

Effect of Some Thinking Strategies on Anxiety and Catecholamine and the Level of Performance in Rhythmical Exercises

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Abstract: This research aims at designing a program of mental training to know its effect on some mental thinking (skilful task - mood words for performance) and some mental skills (relaxation - mental imagery - attention concentration) anxiety - catecholamine and the level of performance in rhythmical exercises. Hypotheses of the research state that there are statistically significant differences between the pre - post measurements in strategies of thinking, mental skills, anxiety, catecholamine and the level of skilful performance in rhythmical exercises on behalf of post measurement. Improvement percentage differs between the pre - post measurements of the research sample in variables under research. The researcher used the experimental method with a design of a single experimental group by following the pre- post measurements on a sample of 6 female third graders specialized in rhythmical exercises. The program lasted 10 weeks as much as 3 training units weekly in 60 minutes for the training unit. Physical and mental measures and tests and analysis of catecholamine in urine were used for 24 hours and the level of skilful performance in rhythmical exercises. The research results were that proper mental thinking training is the fundamental step to apply thinking strategies during training and the situations of stress exam and that using thinking strategies in skilful task and mood words during performance with the followed program of skilful training in college leads to raise skilful performance level for female students in rhythmical exercises.

Key words: Thinking strategies % Mental training % Anxiety % Catecholamine

INTRODUCTION

Athletes experiences and information resulting from physical systems (neuro - mental processes) are considered a product of his response and behavior since skilful, physical, mental and emotional processes involved in performance because sport activity is produced as an integrated somato - psycho unit, so these aspects must be put into consideration during the process of learning mental skills [1].

Mental skills involve several of relaxation - mental imagery - attention concentration - the ability to set goals - control of psyche energy - cognitive reformation - self construction and constructing positive thoughts [2]. Mental training contributes in developing the process of learning motor skills and raising the level of motor performance. Mental training in sport field involves stages of basic mental skills and specialized mental skills for sport activity type and thinking strategies. The importance of developing mental skills particularly relaxation, mental imagery and attention concentration is

due to preventing negative thoughts and distractions that interfere with physical performance. This is an ability if it is available for the athlete, he achieves performance goal successfully in each trial k but it can't be achieved because mind interferes, spoils muscular coordination and influences negatively performance level. Training these mental skills reduces this effect [3, 4].

Thinking strategy in skilful task is considered the primary part in preparing thinking content, so it is necessary to emphasize performance technical aspects such as the exerted power and reducing feelings of tire or the required motor range, while strategy of mood words for performance was developed to fill out the resultant lack from the difficulty of using the strategy of skilful task content for a long term. These strategies express how to perform through using expressive words of the required motor content [5].

Anxiety is one emotions that athlete experiences before and competition. It has it's active function as well as it's negative influence performance, so controlling and directing it act as a positive motivational force of

performance. It is called facilitated anxiety, but if it is intense for the athlete it becomes anxiety hindering performance [6]. Phenomenon of anxiety for athletes is related with catecholamine which is considered a balance. The more anxiety increases, the more the rate of this hormone and vice versa. This anxiety can be reduced during training through exercises of muscular and mental relaxation, listening to music to reduce distress and to achieve the best performance. As a result of huge scientific development in all aspects, this led to obtaining results of hormones estimates in blood or urine on a high degree of precision that enabling to conduct inductive studies providing many intellectual backgrounds to explain phenomena by which human mind puzzles in interpreting them. Hormones interfered in treating several recondite diseases after all available treatments failed in overcoming them [7].

Some bio- chemical changes accompany the work of hormones such as states anxiety through changing the rate of catecholamines in which adrenal gland exerts and they are called adrenaline and epinephrine in a rate of 80%, noradrenaline and norepinephrine in a rate of 20% when stimulation reaches it from Sympathetic fibers from nervous system where the effect of adrenaline on increasing Oxygen consumption and increasing the rate of metabolism higher than noradrenaline [8].

Rhythmical exercises require beside physical skilful abilities, a set of mental skills that must be available for practioners to arrive mastery in this sport such as mental imagery, attention concentration - self confidence - anxiety direction and well conduct in some difficult situations, since this sport requires full mobilization of energies, mental and psychological abilities to reach the best possible sport level since the performance level is the foundation in female student's success and proficiency that is considered a product of interaction between several internal and external factors [9].

