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Combined effect of breathing and meditation on mental toughness of tennis players

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Abstract

The present investigation was to find out the “combined effect of breathing and meditation on mental toughness of tennis players” with the help of psychological analysis. The study was delimited to the Tennis Players (30 male) of Harvest International School, Ludhiana who are further delimited to the age group of 15-19 (national participation). To determine the combined effect the criterion measure for this study was the scores which was obtained from the questionnaire of mental toughness as a standardized by Loher’s Psychological Performance Inventory as standardized by Loher. Areas of Mental Toughness Self-confidence, Negative energy control, Attention control, Visual imagery, Motivational level, Positive energy control and Attitude control. The significance was set at 0.05. Findings of the present study showed that there was significant difference found among all the areas of mental toughness.

Keywords: Breathing, meditation, tennis players

Introduction

Psychology, the youngest of the sport sciences, is concerned with the psychological factors that influences participation in sport and exercise and with the psychological effects derived from participation. Today many athletes and coaches look to sport psychology for a competitive edge by seeking psychological training programs in order to learn, among other things, ways to manage competitive stress, control concentration skills and increase communication skills and team harmony (Williams, 1993) [29]. Yoga is a 1500-year-old Indian philosophy that combines exercise, breathing, and meditation. It is a combination of physical of physical and mental discipline which makes the body stronger and healthier and the mind calmer and more controlled, helping towards self-realization. It emphasizes the relationship of body, the use of preparation, counter pose, sequences of linked postures and modification of postures to suit individual needs.

Yoga is the art of living. It has many aspects. Integrating the many aspects of ourselves and putting us in control of our mind; the effects are holistic, bringing about health awareness and a change of attitude towards ourselves and the world around us. We cannot practice yoga without changes happening within ourselves, becoming more aware that it influences our life and the way we live (Midland, 2012). The basic foundation of mental training is that mental skills can be learned and developed in a manner similar to physical skills. Some of the qualities of a well-prepared athlete are confidence, optimism, calmness under pressure, being mentally focussed in the present, and determination (Loehr 1983). Athletes can improve these qualities by using psychological techniques derived from five basic mental skills: relaxation, positive self-talk, energizations, visualization, and concentration (Bacon, 1989) [1].

Statement of the problem: The problem is entitled as, “combined effect of breathing and meditation on mental toughness of tennis players”.

Materials and Methods

Participants were 30 male tennis players (age – 15-18) Harvest International School, Ludhiana. Participants were at least national level participated.

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Design

A Total of 30 male subjects participated in the study. Subjects were tested on the basis of questionnaires and the purpose of the study was to find out the combined effect of meditation and breathing exercise and the mental toughness of the tennis players.

To determine the combined effect the criterion measure for this study was the scores which was obtained from the questionnaire of mental toughness as a standardized by Loher's Psychological Performance Inventory as standardized by Loher. Areas of Mental Toughness Self-confidence, Negative energy control, Attention control, Visual imagery, Motivational level, Positive energy control and Attitude control. The students were given training for 12 weeks and the process of evaluation was done in 3 stages pre training, during training and post training.

The data thus collected were put to statistical computerization for analysis, which have been presented in this chapter. Repeated one way ANOVA was employed as a measure for present data (SPSS 19 was used).

ANOVA Univariate Analysis

The analysis of variance for repeated measures is made on the same subjects.

To start with the discussion of findings of the total sample (N=30), investigated on the basis of pre, during and post test scores, their descriptive statistics and the univariate analysis on mental toughness has been presented and depicted in the following tables and figures.

Quantitative Analysis of subscales of mental toughness

In order to analyze the quantitative data obtained on psychological subscales of mental toughness, the descriptive analysis was applied to know its nature and Repeated measure one way ANOVA was applied to know the effect of intervention (training program on breathing and meditation) on the sub-scales of mental toughness in tennis players.

