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Effect of progressive muscular relaxation technique and autogenic relaxation technique on pre competitive state anxiety and self-confidence in athletes

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ABSTRACT

Pre-test and Post-test control group design. Participants: 45 subjects were selected on the basis of their CSAI-2R score, they were randomly allocated to one of the three groups. Group 1 (progressive muscular relaxation) group 2 (autogenic relaxation) group 3 (control). Intervention: Progressive muscular relaxation technique and Autogenic relaxation technique for 15-20 minutes. Main outcome measures include somatic anxiety, cognitive anxiety, self-confidence. There was a significant reduction in somatic anxiety and cognitive anxiety and improved self-confidence found in both groups 1 and 2 than group 3 ($p < 0.05$) whereas no significant difference observed in group 1 and group 2. From the result of the study it was concluded that relaxation technique is an effective intervention for reducing pre competitive state anxiety and improving self-confidence in athletes. As both progressive muscular relaxation and autogenic relaxation technique were significantly effective in reducing competitive state anxiety and improving self-confidence than the control group.

Keywords— Cognitive, Somatic, Autogenic, CFA, PMR

1. INTRODUCTION

Sport for leisure can be both fun and thrilling but when competition sets in, it may no longer be so. With competition, the first thought that comes to mind is the pressure, tension, stress or anxiety. There can be tons of pressure in any sport, it can come from the expectations of the coach, friends, and supporters who expect you to win. It can also come from within a person, sometimes we can be very hard on ourselves. We push ourselves to excel and this further adds to the stresses that come with playing in the competitive sport.

Coakley (1994) define competition as “a social process that occurs when rewards are given to people on the basis of how their performance compares with the performance of other doing the same task or participating in the same event”.¹⁴

Today's sporting arena is highly competitive. Sports competition is well known for placing an extremely high demand on the athlete and that ever-increasing demand put the athlete in a stressful condition. Which cause the athlete to react in both physical (somatic) and psychological (cognitive) manner that can negatively affect their performance.^{27, 70, 78.} “Anxiety is a normal response for threat or to a psychologically stress and it is experienced occasionally by everyone it is a reaction by an individual to a stressful situation” (Spiel Berger 1972)⁷⁴. Anxiety detracts from one's overall psychological well-being and is defined as the surfacing of a negative form of cognition characterized by worry, self-doubt and apprehension⁵⁶. Researchers classify anxiety into two type trait anxiety and state anxiety. Trait anxiety is the characterized of our personality of general anxiety whereas state anxiety is our response to a particular situation, it is a temporary reaction (Spiel Berger 1972).⁷⁴

Pre-competitive state anxiety is the state anxiety that occurs prior to a competitive situation. It has been one of the most thoroughly examined topics in sport and performance psychology. This is mainly due to the perceived detrimental effect of anxiety on performance.

The relation between anxiety and sports performance has attracted much research attention over the past 20 years and

researchers have tried to clarify this relationship by advancing several models and theory. These include drive theory of “inverted U hypothesis” (Broadhurst, 1957), “Individual zone of optimal functioning” (Hanin, 1980) “Reversal theory” (Apter, 1982) “catastrophic model” (Hardy, 1990, 1996a) and “Multidimensional anxiety theory” (Marten et al. 1990).^{50,56,78}

There has been a large amount of research concerning the multidimensional aspect of anxiety (Jones, Swain and Cale 1990, Marten, Burton, Vealey and Smith 1990). This theory suggests that anxiety consists of two sub-component cognitive and somatic anxiety and they should influence performance differently. Cognitive anxiety is defined as the mental component of anxiety and in sport, it is commonly manifested by the negative expectation of performing a task and thus negative self-evaluation. According to Marten et al (1990), there is a negative linear relationship between cognitive anxiety and performance.^{47, 50, 56}

The somatic anxiety refer to the physiological element of the anxiety it is reflected in such response as rapid heart rate, shortness of breath, clammy hand, butterflies in the stomach and tense muscle (Gould and Krane 2002 Hardy 2001 Marten (1990) suggest that somatic anxiety has an inverted U shaped relationship with performance in a curvilinear fashion with lower and higher level of somatic anxiety being detrimental to performance.^{50, 56} Sheldon Hanton (2002)⁷⁰.

