

Prevalence of Exercise -Induced Bronchospasm in National Hockey Players of Pakistan

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Abstract

Objective: To determine prevalence of Exercise-induced Bronchospasm (EIB) in hockey players, who had represented or were aspiring to represent Pakistan at international level.

Methods: An observational, cross-sectional study was done on the prevalence of EIB in national hockey players of Pakistan. All participants of the training camp (n=27) players were included in this study, after obtaining permission from the Pakistan Hockey Federation. An acquaintance session was conducted to introduce the study, and for the correct recording of Peak Expiratory Flow (PEF) rate. On field-testing day, pulse and PEF rates were measured first without any exercise and warm up (pre-exercise PEF rate). After competitive 6 minute (6-min) field free running, pulse rate was measured to ensure that players heart rate has reached 70% of the predicted maximum heart rate. PEF and pulse rates were measured at 5-min, 15-min and 30-min post exercise. A player was considered EIB positive based on a post exercise decrement in PEF rate $\geq 15\%$ at any defined point of time

Results: Twenty-seven players participated in our study out of which 5 players (19%) had EIB.

Conclusion: Our findings indicate that a significant number of cases of EIB exist among national field hockey players. We suggest that active screening for EIB should be made part of training sessions, so that performance of players could be enhanced. Diagnosed cases should be treated as per the guidelines laid down by International Olympic Committee Medical Commission (JPMA 54:96;2004).

Introduction

Exercise induced bronchospasm (EIB) is not new to sports or to society¹, however it has been recently recognized to be a problem hampering performance of the athletes. Historically, physicians treating athletes have not appreciated the importance of EIB. One consequence of this occurred at the Munich Olympic Games of 1972, an American lost his gold medal when he took an International Olympic Committee (IOC) banned drug for his EIB. The high incidence of bronchospasm among the 1984 winter Olympians in Sarajevo prompted the United States Olympic Committee (USOC) in conjunction with the American Academy of Allergy and Immunology (AAAI) to study the prevalence of EIB among athletes at the 1984 Summer Games. The most surprising aspect of 1984 study was the realization that many athletes including some world-class ones were unaware of why they have difficulty breathing after the strenuous exercise of their athletic performance². Many highly trained athletes of various events experience exercise induced bronchospasm (EIB).³⁻⁵ Exercise is one of many non-pharmacological and non-immunological stimuli that can produce acute episode of airway obstruction in patients with asthma. Exercise is one of the most common precipitants of acute asthma encountered in clinical practice, because of the dependence of reaction on external and

internal variables that can change with time, there can be great variability in the clinical expression of EIB. In general, activities such as running or skating produce more severe obstruction than walking or swimming.⁶ National Heart Lung and Blood Institute and National Institute of Health in its consensus report on diagnosis and management of Asthma defined EIB as the occurrence of airway obstruction immediately to 30 min after moderate exercise. People with asthma have a wide range of disability for athletes allowing restricted participation in sport. EIB is a diffuse bronchospastics response in both large and small airways following strenuous exercise. It is usually manifested by a history of such post-exercise signs and symptoms as dyspnea, coughing shortness of breath and wheezing. The intensity and duration of action necessary to produce bronchospasm is at a work level sufficient to require 85% oxygen consumption and takes from 5 to 8 min of maximum effort.⁷ It is believed that it is the first study describing EIB in field hockey. Field hockey is the national game of Pakistan and we studied professionally coached field hockey players, who participated in national camp held at Hockey Club of Pakistan, Karachi. EIB is a temporary narrowing of the airway or bronchospasm, which is induced by exercise.⁸ Our objective is to determine prevalence of Exercise-induced Bronchospasm (EIB) in hockey players, who had represented or were aspiring to represent Pakistan at international level.

