

# Effects of Progressive Muscle Relaxation and Transcendental Meditation Treatment on Rifle Shooting Performance

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**Abstract:** It has become necessary to place a greater emphasis on psychological and mental training methods in competitive shooting sports to achieve top performance. The widely held thought that tends to associate shooting with aggressive manners is totally mistaken. On the contrary, the shooting sport demands calmness, concentration combined with physical fitness. Shooting is a learned skill that is developed through physical and psychological practices. In this study a total of 39 male, national level rifle shooters were selected. They were divided into three groups i. e. transcendental meditation, progressive relaxation/imagery and control group. The result of the study indicated that the progressive relaxation group showed significant improvement pre to post experiment on the rifle scores and transcendental meditation group showed non-significant improvement on the rifle scores. The purpose of this study was to investigate the effects of transcendental meditation and progressive muscle relaxation treatment on rifle shooting performance.

**Keywords:** Progressive Muscle Relaxation, Anxiety, Transcendental Meditation, Shooting Performance.

## 1. Introduction

Successful training in competitive sports or any performance-oriented sport is based on the scientific work up of specific physical and psychological as well as technical and didactic elements required for performance. Shooting requires a high level of mental discipline. All branches of the shooting sports have one element in common-success in any one is heavily reliant on mental skills (Kratzer 1982). The shooting sport is mostly referred as a "sport of the mind". One would therefore expect that mental make-up would play a very large role in determining the success or failure of a shooter. Sekhon (2009) reveals that systematic measurements of personality characteristics show this to be the case.

In order to do well at shooting you need to be relaxed, confident and focused and in addition, you also need to have a methodical routine before you pull the trigger. E. G. Hall (1983) conducted a controlled experiment to compare the effect of transcendental meditation versus progressive muscle relaxation versus no treatment. Anxiety in varying levels is an integral part of competitive shooting sports and various relaxation methods are developed to make anxiety less severe.

A method used to overcome anxiety - with a special emphasis on the promotion of relaxation - was introduced in psychotherapy by Edmund Jacobson (1938) in the early 1920s. This was termed "progressive relaxation" and also known as "systematic muscular relaxation" and was later applied in sport medicine. Progressive muscle relaxation (or PMR) is a technique for reducing anxiety by alternately tensing and relaxing the muscles. Progressive relaxation involves alternately tensing and relaxing the muscles. Transcendental meditation is a relaxation technique frequently proposed as a possible method to alleviate the specific anxiety associated to competitive sports. Transcendental meditation has been associated with an increase in alpha activity in the brain (indication of

increased relaxation), decrease in metabolic rate, heart rate, blood pressure, galvanic skin response and an increase in blood flow to the skeleton muscles.

## 2. Subject and Methods

The subjects in this investigation were 39 male air rifle shooters, aged from 18 to 25 years from the various states who had participated in all India inter-university, pre-national and national shooting championship. The subjects were randomly assigned to one of three experiment groups (13 male in each group: transcendental meditation, progressive muscle relaxation and control group. All subjects received same shooting instructions routinely given for the six week treatment phase. During the first week of the treatment period, each subject fired as presented in Table -I

**Table 1:** Course of Fire

S No.	Particular	Remarks
1	Preparation time	10 mnts
2	Sighting time	5 mnts
3	Sighting shots	Unlimited
4	Competition/final shots	10 Shot/fire
5	Shot per target	Single shot
6	No. of shots	10 shots
7	Max scores per shot	10 scores
8	Target	ISSF Air rifle Targets
9	Total score of test	10 X 10 = 100 Scores
10	Timing	As per rifle Final Match

The two scores were averaged for a baseline measure of shooting ability. Rather than using self-report indications of anxiety reduction or relaxation, actual performance scores with the rifle were compared to determine effectiveness of the treatment. The subject in the transcendental meditation

group received instructions from a certified and trained instructor. This group met a total of 13 hours with instructor, going over seven prearranged steps. After this training the subjects practiced transcendental meditation twice a day for 25 minutes through the remainder of the six week treatment period. Subjects in the progressive muscle relaxation group received 13 hour instructions from an experienced/trained instructor. Subject were taught to differentiate between a state of tension and a state of relaxation and then learned how to use visual imagery in mentally practicing course of fire with the rifle. Subjects were also instructed to practice their techniques twice a day for 25 minutes and were monitored to ensure that practice was done. At the end of the six-week treatment period, subjects in all groups again fired a course of fire as mentioned in Table- I. The two scores were averaged to arrive at post-treatment score. In analysis

of the results, scores for the individual fire along with the total courses were compared pre-to post-treatment to see if any of groups showed significant differences over the others. All shooters, at some time in their matches, experience anxiety.

### 3. Results

The pre-treatment and post-treatment data was statistically examined for significance, if any, applying analysis of covariance. After the statistical analysis of the data, the mean scores pre-to post-treatment for all three groups prepared and the same is shown in table:

**Table 2:** Descriptive Statistics  
Dependent Variable: Shooting

Group	Treatment	Mean	Std. Deviation	N
Transcendental Meditation	Pre	90.6154	1.38675	13
	Post	93.6923	1.49358	13
	Total	92.1538	2.11078	26
Progressive Muscle Relaxation	Pre	90.4615	1.45002	13
	Post	94.3077	1.37747	13
	Total	92.3846	2.40128	26
Control	Pre	91.0769	1.75412	13
	Post	91.3077	1.70219	13
	Total	91.1923	1.69751	26
Total	Pre	90.7179	1.52088	39
	Post	93.1026	1.98408	39
	Total	91.9103	2.12704	78

**Table 3:** Tests of Between-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	178.833 <sup>a</sup>	5	35.767	15.189	.000
Intercept	658904.628	1	658904.628	2.798E5	.000
Group	20.795	2	10.397	4.416	.016
Treatment	110.885	1	110.885	47.091	.000
Group * treatment	47.154	2	23.577	10.013	.000
Error	169.538	72	2.355		
Total	659253.000	78			
Corrected Total	348.372	77			

a. R Squared = .513 (Adjusted R Squared = .480)

**Table 4:** Multiple Comparisons

Dependent Variable: Shooting

	(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
LSD	control	Progressive	-1.1923*	.42559	.007	-2.0407	-.3439
		Trancen	-.9615*	.42559	.027	-1.8099	-.1131
	Progressive	control	1.1923*	.42559	.007	.3439	2.0407
		Trancen	.2308	.42559	.589	-.6176	1.0792
	Trancen	control	.9615*	.42559	.027	.1131	1.8099
		Progressive	-.2308	.42559	.589	-1.0792	.6176

Based on observed means.

The error term is Mean Square (Error) = 2.355.

\*. The mean difference is significant at the .05 level.

### 4. Conclusion

The unique quality of competitive sports, including shooting, is that their successful completion requires

overcoming difficulties which place great strain on all of the athlete's energies, physical and psychological. In present study the progressive relaxation group showed statistically significant improvement pre to post treatment on the total scores of course of fire in rifle shooting. The other changes

recorded were statistically insignificant. The transcendental meditation group showed a little improvement on result, but this was not significant difference and could have been accredited to probability alone. These results do not essentially point out that transcendental meditation has no advantageous application to shooting sports.

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