Through the researcher's work in teaching rhythmical exercises at the faculty of physical education - particularly - third grade specialized in rhythmical exercises, she noticed that female students experience distress, fear, anxiety and a negative emotional state overcomes them specially the day of exam and their performance level appears less than the actual level before the exam committee. This what leads the researcher to negative reduction that occurs during female students waiting for introducing motor phrases at the end of school term and using thinking strategies in increasing attention concentration and mental restoration of motor skills that are required to use during exam and use mood words

motivating and encouraging female students on muscular performance and reduce state anxiety that is influenced by reducing catecholamine hormone to improve their performance.

MATERIALS AND METHODS

The researcher used the experimental method with a design of a single experimental group by following the pre- post measurements on a sample of 6 female third graders specialized in rhythmical exercises at the Faculty of Physical Education, Minia University, Egypt on 2010/2011 in the second term. Sample homogeneity was found in variables of time age. The mean was 19.82, height 160.67, weight 62.17 and the physical variables by backbone flexibility 50.33, steady balance 15.17, agility 6.67, coordination 4.17, abdomen muscular power 15.50, muscular endurance 18.50, legs muscular capacity 15.83, thinking strategies in skilful task 23.33, mood words 23.83, skills of mental training (head muscular relaxation 20.67, arm's muscular relaxation 26.27, trunk muscular relaxation 14, legs muscular relaxation 20.83, visual mental imagery 6, audio mental imagery 5.17, motor sensory mental imagery 6.17, emotional mental imagery 5.83, the ability to control imagery 6, attention concentration 17, catecholamine hormone 0.85, anxiety 21.50 and performance level 76.67.

Physical tests were determined through the researcher acknowledgment of the scientific references and previous studies and presented them on experts to determine the most appropriate tests. They include bridge test to measure backbone flexibility, test of standing on foot instep to measure steady balance, test of zigzag running to measure agility, test of rope jumping to measure coordination, sitting from lying to measure abdomen muscular power, test of raising chest high and steady to measure endurance and test of vertical jump of sergeant.

Test of thinking strategies was applied, prepared by Shamooun and Ismael [2]. Two strategies from this test are determined for the present research (thinking in skilful task, mood words for performance). Nedeffer, scard of muscular distress levels [10] is applied to measure muscular relaxation of body parts, the scale of mental imagery [10], test of net attention concentration (prepared by Dorthy Harris - arabized by Shamooun [10], the scale of anxiety (prepared by Rainer Martens - arabized by Alawy [11]) to measure anxiety in sport competitive situations or the day of exam and analyzing urine samples over 24 hours to test catecholamine hormone at the laboratory of Dr. Ahmed Makady in Minia.

The first pilot study was conducted on 13/3/2011 to find scientific coefficients of tests, physical and psychological scales under research and experimenting them on a pilot sample of 20 female students from the research population (teaching branch) and outside the basic sample.

To find validity of tests and scales under research, the researcher used differences validity between groups with the tail comparative method between top quadratic and low quadratic on a pilot sample from the research population of 20 female students. Significance level was between 0.004 and 0.009. Tabulated (z) value at significance level of 0.05 = 1.96.

To calculate reliability of tests and scales under research, the researcher used the method of test and re-test on a sample outside the population of 20 female students. Reliability coefficients of variables (under research) were 0.92: 0.99 since tabulated (r) value at significance level (0.05) = 0.444.

The researcher conducted the second pilot study in 15/3/2011 on a sample of 20 female students from the research population in purpose of experimenting a part of thinking strategies and determining the time spent in performance.

Pre - measurements were conducted in 17/3/2011 on variables under research and applied the suggested program of thinking strategies from 20/3/2011 to 26/5/2011. Post measurements were conducted on the research sample in variables under research on 29/5/2011 and it is the day of practical exam for female students. Statistical treatments of arithmetic mean, standard deviation, skewness coefficients - difference significance with the method of Manwhitney were used.

RESULTS AND DISCUSSION

There are statistical significant differences between the pre- post measurements in thinking strategies (skilful task - mood words and mental skills (relaxation - mental imagery - attention concentration) anxiety, catecholamine hormone and performance level in rhythmical exercises on behalf of post measurement.

