Comparison of the effectiveness of mental, physical and combined mental-physical practices in physical fitness of pre-university boy students of Rasht District 2, Iran

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Abstract

This study has been conducted to compare and evaluate the effectiveness of practices in three areas of mental, physical and combined mental-physical in physical fitness of pre-university students of Rasht District 2, Iran. To conduct this study in a cross-sectional and quasi-experimental design, 120 high school students were selected by available sampling method. Three groups of 45 students were randomly chosen and evaluated based on Hall and Martin revised questionnaire. In order to measure and do physical fitness exercises 4×9 running test, sit, bar fix stretch, long paired jump and 54-meter dash were used, also measuring and recording the related scores were performed in two stages of pretest and posttest. The training program consisted of 8 sessions which the physical practice group did the exercise obviously, mental practice group did the task mentally and mental- physical group first did the task mentally and then took a physical one. To analyze the physical fitness differences between mean scores in these groups, multivariate analysis of covariance (Mankova) and Benfroni post method were applied. The result suggested that firstly mental-physical and next mental practice played a significant positive impact on students` physical fitness. Physical exercise has been the worst way. Consequently, to achieve athletic goals and progresses faster mental-physical method can be used. This method is not only simple, easy, cheap and available, but also it psychologically places the individual in a desirable level in learning in order to participate in races.

Keywords: Mental practice, physical exercise, physical fitness, sports.

Introduction

One of the most important scientific aspects of sport is the psychological issues. Generally speaking, the optimal performance of sport skills depends on three types of physical, skill and mental preparation. Since, different ways of practicing and methods of doing skill, are evolved and the distance between champions has decreased to few milliseconds and millimeters, it seems that differences in the performance of champions are related to mental preparation more than any time (Hadi, 2002).

Along with psychological improvements psychological skills in performing sport skills have got a great importance. Earlier, the importance of physical fitness had been emphasized, of late sport psychologists, trainers and athletes emphasize the psychological preparation increasingly. Also, using psychological skills has caused a significant progress in performance of Olympic and university professional athletes (Mac Mooris, quoted by Ghasemi, 2007).

In recent years, several kinds of mental imaging techniques, positive thinking, success imagination, visual-physical behavior practice and cognitive behaviors balance have been exerted in sport. Words have been used to express products like changing thoughts, emotions, attention and function. Methods of mental imaging, is an important part in athletes preparation function. Some performers do imaging out of structure without applying it specifically for the certain goal. They just make pictures and they may not be able to state the special content of their images orally. Others exert imaging more systematically and professional in their needs types as self-confidence, capability in gaining calmness, learning new skills and concentration (Hadavi, 1998).

Mental training includes: “cognitive training of a physical skill in the absence of obvious physical movement” (Miguel, quoted by salami, 1999). In other words: symbolic repetition of a physical activity in the absence of each difficult muscular movement (Richardson, 1969). The important views regarding mental practice has been introduced at the beginning of 1980s which express three important findings (Feltz & Landers, 1983): 1. Mental practice is better than not doing any exercise in any way; 2. Mental practice when mixed by physical exercise is more effective than each one separately; 3. The effects of mental practice in cognitive tasks are more important than motor tasks.

Few reports reveal that the effects of mental practice which is accompanied by physical arousals are more considerable. Another factor which is basically important in determining mental practice effects is the temporal pacing of formed images during mental practice (Meacci & Price, 1985).

A general assumption about athletes (positive thinking) showed that if the mental practice has negative outcomes, the level of performance will decrease. Negative mental practice probably affects other mechanisms such as confidence and motivation. Paivio (1985) suggested that different kinds of images should have motivation and cognitive effects. Generally

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speaking, both mental image and mental practice can be used for increasing the athletic performance, but there are little information regarding involvement procedure in image forming. Feltz and Landers (1983) in a wide experiment came to the conclusion that if mental practices happen before practical activities, it will have better influences. It is also concluded that the mental practice which takes 1-3 minutes has a better effect than the physical exercise between 5-7 minutes.

Mental imaging will improve the athletic performance in a wide group of sports such as basketball, hockey, diving and golf and specially martial Arts. Mental imaging practices are useful for all athletic groups by itself or as a complement to physical practice. Mental imaging has been used for different reasons within which performance improvement is the most common and the most reasonable motivation for its use (Brouziyane & Molinaro, 2005). The researchers found that 99 percent of Canadian Olympics athletes before 1984 used mental imaging and its use has considerably affected facilitating athletic performance (Martin, 1988).

