The prevalence of exercise-induced bronchospasm in elite athletes

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Abstract

The aim of this study was investigate the prevalence of exercise-induced bronchospasm in elite athletes. Exercise-induced bronchospasm was defined as at decreasing equal or more than 10% in FEV1, decreasing equal or more than 15% in FEF25-75% and decreasing equal or more than 25% in PEFR. The statistical society includes all the professional basketball players in 8 teams of super league from Iran, Khuzestan province. 20 players are selected randomly as the sample group. Before and after RAST anaerobic test were measured some of pulmonary indexes include FEV1, PEFR and FEF25-75%. all statistical analysis was accomplished by using spss (V 16). All collected data were assessed by dependent T-test. Statistical significant was conferred at p=0.05. The findings research showed that in the three measured indexes a were observed meaningfully and paralleled decrease of 12.60%, 7.8%, and 5.41% relatively in FEV1, PEFR and FEF25-75% (P<0.05). According to the definition of exercise-induced bronchospasm we can recognize that the level of exercise-induced bronchospasm Prevalence in the samples only by a sign (the average decrease of 19% of FEV1 in 60% of the samples). In other indicators, the maximum decrease is defined as less than the limit of the exercise-induced bronchospasm (the maximum decrease of 9.87% in PEFR and the maximum decrease of 6.83% in FEF25-75%).

Keywords: Exercise-induced; bronchospasm; Pulmonary function; RAST Test

1. Introduction

The amount of air inhaled during heavy exercise may increase ten to twenty fold; however the design of the pulmonary system is of such that it is capable of meeting the light and heavy oxygen demands of both short term and long term activities. It is of note that individuals who abnormally consume large amounts of oxygen during exhaustive athletic practices will deal with inhalation problems (Wilmore, J.H. and Costill, D. L. 1999). Research has shown that when athletes perform exhaustively there is a large diminishing of arterial oxygen due to the limited amount of time that red blood cells are able to remain in bronchial capillaries (Scott K., Powers.1998). Other research (Pelkonen;M. 2003) has shown that continuous athletic activity can optimize the function of the pulmonary system. However it has been stated that continuous athletic activity can cause bronchial spasms(Liu A,H;2004). In as such that a large percentage of athletes with no prior history of asthma or bronchial spasms will develop symptoms during or after athletic activity. The symptoms will appear after the on start of the athletic activity and will remain until 30 minutes after the ending of the athletic activity; however its peak is approximately between five to ten minutes from the on start of the athletic activity and will continue to about 30 minutes after the athletic activity(Farhoudi, F.2004). Bronchial spasms are also common in professional athletes (Pelkonen;M. 2003). Vahid Ziaee and et al Compared Pulmonary Function tests on professional and semi-professional basketball players prior to and after a basketball match. The obtained results showed that the amount FEV1 in both groups had decreased after the athletic activity was initiated; however the decrease had only a statistical significance in the pro-athlete group and did not show significance in the other group(Ziaee V;2006). Carried out research on the
occurrence of exercise-induced bronchospasm is in over 107 College athletes in 22 different sports in the United States. The obtained results showed that exercise-induced bronchospasm occur in 48% of the sports which require top ventilation and in 20% of the sports which require low ventilation (Jonathan P, Parsons F. 2007). Abdul and et al in their study evaluated exercise-induced bronchospasm between men athletes in Pakistan. prior to measurement the espirometry parameter especially Peak Expiratory Flow rate (PEFR) estimated the Prevalence of exercise-induced bronchospasm 7.26% (Abdul, Ahad. 2002).

**Method**

**2.1. Participants**

This research is a semi-empirical research. The sample population was selected from the elite professional basketball players in the region in order to study the prevalence of exercise-induced bronchospasm in this particular group. 20 basketball player were selected from among the eight Professional basketball teams in the Khuzistan Province, each with at least five years of experience in the field on a professional level. The average age range was between 21 to 29 years old and neither of the players did not have any history of asthma, allergy or any other pulmonary disease nor did they have any skeletal deformities especially in the chest cage region.

