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The effect of mental practice as a practical supplementary on performance and learning of basketball free shot in male and female university students

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ABSTRACT

The purpose of this research was to study the effect of mental practice as a practical supplementary on performance and learning of basketball free shot in male and female university students. 180 right handed university students (90 male, 90 female) with no surgery in shoulder, elbow and wrist were selected randomly. Martin Hall (1997) questionnaire was used to evaluate the ability of all individual's motion. All subjects were randomly assigned to two experimental groups: practice group (n=30) practicing the task physically and mental group (n=30) with internal imagery practice, and control group with no practice at all (n = 30). Physically group practiced free shot 3 times in a week with 30 blocks in a session, mental group did it only mentally. After 12 sessions of practice an acquisition test, three day off a retention test was conducted a week later for each group. Data were analyzed by independent T -test to compare the acquisition and retention test. The results demonstrated a significance difference between males and females with control one in mental imagery and physical practice on learning of basketball free shot ($p < 0.01$). There is no significance difference between males and females in mental and physical practicing ($p < 0.01$).

Key Words: Mental practice, physical practice, free shot.

INTRODUCTION

Although mental exercises have been developed as an effective method in developing and improving motor learning for a few decades, every day new findings in this regard are presented and different approaches of mental practice are studied. Some studies have shown that mental practice as well as physically one could improve motor skills [7]. On the other hand it was obvious that the same mechanisms dealing with learning by physically, they are also active during mental practice [3]. Although some researchers such as Yaguez (1998) have shown that

mental practice is effective as physically exercise in learning motor skills [26], but others have emphasized the role of mental practice less important than physically exercise on motor learning [14]. Some researchers believe that mental practice have no effect on motor learning [16, 21]. In this regard, Hall (1992) believes that ineffective mental practice on motor learning is caused by incorrect mental practice. He believes that a misconception of an activity can be followed by negative effects rather than positive effects [12].

Imagery is seriously planning somebody's actions in order to make progress. Motion sequences, targets and different solutions to a problem are attentioned before needing physical response cognitively [24]. A stop by a gymnast jumping from the bridge is a good example of this theory. The gymnast cognitively review any event in his /her mind before taking steps. Stopping times vary according to the type of the jump, before taking steps a jumper choose the best and most suitable situation by mental practice for a correct jumping. There is a large consensus on the usefulness of mental imagery, but the usefulness of the approach and the way of using it is questioned. Therefore, the mental imagery is mentioned as a cognitive learning process, but its role in increasing the muscles strength is still uncertain [9]. Experimental evidence has shown the effect of mental imagery in some sports such as, basketball, soccer, volleyball, and tennis. Several studies have been done on the effect of mental practicing in order to accelerate the rate of learning motor skills and athletic performance, but the application and its effect on athletic skills are not fully understood yet. It is said imagery practicing facilitates nerve-muscle communication acts as a physical training for athletes. The difference is that athletes who practice mental reduce the percentage of errors and mistakes and increase the confidence with creating positive images and finally the technique is much better performed. If we can confirm this theory, we recommend it to the educators to use it as a supplementary in their training programs with other instructional principles. Therefore, the researchers have decided to find its effectiveness in acquisition and learning of basketball free shot, compared with practical exercises, and both compared with control group.

MATERIALS AND METHODS

Participants

One hundred eighty right handed university students (90 male and 90 female), with no knowledge of basketball shooting, with no history of discomfort, pain and joint surgery in the shoulder and elbow, and wrist injuries in muscles to grip and neuromuscular disease were selected randomly from Zahedan Islamic Azad University. They were not aware of the specific purpose of the study. All participants signed an informed consent form before the experiment.