➤ **Repeated measure ANOVA on Negative Energy Control 'NEC' of Mental Toughness**

Table 1: Descriptive statistics on the variable of negative energy control of mental toughness

| | Mean | Std. Deviation | N |
|--------------------------------|-------|----------------|----|
| Pre Negative energy control | 17.43 | 5.302 | 30 |
| During Negative energy control | 24.30 | 2.614 | 30 |
| Post Negative energy control | 27.90 | 1.971 | 30 |

Table 1 show that the mean and standard deviation of negative energy control sub-scale of mental toughness of tennis players. The sub-scale of mental toughness i.e., negative energy control, the mean and standard deviation values are as follows Pre Negative energy control 17.43±5.30; During Negative energy control 24.30±2.61 and Post Negative energy control 27.90±1.97.

After applying sphericity test the estimates of Epsilon required for correcting the degree of freedom in testing the significance of F value. Mauchly's statistics follows approximately chi-square distribution; hence, the significance of the chi-square is tested for testing the sphericity.

Table 2: Mauchly's Test of Sphericity

| Measure: negative_energy_control | | | | | | | |
|----------------------------------|-------------|--------------------|----|--------------|----------------------|-------------|-------------|
| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | Df | Sig. | Epsilon ^b | | |
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Time | .562 | 16.156 | 2 | .000* | .695 | .719 | .500 |

a. Design: Intercept Within Subjects Design: Time

Bold number indicates that the effect is significant at 5% level.

It can be seen from this table that Mauchly's test is significant because p value associated with the chi-square statistics is 0.000 which is less than 0.05. Since Mauchly's test is significant, sphericity assumption violates in this illustration. This requires some corrections to be made in the degrees of

freedom of the treatment and the error components before testing the significance of F value. Here we can see that the epsilon is less than 0.75; hence, the Greenhouse-Geisser is .695 as shown in Table 2.

Table 3: F Table for testing significance of within-Subjects Effects.

| Measure: negative_energy_control | | | | | | | |
|----------------------------------|--------------------|-------------------------|--------|-------------|--------|------|---------------------|
| | Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| Time | Sphericity Assumed | 1696.622 | 2 | 848.311 | 64.173 | .000 | .689 |
| | Greenhouse-Geisser | 1696.622 | 1.390 | 1220.236 | 64.173 | .000 | .689 |
| | Huynh-Feldt | 1696.622 | 1.438 | 1179.564 | 64.173 | .000 | .689 |
| | Lower-bound | 1696.622 | 1.000 | 1696.622 | 64.173 | .000 | .689 |
| Error(Time) | Sphericity Assumed | 766.711 | 58 | 13.219 | | | |
| | Greenhouse-Geisser | 766.711 | 40.322 | 19.015 | | | |
| | Huynh-Feldt | 766.711 | 41.712 | 18.381 | | | |
| | Lower-bound | 766.711 | 29.000 | 26.438 | | | |

Table 3 shows that the sphericity exists, these degrees of freedom (1.390, 40.322) instead of (2, 58). In SPSS, the significance of F value differs in a situation where the

Greenhouse-Geisser correction is used (p=.000) and where sphericity is assumed (p=.000). Thus, the Greenhouse-Geisser correction simply changes the p and nothing more.

Table 4: Pairwise comparison of marginal means

| Measure: negative_energy_control | | | | | | |
|---|----------|----------|------------|-------------------|---|-------------|
| (I) Time | (J) Time | MD (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -6.867* | 1.077 | .000 | -9.604 | -4.130 |
| | 3 | -10.467* | 1.089 | .000 | -13.233 | -7.700 |
| 2 | 1 | 6.867* | 1.077 | .000 | 4.130 | 9.604 |
| | 3 | -3.600* | .546 | .000 | -4.987 | -2.213 |
| 3 | 1 | 10.467* | 1.089 | .000 | 7.700 | 13.233 |
| | 2 | 3.600* | .546 | .000 | 2.213 | 4.987 |
| Based on estimated marginal means | | | | | | |
| *. The mean difference is significant at the .05 level. | | | | | | |
| b. Adjustment for multiple comparisons: Bonferroni. | | | | | | |
| * 1-Pre-test; 2-During-test; 3-Post-test | | | | | | |

It can be seen from Table 4 negative energy control increases in general with passes of time during breathing and meditation program. However, there was significant increase till the last training session of breathing and meditation program in Negative energy control of mental toughness as their all p values were found significant at 0.01 level. In other

words, breathing and meditation program is effective program which could enhance the negative energy control.

