



The Effect of Sleep Distraction by Ground Travel in different longitude and Latitude on serum Cortisol and Testosterone and behavior manner in youth soccer Players

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Abstract

The goal of research is determining the effect of sleep distraction due to ground travel on serum Cortisol and Testosterone and behavior manner of youth soccer Players. In this regard 15 youth soccer players with age average 18.1 ± 40.24 and height 167.6 ± 66.22 cm and weight 66.7 ± 26.28 kg after two days travel during three weeks in different Iran longitude and latitude and then created distraction in sleep due to Gorgan to Tehran travel and from Gorgan to Khorramabad at night were comparison in Gorgan. Results of variance analysis with repeated measuring in soccer players shown significant decrease of Testosterone from Gorgan to Tehran ($P=0.000$) but increase from Gorgan to Khoramabad. From other hand, distraction in ground travel sleep caused for significant increase of Cortisol in tested persons after travel from Gorgan to Tehran ($P=0.003$) but we have no significant increase in Cortisol after Gorgan to Khoramabad travel ($P=1.000$) and T/C relation show with significant decrease from Gorgan to Terhan ($P=0.000$), but without significant increase of T/C of soccer players from Gorgan to Khoramabad ($P=0.805$). Total grades of manner and behavior between Gorgan and Tehran as are not significant due to statistic ($P=1$, have significant increase and have distraction between players after travel from Tehran to Khoramabad ($P=0.031$). Results shown that ground travel and its distracted disorder may cause to Endocrine system and have considerable effect on manner and behavior response as a function of duration of travel.

Keywords: Sleep Disorders Caused by Travel along Longitude and Latitude; Testosterone; Cortisol; Behavior Manner; Soccer Player

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1. Introduction

Sleep is part of daily life and a regeneration process and recall function of the central nervous system [1] while the start sleeping less done with the symmetry of activity of axis HPA despite increasing activity hypothalamus, hypophysis, adrenal, the phenomenon of insomnia occurs.

While cortisol has a distinct circadian rhythm with high levels after waking up and a reduced wave during the day until bedtime, on the other hand, the circadian rhythm of cortisol is related to the rhythm

of sleep and when sleep is disturbed, it also changes [2]. On the other hand, the secretion of testosterone is seen during daily and nighttime sleep, while seasonal changes, the daily cycle of light and dark, sleep and stress are examples of environmental factors that affect hormonal rhythms. However, environmental changes affect psychological performance, Therefore, the biological pattern of hormones may be affected by sleep deprivation, Of course, sleep is not the only responsible factor for the secretion of hormones, these hormones are often secreted in response to physical and

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psychological stress. Some studies have shown that hormonal changes and mood response are the result of insomnia [3-6]. F. Moegin et al. (2001) conducted a study on 8 male athletes who were deprived of sleep and insomnia after taking a sleeping pill. They found that in all conditions the growth hormone prolactin, cortisol, and vectocolamines showed a significant increase, in addition, sleeping with a sleeping pill did not change the response of the hormones being measured [1]. Jay Locke and E. Chamoux (2003) examined the increasing levels of salivary cortisol as a result of sleep deprivation in shift workers. In this study, 63 shift workers participated in an industrial company whose work schedule was changed three times. A similar cortisol was recorded for night and evening work shifts, but a 6-fold increase in morning shift workers was observed as a result of sleep deprivation as a result of shift workflow [4]. Or Anna Androni et al. (2009) in a study of the effect of travel stress on physiological indicators in racehorses. Their research showed that the increase in plasma cortisol was due to travel and this rate did not change with increasing travel Increased odor base criteria [7]. M.A.L. In a study of 60 male rats, Anderson et al. Found a decrease in testosterone levels in response to sleep deprivation [8]. In this study, 1,312 men aged 65 and over who lived in a public utility complex were kept in a home for 72 hours to assess the duration of sleep and related problems. The results showed that men with lower testosterone levels had less sleep and increased awakening [9]. According to recent studies, the hypothesis that insomnia causes an undesirable mood response [3,4,6,10]. In a study, Die Orton (1989) examined the mood responses of 14 male and 6 female home observers after night work. The results showed that sleep deprivation increased nervous stress, violence, fatigue, confusion, depression, stress and significantly reduced range