Caruso (1990) confirmed that state anxiety is multidimensional and its psychological and physiological component changed over time. Somatic anxiety tends to increase rapidly as the start of an event approach while cognitive anxiety increases more gradually.

A third subcomponent discussed by the Martens (1990) is the individual difference factor of self-confidence this encompasses the athlete’s global perception of confidence although not originally proposed as a sub-component of anxiety. But it has been found to account for a greater proportion of variance in performance than cognitive or somatic anxiety and has a positive linear relationship with performance^{50,56}. Tim Woodman and Lew Hardy (2003)⁷⁸ supported the relationship that is found between self-reported state anxiety and performance. They suggest that high anxiety level leads to poor athletic performance. Better performance has been attributed to either lower level of cognitive and somatic anxiety or higher level of self- confidence (Martens, Burton, Bump and Smith (1990) as cited in Sara Legion).⁶⁸

More recent finding has been revealed that other dimension of the competitive response, in addition to intensity and frequency, may also play an important role in influencing performance. In particular, the dimension of “direction” of an individual’ interpretation of thought and feeling (i.e. facilitative or debilitating) to performance has received considerable attention. The researcher had been concluded that anxiety level higher in an athlete who interpreted their anxiety as a debilitating as those who reported it as being facilitative.^{31, 47, 70}

A review of the sports psychology literature reveals that a wide variety of psychologically skill training or technique has been used with the athlete. most anxiety reduction and performance enhancement intervention include cognitive-somatic technique like Cognitive behaviors therapy, Thought control strategy such as Positive thinking and Cognitive restructuring, Goal setting, Mental imagery, Meditation, Cyclic meditation, Biofeedback, Yoga, Benson technique, Laura Mitchell’s, Applied relaxation, Diaphragmatic breathing exercise, Music therapy, Passive relaxation technique, Progressive muscular relaxation technique, Autogenic relaxation technique have all been employed effectively in sport psychology such intervention are generally aimed at helping athlete to control or manage their arousal, stress, and anxiety.^{11, 56, 47}

Gables (1990) used two computerized databases to review the research on physical intervention in sport. Based on 128 studies they concluded that most of the published work consists of anecdotal evidence or systemic description of the case study, not controlled experimentation. In line with this conclusion, Whelen (1991) reported over 100 empirical evaluation of psychological intervention in sport. Only 19 intervention concerned athlete in a competitive situation and Relaxation technique is a widely accepted intervention in sport.¹¹

A relaxation technique is the effective intervention for manage anxiety. A recent 10-year systematic review with Meta-analysis study showed consistent and significant efficacy of relaxation training in reducing anxiety.³³ The relaxation response is proposed to involve decrease arousal of the autonomic nervous system and the central nervous system and increase parasympathetic activity characterized by lower musculoskeletal and cardiovascular tone and altered neuroendocrine function.^{14, 37, 42, 79} It helps to promote rest, recovery and recuperation.²⁴ It has been suggested to increase concentration², enhance motor skill and improve the ability to handle arousal and stress^{24, 80}. It helps to establish of a set level of physical and mental arousal prior to warming up for competition. When player become relax they can make better attention and concentration towards the game and able to take a quicker decision as well as able to play more confidently at their topmost level.

According to review the literature of past 20 years there is an increase in the prevalence of competitive state anxiety in athletes, and it is highly accepted that the competitive state anxiety plays a major role in the performance of an athlete in competition. As the competition gets closer there is a gradual increase in the intensity and frequency of anxiety⁷⁰ athlete feels nervous, unease, and tense that all does the athlete to feel like choking under pressure which can affect their performance. Therefore many studies had suggested that there is need of an effective coping strategy to handle the pre-competitive anxiety for better performance.^{47, 50, 55, 70}

Autogenic relaxation and progressive muscular relaxation is widely accepted as an effective relaxation technique for reducing

competitive anxiety. They showed their effectiveness consistently in competitive sport and there considerable effect on reducing state anxiety is also proved.

2. METHOD

Subjects: 45 male athletes (15 Table tennis, 15 Badminton, 9 Karate, 6 Skating) with the mean age of 17.8±4.6 were selected for the study after fulfilling the all inclusion and exclusion criteria.

2.1 Inclusion criteria

- Athlete performs in competitive sport.
- An athlete who perceive their anxiety feeling as a debilitating (un-helpful) to their performance
- An athlete with somatic anxiety score between (12–24), cognitive score (10 –20) and self-confidence score (10–5) was included in the study.
- Athlete gave a written consent as a participant for study.