➤ **Repeated measure ANOVA on Attention control ‘AC’ of Mental Toughness**

Table 5: Descriptive statistics on the variable of Attention control of mental toughness.

| | Mean | Std. Deviation | N |
|--------------------------|-------|----------------|----|
| Pre Attention Control | 17.37 | 4.38 | 30 |
| During Attention Control | 24.53 | 2.78 | 30 |
| Post Attention Control | 26.47 | 2.85 | 30 |

Shows that the mean and standard deviation of attention control sub-scale of mental toughness of tennis players. The sub-scale of mental toughness i.e., attention control, the mean and standard deviation values are as follows Pre attention control 17.37±4.38; During attention control 24.53±2.78 and Post attention control 26.47±2.85.

After applying sphericity test the estimates of Epsilon required for correcting the degree of freedom in testing the significance of F value. Mauchly’s statistics follows approximately chi-square distribution; hence, the significance of the chi-square is tested for testing the sphericity.

Table 6: Mauchly’s test of Sphericity

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | DF | Sig. | Epsilon ^b | | |
|------------------------|-------------|--------------------|----|------|----------------------|-------------|-------------|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Time | .882 | 3.521 | 2 | .172 | .894 | .949 | .500 |

a. Design: Intercept Within Subjects Design: Time

It can be seen from this table that mauchly’s test is insignificant because p value associated with the chi-square statistics is 0.172 which is more than 0.05. Since Mauchly’s test is insignificant, sphericity assumption does not violate in

this illustration. So, it does not require any corrections to be made in the degrees of freedom of the treatment. However, sphericity assumed was found significant in Table.

Table 7: F Table for testing significance of with-in-Subjects Effects

| | Source | Type III Sum of Squares | DF | Mean Square | F | Sig. | Partial Eta Squared |
|-------------|--------------------|-------------------------|--------|-------------|--------|------|---------------------|
| Time | Sphericity Assumed | 1379.089 | 2 | 689.544 | 56.843 | .000 | .662 |
| | Greenhouse-Geisser | 1379.089 | 1.789 | 771.025 | 56.843 | .000 | .662 |
| | Huynh-Feldt | 1379.089 | 1.898 | 726.431 | 56.843 | .000 | .662 |
| | Lower-bound | 1379.089 | 1.000 | 1379.089 | 56.843 | .000 | .662 |
| Error(Time) | Sphericity Assumed | 703.578 | 58 | 12.131 | | | |
| | Greenhouse-Geisser | 703.578 | 51.871 | 13.564 | | | |
| | Huynh-Feldt | 703.578 | 55.055 | 12.780 | | | |
| | Lower-bound | 703.578 | 29.000 | 24.261 | | | |

In Table 7, it is found that the F-value of training program was found significant at 0.01 level of significance. Which means that there is significant effect of training program on

attention control of mental toughness. Further the pairwise comparison will explain the least differences.

Table 8: Pairwise comparison of marginal means

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
|----------|----------|-----------------------|------------|-------------------|---|-------------|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -7.167* | .902 | .000* | -9.459 | -4.874 |
| | 3 | -9.100* | 1.023 | .000* | -11.700 | -6.500 |
| 2 | 1 | 7.167* | .902 | .000 | 4.874 | 9.459 |
| | 3 | -1.933* | .752 | .047* | -3.844 | -.023 |
| 3 | 1 | 9.100* | 1.023 | .000 | 6.500 | 11.700 |
| | 2 | 1.933* | .752 | .047 | .023 | 3.844 |

Based on estimated marginal means
 *. The mean difference is significant at the .05 level.
 b. Adjustment for multiple comparisons: Bonferroni.