The result of Fleetcher's investigations showed that for improving their performance to decrease stress before competition, athletes should use cognitive rebuilding including specifying goal and mental imaging. In another study, golf players used mental imaging to decrease negative cognitive emotions which led to improving performance (Feeltcher & Hanton, 2001).

Feltz and Driskell came to the conclusion that mental practice affects cognitive and motor activities, but its effect on learning cognitive activity is more considerable. Studies has indicated that mental practice has less effect on learning of people with lower level of image forming, in comparison with those who have higher ability in forming image (Miguel, quoted by Salami,1999).

It is also proven that in different situations of human life, such as home, workplace and even for armies, physical fitness is not enough and imaging before doing the activity is also very important, because in these situations, people not only decide about what to do, but also they have to make an image and then do the activity. Therefore, sometimes it is necessary to evaluate these two factors which are indicators of adapting to environment. Current study has been conducted on the effectiveness of exercise in three areas including mental, physical and mental-physical combination practices in pre-university students` physical fitness of Rasht educational district 2 in the year 2010.

Method

This study is a quasi experimental study that investigates the effect of independent variable of the type of practice in three levels of mental, physical and mental-physical practices on physical fitness which is a dependant variable. 120 pre-university students of Rasht district 2 formed the subjects of the study .Subjects who didn't know about the topic and didn't do regular exercises, filled a personal information form and then took the mental imaging test. The samples were 45 individuals who were randomly arranged in three 15-member different exercise groups (physical, mental and mental-physical practice groups). All subjects took the initial physical fitness test. The practice programs were exerted on the group during eight sessions, and then they took the retest. The pretest and posttest research design was without observe group with 3 experimental groups including: physical, mental and mental-physical groups. The examined dependant variables of the study were: 1.Shoulder girdle muscle endurance and upper body bender - was measured by stretch of Pull Up test, according to the number in a minute; 2. Bender muscle endurance of upper body and thighs was measured by the sit test according to the number in a minute; 3. Speed of 60 m distance yards (54 meters) running in seconds and tenth seconds were measured; 4. The agility test in 9 × 4 m was measured in seconds and hundredth; 5. Muscle power test was measured by the paired long jump in cm.

Five subtests taken in the current research were compound tests which evaluated general physical fitness. The first basis of this standard test was established by HPERD organization in the US in 1975 and finally it was reexamined by David Nieman in 1993. Nowadays there are just six subtests, five of which has been used in the current study. The sixth one was 548-metre running which was omitted because of the existing problem in school plan to take out students. The subtests have been done for each subject in one stage and regulating standards' order according to the instruction. The subjects were pre-university students of Allame Jafari School in second district of Rasht in spring 2010. They were selected by available sampling. The criterion for selecting people, who were not athletes, was not being the member of sport clubs and not having championships' titles in any sport majors.

After exerting questionnaire of motor mental imaging and selecting 45 subjects, the subjects were divided in three groups (Mental practice, Physical exercise and Mental-physical exercise). After that the subjects were convinced separately about the goal and the way of doing test and they were also asked to do the specific exercises of their own group during eight sessions (every other day).

After exerting Movement Imagery Questionnaire and selecting 45 subjects, the subjects were divided into three groups (Mental practice, Physical practice and Mental-physical practice). After that the subjects were convinced separately about the goal and the way of doing test and they were also asked to do the specific exercises of their own group during eight sessions (every other day).

Findings

Considering the type of the present study which is pretest and posttest one with more than two groups, the best method to analyze data, is using multivariate analysis of covariance (Mancova) (Khalatbari, 2006). The related information about subjects before and after

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training courses are brought in separate tables. After conducting the study gained data has

been analyzed using descriptive statistical methods (mean, standard deviation) and inferential statistics (MANCOVA) test by SPSS18.

First hypothesis: the effectiveness of mental, physical and combined (mental-physical) practices in physical fitness (paired long jump) is different.

Table 1. The results of training effectiveness test on physical fitness (paired long jump)

Dependant variable	Squares sum	Freedom degree	Mean squares	F	Significant	Effect
Paired jump	355/2	2	177/6	8/09	0/0001	0/31
Error	811/57	37	2/93			

According Table 1, training effect with the following sum: F=8/09 ، P<0/001 ، Partial η^2=0/31 had a significant effect on physical fitness (paired long jump). Eta square shows the effects intensity as (0/31). Considering the significance of training effect, the subsequent test was done in order to specify which training method had more effect on physical fitness (paired long jump).