2.2 Exclusion criteria

Athlete took any medication or any specialized technique for controlling anxiety were excluded from the study

Subjects were randomly assigned to one of three groups. Group 1 received Progressive muscular relaxation technique (n=15), group 2 received Autogenic Relaxation Technique (n=15) and group 3 subjects form a control group (n=15).

2.3 Measure

Pre-competitive state anxiety and self-confidence were measured by using a revised version of competitive state anxiety inventory 2 (CSAI-2R). This is 17 items measure and has three subscales cognitive anxiety, somatic anxiety, and self-confidence. 7 items in somatic anxiety subscale and 5 items in each of the subscales of cognitive anxiety and self-confidence The 17-item revised CSAI-2 was subjected to a confirmatory factor analysis (CFA) using the validation data sample, resulting a good fit of the data to the model which comparative fit index was .95, not- normed fit index was .94 and the root mean squared error of approximation was .054 (Cox, Martens and Russell, 2003).

2.4 Protocol

1 hour prior to the competitive performance Subject were asked to fill the revised version of competitive state anxiety inventory 2 (CSAI 2R) on the basis of fulfillment of all inclusion and exclusion criteria subject were selected for the study and their CSAI 2 score consider as a pre-intervention data. Than subject were randomly assigned to one of three groups. Group (1) received Progressive muscular relaxation technique [PMR], group (2) received the Autogenic Relaxation Technique [AR], and group (3) was the control group. The subject of intervention group [PMR, AR] explained the procedure and effect of their respected intervention while the subject of the control group was kept blind about the purpose of the study. The subject of intervention group [PMR, AR] received relaxation technique in quiet and suitable place for 15 – 20 min. after that subject was returned back to the competitive environment. 30 min. prior to competitive performance subject was again asked to fill the CSAI 2R scale and score were collected as post-intervention data.

Dependent variables: somatic anxiety, cognitive anxiety, self-confidence

3. PROCEDURE

The selected place was quiet and well ventilated, with dim lighted and favorable for relaxation with no external noise or distraction.

Subject was asked to wear comfortable light clothing and asked to remove shoes, watches or any band if wear. Every subject received relaxation technique in a supine lying position.

All the procedures were properly explained to the subject, and they were asked to listen and follow the instruction carefully.

3.1 Progressive muscular relaxation technique

Progressive muscular relaxation is the systemic technique developed by Edmund Jacobson’s in (1938). It is a widely used the active procedure for aid relaxation and relieves tension.

The procedure involves, asking the subject to focus on a specific muscle group which is going to be tense than taking a deep breath and simultaneously tense that specific muscle group and feel the tension for 5 - 7 sec. which are guided by the therapist counting (1 to 5) followed by exhaling and simultaneously released the tension and feel the sense of relaxation for 10 – 15 sec.

Table 1: Instructions for progressive muscle relaxation training

Hand	Make a tight fist of left hand..... feel the Tension..... Relax and let hand hang loosely. Same for the right side.
Wrists	Bend left hand back hyper extending your Wrists.....feel the tension..... Relax. Same for the right side.
Upper arms	Tightly pull your left lower arm towards your upper arm and tense biceps muscle.....feel the tension.....Relax. Same for the right side.
Shoulders	Bring your both shoulders up toward your ears..... feel the tension.....Relax let your shoulders drop down.
Forehead	Wrinkle your forehead, raise your Eyebrows..... feel the tension..... Relax.
Eyes	Close your eyes tightly.....feel the tension..... Relax.
Jaws	Clench your jaws tightly.....feel the tension..... Relax.
Tongue	Press your tongue against the roof of Your mouth.....feel the tension..... Relax.

Mouth	Press your lips together tightlyfeel the tension Relax.
Neck and Jaws	Bend your head forward, pressing your Chin against your chest.....feel the tension Straighten and relax.
Chest	Take a deep breath and hold it for 5 Seconds...feel the tension.... slowly exhale and relax.
Abdomen	Tighten your stomach muscles.... feel the tension Relax.
Thighs	Stretch your right legs in front of you. Tighten Your thigh muscles.....feel the tension..... Relax. Same for the left side.
Hamstrings	Push your right heels down into the floor, tighten Your hamstring muscles.....feel the tension..... Relax. Same for the left side.
Calves	Point your toes toward your head..... feel the tension.....Relax. Same for the left side.
Feet	Curl your toes toward the bottom of your Feet..... feel the tension..... Relax. Same for the left side.