Table 8 shows that mean difference of attention control among all the three testing time period are significant.

Repeated measure ANOVA on Self-confidence ‘SC’ of Mental Toughness

Table 9: Descriptive statistics on the variable of Self-confidence of mental toughness Descriptive Statistics

| | Mean | Std. Deviation | N |
|------------------------|-------|----------------|----|
| Pre_Self confidence | 20.60 | 4.28 | 30 |
| During_Self confidence | 25.03 | 2.42 | 30 |
| Post_Self confidence | 28.13 | 1.55 | 30 |

Table 9 shows that the mean and standard deviation of Self-confidence sub-scale of mental toughness of tennis players. The sub-scale of mental toughness i.e., Self-confidence, the mean and standard deviation values are as follows Pre Self-confidence 20.60±4.28; During Self-confidence 25.03±2.42 and Post Self-confidence 28.13±1.55.

After applying sphericity test the estimates of Epsilon required for correcting the degree of freedom in testing the significance of F value. Mauchly’s statistics follows approximately chi-square distribution; hence, the significance of the chi-square is tested for testing the sphericity.

Table 10: Mauchly's Test of Sphericity^a

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | DF | Sig. | Epsilon ^b | | |
|------------------------|-------------|--------------------|----|------|----------------------|-------------|-------------|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Time | .732 | 8.742 | 2 | .013 | .789 | .826 | .500 |

a. Design: Intercept Within Subjects Design: Time

It can be seen from this Table 10 that mauchly’s test is significant because p value associated with the chi-square statistics is 0.013 which is less than 0.05. Since Mauchly’s test is significant, sphericity assumption violates in this illustration. This requires some corrections to be made in the

degrees of freedom of the treatment and the error components before testing the significance of F value. Here we can see that the epsilon is less than 0.75; hence, the greenhouse-geisser is .789 as shown in Table 2.

Table 11: F Table for testing significance of with-in-Subjects Effects

| | Source | Type III Sum of Squares | DF | Mean Square | F | Sig. | Partial Eta Squared |
|-------------|--------------------|-------------------------|--------|-------------|--------|------|---------------------|
| Time | Sphericity Assumed | 860.156 | 2 | 430.078 | 48.482 | .000 | .626 |
| | Greenhouse-Geisser | 860.156 | 1.577 | 545.419 | 48.482 | .000 | .626 |
| | Huynh-Feldt | 860.156 | 1.652 | 520.572 | 48.482 | .000 | .626 |
| | Lower-bound | 860.156 | 1.000 | 860.156 | 48.482 | .000 | .626 |
| Error(Time) | Sphericity Assumed | 514.511 | 58 | 8.871 | | | |
| | Greenhouse-Geisser | 514.511 | 45.735 | 11.250 | | | |
| | Huynh-Feldt | 514.511 | 47.917 | 10.737 | | | |
| | Lower-bound | 514.511 | 29.000 | 17.742 | | | |

Table 11 shows that the sphericity exists, these degrees of freedom (1.577, 45.735) instead of (2, 58). In SPSS, the significance of F value differs in a situation where the

Greenhouse-Geisser correction is used (p=.000) and where sphericity is assumed (p=.000). Thus, the Greenhouse-Geisser correction simply changes the p and nothing more.

Table 12: Pairwise comparison of marginal means

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
|----------|----------|-----------------------|------------|-------------------|---|-------------|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -4.433* | .873 | .000* | -6.652 | -2.215 |
| | 3 | -7.533* | .852 | .000* | -9.698 | -5.369 |
| 2 | 1 | 4.433* | .873 | .000 | 2.215 | 6.652 |
| | 3 | -3.100* | .535 | .000* | -4.459 | -1.741 |
| 3 | 1 | 7.533* | .852 | .000 | 5.369 | 9.698 |
| | 2 | 3.100* | .535 | .000 | 1.741 | 4.459 |

Based on estimated marginal means
 *. The mean difference is significant at the .05 level.
 b. Adjustment for multiple comparisons: Bonferroni.

