The Effect of Night Futsal Sport on The Level of Cortisol Serum In Young Adults

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Abstract. In general, futsal sport is done during the day. However, the busyness in life and recent modern culture makes people shift their behavior to do futsal sport at night. This research has purpose to know the effect of futsal night-sport towards cortisol serum level in young adults. The method that is used in this research is quasi-experiment with pretest-post-test control group design. This research is conducted in Beex Indoor Futsal field, Makassar. The samples are chosen by using purposive sampling technique, at approximately 18 persons. The data collecting method to analyze the cortisol serum level is done at 9 pm and 11 pm Middle Indonesian Time Zone or before and after the futsal sport for 2 x 20 minutes. The area of sample collection of blood/incretion in the area of vena mediana cubiti has been disinfected by 70% alcohol. Vena blood is taken 30 minutes before and after the intervention for about 3ml by using spoit to check the cortisol serum level, and then the blood sample that has been taken will be centrifuged in Hasanuddin University Makassar Hospital. The data is analyzed by using Wilcoxon test. The result of the research shows that there is no significant effect towards cortisol serum level when doing a night futsal sport (p = 0.678). The conclusion of this research is that there is no significant cortisol serum level when doing a night futsal sport. The significance is determined based on p<0.05 score.

1. Introduction

Sport are generally useful to maintain and improve mobility and independence of motion (dynamic healthy). Sport prevents, inhibits travel and relieves symptoms of non-infectious diseases, including curing diseases of physical weakness and weight control along with dieting, boosting morale and sleep quality [4].

Physical activity or sport is a part of the basic needs in everyday life, especially an increase in health level that according to our ancestors is part of our life portion. However, with the growth and development in the world of technology today, it facilitates all activities that cause us less mobile (low body movement) or with other terms hypo-kinetic, such as the use of remote controls, computers, elevators, escalators, transportation, and other sophisticated equipment without the same portion of physical activity [8].

In general, the activity contained in sports activities consists of a combination of two types of anaerobic and aerobic activities. Anaerobic sport (without O2) is a short-term high-intensity activity, for example weightlifting and 100 meters sprint, which take place in a matter of seconds and is solely depended on the energy stored in the muscles and glycol-sis. It is different from aerobic sport (with O2) that involve many muscle groups and carried on by low enough intensity and for a quite long period of time so that the sources of fuel can be converted into ATP using the citric acid cycle and the
electron transport chain as a metabolic main pathway. Aerobic sport can be maintained from 15 to 20 minutes up to several hours in a single turn [16].

Aerobic sport is needed to develop and maintain cardiorespiratory health and desired body composition. To improve health, sport should be intensive enough to raise your heart rate from 60% to 90% of the maximum (HR max). In addition, sport should be done continuously for 20-60 minutes and should be done 3 up to 5 days a week [12].

Sport is one of the very physiological and meli-stimuli for body systems, be it the muscular system, the nerves, the metabolic system and the hormonal system [10]. One of the most popular sport today is futsal. Futsal is an sport that uses high physical, techniques, and tactics on the players. Futsal has the same period as basketball at 2 x 20 minutes and is played on a 40 x 20 m field with 3 x 2 m wicket. A team consists of five players, with four pitches and one player as a goal keeper. Maximum amount player in squad for the match is 12 (Ten field players and two goalkeeper). Team can request time-out (1 minute) in each half and there is a 10-minute rest between match sessions. Every game is led by two referees and a linesman [1].

Futsal demands physical ability due to its very complex movements [18]. In general, futsal sport is performed during the day. However, the busyness in life and recent modern culture, most people switch to do futsal sport at night.

Sport at night causes some adverse effects on the body, such as insomnia and also resulting in muscle tension [9]. It can also affect the biological clock. Physiologically, the night time, which is part of the circadian rhythm, is the best time for the body to repair cell and tissue damage from toxic free radicals produced as a side product of metabolism during daytime activities [16].

Circadian rhythms (in a day) or diurnal rhythms (day and night) are fluctuations characterized by repeated oscillations of regular and 24-hour cyclic hormone levels [16]. Circadian rhythms secrete many hormones, including melatonin, cortisol, and adrenocorticotropic hormone (ACTH), with additional circadian rhythm for growth hormone (GH), male testosterone and monthly cycles for female reproductive hormones. There is also a circadian rhythm for body temperature, blood pressure, heart rate, and electrolyte excretion [16].

Cortisol is the main glucocorticoid as a stress hormone that plays a role in the metabolism of carbohydrates, fats and proteins [15,16]. Glucocorticoids serve as an intermediary metabolism of gluconeogenesis and homeostasis maintainers of the internal environment of the body [11]. Stress is a condition that is a psychobiological consequence of the failure of living organisms to respond successfully to any physical or emotional threats, both actual and imaginary threats, acting as stressors [15]. Almost every kind of physical and mental stress of stress within a few minutes can improve as a result of ACTH and cortisol secretion is also greatly improved, even up to 20-fold [7].