The improvement percentages differ between the pre-post measurements of the research sample in variables under research.

It is shown from the table that the rate of improvement percentage for both pre- post measurements for the research sample in variables under research is between (13.33: 277.78) indicating the influence of thinking strategies and mental skills program on improving variables under research.

DISCUSSION

In the light of statistical analysis results for the research data, results were discussed according to research hypotheses. The hypothesis states that there are statistically significant differences between the pre - post measurements in thinking strategies (skilful task - mood words) mental skills (relaxation - mental imagery - attention concentration) anxiety, catecholamine hormone and the level of skilful performance in rhythmical exercises on behalf of post measurement.

Table 1 indicates that there are significant differences between the pre - post measurements of ex - research variables. The researcher attributes this to the effect of the suggested program for mental training including exercises of (relaxation, mental imagery, attention concentration) and using the method of proper respiration during performing relaxation exercises for every body parts with mental imagery for every previous learned skill in rhythmical exercises, narrowing and concentrating attention on performed skills within motor phrases leading to reducing skilful performance errors. Music accompanied performance where it played a fundamental part in homogenizing movements with body parts, improving female students mood and reducing distress, anxiety and tire resulting from organized training during the program, since applying the program of mental training accompanies skilful movements training and different skills for motor phrases (free and rope).

The researcher attributes these differences the use of thinking strategies in skilful task and mood words including positive statements and encouragement words where they contribute in increasing performance periods through repeating positive words particularly in critical movements or when tire increases during continuous performance in motor phrase that motivating female student and exciting her senses to make performance continues without stopping, so her self confidence increases, consequently her performance level improves.

These results accord with what Shamoan [10] indicated that it is important to prepare strategies of mental imagery and attention concentration lies in avoiding failure, reducing anxiety, increasing motive to success, isolating external distractions and concentrating attention on motor task that influences directly on performance level.

These results accord with previous studies [12-16] on the importance of using these studies in integrating mental aspects (relaxation - mental imagery - attention concentration) and thinking strategies in raising performance level.

Table 1: Pre- measurement (mean ranks - sum ranks) post measurement (mean ranks - sum ranks) (z) value at significance level: n = 6

Variables	Mean ranks	Sum rank	Mean ranks	Sum rank	Z value	Significance level
Skilful task	.00	.00	3.50	21	2.26	.024
Mood words	.00	.00	3.50	21	2.21	.027
Head muscular relaxation	3.50	21	.00	.00	2.25	.024
Arms muscular relaxation	3.50	21	.00	.00	2.23	.026
Trunk muscular relaxation	3.50	21	.00	.00	2.27	0.230
legs muscular relaxation	3.50	21	.00	.00	2.27	.023
Total score	3.50	21	.00	.00	2.22	.026
Visual imagery	.00	.00	3.50	21	2.23	0.026
Audio imagery	.00	.00	3.50	21	2.23	0.026
Motor sensory imagery	.00	.00	3.50	21	2.21	0.027
Emotional imagery	.00	.00	3.50	21	2.23	0.026
Ability to control imagery	.00	.00	3.50	21	2.23	0.026
Total score	.00	.00	3.50	21	2.21	0.027
Attention concentration	.00	.00	3.50	21	2.23	0.026
Catecholamine hormone	3.50	21	.00	.00	2.21	0.027
Anxiety	3.50	21	.00	.00	2.25	0.024
Performance level	.00	.00	3.50	21	2.27	0.023

Tabulated (z) value at (0.05) = 1.96

Table 2: pre measurement - post measurement - improvement percentage %, n = 6

Variables	Pre - measurement	Post measurement	Improvement percentage %
Skilful task	23.33	32.83	40.71
Mood words	23.83	31.83	33.57
Head muscular relaxation	20.67	12.17	41.13
Arms muscular relaxation	26.67	12.50	53.13
Trunk muscular relaxation	14.00	9.33	33.33
legs muscular relaxation	20.83	10.17	51.20
Total score	82.17	44.17	46.25
Visual imagery	6.00	22.67	277.78
Audio imagery	5.17	14.00	170.97
Motor sensory imagery	6.17	14.00	127.03
Emotional imagery	5.83	13.50	131.43
Ability to control imagery	6.00	12.67	111.11
Total score	29.17	76.83	163.43
Attention concentration	17.00	30.50	79.41
Catecholamine hormone	85.00	73.67	13.33
Anxiety	21.50	15.00	30.23
Performance level	76.67	103.33	24.78

It is shown from Table 1 that there are statistically significant differences between the pre - post measurements in variables (anxiety - catecholamine hormone - performance level) on behalf of post-measurement.

