

Influence of Pre-competition Intensive Training on B Lymphocyte Immunity of Excellent Track and Field Athletes

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Abstract: Objective: Study the influence of pre-competition intensive training on B lymphocyte immunity of excellent track and field athletes. Method: Select 10 excellent track and field athletes of the school to receive pre-competition intensive training and observe the influence of long-time training and competition on B lymphocyte immunity of these athletes. Result: In this study, the concentration of serum IgG of these athletes is obviously lower than normal value before and after training. The comparative result has visible difference and is of statistical significance ($p < 0.05$). After one-month intensive training, the concentration of SIgA increases gradually, is visibly different from that before training, and is of statistical significance ($p < 0.05$). The change of the concentration of SIgA has positive correlation with that of IgG and has negative correlation with that of IgA and IgM. After competition, the change of the concentration of SIgA has negative correlation with that of IgG and has positive correlation with that of IgA and IgM. Conclusion: The pre-competition intensive training to excellent track and field athletes will not cause significant influence on the concentration of serum immunoglobulin of athletes, but SIgA will increase visibly, indicating that the mucosal immune system of athletes is in good condition.

Keywords: B lymphocyte immunity, excellent track and field athletes, pre-competition intensity training.

1. INTRODUCTION

With the continuous popularization in recent years, the level of track and field athletics gradually improves. To enhance athletes' self quality, proper training way should be adopted during intensive training. Recently, track and field athletes suffer from different diseases in routine training, including cold, fever, common respiratory diseases, etc., which has a strong impact on normal training and playing at normal level. Pre-competition intensive training to track and field athletes contributes to reducing the influence on athletes' immune system. To study the influence of pre-competition intensive training on B lymphocyte immunity of excellent track and field athletes, this paper selects 10 excellent track and field athletes of the school to receive pre-competition intensive training and analyzes the results. The details are shown below:

2. OBJECTS AND METHODS

2.1. Objects

Ten excellent track and field athletes of the school, including five male athletes and five female athletes, are selected as objects of study. These objects are in good health and do not suffer from any serious endocrine system diseases. They are 18 to 26 years old on average, their height ranges from 168cm to 178cm, and weight ranges from 50kg to 68kg [1]. See Table 1 for analysis on general information.

2.2. Experimental Methods

2.2.1. Detailed Contents

All athletes should take a one-month pre-competition intensive training. Speed training, physical training and endurance training should be done weekly. To enhance the willpower of the athletes, various training activities should be carried out in practice. See Table 2 for detailed arrangements.

2.2.2. Sample Collection

Take 3ml venous blood from each athlete in the first week after pre-competition intensive training; take 3ml venous blood and 3ml saliva from each athlete after one-month pre-competition intensive training; put all blood and saliva samples collected into common test tube and place in the lab for 30min; and then centrifuge blood samples at 2500r/min for 10min. Before collecting saliva, athletes should gargle with clear water, centrifugation of naturally-secreted saliva at 3000r/min should be done before taking supernate; send samples to immunological detection center for testing; finally, take 3ml venous blood and 3ml saliva from each athlete after competition, keep in 0-4°C refrigerator, and send to testing center in time for examination [2].

2.2.3. Testing Methods

In this study, Array360System automatic analytical instrument is used to analyze the samples by rate nephelometry and measure IgG, IgA and IgM coefficients. The kit selected is original auxiliary product [3].

Table 1. Analysis on general information of objects of study.

Number of Cases(n)	Average Age (year)	Average Height (cm)	Average Weight (kg)	Average Training Time (year)
10	22±1.2	174±5.12	64.9±2.1	6.9±1.2

Table 2. Weekly training contents.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Speed training	Speed training	Physical training	Adjustment	Speed training	Speed training	Adjustment and relaxation
	Endurance training			Physical training		

Table 3. Change of the concentration of IgG before and after intensity training and after competition.

	Before Pre-competition Intensive Training	After Pre-competition Intensive Training	After Competition	Normal Value
IgG/(g.L ⁻¹)	10.23±0.98	10.56±1.25	10.78±1.21	12.56±2.5

Table 4. Change of the concentration of IgA and IgM before and after intensity training and after competition.

	Before Pre-Competition Intensive Training	After Pre-Competition Intensive Training	After Competition	Normal Value
IgA/(g.L ⁻¹)	2.35±0.85	2.24±0.56	2.31±0.57	2.45±1
IgM/(g.L ⁻¹)	1.35±0.26	1.45±0.25	1.38±0.45	1.48±0.58

Table 5. Change of the concentration of SIgA before and after intensity training & before and after competition.

	Before Pre-Competition Intensive Training	After Pre-Competition Intensive Training	After Competition	After Competition
SIgA/(g.L ⁻¹)	0.12±0.02	0.18±0.06	0.18±0.07	0.21±0.04

2.2.4. Data Processing Way

Statistics software SPSS20.0 is adopted in this study to process the statistical data. All data are expressed as average value ±standard deviation (X±SD). T and μ test should be done. The difference is of statistical significance if $P < 0.05$, and that is of great statistical significance if $p < 0.01$.