Cortisol is secreted by the adrenal cortex derived from peripheral endocrine glands. Many endocrine control systems involve neuroendocrine reflex, which includes both nerve and hormonal components. The purpose of this kind of reflex is to produce a sudden increase of hormone secretion in response to external stimuli of the body [7]. Nerve impulses to the endocrine glands are the only factors that regulate hormone secretion, such as epinephrine secretion by the adrenal medulla controlled solely by the sympathetic nervous system [3]. In contrast, some endocrine control systems include feedback control (which maintains basal levels of hormones) and neuroendocrine reflexes (which leads to sudden increase of secretions in response to the sudden increase in the need for such hormones). One example is that the increased secretion of cortisol which is a stress hormone by the adrenal cortex during a stress response [16].

Cortisol response to sport depends on the duration and the intensity of sport. Despite influenced by the intensity and duration of sport, cortisol response is also influenced by the fitness status, nutritional status, and the body's circadian rhythms [6].

Plasma cortisol concentrations show typical diurnal rhythms, with the highest levels occurring in the morning and lows at night. This diurnal rhythm, which is intrinsic to the hypothalamic-pituitary control system, is concerned primarily with the wake-up cycle [16].

Bassed on this assumptions, then this research was conducted to know how night futsal sport affects cortisol levels in the body. The purpose of the research was to examine the effect of night futsal sport on the level of cortisol serum in young adults.
2. Materials and Methods

2.1. Location and research design
This research is a quasi-experimental research with pre-test post-test control group design. There are two groups that carried out the measurement of pre-test and post-test, i.e. group control without given intervention and experiment group given intervention [17]. This research was conducted in Beex futsal Indoor field in Makassar and then analyzed in Clinical Pathology Laboratory of Hospital in Hasanuddin State University of Makassar.

2.2. Sample and population
The population in this study is all students (young adults) who live in the city of Makassar. The method to collect samples in this study is purposive sampling i.e. the sampling technique based on a particular judgment made by the researchers themselves, based on the characteristics or properties of the previously known populations [14].

2.3. Data collection method
Data collection for serum cortisol level analysis was performed at 9 pm and at 11 pm or before and after futsal sport for 2 x 20 min. The area of blood sampling / insertion in the median cubital vein has been disinfected with 70% alcohol. Venous blood taken 30 minutes before and after intervention of 3 ml by using spoit for serum cortisol examination, then blood samples that have been taken will be done a centrifuged process at Hasanuddin University State University Hospital Makassar. Blood sampling was conducted by experts from University Hospital Laboratory University Hasanuddin Makassar.

2.4. Data analysis
Data analysis was performed on each independent variable and dependent variable by using paired t test to determine the effect of independent variable towards dependent variable if the data are distributed normally and Wilcoxon test if the data are not normally distributed with p = < 0.05 significance through SPSS 22.0 computer program.

3. Results
The design of this study uses quasi-experimental research method with pre-test post-test control group design. It is where the subject will dianamnesa first by knowing age, weight, height, blood pressure and heart rate. The population of this study were all young adult males with 18-24 year age range, which would then be divided into two groups where one group was given intervention (the group given the intervention in the form of night futsal for 2 x 20 minutes) while the other group as a control group.

This research was conducted for 3 months starting from the month of March to May 2015, with the number of respondents in this study were 20 respondents, one of them was dropped out, and the results of data analysis obtained 1 data is out lier. So, the total respondents who meet the criteria are as many as 18 people.

Prior to treatment, a blood sample was taken 30 minutes before the intervention for examining the level of serum cortisol. Similarly, 30 minutes after the intervention, blood sampling for serum cortisol level was taken. All blood samples have been taken and it will be centrifuged in RSPTN Hasanuddin University to measure the level of serum cortisol.

| Variable  | Denomination | (n = 18) | Mean ± Std. Deviation |
|-----------|--------------|---------|-----------------------|
| Age       | Year         | 18      | 22                    | 21.16 ± 1.29 |
| Weight    | Kg           | 44      | 69                    | 54.50 ± 7.77 |
| Height    | Cm           | 160     | 171                   | 165.27 ± 3.21 |
| Systolic  | mm/Hg        | 105     | 135                   | 120 ± 9.23  |
| Blood Pressure          | Diastolic Blood Pressure mm/Hg | 70  | 90  | 80  | 82.50 ± 6.91 |
|-------------------------|--------------------------------|------|------|------|--------------|
| Heart Rate              | bpm                            | 53   | 87   | 70   | 69.22 ± 9.62 |

