjusted	75.20	74.86	64.25	84.85	41.11	Between	16291.85	4	4072.96	210.06*
						Within	1337.86	69	19.39	
Mean Gain	33.53	34.20	22.80	46.80	0.13					

Table F-ratio at 0.05 level of confidence for 4 and 70 (df) = 2.50, 4 and 69 (df) = 2.51

*Significant

Table XXXVII showed that the pre test mean scores of playing ability of Progressive muscular relaxation group was 41.93, autogenic relaxation group was 40.67,

meditation group was 41.67, mental imagery group was 37.40 and control group was 41.40. The post test means showed differences due to progressive muscular relaxation, autogenic, meditation and mental imagery and the mean values recorded were 75.47, 74.87, 64.47 and 84.20 respectively whereas the control group post test mean was 41.27.

The obtained F value on pre test scores 1.88 was less than the required F value of 2.50 to be significant at 0.05 level. This proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 202.45 was greater than the required F value of 2.50. This proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean scores were calculated and subjected to statistical treatment. The obtained F value of 210.06 was greater than the required F value of 2.51. This proved that there was a significant difference among the means due to the experimental trainings on playing ability.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's post hoc test. The results were presented in Table XXXVIII

TABLE XXXVIII
SCHEFFE'S POST HOC TEST ON PLAYING ABILITY

Mean					Mean Difference	Required CI
PMR	Autogenic	Meditation	Mental Imagery	Control Group		
75.20	74.86	-	-	-	0.34	5.09
75.20	-	64.25	-	-	10.95*	5.09
75.20	-	-	84.85	-	9.65*	5.09
75.20	-	-	-	41.11	34.09*	5.09
-	74.86	64.25	-	-	10.60*	5.09
-	74.86	-	84.85	-	9.99*	5.09
-	74.86	-	-	41.11	33.75*	5.09
-	-	64.25	84.85	-	20.60*	5.09
-	-	64.25	-	41.11	23.15*	5.09
-	-	-	84.85	41.11	43.74*	5.09

*Significant

The multiple mean comparisons showed in Table XXXVIII proved that there was significant differences exists between the adjusted means of progressive muscular relaxation with meditation, mental imagery and control group and autogenic group with meditation, mental imagery and control group and meditation group with mental imagery and control group and mental imagery group with control group. There was no significant difference between progressive muscular relaxation and autogenic group.

The adjusted means on playing ability were presented through bar diagram for better understanding of the results of this study in Figure-31.

4.4.6.1.1 DISCUSSIONS ON THE FINDINGS OF PLAYING ABILITY

The results presented in Table XXXVII showed that obtained adjusted means on playing ability among mental imagery group was 84.85 followed by progressive muscular relaxation group with mean value of 75.20, autogenic group with mean value of 74.86, meditation group with mean value of 64.25, and control group with mean value of 41.11. The differences among pretest scores, post test scores and adjusted mean scores of the subjects were statistically treated using ANCOVA and the obtained F values were 1.88, 202.45 and 210.06 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table F value of 2.50 and 2.51.

The post hoc analysis through Scheffe's Confidence test proved that due to twelve weeks training of mental imagery, progressive muscular relaxation, autogenic and meditation group has improved playing ability than the control group and the differences were significant at 0.05 level. Further, the post hoc analysis showed that there was significant differences exist between the experimental groups, clearly indicating that mental imagery training was significantly better than meditation, autogenic and progressive muscular relaxation training in improving the playing ability of the inter collegiate hockey players.

The study conducted by Manoj Kumar (2012) and Jayachitra (2010) proved that there was an improvement in playing ability due to psych-up strategies.

4.5 DISCUSSION ON HYPOTHESES

The Investigator has formulated three important hypotheses to further progress his study.

1. The first hypothesis stated that the progressive muscular relaxation, autogenic, meditation and mental imagery trainings would have significant improvement on selected cognitive abilities namely concentration without distraction, concentration with distraction and attention (TMT A), attention (TMT B) among intercollegiate hockey players.

The results presented in table V, VI, VII, VIII, IX, X, XI and XII proved that the progressive muscular relaxation, autogenic, meditation and mental imagery trainings had a significant improvement on selected cognitive abilities namely concentration without distraction, concentration with distraction and attention (TMT A), attention (TMT B) among intercollegiate hockey players. Hence the formulated research hypothesis was accepted and the null hypothesis was rejected at 0.05 level.

2. The second hypothesis stated that the progressive muscular relaxation, autogenic, meditation and mental imagery trainings would have significant improvement on competitive anxiety namely cognitive anxiety, somatic anxiety and self-confidence among intercollegiate hockey players.

The results presented in table XIII, XIV, XV, XVI, XVII and XVIII proved that the progressive muscular relaxation, autogenic, meditation and mental imagery trainings had a significant improvement on competitive anxiety namely cognitive anxiety, somatic anxiety and Self-confidence among intercollegiate hockey players. Hence the formulated research hypothesis was accepted and the null hypothesis was rejected at 0.05 level.

3. The third hypothesis stated that the progressive muscular relaxation, autogenic, meditation and mental imagery trainings would have significant improvement on mood states namely tension, depression, anger, fatigue, vigor and confusion among intercollegiate hockey players.

The results presented in table XIX, XX, XXI, XXII, XXIII, XXIV, XXV, XXVI, XXVII, XXVIII, XXIX and XXX proved that the progressive muscular relaxation, autogenic, meditation and mental imagery trainings had a significant improvement on mood states namely tension, depression, anger, vigor, fatigue and confusion among intercollegiate hockey players. Hence the formulated research hypothesis was accepted and the null hypothesis was rejected at 0.05 level.

4. The fourth hypothesis stated that the progressive muscular relaxation, autogenic, meditation and mental imagery trainings would have significant improvement on game skill variables namely hit, scoop and flick among intercollegiate hockey players.

The results presented in table XXXI, XXXII, XXXIII, XXXIV, XXXV and XXXVI proved that the progressive muscular relaxation, autogenic, meditation and mental imagery trainings had a significant improvement on game skill variables namely hit, scoop and flick among intercollegiate hockey players. Hence the formulated research hypothesis was accepted and the null hypothesis was rejected at 0.05 level.

5. The fifth hypothesis stated that the progressive muscular relaxation, autogenic, meditation and mental imagery trainings would have significant improvement on playing ability among intercollegiate hockey players.

The result presented in table XXXVII and XXXVIII proved that the progressive muscular relaxation, autogenic, meditation and mental imagery trainings had a significant improvement on playing ability among intercollegiate hockey players. Hence the formulated research hypothesis was accepted and the null hypothesis was rejected at 0.05 level.