It can be seen from Table 12 Self-confidence increases in general with passes of time during breathing and meditation program. However, there was significant increase till the last training session of breathing and meditation program in Self-confidence of mental toughness as their all p values were found significant at 0.01 level. In other words, breathing and

meditation program is effective program which could enhance the Self-confidence.

➤ **Repeated measure ANOVA on Imagery control ‘IC’ of Mental Toughness**

Table 13: Descriptive statistics on the variable of Imagery control of mental toughness.

| | Mean | Std. Deviation | N |
|-------------------------|-------|----------------|----|
| Pre _Imagery Control | 21.07 | 4.53 | 30 |
| During _Imagery Control | 23.40 | 3.50 | 30 |
| Post _Imagery Control | 27.33 | 2.29 | 30 |

Table 13 shows that the mean and standard deviation of imagery control sub-scale of mental toughness of tennis players. The sub-scale of mental toughness i.e., imagery control, the mean and standard deviation values are as follows Pre imagery control 21.07±4.53; During imagery control 23.40±3.50 and Post imagery control 27.33±2.29.

After applying sphericity test the estimates of Epsilon required for correcting the degree of freedom in testing the significance of F value. Mauchly’s statistics follows approximately chi-square distribution; hence, the significance of the chi-square is tested for testing the sphericity.

Table 14: Mauchly's Test of Sphericity^a

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | DF | Sig. | Epsilon ^b | | |
|------------------------|-------------|--------------------|----|------|----------------------|-------------|-------------|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Time | .927 | 2.132 | 2 | .344 | .932 | .993 | .500 |

a. Design: Intercept
Within Subjects Design: Time

It can be seen from this table that Mauchly’s test is insignificant because p value associated with the chi-square statistics is 0.344 which is more than 0.05. Since Mauchly’s test is insignificant, sphericity assumption does not violate in

this illustration. This does not require any corrections to be made in the degrees of freedom of the treatment. However, sphericity assumed was found significant in Table.

Table 15: Pairwise comparison of marginal means

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
|----------|----------|-----------------------|------------|-------------------|---|-------------|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -2.333* | .915 | .049* | -4.659 | -.008 |
| | 3 | -6.267* | 1.045 | .000* | -8.922 | -3.612 |
| 2 | 1 | 2.333* | .915 | .049 | .008 | 4.659 |
| | 3 | -3.933* | .829 | .000* | -6.040 | -1.827 |
| 3 | 1 | 6.267* | 1.045 | .000 | 3.612 | 8.922 |
| | 2 | 3.933* | .829 | .000 | 1.827 | 6.040 |

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Bonferroni.

It can be seen from Table 15 imagery control increases in general with passes of time during breathing and meditation program. However, there was significant increase till the last training session of breathing and meditation program in imagery control of mental toughness as their all p values were found significant at 0.01 level. In other words, breathing and

meditation program is effective program which could enhance the imagery control.

Repeated measure ANOVA on Motivational Level ‘ML’ of Mental Toughness

Table 16: Descriptive statistics on the variable of Motivational level of mental toughness.

| Descriptive Statistics | | | |
|----------------------------|-------|----------------|----|
| | Mean | Std. Deviation | N |
| Pre _Motivational Level | 23.43 | 4.36 | 30 |
| During _Motivational Level | 23.20 | 4.23 | 30 |
| Post _Motivational Level | 27.93 | 1.77 | 30 |

Table 16 shows that the mean and standard deviation of motivational level sub-scale of mental toughness of tennis players. The sub-scale of mental toughness i.e., motivational level, the mean and standard deviation values are as follows Pre motivational level 23.43±4.36; During motivational level 23.20±4.23 and Post motivational level 27.93±1.77.

