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Impact of progressive muscle relaxation training on selected physiological variables of netball players

Maria George[1], Arun S S Kumar[2]
[1] Research Scholar, Department of Physical Education, Faculty of Fisheries Management, Kerala University of Fisheries and Ocean Studies, Kerala, India
[2] Associate Professor, Department of Physical Education, KNM Government College, Kanjiramkulam, Thiruvananthapuram, Kerala, India

Abstract
The study was designed to examine the effects of progressive muscle relaxation training on selected physiological variables of netball players. Study participants were college female netball players in Kerala. Forty players were block randomised and then assigned to an experimental and control group. The experimental group received progressive muscle relaxation training for three weeks and the control group received normal relaxation training. Resting heart rate and blood pressure chosen as the physiological variables. Results from the standardised tests for both physiological variables were compared between groups by measuring pre-training and post training conditions of each player. The degree of improvement was significantly higher in the progressive muscle relaxation training group than in the control group after progressive muscle relaxation training intervention ($p<0.05$).

Keywords: PMRT, netball, blood pressure, resting heart rate

Introduction

It's common for athletes practising for competitive sports, especially those at the elite level, to engage in extremely hard workouts twice or three times each day. If the body does not sufficiently recover in between rigorous training sessions, large amounts of exercise might have a negative impact on performance. Therefore, recovery can be considered a significant component of athletic training and performance. A perfect relaxation training provides a speedy and better recovery for the athletes. Various techniques/training methods are used by individuals to improve their state of relaxation.

Relaxation training/techniques has beneficial effect for athletic performance in many ways (Cheung *et al*. 2003) Progressive muscle relaxation is one of the relaxation technique developed by American physician Edmund Jacobson in the early 1930s. PMRT allows individuals to relax while increasing their awareness of personal stress. PMRT is a primary method that is easily learned to achieve relaxation. When an individual is anxious, the body activates a set of stress responses. Progressive muscle relaxation training mainly involves a two-step process in which the individual systematically tense and relax different muscle groups in the body. With regular practice, progressive muscle relaxation gives an intimate familiarity with what tension as well as complete relaxation feels like in different parts of the body. This awareness helps to spot and counteract the first signs of the muscular tension that accompanies stress. Progressive relaxation involves alternately tensing and relaxing the muscles. A person using PMR may start by sitting or lying down in a comfortable position. With the eyes closed, the muscles are tensed (10 seconds) and relaxed (20 seconds) sequentially through various parts of the body. The whole PMR session takes approximately 20 to 30 minutes.

Most progressive muscle relaxation practitioners start from the lower body and work their way towards upper body. For a sequence of muscle groups to follow, the procedure is given below.

- Loosen your clothing, take off your shoes, and get comfortable.
- Take a few minutes to relax, breathing in and out in slow, deep breaths.
- When you're relaxed and ready to start, shift your attention to your right foot.Take a moment to focus on the way it feels.
- Slowly tense the muscles in your right foot, squeezing as tightly as you can. Hold for a count of 10.
- Relax your right foot. Focus on the tension flowing away and the way your foot feels as it becomes limp and loose.
- Stay in this relaxed state for a moment, breathing deeply and slowly. When you're ready, shift your attention to your left foot. Follow the same sequence of muscle tension and release.
- Move slowly up through your body, contracting and relaxing the muscle groups as you go.
- It may take some practice at first, but try not to tense muscles other than those intended.

Progressive Muscle Relaxation Sequence

The most popular sequence runs as follows:

1. Right foot
2. Left foot
3. Right calf
4. Left calf
5. Right thigh
6. Left thigh
7. Hips and buttocks
8. Stomach
9. Chest
10. Back
11. Right arm and hand
12. Left arm and hand

13. Neck and shoulders
14. Face

Netball

Netball is a fast, exciting team sport which involves running, jumping, throwing and catching. Netball and basketball are similar but although the rules, equipment, uniforms and team members are slightly different in netball, no dribbling and no running with the ball. Netball is played both indoors and outdoors. Netball is played in a rectangle court between two teams of seven players each with specialist positions. The specific positions restrict them to movement within specific areas-or thirds-of the court. Letters worn by the players on their tops identify their positions. This helps the two umpires who control the game to see when players travel outside their areas. The main aim of this game is to keep or gain control of the ball, passing the ball between team players down the court to the scoring area. Here the ball must be thrown into a ring attached to a post in order to score a goal; the team with the higher score wins the game. Players must not obstruct or contact other players, nor may they touch the ball held by another player. A pass or shot must be made within three seconds and a player may take only one step while holding the ball. A netball court is little longer than a basketball court and is divided into three equal areas (Miles, 1981) [1].

Physiological variables

Physiological variables, such as blood pressure, body temperature, breathing rate, heart rate, blood oxygen saturation, and various electrophysiological signals, represent the operation of a human body and are thus useful as reference values in human health monitoring

Blood pressure

Blood pressure is the force exerted by circulating blood against the walls of the body's arteries, the major blood vessels in the body (WHO). Regular exercise makes the heart stronger. A stronger heart can pump more blood with less effort. As a result, the force on the arteries decreases. This lowers blood pressure. Normal blood pressure is 120/80 mm Hg.