Table 1 shows the characteristics of the study subjects, showing the average study subjects aged between 18-23 years with median 22 years and mean ± standard deviation 21.16 ± 1.29 years. Subject weight ranges from 44 to 69 kg with median of 50.50 kg and mean ± standard deviation of 54.50 ± 7.77 kg. The subject height is 160 - 171 cm with median 165 cm and mean ± standard deviation 165.27 ± 3.21 cm. The systolic blood pressure of the subjects ranged from 105 - 135 mmHg with median 120 mmHg and mean ± standard deviation of 120 ± 9.23 mmHg. The diastolic blood pressure of the subjects ranged from 70 to 90 mmHg with median 80 mmHg and mean ± standard deviation 82.50 ± 6.91 mmHg. Heart rate ranges from 53 - 87 bpm with median 70 bpm and mean ± standard deviation 69.22 ± 9.62 bpm.

Table 2. The Influence of The Night Futsal Exercise on The Certified Serum Service

| Kelompok | n     | Median (Min/Max) | Pretest | Posttest | Perubahan | N  | ilai p* |
|----------|-------|------------------|---------|----------|-----------|----|---------|
| Futsal   | 10    | 5.91 (2.79/32.17)| 4.95    | (0.63/54.57) | -0.87 (-12.26/25.15) | 0  | 678     |
| Control  | 8     | 5.18 (0.71/54.41)| 1.50    | (0.73/60.56) | -0.03 (-9.18/6.15)  | 1  | 000     |

Table 2 shows changes in serum cortisol levels before and after performing futsal sport, where the median values of serum cortisol levels in the evening futsal group on sampling prior to futsal intervention showed a value of 5.91 nmol/L, whereas for sampling after the intervention showed a value of 4.95 nmol/L, and the median value of the change, at -0.87 nmol/L. As statistical tests using the Wilcoxon test for this group obtained a value of 0.678 or the value of p> 0.05. This suggests that there was no significant change in the level of serum cortisol before and after futsal intervention at night.

In the control group, it is gained a median value of serum cortisol levels at the start of sampling showed a value of 5.18 nmol / L, whereas for subsequent sampling showed a value of 1.50 nmol / L, and the median value of the change of -0.03 nmol / L. As statistical tests using the Wilcoxon test for this group obtained a value of 1.000, or the value of p> 0.05. This indicates that there was no significant change in serum cortisol levels between 9 pm and blood taking at 11 pm, as shown in the following figure: the control group, it is gained a median value of serum cortisol levels at the start of sampling showed a value of 5.18 nmol / L, whereas for subsequent sampling showed a value of 1.50 nmol / L, and the median value of the change of -0.03 nmol / L. As statistical tests using the Wilcoxon test for this group obtained a value of 1000, or the value of p> 0.05. This indicates that there was no significant change in serum cortisol levels between 9 pm and blood taking at 11 pm, as shown in the following figure:
4. Discussion
This study shows that there is no significant change in night futsal group with the value of $p = 0.678$ greater than 0.05. This is consistent with that proposed by reference [2] that there was no significant increase in serum cortisol levels in sport with acute responses. Reference [13] also suggests that moderate and non-pathological elevations of cortisol are linked not only to sport but also to quality of life.

This can also be due to low sport intensity with a short duration of 2 x 20 minutes and is not competitive, so changes in serum cortisol levels before and after intervention do not look so real.

Moreover, in theory, CRH, ACTH and cortisol secretion speed are all high in the early morning, at approximately 75% of cortisol formation occurs between 4 and 10 o’clock in the morning but becomes low in the late afternoon between 5 pm and midnight or 1 am. Highest plasma cortisol levels of approximately 20 µg/dL an hour before sunrise in the morning and the lowest is approximately 5 µg/dL around midnight. This effect is resulted from changes in the signal cycle of the hypothalamus during the 24 hours that cause the secretion of cortisol [3,7].

While in the night, control group showed that there was no significant change with the value of $p = 1.000$ or greater than 0.05. This is due to the absence of the treatment given to trigger a rise in serum cortisol levels, besides that the night time is also a circadian period that suppresses the secretion of the hormone. In addition, in theory, reference [16] states that plasma cortisol concentrations show typical diurnal rhythms, with the highest levels occurring in the morning and the lowest level at night.

5. Conclusion
Based on the results of the study and discussion, it can be concluded that night futsal with low to moderate intensity and with 2 x 20 minutes duration did not affect serum cortisol levels. This is proven by there is no significant change in night-futsal group and control group. It is recommended that further research with more samples is required in order to obtain more adequate results and be comparable to this study. For the next researchers, they should control the physical activity, diet and sleep patterns of respondents at a maximum of 2 weeks before doing research as well as at the time before and after sport intervention so that factors that are likely to confound the results of research can be minimized. Based on the results of research, it seems that futsal sport can be done at night as long as the intensity is around low or medium and the duration is not that long.
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