After applying sphericity test the estimates of Epsilon required for correcting the degree of freedom in testing the significance of F value. Mauchly’s statistics follows approximately chi-square distribution; hence, the significance of the chi-square is tested for testing the sphericity.

Table 17: Mauchly's Test of Sphericity^a

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | Df | Sig. | Epsilon ^b | | |
|------------------------|-------------|--------------------|----|------|----------------------|-------------|-------------|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Time | .863 | 4.116 | 2 | .128 | .880 | .932 | .500 |

a. Design: Intercept
Within Subjects Design: Time

It can be seen from this Table 17 that mauchly's test is insignificant because p value associated with the chi-square statistics is 0.128 which is more than 0.05. Since Mauchly's test is insignificant, sphericity assumption does not violate in

this illustration. This does not require any corrections to be made in the degrees of freedom of the treatment. However, sphericity assumed was found significant in Table.

Table 18: Pairwise comparison of marginal means

| Measure: Motivational_level | | | | | | |
|-----------------------------|----------|-----------------------|------------|-------------------|---|-------------|
| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | .233 | .996 | 1.000 | -2.298 | 2.765 |
| | 3 | -4.500* | .782 | .000* | -6.486 | -2.514 |
| 2 | 1 | -.233 | .996 | 1.000 | -2.765 | 2.298 |
| | 3 | -4.733* | .756 | .000* | -6.655 | -2.811 |
| 3 | 1 | 4.500* | .782 | .000 | 2.514 | 6.486 |
| | 2 | 4.733* | .756 | .000 | 2.811 | 6.655 |

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
b. Adjustment for multiple comparisons: Bonferroni.

It can be seen form Table 18 motivational level increases in general with passes of time during breathing and meditation program. However, there was significant increase till the last training session of breathing and meditation program in motivational level of mental toughness as their all p values

were found significant at 0.01 level. In other words, breathing and meditation program is effective program which could enhance the motivational level. Repeated measure ANOVA on Positive control 'PC' of Mental Toughness

Table 19: Descriptive statistics on the variable on Positive control of mental toughness.

| Descriptive Statistics | | | |
|-------------------------|-------|----------------|----|
| | Mean | Std. Deviation | N |
| Pre_Positive Control | 22.46 | 3.36 | 30 |
| During_Positive Control | 22.83 | 3.36 | 30 |
| Post_Positive Control | 27.83 | 2.18 | 30 |

Table 19 shows that the mean and standard deviation of positive control sub-scale of mental toughness of tennis players. The sub-scale of mental toughness i.e., positive control, the mean and standard deviation values are as follows Pre positive control 22.46±3.36; During positive control 22.83±3.36 and Post positive control 27.83±2.18.

After applying sphericity test the estimates of Epsilon required for correcting the degree of freedom in testing the significance of F value. Mauchly's statistics follows approximately chi-square distribution; hence, the significance of the chi-square is tested for testing the sphericity.

Table 20: Mauchly's Test of Sphericity^a

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | DF | Sig. | Epsilon ^b | | |
|------------------------|-------------|--------------------|----|------|----------------------|-------------|-------------|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Time | .886 | 3.391 | 2 | .184 | .898 | .953 | .500 |

a. Design: Intercept
Within Subjects Design: Time

It can be seen from this Table 20 that mauchly's test is insignificant because p value associated with the chi-square statistics is 0.184 which is more than 0.05. Since Mauchly's test is insignificant, sphericity assumption does not violate in

this illustration. This does not require any corrections to be made in the degrees of freedom of the treatment. However, sphericity assumed was found significant in Table 21.