Autogenic relaxation technique Autogenic relaxation technique All the procedures were properly explained to the subject, and subjects were asked to listen and follow the instruction carefully.

The instructions are as follows:

1. Close your eyes imagine you are sitting in a peaceful place.
2. Take a slow deep breath and exhale slowly repeat for three times.
3. Concentrate on your arm and hands..... say and feel “My arm and hand are heavy” “My arm and hand are heavy” repeat for 5 times.
4. Concentrate on your leg and feet.....say and feel “My leg and feet are heavy” “My leg and feet are heavy” repeat for 5 times.
5. Concentrate on your arm and hands..... say and feel “My arm and hand are warm” “My arm and hand are warm” repeat for 5 times.
6. Concentrate on your leg and feet.....say and feel “My leg and feet are warm” “My leg and feet are warm” repeat for 5 times.
7. Concentrate on your heart beat and say “My heartbeat is calm and regular” “My heartbeat is calm and regular” repeat for 5 times.
8. Concentrate on your breath..... take a deep breath in..... feel the air drawn in from your nose and filling your lungs..... Slowly release the breath and say “My breathing is smooth and rhythmic”. “My breathing is smooth and rhythmic” repeat for 5 times.
9. Concentrate on your forehead..... Say and feel “ My forehead is cool” “ My forehead is cool” repeat for 5 times.
10. Now take a slow deep breath..... Slowly release the breath and say..... “My body feels calm and relaxed” “My body feel calm and relaxed” repeat for 3 times. stay quite for few mins. then slowly open your eye.

4. RESULTS

The data were analyzed using SPSS (version 15) in within-group comparison by using paired t-test results revealed that both PMR group and AR group showed a significant difference in pre-test post test mean value of somatic anxiety, cognitive anxiety, and self-confidence than the control group at $p < 0.05$ level of significance. (See table no. 2 for descriptive statistics). between group analysis by using one way ANOVA with Scheffe post hoc test results revealed that both the PMR and AR group were significantly different from the control group in posttest measure at $p < 0.05$ level of significance (see table no. 3 for descriptive statistics).

Table 2: Within group analysis: Group 1

		Group 1	Group 2	Group 3
Somatic anxiety:	Pretest	14.27±2	14.3±1.8	14±1.4
	Posttest	10±3.8*	8.8±3.3*	14.2±3.2
Cognitive anxiety:	Pretest	13±1.8	13±1.9	12.6±0.9
	Posttest	9±3.8*	8.3±3.3*	12.9±3.4
Self- confidence:	Pretest	5	5	5
	Posttest	8.6±4.1* 8.8±4.3*	5.2±1	8.6±4.1* 8.8±4.3*

*significant at $p < 0.05$

Data are expressed as Mean± S.D

Table 3: Within group analysis

		Group 1 vs. 2	Group 1 vs. 3	Group 2 vs. 3
Somatic anxiety:	Mean difference	1.13	-4.2	-5.3
	Scheffe sig.	0.67	0.008*	0.001*
Cognitive anxiety:	Mean difference	0.66	-3.93	-4.6
	Scheffe sig.	0.87	0.014*	0.003*
Self- confidence:	Mean difference	-0.2	3.33	3.53
	Scheffe sig.	0.98	0.04*	0.03*

*significant at $p < 0.05$ Mean diff. = mean difference

Scheffe sig. = Scheffe significance

5. DISCUSSION

The purpose of this study was to assess the effectiveness of PMR technique and AR technique on pre-competitive state anxiety and self-confidence in athletes.

The within-group analysis results revealed that there was a significant reduction in the competitive state anxiety and improved self-confidence in group 1 (somatic $t = 4.17$ $p < 0.001$, cognitive $t = 5.2$ $p < 0.00$, self-confidence $t = -3.39$ $p < 0.004$) and group 2 (somatic anxiety $t = 6.56$ $p < 0.00$, cognitive $t = 5.86$ $p < 0.00$, self-confidence $t = -3.37$ $p < 0.005$. and there was no significant difference found in pre-test and post-test measures of competitive state anxiety and self-confidence in group 3.

