THE EFFECT OF 36 HOURS SLEEP DEPRIVATION ON DRIBBLING SKILLS OF SOCCER PLAYERS

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Abstract. The aim of this study is to determine the effect of sleep deprivation on the dribbling skills of football players. To this end, 22 students of Sahand University, with age range (20-24 years) performed dribbling skill in the pre-test and post test stages. In this study to assess this skill, the test "Mor - Christian" has been used. In the first step, subjects conducted the dribble test as pre-test after 8 hours sleep a night. 10 days later, to ensure the validity of tests and test results on the learning effect, subjects did the same test again after 8 hours sleep a night. In the third stage, 36 hours of sleep deprivation as an independent variable imposed on the subjects and then the test was repeated and experimental test results were compared as recorded using paired t-test. The findings showed that 36 hour sleep deprivation decreases dribble implementation skills ($p < 0.001$). Therefore, the findings showed that sleep deprivation can be a devastating effect on dribbling skill.
Keywords: sleep, sleep deprivation, dribbling, skill, soccer.

Introduction

Sleep is a complex combination of physiological and behavioral factors that is required for renewal of physical and mental powers in normal individuals and athletes (Willy et al., 2008) However, sleep disorders may be observed in athletes who may participate in a competition with prescribed schedule, after a long trip, change in the environment, physical activity and anxiety (Bryant et al., 1992 Chen., 1991).

A study (2002) on more than one million men and women showed that the death risk of people sleeping over 8.5 hours or less than 3.5 hours a night, is 15 percent higher than those who averagely sleep seven hours a night (Williams et al., 2003). The sleep quality of athletes is important in such a way that sleeps disorders in athletes causes psychologically negative effects, increased heart rate, decreased peak oxygen consumption during physical activity performance, weak immune system, hormonal changes, etc (Willy et al., 2008 Tulio et al., 2005 Selma et al., 2007). Another study revealed that the amount and state of night sleep can affect the individual level of cognitive function and activities (Silvia. 2006). Result of another study on the negative effects caused by sleep deprivation suggests that sleeping less than 5-6 on the night can lead to dysfunction (Veasey et al., 2002). Athletes can be easily affected by anxiety, fatigue, exercise pressures, and especially long journeys and as a result, they will suffer from sleeplessness or insomnia. In sports psychology literature, experimental or quasi-experimental research about amount and state of sleep in athletes has been done very rarely. Usually athletes, coaches and sports psychologists have a lot of information about many factors that can be effective on the performance. But the effect of sleep deprivation on athletic performance, often have been less studied. However, it was shown that when the sleep schedule changes, it indirectly affects on athletic performance. But the results of research done in this case has less integrity and often are contradictory (Bond et al., 1986 Hill. 1992 Holland., 1986 Johnson., 1982). For example, (Bond. 1986) demonstrated that sleep deprivation reduces maximum oxygen consumption, while Martin and Gdys (Hill., 1992) stated that there are no changes in VO2 following sleep deprivation (Bryant et al., 1992). In addition, most previous studies have shown that heart rate at a given workload by sleep deprivation is not affected (Hill., 1992 Holland., 1986). (Bond. 1986) reported that heart rate after sleep deprivation decreases. These differences can result from different research methods, including sleep deprivation period, measuring techniques and training methods, so the investigation can add some information about the effect of sleep on performance. Another test, on six patients, sleep deprivation did not show a significant effect on peak oxygen consumption, but the peak exercise heart rate was significantly reduced. These results suggest that sleep deprivation changes psychological responses to exercise of moderate to severe level (Hill. 1992). Chen (1991) examined 30 hour sleep deprivation effects on heart- breathing function at rest and exercise in 15 healthy male volunteers. Results showed a decrease in heart rate, catecholamine levels and blood PH at rest followed by 30 hours sleep deprivation; while the minute ventilation and CO2 production increased ($p < 0.05$). Maximum exercise performance by the maximum heart rate, peak minute ventilation, peak production of carbon dioxide and peak oxygen consumption assessed by the sleep deprivation has decreased. However, significant changes in endurance exercise, PH CO2 and blood pressure during exercise was observed followed by sleep deprivation. Chen. 1991 concluded that 30 hours of sleep deprivation changed the heart- breathing function in relaxation and ability to exercise, but endurance training had not been affected. Pilcher and Huffcutt (1996), in several researches, studied the effect of complete sleep deprivation on some human functions such as mood and thought, rather than cognitive dimensions.