The researcher attributes this to the girls distinctive performance in terms of aesthetical character in which her movements and skills add that are beloved to female students. Music accompanies performance which spreads the spirit of pleasure and joyful and reducing distress, tire and anxiety. It is no doubt that female student experiences distress and anxiety in exam day to present motor phrases (free- rope) and inefficiency that influences negatively performance level. So, we

find that training mental skills and thinking strategies (under research) helped in reducing feelings of anxiety and removing negative influences, distracting them, concentrating on the ideal performance and correcting faults by which female student exposed during training.

Sport competitions relate with several unpleasant emotional situations especially anxiety and what relates with states anxiety with physiological and bio - chemical changes [17].

The most important bio- chemical variables accompanied states anxiety are changing the rate of Adrenaline and Noradrenaline hormones both of them are called catecholamines [11, 18].

Exertion of Adrenaline hormone increases under circumstances of psychological excitement, states anxiety and ambiguous situations that can't predict their results, to prepare the individual to perform continuous physical activity [19].

The researcher adds that her use of mental skills and thinking strategies (under research) helped in reducing anxiety particularly the exam and consequently reducing the rate of catecholamine hormone in urine leading to improving skilful performance level for female students in rhythmical exercises.

These results accord with prior studies [20-25] in terms of the importance of the relationship between catecholamine hormones reduction and its relation with anxiety before competition contributing in raising performance level.

The second hypothesis states that the rate of improvement percentage differs between the pre - post measurements of the research sample in variables under research.

Results of Table 2 indicate that improvement percentage for both pre- post measurements of the research sample in variables under research ranged 13.33%: 277.78%. The researcher attributes this improvement that the program of mental training and its vocabularies such as (relaxation - mental imagery - attention concentration) helped in learning motor skills in a tangible and quick way since these mental skills contributed in simplifying motor skills of rhythmical exercises, precise representation of its parts then representing them wholly so that performance reaches dynamics as well as representing body parts during performance and female student position for her followers. These parts were related to form full performance (motor phrases) where relaxation skills contributed in providing an opportunity for the nervous system to fumble information coming from motor units which helped in fixing proper performance of the female student, her understanding and increasing her control in performance.

Relaxation is considered the common denominator in all programs of mental preparation and thinking strategies since they can be used to confront distress, anxiety and removing muscular tension in some specific muscles and in delaying the appearance of muscular tire and in achieving the best results [26].

The researcher attributes improvement in mental representation to trainings used in the suggested program where they contributed in developing visual, audio, motor sensory, the accompanied emotional states and controlling imagery in a balanced integrated frame where

mental representation helped in reducing anxiety, motivating female student, increasing self confidence, removing negative feelings and developing sense of success and mastery [4].

The researcher also attributes improvement in attention concentration to the use of different trainings to increase and select attention leading to the reduction of intense distress and anxiety that are considered the method in increasing attention during performance and consequently the best results.

These results accord with previous studies [12, 13, 15, 20] conducting that the used mental training influences positively in raising relaxation ability, reducing distress and increasing achievement motivation, consequently raising performance level. As well as prior studies [6, 21-24, 27] in reducing anxiety and its relation with catecholamine hormone and its reduction during performing different sport activities.

CONCLUSION

- C Proper mental training is considered one of the basic steps to apply thinking strategies during training and stressful exam situations.
- C Using thinking strategies in skilful task and mood words of performance contribute in reducing anxiety and catecholamine hormone and raising performance level in rhythmical exercises especially at exam day.

Recommendation

- C Using thinking strategies in skilful task and mood words with skilful program followed at faculties of physical education for girls in the courses of rhythmical exercises as several previous studies showed in raising the level of skilful performance.
- C Conducting further studies in the field of thinking strategies, the importance of each of them and integrating them with studying relations with each other.

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