Study on the Fatigue in the Basketball Games

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Introduction

Basketball is a one of the most popular sports event in Japan. It is not only a part of the factor of our social lives, but also they are a factor of our health promotion. Neither the professional nor the amateur, sports activity must be healthiness. School education has been adopted basketball game in the class of physical education, and the basketball events open frequently at weekend for the extracurricular activity.

In this study focused on the fatigue of the basketball players at college basketball league match (held 2003/8/9-12), and measured blood hemoglobin and lactate values. This event (basketball) was considered as a short term, however, the players have to pay large effort to play the games for win because the players must execute upon eight games within four days (two games per a day).

The purpose of this continuous study was to investigate the fatigue and the trend of hemoglobin of the basketball players for grasping clear correlation between the ATP and lactic acid production.

Material and Method

Subjects

The subjects in this study are five healthy, normal males (aged (mean±SD)) who were the basketball athletes. Table 1 showed body characteristics of the subjects.

Table1. Body Characteristics of the subjects

Sub.	Age	H(cm)	W(kg)	%Fat
1	21	180.4	76.5	16
2	20	188.6	83.6	14
3	20	189.4	83.2	12
4	21	174.2	64.4	12
5	21	170.8	62.7	12
M	20.6	180.6	74.0	13.2
SD	0.49	7.46	8.9	1.6

Method

1) lactic acid

Taking a blood sample from the top of a middle finger, and measurements lactic acid were respect with Lactate-Pro™.

2) hemoglobin

Taking a blood sample from the top of a middle finger, and measurements hemoglobin were respect with Blood Hemoglobin Photo Mater.

Material

Lactate-Pro™ (Arkray Factory Co. /Japan)

Blood Hemoglobin Photo Mater (Hemo-Cue AB/ Sweden)

Results

The average of the lactic acid resting state within 4days showed a tendency of increasing day by day, however, it was the normal range physiologically. Table 2 showed the values of the lactic acid resting state.

The average of the hemoglobin resting state within 4days showed a tendency of increasing day by day, however, it was the normal range physiologically. Table 3 showed the values of the hemoglobin resting state.

The average of the lactic acid during exercise after the second games showed lower values than the first games through 4daiys. And the production of lactic acid gradually decreased. Table 4 showed the values of the lactic acid during exercise.

The average of the hemoglobin during exercise after the second games showed lower values than the first games each day, respectively($p<0.05$).

Table 5 showed the values of the hemoglobin during exercise.

Table2. The Values of Lactic Acid resting state (mmol/l)

Sub.	Day 1	Day 2	Day 3
1	1.2	1.2	1.1
2	1.3	1.4	1.4
3	1.1	1.1	1.3
4	1.2	1.4	1.2
5	1.2	1.2	1.2
M	1.2	1.3	1.2
SD	0.063	0.1	0.1

Table3. The Values of Hemoglobin resting state (g/dl)

Sub.	Day 1	Day 2	Day 3
1	14.6	14.4	14.6
2	15.2	14.9	15
3	14.6	14.6	14.4
4	14.4	14.4	14.1
5	15.6	15.4	15.4
M	14.88	14.74	14.7
SD	0.44	0.37	0.45

Table4. The Values of Lactic Acid during exercise (mmol/l)

Sub.	Dy1-1	Dy1-2	Dy2-1	Dy2-2	Dy3-1	Dy3-2
1	7.4	6.4	7.8	6.4	6.2	5.4
2	12.2	12.4	11.6	10.2	10.6	9.3
3	12.4	12.4	12.6	9.8	7.8	6.2
4	6.6	6.2	5.9	5.2	6.2	4.8
5	5.8	4.8	5.1	4.8	3.6	3.2
M	8.88	8.44	8.6	7.28	6.88	5.78
SD	2.839	3.280	3.006	2.286	2.296	2.016

Table5. The Values of Hemoglobin during exercise (g/dl)

Sub.	Dy1-1	Dy1-2	Dy2-1	Dy2-2	Dy3-1	Dy3-2
1	14.8	14.6	14.8	14.2	14.4	13.8
2	15.5	15.2	14.8	14.6	13.7	13.2
3	16.2	15.6	15.2	14.2	14.1	13.6
4	14.8	14.2	14.4	13.8	13.6	13.2
5	15.6	14.6	15.1	14.4	13.8	13.2
M	15.3	14.8	14.9	14.2	13.9	13.4
SD	0.53	0.50	0.28	0.27	0.29	0.25

Discussion

Lactic acid:

The measurements of the production of lactic acid were not stable. Even though the contents of games were quite heard or not, uneven values of lactic acid found each player's positions. However, as I mentioned before about the lactic acid, the values of the subjects tended to decrease that it means deterioration of the player's performance.[1)] The factor of this situation is able to prevent to consider the term of the event. Lactic acid production is not only by-product, but also it is important process for Physiological energy system (ATP production) that it provides to muscles when the muscle power required. Thus, the longer term should be able to keep the player's performances better and there physical condition more healthy than the present.

Hemoglobin:

The measurements showed the value of hemoglobin to increase or to decrease that they were the normal ranges. the measurements should not show any correlation with the fatigue.

Glycolysis and ATP Production:

Decreasing ATP production should be factor of the obstruction to high power performance, such as jump, stop, and dash in basketball games. These high power performances require the fast glycolysis system. And also players require the slow glycolysis system for transition in the games. The fast glycolysis products high level of lactic acid, so decreasing ATP supply means to show lower level of performance.

In this study, the measurement of lactic acid found one of the factors of fatigue in the basketball games. Investigating the correlation between lactic acid and glucose should make a distinct area of fatigue in basketball games.

Reference

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Abstract

The purpose of this continuous study was to investigate the fatigue and the trend of hemoglobin of the basketball players for grasping clear correlation between the ATP and lactic acid production. Subjects in this study are five healthy, normal male (aged (mean±SD)) who were the basketball athletes.

The following results are obtained;

1) The average of the lactic acid during exercise after the second games showed lower values than the first games through 4daiys.
2) The values of lactic acid during exercise decrease gradually through 4days.
3) The average of the hemoglobin during exercise after the second games showed lower values than the first games each day, respectively ($p<0.05$).
4) Therefore, a significant consideration of the fatigue depends on the event term.

2 games per day should be quite heavy duty for the basketball players. And more investigating the correlation between the glycolysis and ATP production, such as glucose testing, should be the factor of prevention of the fatigue.