of mood power [11]. Mindy Angel and colleagues (2003) examined the effect of lack of sleep on the amount of effort the next day and came to this conclusion. Mood swings in 5 items (depression, strength, pressure, confusion, anger) regardless of the meaning of the drug fatigue were associated with a significant increase in insomnia group [5]. Sleep disorders may be experienced by athletes who wake up early in the morning to travel and participate in competitions or those who cannot sleep because of the stress of a competition. Such disturbed sleep may have an effect on the sleep-wake cycle and the release of hormones, including cortisol [1]. Due to the importance of possible changes in hormonal secretions and subsequent mood responses due to sleep disturbances caused by ground travel in athletes and the existence of obvious discrepancies in the results of previous studies in this field. Responding to sleep disturbances caused by ground travel is considered a stressor. Our assumption is that sleep disturbances caused by land travel affect the hormonal changes and mood responses of subjects.

2. Materials and Methods

2.1. Subjects

Among the teams present in the first division of Golestan province in the youth category, 15 young football players with about 3 to 5 years of sports experience participated in this research as a targeted and available sample that Based on the information of the researcher-made questionnaire, including the history of activity, sleep history and prior to hormonal diseases, and non-smoking, they were selected as the subjects of the research. After selecting the subjects, the details of the research were explained to them and their parents in detail, and the parents' written consent to participate in the research was signed by the parents. The general characteristics of the subjects are presented in Table 1.

Table 1. General characteristics of subjects. Statistical indicators based on mean and standard deviation.

Indicators	Average and standard deviation
Variables	
Calendar age (year)	18.4±1.24
Weight (kg)	66.26±7.28
Height (cm)	167.66±6.22
(BMI)	23.60±2.47
History of sports activities (year)	3.5±1.45

2.2. Study plan

The experiment consisted of three stages: 1- The first part of the experiment (basic criterion) was performed on the day after the normal sleep of the subjects at 10:00 AM by filling out the questionnaire of mood and blood sampling of the left ventricular anticoagulant vein of the subjects. 2-

The next part, which was the stage of sleep disorder caused by earth travel during 50 to 53 east and 36 to 35 north latitude from Gorgan to Tehran, Immediately after arriving in Tehran, the subjects filled out a questionnaire about their mood and a blood sample was taken from them at the same time. 3- The third stage of this study was performed

the following week with a trip from Gorgan to Khorramabad along 47 to 50 degrees east and 33-34 degrees north latitude. The tests were performed at 10 a.m. During the nights before the tests, they were not allowed to drink coffee or tea and other stimulants and their meals were tested on three test nights so that the food did not affect their lack of sleep.

Hormonal assessment:

Measurement of serum testosterone concentration of subjects was measured using CLIA¹ method and Diasorn trading machine made in the United States (CV) was carefully measured at 2% ng / dl. The serum cortisol concentration of the subjects was measured using RIA method and the manufacturing quality of Immunotech Company of France was measured with an accuracy of 2% micg / dl (CV).

2.3. Statistical Method

The results of the present study showed that the serum testosterone concentration of the subjects between Gorgan and Tehran cities had a significant decrease ($p = 0.000$). However, an increase from Gorgan to Khorramabad was observed after sleep disturbance due to land travel, which was not statistically significant ($p = 0.858$).

Serum cortisol concentration of subjects between Gorgan and Tehran cities showed a significant increase ($p = 0.003$) and There was no significant change in serum cortisol concentration between subjects in Gorgan and Khorramabad after sleep disturbance due to ground travel ($p = 1,000$).