**2.1.1. Measurements**

In this study before and after a Running based anaerobic sprint test (RAST) was measured Three pulmonary index including FEV1, PEFR, FEF25-75% in two stage pre-test and post-test from the sample population. A Japanese digital Spirometer model HI-601 was used to measure the pulmonary function indices. The variables of age, height, weight and environmental temperature were carefully recorded and entered into the device. Since the variables of height and weight are among the important variables for analyzing the pulmonary function test results, they were incorporated as central values in the spirometry for the predicting of Spirometric values. Each candidate had to perform the test three times and the best record obtained was recorded. The RAST test was performed as six 35 meter sprints both alternately and with an active rest period of 20 seconds each.

**2.1.1.1. Procedure**

In this study, descriptive statistics (average, standard deviation, Graphs & tables) inferential statistic (Correlated t test) in a significant level of P < 0.05 were used and analyzed by V.16 of SPSS software.

**3. Results**

In the research carried out the indices of FEV1, PEFR and FEF25-75 in the pre and post test stages had a significant decrease and were respectively 12.60%, 7.82% and 5.41% (p<0.05). As per the definition for exercise-induced bronchospasm any decrease more than 10% in the FEV1 and more than 15% in the amount of PEFR or a decrease more than 25% in FEF25-75 is defined. In the research carried out it was observed that only one index i.e. FEV1 had a significant decrease measuring 19% in 60% of the sample population due to bronchial spasm. The results have been incorporated in a Table1.

<table>
<thead>
<tr>
<th>Pulmonary index</th>
<th>N</th>
<th>stage</th>
<th>Mean</th>
<th>SD</th>
<th>t-test</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEV1</td>
<td>20</td>
<td>Pre-test</td>
<td>82.93</td>
<td>7.41</td>
<td>5.17</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-test</td>
<td>72.48</td>
<td>10.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEFR</td>
<td>20</td>
<td>Pre-test</td>
<td>86.81</td>
<td>5.92</td>
<td>7.37</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-test</td>
<td>75.48</td>
<td>6.76</td>
<td></td>
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</tr>
<tr>
<td>FEF25-75%</td>
<td>20</td>
<td>Pre-test</td>
<td>78.85</td>
<td>4.75</td>
<td>7.49</td>
<td>0.012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-test</td>
<td>74.59</td>
<td>5.25</td>
<td></td>
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</tr>
</tbody>
</table>
4. Discussion and Conclusion

It has been stated that exercising in a cold environment is a cause of bronchial spasm among athletes, however in the study carried out the exercises were held in a warm climate and the sample population had had an extensive exposure to training in an arid climate. With due regards to this fact, one index of exercise-induced bronchospasm was observed among the sample population (a 19% decrease in the FEV1 index among 12 members of the study group). It can be implied that the type of exercise carried out can be considered a cause for the occurrence of bronchial spasms rather than the temperature of the environment itself. In addition the indices of FEV1, PEFR and FEF25-75 are also important indices in the reviewing of the extent of exercise-induced bronchospasm due to athletic activities among athletes. If after any activity the rate of FEV1 reaches a level of +10%, the rate of PEFR reaches a level of +15% and the rate of FEF25-75 increases by +25% the resulting phenomena is defined as exercise-induced bronchospasm. Some research state that a decrease of approximately 6.5% can be defined as minor exercise-induced bronchospasm. The research found that there is a significant decrease in the values for FEV1, PEFR, and FEF25-75. This paralleled the results obtained by, Jonathan et al (Jonathan p;2007), Mehmet et al (Mehmet U;2004) Abdul et al (Abdul,Ahad J;2002) Parkkari et al (Parkkari J;2002) Ozturan et al (Ozturan D;1999), McKenzie et al (Mckenzie D, C;1994). Of note is the fact that the results of the research failed to parallel the results obtained by Varma et al (Varma,N;1998) due to the fact that the methodology applied was over four sports and thus different in its application.

References

Wilmore, Jack., David L. Costill, W. Larry Kenney, Physiology of sport and exercise, Champaign, IL : Human Kinetics, c2008 (Chapter 6)
Ziaee, Ahmadi H ;Ghasemi M; A Cross Comparison of the Results obtained from A Pre and Post Pulmonary Function Test on Semi- Pro and Professional Basketball Players; Medical Journal of Iran, 2006, Vol 9,18-27.