Table 21: Pair wise comparison of marginal means

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
|----------|----------|-----------------------|------------|-------------------|---|-------------|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -.367 | .904 | 1.000 | -2.664 | 1.930 |
| | 3 | -5.367* | .697 | .000 | -7.138 | -3.595 |
| 2 | 1 | .367 | .904 | 1.000 | -1.930 | 2.664 |
| | 3 | -5.000* | .730 | .000 | -6.856 | -3.144 |
| 3 | 1 | 5.367* | .697 | .000 | 3.595 | 7.138 |
| | 2 | 5.000* | .730 | .000 | 3.144 | 6.856 |

Based on estimated marginal means
 *. The mean difference is significant at the .05 level.
 b. Adjustment for multiple comparisons: Bonferroni.

It can be seen from Table 21 positive control increases in general with passes of time during breathing and meditation program. However, there was significant increase till the last training session of breathing and meditation program in positive control of mental toughness as their all p values were found significant at 0.01 level. In other words, breathing and

meditation program is effective program which could enhance the positive control. The performance of this program can also be seen from the Figure 6.

➤ **Repeated measure ANOVA on Attitude control ‘AT C’ of Mental Toughness**

Table 22: Descriptive statistics on the variable of Attitude control of mental toughness.

| Descriptive Statistics | | | |
|--------------------------|-------|----------------|----|
| | Mean | Std. Deviation | N |
| Pre _Attitude Control | 20.26 | 5.30 | 30 |
| During _Attitude Control | 24.13 | 3.12 | 30 |
| Post _Attitude Control | 28.20 | 2.18 | 30 |

Tables 22 shows that the mean and standard deviation of attitude control sub-scale of mental toughness of tennis players. The sub-scale of mental toughness i.e., attitude control, the mean and standard deviation values are as follows Pre attitude control 20.26±5.30; During attitude control 24.13±3.12 and Post attitude control 28.20±2.18.

After applying sphericity test the estimates of Epsilon required for correcting the degree of freedom in testing the significance of F value. Mauchly’s statistics follows approximately chi-square distribution; hence, the significance of the chi-square is tested for testing the sphericity.

Table 23: Mauchly's Test of Sphericity^a

| Within Subjects Effect | Mauchly's W | Approx. Chi-Square | DF | Sig. | Epsilon ^b | | |
|------------------------|-------------|--------------------|----|------|----------------------|-------------|-------------|
| | | | | | Greenhouse-Geisser | Huynh-Feldt | Lower-bound |
| Time | .742 | 8.344 | 2 | .015 | .795 | .834 | .500 |

a. Design: Intercept
 Within Subjects Design: Time

It can be seen from this Table 23 that mauchly’s test is significant because p value associated with the chi-square statistics is 0.015 which is less than 0.05. Since Mauchly’s test is significant, sphericity assumption violates in this illustration. This requires some corrections to be made in the

degrees of freedom of the treatment and the error components before testing the significance of F value. Here we can see that the epsilon is less than 0.75; hence, the greenhouse-geisser is .695 as shown in Table 24.

Table 24: F table for testing significance of within-subjects effects.

| Measure: Attitude_control | | | | | | | |
|---------------------------|--------------------|-------------------------|--------|-------------|--------|------|---------------------|
| | Source | Type III Sum of Squares | DF | Mean Square | F | Sig. | Partial Eta Squared |
| Time | Sphericity Assumed | 944.267 | 2 | 472.133 | 32.151 | .000 | .526 |
| | Greenhouse-Geisser | 944.267 | 1.590 | 593.803 | 32.151 | .000 | .526 |
| | Huynh-Feldt | 944.267 | 1.668 | 566.275 | 32.151 | .000 | .526 |
| | Lower-bound | 944.267 | 1.000 | 944.267 | 32.151 | .000 | .526 |
| Error(Time) | Sphericity Assumed | 851.733 | 58 | 14.685 | | | |
| | Greenhouse-Geisser | 851.733 | 46.116 | 18.469 | | | |
| | Huynh-Feldt | 851.733 | 48.358 | 17.613 | | | |
| | Lower-bound | 851.733 | 29.000 | 29.370 | | | |

Table 24 shows that the sphericity exists, these degrees of freedom (1.668, 48.358) instead of (2, 58). In SPSS, the significance of F value differs in a situation where the

Greenhouse-Geisser correction is used (p=.000) and where sphericity is assumed (p=.000). Thus, the Greenhouse-Geisser correction simply changes the p and nothing more.