3. LAB RESULTS

3.1. Comparison with Lg Cell Value of Athletes in Quiet State

In this study, the concentration of serum IgG of these athletes is visibly lower than normal value before and after training. The comparative result has visible difference and is of statistical significance ($p < 0.05$), which means that, before pre-competition intensive training, the B lymphocyte immunity of athletes are normal. See Table 3 for detailed comparative results.

3.2. Change of B Lymphocyte Immunity after Intensive Training and Competition

In the study, the concentration of IgA declines after training and increases after competition, the change trend is not distinct and is of no statistical significance ($p > 0.05$); the concentration of IgM increases after training and declines after competition, the change trend is also not distinct and is also of no statistical significance ($p > 0.05$) [4]. Therefore, the values of different phases have no visible difference. See Table 4 for detailed comparative results.

3.3. Change of SIgA

In the study, the concentration of SIgA increases gradually after one-month intensive training, and it is visibly different from that before competition and is of statistical significance ($p < 0.05$). After competition, the concentration of SIgA increases immediately, and it is visibly different from that before training and is of statistical significance ($p < 0.05$). See Table 5 for detailed comparative results.

Table 6. Correlation of SIgA with IgG, IgA and IgM before and after intensive training and competition & before and after competition.

	IgG (g·L ⁻¹)	IgA (g·L ⁻¹)	IgM (g·L ⁻¹)
SIgA (g·L ⁻¹) before training	0.425	-0.0145	-0.894
SIgA (g·L ⁻¹) after training	-0.541	0.894	-0.1254
SIgA (g·L ⁻¹) after competition	-0.874	0.2578	-0.987

3.4. Correlation of SIgA, IgG, IgA and IgM before and after Intensive Training and Competition

In the study, the change of the concentration of SIgA has positive correlation with that of IgG and has negative correlation with that of IgA and IgM [5]. After competition, the change of the concentration of SIgA has negative correlation with that of IgG and has positive correlation with that of IgA and IgM. According to the results, in order to define the testing method, the relevant analysis results can be used to analyze the three immune globulins and identify the change situation of serum immunoglobulin. See Table 6 for detailed comparative results.

4. SUMMARY

4.1. Influence of Long-time and High-intensity Training on B Lymphocyte Immunity

Immune globulin refers to the globulin which is similar to antibody in activity or chemical structure. It is mainly produced by B lymphocyte and exists in blood. Currently, IgG, IgA and IgM are mainly used to assess body immunity index. Generally, B cells in peripheral blood cyclic system will surely be changed after acute exercise, but the quantity will not be changed. Since the coefficient of IgG, IgA and IgM produced by B cells declines visibly in and after exercise and can be recovered after exercise, long-time intensive training has less influence on B lymphocyte immune system. In the study, IgA and IgM are balanced before training, which is mainly caused by the difference of training level of athletes, therefore, training contents can be added properly in pre-competition training [6].

4.2. Influence of Long-time and High-intensity Training on SIgA

SIgA mainly appears in respiratory system and digestive system, and is the first anti-infection line of defense of body. Since epithelial and hypodermal cells on mucosa have a direct or indirect antigen-antibody reaction, they should be combined with partial immune system consisting of peripheral T cells and B cells for detailed analysis. If the immune system has visible reaction after being stimulated, detailed analysis should be made on the involved factors. Since central system does not participate when the immune system is stimulated, immune response can be done by itself [7].

4.3. Correlation of Serum Immune Globulins and SIgA during Long-time and High-intensity Intensive Training

According to the study, the correlation of serum immune globulins (IgG, IgA and IgM) and SIgA is known. Before training, the change of the concentration of IgM has negative correlation with SIgA and the correlation coefficient is about -0.7. Hence, SIgA should be analyzed before and after training. Since IgM is high-efficiency antimicrobial, its decline and increase in infection rate and immune level have certain internal relations. In the study, the change of the concentration of SIgA has positive correlation with that of IgG and negative correlation with that of IgA and IgM. After competition, the change of the concentration of SIgA has negative correlation with that of IgG and positive correlation with that of IgA and IgM. According to current immunological knowledge, most contents are IgG. Since different individuals have certain difference, the detailed change of IgG can be known through the change of serum values before and after competition.

CONCLUSION

IgA and IgM of excellent track and field athletes before and after training are in normal range. Since IgG is in normal range, long-time training before competition contributes to improving the immune level of track and field athletes. Practice proves that, IgG, IgA and IgM of athletes after training and competition have no visible difference, hence, intensive training has less influence on body immune system, and proper routine training can be done before competition.

CONFLICT OF INTEREST

The author confirms that this article content has no conflict of interest.

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