Table 1. Research plan

Groups	Pre test	Dependent variable	Acquisition test	Retention test
Physical practice	T1	X	T2	T3
	T1	X	T2	T3
	T1	X	T2	T3
Mental practice	T1	Y	T2	T3
	T1	Y	T2	T3
	T1	Y	T2	T3
Control	T1	-	T2	T3
	T1	-	T2	T3
	T1	-	T2	T3

First, all subjects were assessed using MIQR questionnaire for mental imagery ability and those with lack ability and with experience of basketball were removed from the test. The task involved

was the throwing ball toward basket from penalty line in basketball. The goal of the movement was to score the results of throwing under three conditions. Martin Hall (1997) questionnaire was used to evaluate the ability of all individual's motion. All subjects were randomly assigned to two experimental groups based on their pre-test scores of 10 shooting (AAPHERD test): practice group (n=30) practicing the task physically and mental group (n=30) with internal imagery practice, and control group with no practice at all (n = 30). All participants followed the same warm up prior to each day's practice and the shooting practice was done immediately following the five minute warm up period. Physically group practiced free shot 3 times in a week with 30 blocks in a session, mental group did it only mentally, as though, feeling emotionally as an actual experience (Table 1). After 12 sessions of practice an acquisition test, three day off a retention test was conducted a week later for each group.

Statistical method

First to compare the effect of mental practice or physically on males and females, the scores of acquisition and retention tests was subtracted. In acquisition stage subtraction of pre-test and acquisition one; and in retention stage, subtraction of acquisition and retention tests were calculated. Data were analyzed by independent T -test to compare the acquisition and retention test of physically and mentally practicing with control group.

RESULTS

Table 2. Mean and Standard Deviation among males and females (MIQR)

	Physical practice	Mental practice	Control
M (SD) Females	1.76	1.75	1.78
M(SD) Males	1.75	1.75	1.77

Table 3. The effect of Physical and Mental practice of females and males in acquisition and retention stage

		Groups	M	Df	T	Sig.
Females	Acquisition	Control	1.3	58	-6.32	0.000
		Mental	3.9			
	Retention	Control	1.3	58	-3.61	0.001
		Physical	2.7			
		Mental	3.9	58	-3.27	0.002
		Physical	2.7			
Males	Acquisition	Control	-9.33	58	-3.57	0.002
		Mental	9.33			
	Retention	Control	-0.93	58	-3.25	0.002
		Physical	0.9			
		Mental	0.93	58	-0.05	0.955
		Physical	0.90			
Males	Acquisition	Control	0.90	58	-3.884	0.000
		Mental	3.66			
	Retention	Control	0.90	45.23	-4.74	0.000
		Physical	3			
		Mental	3.66	36.12	-1.30	0.307
		Physical	3			
Males	Acquisition	Control	-0.6	54.25	-1.83	0.701
		Mental	0.43			
	Retention	Control	-0.6	58	-3.66	0.001
		Physical	1.1			
		Mental	0.43	58	1.14	0.256
		Physical	1.1			

As it is shown in table 2, the highest scores belong to control group (1.78) and the least scores belong to mental practice

As it is shown in table 3, the result show a significant difference between mental and physical practice on acquisition of basketball free shot control in females and males ($p < 0.01$). There was a significance difference between mental and physical practice on retention stage among females, but not significance difference in physical practice among males in this stage ($p < 0.01$).

Table 4. Effect of Mental and Physical practice between females and males in acquisition and retention stage

	Practice	Groups	Mean	df	T	Sig.
Acquisition	Mental practice	Females	3.9	40.5	0.35	0.728
		Males	3.66			
	Physical practice	Females	2.7	58	-0.931	0.356
		Males	3			
Retention	Mental practice	Females	0.93	58	0.815	0.418
		Males	0.43			
	Physical practice	Females	0.9	59	-0.362	0.719
		Males	1.1			

As it is shown in Table 4, there was no significance difference between females and males in mental and physically groups in acquisition and retention stages ($P \geq 0.01$).