The general mood score of the subjects increased between Gorgan and Tehran cities but they were not statistically significant ($p = 1/000$). However, a significant increase in the general mood score of the subjects was observed between Gorgan and Khorramabad cities after sleep disturbance due to land travel ($p = 0.031$).

The subjects' confusion scale and mood swings did not show a significant difference between Gorgan and Tehran cities ($p = 1.000$) and a significant increase in the score of confusion and mood disturbances of the subjects between Gorgan and Khorramabad cities was observed after sleep disturbance due to land travel ($p = 0.008$).

Sub-scale fatigue of subjects among Gorgan and Tehran cities showed a significant increase ($p = 0.000$) and There was also a significant increase in the subjects' mood fatigue score between Gorgan and Khorramabad cities after sleep disturbance due to land travel ($p = 0.000$).

Substantial strong subscales of subjects between Gorgan and Tehran showed a significant decrease ($p = 0.030$) and a significant decrease in the morale of the subjects between Gorgan and Khorramabad cities was observed after sleep disturbance due to land travel ($p = 0.001$).

Sub-scale anger of subjects among Gorgan and Tehran cities decreased slightly, which was not statistically significant ($p = 0.480$) and A significant increase in mood scores of subjects was observed between Gorgan and Khorramabad cities after sleep disturbance due to land travel ($p = 0.020$) but Given that the value of the corrected critical level of the Wilcoxon test, which is greater than 0.01667, the result is insignificant.

The subscales of temperament depression in Gorgan and Tehran have decreased, which is statistically significant. Among the cities of Gorgan and Khorramabad, it was statistically significant ($P = 0.091$).

Substantial pressure scale of the subjects showed an increase between Gorgan and Tehran cities, although it was not statistically significant and increased between Gorgan and Khorramabad cities, which was not statistically significant ($P = 0.195$).

3. Discussion

The results of this study showed that testosterone decreased statistically during the first trip from Gorgan to Tehran, which was statistically significant. However, during the second trip from Gorgan to Khorramabad and its aftermath, the disturbance in sleep caused a slight increase in serum testosterone levels. But this increase was not statistically significant. Decreased testosterone levels are associated with increased stress levels [12-15]. Therefore, it seems that the first trip, due to its research nature and dullness, and the psychological and physical stress caused by the land trip, caused a decrease in testosterone levels. Elizabeth Burt (2008) showed that less sleep is associated with lower testosterone levels [9]. However, the first trip reduced testosterone levels. On the other hand, an increase in testosterone concentration occurs 10 to 30 minutes before the transition from sleep to non-rapid eye-to-eye movements with rapid eye movements [16]. Based on this principle, it is possible that during the second trip, due to the long journey and the subsequent sleep disturbance, different results were observed with the first trip at testosterone levels. ML Anderson (2004) found that insomnia reduced testosterone levels in mice deprived of sleep [8]. Another finding of this study was an increase in cortisol levels, so that during the first period, an increase in cortisol levels that was statistically significant during the second trip did not increase statistically. Various studies have shown that stress increases levels. Becomes cortisol [1,17]. The results of the present study examined the findings of Johnson Park (2006) who examined the levels of stress hormones in the urine at the same time as shift work in shift workers in South Korea and concluded that night shifts increased cortisol levels [17].