Subjects and Methods

Twenty seven (n=27) national hockey players participated in a training camp set up to select a team for an immediately following tournament, like Four-nations championship at Hamburg, Germany. Similar training camps were also set up for major events like 11th Azlan Shah Cup, Six nations championship, 10th World cup, Common Wealth games, 24th Champions trophy and Asian games. The participants were the same in all these camps. Permission from Pakistan Hockey Federation and consent of players was taken before induction into the study. In this cross sectional, observational study on the prevalence of EIB in national hockey players, an acquaintance session was conducted to introduce the project to them and clear their apprehensions if any, to get their full cooperation. Peak expiratory flow meters (Pocketpeak -Hudson Respiratory Care Inc.) were shown to the players. The instructions related to the use of PEF meters were explained to them.⁹ To minimize the technical sources of variation, the players throughout the study used same PEF meter. To minimize the biological sources of variations of lung functions with an individual, the guidelines laid down by American Thoracic Society were explained and the PEF readings were taken.¹⁰ The imperative for standardizations is one reason for the recommendations that the expiratory maneuver be performed with maximal effort. Variable expiratory effort may thus be a confounding factor. The players were asked to take a deep breath and blow as fast as possible. The field investigator showed them how to record the peak expiratory flow rate. Under supervision each player practiced till his three consecutive readings with a difference not more than 5% were recorded. On field testing day players were advised not to perform any exercise stretching or warm-up for pre-exercise measurement of pulse rate by pulse oximeter (pulse oximeter model 305, Palco Labs, Inc.)¹¹ and PEF rate three readings were recorded out of which one with maximum value was selected. After competitive 6-min field run PEF rate and pulse rate of two players were measured without any physical

activity in between the recordings. Pulse rate was measured by pulse oximeter at 0, 5, 15 and 30 minutes. Maximum heart rate was calculated by using the formula $(220 - \text{age in years})$ and target heart rate was calculated as 70% of the maximum heart rate. Players who achieved 70% of the target heart rate at 0-minute post exercise were included and only one player out of 27 who did not achieve the target heart rate, was asked to run for another 3 minutes to achieve the target. PBF rate was determined at 5, 15 and 30 minutes, three readings were taken at these timings and the one with maximum value was selected. Diagnosis of EIB The best of pre-exercise PBF rate along with the individual post-exercise PBF rate measured at 5, 15 and 30 minutes were used to determine the presence of EIB. A player was considered BIB positive based on a post exercise decrement in PBF rate $>15\%$. 6, 12-14.

Results

The mean age of the players was 24 ± 3.5 years. The pre-exercise mean PBF rate was 560 ± 76 L/min and 5-min post exercise was 549 ± 77 L/min, 15-min post exercise was 556 ± 83 L/min and 30-min post exercise was 562 ± 80 L/min. Post exercise PBF rate when compared with pre exercise test revealed the presence of BIB (A decrease from pre-exercise PBF rate $>15\%$). Five players had $>15\%$ decreased in PBF rate. One player developed BIB at 5-min and 4 players at 15-min. None of the players developed BIB at 30-min. Anthropometric and physiological measurements of players are shown in the table 2. It was not significant. There was no significant correlation between any of anthropometric and physiological measurement as shown in table 3. The overall prevalence of BIB in hockey players was (19%). Among those found to be BIB positive, one standby goalkeeper and two players were selected for the immediate Table 1 . Comparison of Age and PEF rate in players with and without Exercise Induced Bronchospasm.

[(1)] Four nations championship. The here players were also selected for major events like 11th Azlan Shah Cup, Six nations championship, 10th World cup, Common Wealth games, 24th Champions trophy and Asian games.

Discussion

It is probably the first study to determine the prevalence of EIB in field hockey players. Previously such studies were done on figure skaters 3,12 , high school athletes 11, winter Olympic athletes 2,13 , summer olympic athletes 14,15 cross-country runners 4 Intercollegiate athletes 20 Cross-country skiers and Ice hockey 16 Norwegian elite athletes senior and junior team 1997. 15 Studies of rural and urban school children 16-18 were also done to compare and measure the prevalence of EIB. We have not compared rural and urban athletes in our study because we did not know their origin. It could be treated as a limitation of the study. Prevalence of EIB is different in different sports, as several factors have been implicated in its production. It has been reported to be maximum in cold games like Figure Skaters 3,19 (35 -55 %) and Cross-country skiers 13 (50%) .To our surprise prevalence of EIB in our study is more than reported for ice hockey. We don't know the reason but probably environmental conditions as humidity could be involved. However our values are comparable with those for Colleges cross-

country runners 4 (14%). Recently Pakistan Hockey has witnessed a decline in the performance of a few players, which can have varying degree of impact on the overall performance of a team. Hyperventilation has been found to be one of the important underlying mechanism for EIB and as compared to the field running test performed by us, the player undergoes a much strenuous exercise regimen when they are playing matches and are bound to hyperventilate. Thus EIB serves to limit the oxygen delivery to the tissues and thus limit performance. The result presented in this report increases the need for assessment and therapeutic control. Screening for EIB should be made part of such training camps. Pulmonary function testing is easily carried out at training and competition sites and under these conditions probably yield the most useful information concerning EIB in competitive athlete. We suggest that active screening for EIB should be made part of training sessions, so that performance of players could be enhanced. Diagnosed cases should be treated according to the guidelines laid down by International Olympic Committee Medical Commission.

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