Table 2. Following test effect of three training methods on physical fitness (paired jump)

Comparing	Mean difference	Standard Error	Significant Level
Mental- Physical	2/29	1/73	0/19
Combined- Mental	-4/74	1/82	0/01
Combined- Physical	-7/02	1/86	0/0001

As per Table 2, the difference between combined-mental means (D = -4/74) is statistically significant (p<0/01), also the difference between combined-physical means (D=-7/02) is statistically significant (p<0/0001). Therefore, it can be concluded that combined training has had more effect and physical training has the least effect on physical fitness (paired jump).

Table 3.The result of training effectiveness test on physical fitness (Pull Up)

Dependant variable	Squares sum	Freedom degree	Mean squares	F	Significant	Effect
Pull Up	71/21	2	35/61	9/24	0/001	0/33
Error	142/58	37	3/85			

Hypothesis 2: the effectiveness of mental, physical and combined (mental-physical) practices on physical fitness (Pull up) is different.

According Table 3, training effect with the following sum: F=9/24 P<0/001 ، Partial η^2=0/33 had a significant effect on physical fitness (Pull Up). Eta square shows the effects intensity (0/33). Considering the significance of training effect, the subsequent test was done in order to specify which training method had more effect on physical fitness (Pull Up).

As shown in Table 4, the difference between mental - Physical means (D = -0/06) isn't statistically significant (p> 0/94), also the difference between Mental-combined means (D=-2/86) and physical - Combined (p= 8/2) is statistically significant (p< 0/001). Therefore, it is concluded that combined training has the most effect on physical fitness (Pull Up).

Hypothesis 3: the effectiveness of mental, physical and combined (mental-physical) practices on physical fitness (60 yard running) is different.

Table 5 shows the training effect with the sum: F=7/07، P>0/003 Partial η^2=0/28 had a significant effect on physical fitness (60 yard running. Eta square shows the effects intensity (0/28). Considering the significance of training effect, the subsequent test were done in order to specify which training method had more effect on physical fitness (60 yard running).

As it is shown in Table 6, the difference between Mental - Physical means (D = -0/34) isn't statistically significant (p> 0/2) , also the difference between Mental - combined means (D=0/64) is statistically significant(p<0/02) and physical - Combined (p= 0/98) is statistically significant(p<0/001). Therefore, it is concluded that combined training has the more effect on

Table 4. Subsequent test effect of three training methods on physical fitness (Pull Up)

Comparing	Mean difference	Standard Error	Significant Level
Mental- Physical	0/73	0/94	-0/06
Combined-Mental	-2/86	0/76	0/001
Combined- Physical	-2/8	0/74	/001

mental preparation (60 yard running). Also the effect of combined training has the more effect on physical fitness.

Hypothesis 4: the effectiveness of mental, physical and combined (mental-physical) exercises on physical fitness (4*9 running) is different.

Table 7 shows the training effect as the sum: F=7/85 ، P<0/001 ، Partial η^2=0/30 had a significant effect on physical fitness (4*9 running). Eta square shows the effects intensity (0/30). Considering the significance of training effect , the subsequent test were done in order to specify which training method had more effect on physical fitness (4*9 running).

As shown in Table 8, the difference between Mental - Physical means (D = 0/14) isn't statistically significant (p>0/48) , also the difference between Mental - Combined means (D=0/77) is statistically significant (p<0/001). Also difference between physical - Combined D (0/63) is statistically significant (p<0/003). Therefore, it is

Table 5. the result of training effectiveness test on physical fitness (60 yard running)

Dependant variable	Squares sum	Freedom degree	Mean squares	F	Significant	Effect
60 yard Running	6/91	2	3/45	7/07	0/003	0/28
Error	18/06	37	0/49			

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concluded that combined training has most effect than both mental and physical fitness (4*9 running). Hypothesis 5: the effectiveness of mental, physical and combined (mental-physical) practice on physical fitness (laying sit) is different.

According to the Table 9, training effect with the sum: F=15/25، P<0000/1 ، Partial $\frac{2}{\eta}$=0/45 had a significant effect on physical fitness (laying sit). Eta square shows the effects intensity (0/45). Considering the significance of training effect, the subsequent test was done in order to specify which training method had more effect on physical fitness (laying sit).