Table 2. Statistical indicators calculated for research variables

Variables	Reference night (gorgan) (Length 54-56) (37-38 north latitude)	Tehran (Length 50-53 East) (North latitude 36-35)	Khoramabad (Length 47-50 east) (Width 34-33 north)	Value p		Result	
				Tehran	Khoramabad	Tehran	Khoramabad
Serum testosterone concentration	409.33±99.839	292.13±80.083	438.73±58.220	p=0.000	p=0.858	♣	⬆
Serum cortisol concentration	17.578±2.948	22.121±4.341	17.800±5.085	p=0.003	p=1	♣	⬆
The overall score of the mood	14.733±4.216	15.467±4.068	25.667±13.982	p=1	p=0.031	⬆	♣
People's anger	0.5333±0.743	0.4000±0.507	3.004±3.184	p=0.480	p=0.020	⬆	♣
Confusion	1.400±1.764	1.400±1.121	4.000±3.184	p=1	p=0.008	⬆	♣
Mood depression	1.266±1.624	0.5333±0.516	2.133±2.503	P=0.091	P=0.091	⬆	⬆
Mood fatigue	1.533±0.990	5.533±2.924	8.400±3.924	p=0.000	p=0.000	♣	♣
Mood pressure	1.066±1.533	1.133±0.990	2.600±2.164	P=0.195	P=0.195	⬆	⬆
People's strength	8.933±2.987	6.466±3.542	5.133±3.136	p=0.030	p=0.001	♣	♣

* =Meaning at level P <0.05

♣ = indicates meaning

⬆= indicates the absence of meaning

In this regard, Joanna et al. (2009) found an increase in plasma cortisol during horse transport as a result of terrestrial travel [7]. On the other hand, despite the lack of similarity in the selection of subjects in this study, there is no difference of opinion on the stressful nature of sleep apnea and its aftermath. In another study, Pierre Merlot (2002) found that sleep deprivation was a factor in a small increase in ACTH, while glucocorticoid exposure had a significant effect. Which affect metabolism to memory and retrieval, and as important as they are for these functions, over-increasing them have their own side effects [18]. As I mentioned in the present study, cortisol levels showed different changes in the second trip compared to the first trip. It is possible that the unfavorable environment during the trip was one of the effective factors for hormonal response while the difference between the current study and previous studies may be related to the stages of insomnia or the difference between homework and laboratory conditions, ask for more information. However, these results cannot be generalized to chronic insomnia. Another finding of this study was an increase in the overall mood index during sleep disturbance due to land travel, which was not statistically significant. However, during the second trip and with the increase in the length of the second distance, this increase was statistically significant. It seems that this increase is a function of the duration of the trip and the subsequent disruption caused by the trip. Sleep disorders often cause mood swings and it can affect people's

performance due to the fact that the study of psychological behavior can affect the physical indicators in some way, they can be identified before behavioral changes occur. The two most important indicators in the mood response are mood fatigue and other mood swings. Various studies have shown that these mood swings are inversely related [5,6,10,17]. In this study, as expected, mood swings increased over two years. At the same time, the people's morale was declining. Therefore, it can be stated that increased fatigue and decreased strength in response to sleep disturbances caused by sleep apnea are probably due to the unsuitable environment created for the same trip as the unsuitable vehicle. And this was in line with research that showed that a harsh and sleep-deprived environment increases fatigue and reduces fatigue [3]. An important point in sports science is the ratio of testosterone to cortisol as an anabolic to a catabolic ratio [19]. In this study, the correlation between temperamental fatigue of subjects and the ratio of testosterone to cortisol after sleep disturbance due to ground travel was shown that There is a correlation between these factors It seems that the effects of earthly travel have been effective in all these factors. However, there was no correlation between subjects' mood swings and testosterone-to-cortisol ratio after sleep disturbance due to ground travel. Therefore, sleep disturbances caused during travel are associated with stress, which is likely to increase the effective mood of increasing cortisol hormone levels.

4. Conclusion

In short, most athletes are concerned about the effects of insomnia and fatigue caused by ground travel on exercise in their activities [1,3,9,11,20]. The final conclusion of the present study clearly shows that sleep disturbance caused by ground travel can be considered as an influential factor on the endocrine system. Sleep disturbance appears to affect mood responses, and the severity of this effect depends on the length of the trip and the disruption that follows. Increased fatigue, decreased mood, and elevated levels of cortisol and changes in testosterone levels have all been shown to be stressful. The results of this study can be considered as a potential candidate for disorders created during travel, and despite minor differences in the effect of sleep disturbance caused by travel on mood and hormonal concentration, the use of travel for individuals should be carefully considered.

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