Habeeck et al, (2002) showed sleep deprivation damages precision performance. Dongen von et al (2003) postulated that 4-6 hours of sleep deprivation reduces cognitive function. Scott et al (2006) examined the effect of sleep deprivation on cognitive and motion performance in their study of six persons deprived of sleep and concluded that 30 hours of sleep deprivation had significant effects on the reaction time at rest and during exercise and the reaction time with 26 Sleepless hours significantly increased (Waterhouse, 1998).

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Since in many sports, motion skill performance is of great importance and very few researches had been done on the impact of sleep deprivation on the performed skill, it seems that the conducted study can partly fill the needs of coaches and athletes to control the effects of sleep deprivation in order to get the best results.

Methodology:

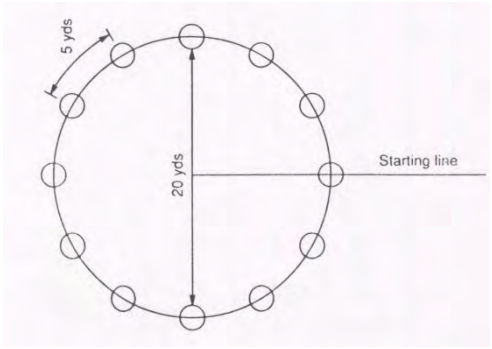

Fig 1. Dribbling test

The statistic samples of this research were 22 members of Sahand university football team with ages ranged between 20 and 24 and at least with 3 years experience in playing football. Samples were completely healthy. They didn't have any abuse such as smoking. They had regular sleep and wake program one month before the test. They didn't do any difficult physical activities 48 hours before the test. All of the samples (here means subject of the test) participated in this research as volunteer. Volunteers (subject) did the dribbling (dribbling clockwise and counterclockwise direction) tests as a pretest after 8 hours sleep. 10 days later, to ensure the validity of the test, subjects run the tests as post-test again after 8 hours of night sleep. 10 days after this process and as the third stage, the independent variable was applied upon subjects. After 36 hours of sleep deprivation, the subjects repeated the test again. The results were recorded as an experimental test. To measure the basic skills of football (i.e. pass and shoot), Mohr Christine test was used. The aim was general evaluation of football. Validity of the test is 81 percent and the stability is reported 92 percent. In the dribble test, a circle of diameter 20 yards (2/18 cm) drawn and a 12 cones 18 inches (72/45 cm), around the circle and the distance of 5 yards (15/4 meters) from each other is placed (Fig-1). A start line perpendicular to the circle is drawn from a point located one foot outside of the circle. The ball is put on the starting line. Following the start command of the station commander, the subject starts to pass through the cones with zigzag dribbling in clockwise direction with his maximum velocity. The time of this movement is recorded in seconds and the subject is asked to do the same movement in opposite direction.

For statistic analysis from descriptive statistics, the resulted average and standard deviation were used and from inferential statistics for investigating the difference of pretest and post-test, significance level of 5% was used and SPSS statistic software and excel software were used for drawing charts .

Results

According to Table 1, average age of the samples (subjects) was 21.56±1.23 years old, average height was 172.06 ± 4.84 centimeter and average weight was 68.56 ± 3.36 kg.

Table 1

Individual specifications

variable	number	Standard deviation	average
age (old)	22	1.23	21.56
Weight(kg)	22	3.36	68.56
Height(centimeter)	22	4.84	172.06
Fat(percent)	22	2.27	13.46

Table 2

The descriptive statistic of dribbling test

Test	Number	Process	Standard deviation	Average
Dribbling(clockwise direction)	22	Pretest	1.1235	17.3622
	22	Posttest of control	1.0691	17.4133
	22	Experimental post test	1.4129	20.0233
Dribbling(counterclockwise direction)	22	Pretest	1.2206	17.4750
	22	Posttest of control	1.0708	17.4083
	22	Experimental post test	1.6465	19.6083

The results of statistical description of subjects are presented in Table 2 and Fig.2. These results indicate that the average movement time for clockwise and counterclockwise directions, before sleep deprivation, were respectively

(17.3622±1.1235), (17.4133±1.0691) and (17.4750±1.2206), (17.4083±1.0708) for validity test or controlling posttest. The average and standard deviation of dribbling test time in experimental posttest which was done after 36 hours of sleep deprivation were respectively (20.0233±1.4129) and (19.6083±1.6465) for clockwise and counterclockwise directions.