In between group analysis, the results revealed that there was a significantly greater reduction in competitive state anxiety and improved self-confidence in group 1 than the group 3. (Somatic $p < 0.008$, Cognitive $p < 0.014$, Self-confidence ($p < 0.43$).

These findings were consistent with previous research of David C. et al.¹⁸ they found that single session of PMR technique significantly reduced the snake-phobic behavior in adults. Result confirms the considerable effect of PMR technique on autonomic activity. This finding was similar with the finding of William H. et al.⁸⁴, who reported that brief relaxation training did not significantly affect either verbal report of anxiety or autonomic level, following training but did affect autonomic response in the anxiety condition. Similarly, Khanna et al.⁷ found that PMR technique does an effective reduction in pulse rate on the first day of treatment. Other studies also confirm the immediate effect of relaxation training on ANS activity (Thomas W. Vodde⁷⁹, Jan Falkowski³⁷, Karen S. Lucic⁴²). Between groups analysis results further revealed that there was a significantly greater reduction in competitive state anxiety and improved self-confidence in group 2 than the group 3. (somatic $p < 0.001$, cognitive $p < 0.003$), self-confidence ($p < 0.30$).

These findings consisted with the previous research of Peter E. Crocker et al.⁶¹ they found that single session AR training significantly reduced the induced state anxiety. He further revealed that more the level of anxiety, more powerful the relaxation effect.

In between group analysis of Group 1 and Group 2, findings revealed that both the group had significantly reduced competitive state anxiety and improved self-confidence. But there was no significant difference found between both the groups.

These findings support the previous finding of Rodney K. Miller et al.⁶⁵ who reported that 30 min. of PMR and AR training significantly reduced the state anxiety but there was no significant difference found between these two interventions. These findings also consistent with the previous finding of Gordan L. Paul et al.³⁰ they reported that both the intervention produced a significantly greater reduction in physiological response to stressful images than the control group.

The result of the study clearly indicated that relaxation technique has a significant effect on pre-competitive state anxiety. Both the techniques were found to be effective in reducing somatic and cognitive anxiety and improving self-confidence. Hence the first and second experimental hypothesis was proved. The relaxation response is proposed to involve decreased arousal of the autonomic nervous system and central nervous system, and increased parasympathetic activity, which does lowered musculoskeletal and cardiovascular tone and recovered normal neuroendocrine function.¹⁴ Cognitive theory had suggested that relaxation technique work on distraction hypothesis it can distract attention from anxiety-provoking thoughts and produce a "time-out" from cares and worries.¹⁴ although the mechanism by which relaxation might exert its influence is not fully understood.⁴⁷

As there is no significant difference found in the effectiveness of PMR and AR technique on reducing pre-competitive state anxiety and improving self-confidence. Both the techniques were reported to significantly effective in controlling the arousal of ANS and CNS system. Hence the third experimental hypothesis was rejected and the null hypothesis was accepted.

In this study, the effect of relaxation technique was explained to the Athlete prior to the relaxation session, which is found to be significantly helpful in reducing anxiety. Similar findings reported by W. Steward Agras et al.⁸⁷ they found that subject who receive instruction about immediate blood pressure lowering effect of PMR training showed significant lowering in blood pressure than who received the instruction of late effect of PMR training on blood pressure.

The findings of this study have laid the foundation for further experimentation to determine whether relaxation training is effective on reduction of pre-competitive state anxiety. The identification of the limitations of this study points the way to design modifications required in future research All the findings found in the study are up to 30 min prior to competition. (Sheldon Hanton²², Lew Hardy⁴⁷) reported that there was a gradual increase in cognitive anxiety and sharp increase in somatic anxiety as close to the competitive performance. Increased somatic and cognitive anxiety in the control group was found in this study, so the persistent effect of relaxation training is not checking as close to competition, as they might change. Also, the effect of relaxation training on athlete performance is not addressed in this study so there is need of a future study to assess the level state anxiety on before the start of the competition and also assess the effect on performance due to anxiety reduction

6. CONCLUSION

From the result of the study, it was concluded that relaxation technique is an effective intervention for reducing pre-competitive state anxiety and improving self-confidence in athletes. As both progressive muscular relaxation and autogenic relaxation technique were significantly effective in reducing competitive state anxiety and improving self-confidence than the

control group.

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