Table 6. Subsequent test effect of three training methods on physical fitness (60 yard running)

Comparing	Standard Error	Mean different	Significant Level
Mental - Physical	-0/34	0/26	0/2
Combined - Mental	0/64	0/27	0/02
Combined - Physical	0/98	0/26	0/001

*Table 7. The result of training effectiveness test on physical fitness (4*9 running)*

Dependant variable	squares sum	freedom degree	Mean squares	F	Significant	Effect
4*9 running	4/40	2	2/2	7/85	0/001	0/30
Error	10/37	37	0/28			

As shown in above Table 10, the difference between Mental - Physical means (D = 1/13) isn't statistically significant (p>0/49), also the difference between Mental - Combined means (D=-7/63) and Combined - Physical (D= -8/76) is statistically significant (p<0/0001). Therefore, it is concluded that combined exercise has more effect than both mental and physical fitness (laying sit).

*Table 8. Following test effect of three training methods on physical fitness (4*9 running)*

Comparing	Mean different	Standard Error	Significant Level
Mental-Physical	0/14	0/2	0/48
Combined-Mental	0/77	0/21	0/001
Combined-Physical	0/63	0/2	0/003

Table 9. The result of training effectiveness test on physical fitness (laying sit)

Dependant variable	Squares sum	Freedom degree	Mean squares	F	Significant	Effect
Laying sit	615/06	2	307/53	15/25	0/0001	0/45
Error	745/92	37	20/16			

Discussion

Mental practice has a useful effect on physical fitness. Theory of symbolic learning indicates that if cognitive components are more prominent, learning will be faster through mental practice (Saket, 1994). During mental practice, there would be a mental map in the mind for doing a skill and as a result it helps saving and reminding of that skill . Mental practice could create these maps so it cause the learning process to get faster (Magill, quoted by Mousavi, Vaezi , 2001). Up to this point, the results of the present study match the results of previous works (Feltz & Landers 1983; Kazemi,1996; Mohammad Kazemi,1999; Hemayat Talab & Movahedi, 2009). Feltz & Landers (1983) concluded that mental practice effects motor and cognative learning activity, but it has more effect on cognitive skills. If performing skills have more cognitive background, they will take more advantage of mental practice.

Table 10. Following test effect of three training methods on physical fitness (laying sit)

Comparing	Mean different	Standard Error	Significant Level
Mental-Physical	1/13	1/66	0/49
Combined-Mental	-7/63	1/74	0/0001
Combined-Physical	-8/76	1/69	0/0001

Science information process state in physical fitness is a mental process it follows the sum rule. Mental imaging and exercise is an activity related to the nervous system which can effect memory directly and let to performance progress (Brouziyane & Molinare, 2005). According to Fitez and Busner the effectiveness of mental practice dependent's on the task's which have wide cognitive components throwing, free shot of basketball and goal sports that need high amount of eyes and hand harmony and subtle motor control (Salami & Bahram (1996). Personnier *et al*. (2008) conducted a research under the title of every day movement motor imaging which resulted in activating outer and inner pre movement cortex (A parietal cortex) (Personnier *et al*., 2008). Then the mental-physical results of the study match earlier reports (Kazemi,1996; Bahrami, 1999; Mohammad Kazemi, 1999; Golestani, 2007; Salari, 2002; Adib Saber, 2002). By comparing these two kinds of physical exercise (group 1) and mental practice (group 2), it can be concluded that mental practice shows more effect than physical one. This is in contrast with result of Grouius (1992) and many other researchers. According to theory of attention arousal collection, the individual can learn physiological arousal through mental practice.

The members of physical exercise couldn't exert enough concentration of the siren tasks. They have also lower arousal levels than the two other groups. But physiological skills of mental practice can decrease the stress and anxiety and boost self confidence. Another reason is the resulting fatigue caused by doing physical exercise and subsequently lack of motivation. The low-function of the physical may also be as a result of lack of progress or even backwardness in physical fitness. We can

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suggest that in the past its focus was on the cognitive nature of physical fitness; it was proposed than mental practice is cognitive and affects the tasks with cognitive components fitness. Then, to obtain a faster access to sport goals and improvements physiological exercise of mental practice can be used. It is not only simple, easy, cheap and practicable everywhere, but also put the person physiologically in the desirable level in learning or preparing for international competitions.

Suggestion

Trainers of most of courses impart physical exercise to all athletes specially of national team members who take part in many races. There may be stressful and non-motivating situation especially when hurt or injured and the use of mental-physical exercise may be a good option. Our investigation reveals that: 1. Mental practice is more effective in improving physical fitness; 2. Mental-physical exercise is efficient to get the intended results; 3. Comparing physical practice, mental practice imparted a better effect on improving physical exercise; Generally, by analyzing result of the present study and other studies it is clear that mental practice has a positive and important effect on physical exercise.

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