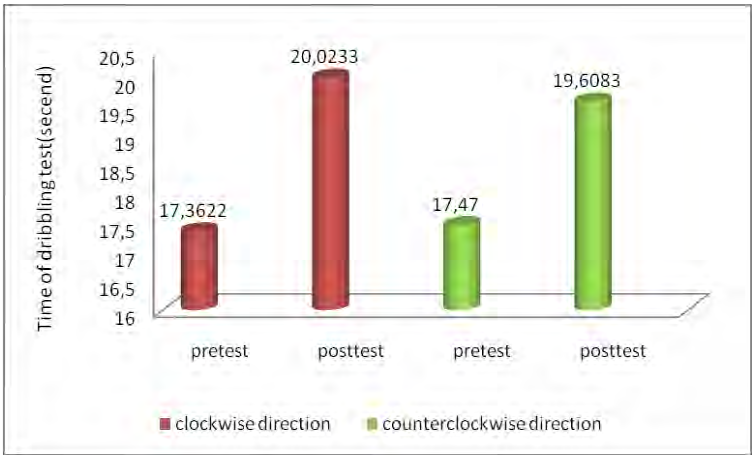

Fig. 2. The results of dribbling test in pretest and posttest.

Considering Table 3 through 4 comparing the results of pretest and post test of dribbling in clockwise and counterclockwise directions, sleep deprivation has a meaningfully effect on subjects' performance. The differences in clockwise and counterclockwise direction test were respectively -7.795 and 07.071. Since the observed T is greater than the T in the Ttest table in a 0.001 level, for both cases, it is resulted that dribbling performance is influenced y sleep deprivation.

Table 3

T test result in the pre-test and experimental post test of dribbling skill in the clockwise direction

	average	Standard deviation	Obs T	Significant level
pre-test	17.3622	1.1235	-7.795	0.001
experimental post test	20.0233	1.4129		

Table 4

T test result in the pre-test and experimental post test of dribbling skill in the counterclockwise direction

	average	Standard deviation	Obs T	Significant level
pre-test	17.4750	1.2206	-7.071	0.001
experimental post test	19.6083	1.6465		

Discussion and conclusion

Sleep deprivation is one of the problems that may occur in athletes caused by long trips (or any other cause) and their optimal athletic performance on race day or practice may be affected. Athletes for many reasons, including excitement, travel, change of habits, change of sleep time, malnutrition, etc are suffering from change in circadian rhythm and in some cases sleep deprivation. Study results showed that 36 hours sleep deprivation has a significant negative impact on performance of pass and shoot skills in football players. Limited studies in this area are mostly done on the impact of sleep deprivation on the physiological and psychological factors. Scott et al (2006) in their study of six persons deprived of sleep and its effect on cognitive and motion performance concluded that 30 hours of sleep deprivation had significant effect on reaction time; Also 26 hours of sleep deprivation significantly increased the reaction time during exercise(Waterhouse., 1998). Flip et al (1993) in other research expressed that sleep deprivation range from 30 to 64 hours has a significant effect on the choice and simple reaction time. Thus, the results of the present study are consistent with the research. Review study of Haack and Mullington (2005) also showed that duration of sleep deprivation has an effect on performance however, less than 20 hours is not impressive and the effects of sleep deprivation usually show up in more than 30 hours of deprivation (Willy et al., 2008 Van Helder., 1989). Considering that the basic skills of football (Dribbling) are needed to be done accurately and quickly and also considering the results of research done regarding the significance of sleep deprivation on performance of skills, and confirmation of the effect of sleep deprivation, controlling the sleep before competitions and exercises becomes necessary to prevent loss of essential functions and soccer coaches persist on the importance of sleep to players and plan a full program on controlling their rest.

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