DISCUSSION

The purpose of this research was to study the effect of mental practice as a practical supplementary on performance and learning of basketball free shot by male and female university students. According to the findings, mental practice has a significant effect on acquisition of basketball free shot between females and males compared with the control group. In other words, in addition to physical practice, "which is expected to be effective on motor learning", mental practice is effective on participants in development of skill acquisition component criterion (basketball set shot). Several studies Leonardo (1995), Yaguez et al. (1998), Cumming and Hall (2002), Hall (2002), Hill et al. (2003), Dijkerman et al. (2004) and Sanders et al. (2004) have confirmed these findings. They have shown in separate studies that mental practice can improve motor learning. However, there are other studies in mental practice learning and acquisition of motor skills that are viewed as ineffective. Ryan and Simon (1982) showed that mental practice has no effect on motor skill learning. Mulder at al. (2004) showed mental exercise has no effect on learning of a new motor task. Although Nowicki (1995) believes that the ineffectual of mental practice in learning motor skills resulting from the wrong implementation. In other words, he and other researchers (Hall, 2002) contribute this matter to person's disability to function imagery properly. Unlike the results of Rawlings at al. (1972), Gabriel at al. (1989) show that mental practice affects learning of motor skills as much as physical practice. Thus, Grouise (1992) found physical practice improves the performance of diving skill better than mental practice. Also Kohl at al. (1992) reported that real exercise leads to better acquisition of motor skills than mental practice. Moreover, Jackson (2004) found mental practice has less impact than physical one in learning of a sequence task. Mulder at al. (2004) found that mental practice has no effect on learning of a new motor task. On the contrary of Rawlings finding, Wendell (1989) examined impact of mental practice in enhancing spear throwing skill, and concluded that mental practice has the same effect of physical practice. Yaguez at al. (1998) reported that mental and physical practice both improve motor learning as the same rate.

According to contradiction results, it is said that mental imagery has an important effect on performance by mental practicing, but those with low ability of imagery, their mental practice have little effect on their motor learning and the higher imagery ability, the more benefit from mental practice. Another factor is the period of mental practice. In this research we used internal imagery and it has been confirmed by some studies. The idea of differential diagnosis between internal and external imagery have been suggested by (Jacobsin, 1932). In their studies they found that internal imagery versus external imagery leads to increased muscle activity. Given these results, Epstein (1982), assuming that internal imagery improves motor learning, did a research, but found that the learning rate was similar in both cases. White and Hardy (1995) attributed internal and external imagery to characteristics of skills. They reported that people with external imagery focus on the speed of performance, but in internal imagery on the accuracy of it. White *et al.* (1977) found those using internal imagery have higher levels of somatic arousal and less visual activity. The effect of mental practice for the sense of motion and proprioceptive feedback is important, therefore, higher levels of mental imagery provides internal imagery than external. Because this type of imagery is associated with higher muscular activity.

A study showed internal imagery is closer to the real performance [19]. Ryan and Simon (1982) found that mental practice is more beneficial on cognitive aspects of task. Bohan *et al.* (1999) showed that mental practice in early stages of learning (verbal - cognitive) has the most effect and there is an inverse relationship between level of experience and mental practice efficacy. However, some results weaken the mental practice cognitive hypothesis. So Blair *et al.* (1993) observed the effect of mental imagery on the performance of skilled and novice soccer players. He found the same progress for both groups. In another study by Mulder *et al.* (2004), this hypothesis was rejected. Since they understood that mental practice does not have any effect on learning of inexperienced ones, except those who were somewhat familiar with the task got advantage of it. Overall, the results of this research, is parallel with the findings of Gabriel *et al.* (1989), Smith (1996) and Jenealer (1991). He found men and women receive the same amount benefit during training by mental practice.

According to the result of findings, we can say that mental exercises can cause the promotion of learning motor skills compared with control ones, Although its efficacy is not as much as practical one, it seems mental practice is an effective way for learning in early stages of instruction, injured, tired and over-training period. Moreover, according to current research it might be said, we can use the mental exercise as a mean for instruction of sport skills

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