Resting heart rate

Resting heart rate, or pulse, is the number of times your heart beats per minute when you are at rest. A normal resting heart rate for adults ranges from 60 to 100 beats per minute. Generally, a lower heart rate at rest implies more efficient heart function and better cardiovascular fitness. For example, a well-trained athlete might have a normal resting heart rate closer to 40 beats per minute.

1. Statement of the Problem

The purpose of the study was to "analyse the impact of progressive muscle relaxation training on selected physiological variables of netball players."

2. Objectives of the Study

The objective of the research was to analyse how the progressive muscle relaxation influence the selected physiological variables of netball players.

3. Hypotheses

1. It was hypothesised that there would be a significant difference in resting heart rate of netball players due to the progressive muscle relaxation training.
2. It was hypothesised that there would be a significant difference in blood pressure of netball players due to the progressive muscle relaxation training.

Materials and methods

To ensure program standardisation, based on the PMRT audiotape by Jacobson's progressive muscle relaxation protocol, developed a script for the players starting from the lower body. The PMRT tape contained instructions for systematic tensing and relaxation of specific muscle groups, starting with the groups of muscles in the lower body and progressing to the upper part of the body. The whole PMR session takes approximately 20 to 30 minutes.

1. Data collection

Players were randomly assigned to an experimental or a control group. Each group contains 20 members. Pre training and post training data were collected by the same methods in both groups. Palpation method is used to measure resting heart rate and sphygmomanometer was used to measure blood pressure. Before the intervention, one training session was given to the experimental group and feedback was elicited during this experience to allow patients to experience and share the changes and sensations of relaxation.

2. Statistical analysis

Descriptive data are presented as means - standard deviation (SD). Paired t-tests were used to compare results between experiment and control group of players. Results were considered statistically significant if $p < 0.05$.

Results and discussions

Table 1: Descriptive Statistics on resting heart rate of experiment and control Group.

Group	Pre Test			Post Test		
	N	Mean	SD	N	Mean	SD
Experiment	20	53.10	3.959	20	43.35	2.870
Control	20	53.90	4.564	20	54.10	4.278

Tables 1 indicates the Means and Standard Deviations (SD) observed for resting heart rate of the experiment group players and control group players in the pre training test and post training test.

Table 2: Paired Samples Test of resting heart rate

		t	df	Sig.
Experiment group	pre - post	12.379	19	.000
Control group	Pre-post	.623	19	.541

Table 2 shows paired t test results of resting heart rate. The statistical results showed that there would be significant differences between pre and post-test of experiment group players ($p<0.05$), and there would be no significant differences between pre and post-test of control group players ($p> 0.05$)

Table 3: Descriptive Statistics on blood pressure of experiment and control Group.

Group	Pre Test			Post Test		
	N	Mean	SD	N	Mean	SD
Experiment	20	93.55	4.582	20	82.45	4.298
Control	20	90.15	5.373	20	89.55	5.539

Tables 3 indicates the Means and Standard Deviations (SD) observed for blood pressure of the experiment group players and control group players in the pre training test and post training test.

Table 4: Paired Samples Test of blood pressure

		t	df	Sig.
Experiment group	pre - post	17.335	19	.000
Control group	Pre-post	1.831	19	.083

Table 4 shows paired t test results of blood pressure. The statistical results showed that there would be significant differences between of pre and post-test of experiment group players ($p<0.05$), and there would be no significant differences between pre and post-test of control group players ($p> 0.05$)

1. Discussion on Findings

The study to find out the impact of progressive muscle relaxation training on selected, physiological variables among netball players. The results shows that experimental group players that is the players who got the training sessions had a significant changes in their physiological variables.

2. Discussion on Hypotheses

Based on the results and discussions on findings:

1. It was hypothesised that there would be a significant difference in resting heart rate of netball players due to the progressive muscle relaxation training.

The results of the study shows that there was significant differences in resting heart rate between pre and post-test among the experimental group players.

Hence the hypothesis of the study was accepted.

2. It was hypothesised that there would be a significant difference in blood pressure of netball players due to the progressive muscle relaxation training.

The results of the study shows that there was significant differences in blood pressure between pre and post-test among the experimental group players.

Hence the hypothesis of the study was accepted.

Conclusion

This study has demonstrated that providing PMRT can effectively alleviate blood pressure and resting heart rate of netball players. Progressive muscle relaxation can be learned by nearly anyone and requires only 20 minutes to 25 minutes per day to practice (possibly less if you focus on only one muscle group/area of the body or combine muscle groups) Future studies could collect and assess data from other physiological indices to further validate the efficacy of the PMRT. Future studies can also examine the effect on players other physiological variables as well as psychological variables.

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