Table 25: Pair wise comparison of means in each testing of Attitude control.

| (I) Time | (J) Time | Mean Difference (I-J) | Std. Error | Sig. ^b | 95% Confidence Interval for Difference ^b | |
|---|----------|-----------------------|------------|-------------------|---|-------------|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -3.867* | 1.098 | .004 | -6.657 | -1.076 |
| | 3 | -7.933* | 1.117 | .000 | -10.772 | -5.095 |
| 2 | 1 | 3.867* | 1.098 | .004 | 1.076 | 6.657 |
| | 3 | -4.067* | .695 | .000 | -5.832 | -2.302 |
| 3 | 1 | 7.933* | 1.117 | .000 | 5.095 | 10.772 |
| | 2 | 4.067* | .695 | .000 | 2.302 | 5.832 |
| Based on estimated marginal means | | | | | | |
| *. The mean difference is significant at the .05 level. | | | | | | |
| b. Adjustment for multiple comparisons: Bonferroni. | | | | | | |

It can be seen from Table 25 attitude control increases in general with passes of time during breathing and meditation program. However, there was significant increase till the last training session of breathing and meditation program in attitude control of mental toughness as their all p values were found significant at 0.01 level. In other words, breathing and meditation program is effective program which could enhance the attitude control. The performance of this program can also be seen from the Figure 7.

Discussion of findings

For the procedure for the study, in the samples for the study 30 male students of harvest International School, Ludhiana between the age group of 15-18 years with a mean and standard deviation values are as follows Pre Negative energy control 17.43+5.30; During Negative energy control 24.30+2.61 and Post Negative energy control 27.90+1.97.

Findings of the present study showed that there was significant difference found on all the sub-scales i.e. self-confidence, negative energy, attention control, visual and imagery control, motivation, positive energy, and attitude control of mental toughness in tennis players. In other words, tennis is the game where practicing mental tennis tips, and developing mental toughness for tennis, you will very likely lose to lesser players. Mental tennis tips can avail you gain the confidence, consistency, and concentration needed to win game after game (Develop Mental Toughness for Tennis, 2015).

Tennis champions reveal a key drawback associated with mental toughness. Elite court game players would like the flexibility to regulate their focus throughout high-stakes games, and through terribly crucial moments (Persaud and Furnham, 2015).

Tennis mental toughness relates to a player's mental game in tennis in competitive tennis matches. Tennis champions and pro players understand the essential ingredients behind mental toughness in tennis that make up a high performance tennis player (Develop Mental Toughness for Tennis, 2015).

Tennis players who systematically win do thus as a result of they are mentally powerful. That is, they need the power to: Effectively handle the pressure of competition; make a comeback from lost shots, double faults and lost tie-breakers; specialize in what's vital and block out the opponent's tries at inequity, the crowd, lousy court conditions and difficult weather; Avoid obtaining psyched out or intimidated; Maintain self-assurance and a positive perspective even once your back's to the wall (Goldberg, 2018).

The intervention was clearly effective in enhancing a basketball skill during games, and social validity measures were very positive. The need for further research in this area is discussed.

Stephen *et al.* 2007 [25] also had programme analysis with a

gaggle of young provincial rugby players discovered its effectiveness in up psychological skills, health and sport as assessed on a consistent live of psychological skills and as seasoned by players. Implications for additional analysis and implementation of the programme area unit mentioned with special regard to South Africa.

Zeidan *et al.* [30] Also supported the study that interventions were effective at up mood however solely transient meditation coaching reduced fatigue, anxiety, and hyperbolic attentiveness. Moreover, transient attentiveness coaching considerably improved visuo-spatial process, remembering, and government functions.

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