International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Prevalence of Exercise Induced Bronchospasm among the Football Clubs of Punjab

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Received: 14/01/2017 *Revised: 25/01/2017* *Accepted: 25/01/2017*

ABSTRACT

Background of the study: The performance of the elite athletes can be affected through Exercise Induced Bronchospasm (EIB) at any level of a game or exercise which can be presented through several complaints during exercise or event. Spiro metric parameters such as FEV1 and PEF can be used as main diagnostic tools for EIB. Recognition of EIB helps in subsiding complications and improving the health of the athlete, it could help in providing better conditions for athletes with asthma considering the prophylactic and therapeutic use.
Aim and Objective: The main aim of the study is to evaluate the effect of exercise on bronchospasm in the players of football clubs by measuring the pulmonary functions parameters such as FEV1, PEF/MMEF at different intervals of exercise.
Methodology: In this study, 40 elite football players of 17 to 25 years of age from the 5 different football clubs of Punjab were included. Then Spiro metric parameters (FEV1, PEF/MMEF) were recorded at pre, post 5 minutes and post 12 minutes of exercise. Mean standard deviation and percentile was used to prepare summary statistics. Unpaired t - Test was the tool for statistical analysis at the $p<0.05$ level of significance between the various demographic parameters.
Results: The total prevalence of EIB among the 5different football clubs was found to be 22.5%.
Conclusion: It is concluded from the study that elite football players of football clubs are prone to EIB.

Key words: EIB, spirometry, pulmonary functions, FEV1, PEF/MMEF

INTRODUCTION

EIB (Exercise induced bronchospasm) is an acute, transient airway narrowing that occurs during and most often after 5 to 15 minutes of exercise (Rundell and Jenkinson, 2002). It is a condition which can affects the elite and recreational athletes at any level even if they don't have any history of asthma and allergy. Excessive airway narrowing on exposure to non-allergic stimulus results in bronchial hyper responsiveness (Sudhir and Prasad, 2003). Smooth muscle of the airways constricts in response to physical activity which is reversible in nature. Due to EIB athletic performance declines, as the player experiences difficulty in breathing (Fuentes and Dimeo, 1999). Prevalence rates of bronchospasm related to exercise in athletes range from 11 to 50% and up to 90% of subjects with asthma will have EIB(McFadden and Gilbert, 1994; Rundell and Jenkinson, 2002). Ziaee et al. (2007) represents through an attempt to determine the prevalence of exercise induced bronchospasm among 234 soccer player

children and suggests that at least 2.1% of soccer players will develop bronchospasm even if they do not have any history of asthma and allergy.

EIB is associated with breathing relatively dry air which results into water loss from the airway surface due to osmotic and thermal consequences (Anderson and Daviskas, 2000). Water loss from the airways acts as a stimuli which releases histamine from mast cells degranulation and cause cough and mucus production and bronchoconstriction even in non-asthmatic patient (Eggleston et al. 1987; Jonathan and Parsons, 2005). According to American Academy of Family Physicians (2003), the symptoms of EIB include coughing, wheezing or noisy breathing, shortness of breath, chest pain or tightness, trouble getting a deep breath, unusual fatigue while exercising. Exercise at 80% of the maximal predicted O_2 consumption workload for 5-8 minutes can cause EIB in most of the athletes (Godfrey, 1977). EIB can be revealed out through the pulmonary function test by using spirometer. Objective change (usually a > 10% decrease in FEV1) between pre-broncho provocation testing and post-broncho provocation testing values is necessary to confirm the diagnosis of EIB (Anderson et al. 2001). Short-acting bronchodilator (Beta2 receptor agonists such as albuterol before the exercise is the most effective therapy for the prevention of symptoms of EIB in asthmatic patients (Godfrey, 1977; NAEPP, 2002),while wearing face mask (Schacter, 1982), consuming vitamin C supplement one hour before the exercise in the diet (Hatch, 1995; Cohen et al. 1997) and 10-15minutes of warm up before the main activity can also help in preventing EIB episodes chances (Disabella et. al., 1998; Wilkerson, 1998; Fuentes and Dimeo, 1999).The prevalence of EIB may be variable according to the type, duration or intensity of exercise, environmental factors, and diagnostic criteria (Storms, 1999; Rundell et al. 2000). Condition is said to be EIB if it constitutes10 to 20% reduction in FEV1 or 15 to 25% reduction in PEF or FEF25-75 (Cummiskey, 2001;Massie, 2002; Liu et al., 2004).

METHODOLOGY

In this observational cross sectional study 40 players out of 68 elite football players of age group between 17 to 25 years from the 5 different football clubs of Punjab were selected on the basis of inclusion criteria. No history of asthma, rhinitis, or any other kind of allergy, without any systemic pathology or history of cold and cough in past7 days, and does not consume bronchodilators 24 hours prior to the procedure were included while on the other hand smokers, players on any kind of medication, respiratory tract infection were excluded. Detailed history was taken from the player and then screening was done on the basis of questionnaire. Then Spiro metric parameters were recorded at pre, post 5 minutes and post 12 minutes of exercise. The design of this study is a survey using a questionnaire for screening purpose.

PROCEDURE

The study topic and procedure was decided and approved by Departmental Research Board of Physiotherapy Department, Punjabi university, Patiala. A detailed physical evaluation and explanation about the study was made to the subjects after signing consent from players and taking permission from the respective coaches. The demographic data of the participant was recorded in the data base of the Spirometer as well as on the evaluation form. The proper procedure to perform Spirometry was demonstrated to each participant in a group. Anthropometric rod was used to measure the height (cms) and weight (kg) was measured through weighing machine. Pulse oximeter was used to record pulse rate prior and post exercise. No prior warm up, stretching, or any other type of physical activity allowed before the test. The procedure of Spirometer was performed 3 times (pretest, post 5 minutes test and post 12 minutes) and the best of the 3 readings was taken for data analysis. After taking pre

exercise reading, ten minutes of free running was asked to perform by each player. The exercise intensity was aimed to raise heart rate over 85% of the maximal heart rate in order to standardize the exercise. Maximum heart rate was calculated by the formula: 220–age.Pulse rate was then reexamined within the zero minutes after the completion of 10 minutes of exercise. If the desired heart rate was not achieved, then extra 3 minutes were allotted to the participant in order to achieve the appropriate target heart rate. Then player was asked to relax himself for the period of 5 minutes after which the pulmonary functions (FEV1 and PEF) were reexamined. This procedure was again repeated after 12minutes of rest from the time participant had finished his exercise. The average environmental temperature and relative humidity during the procedure was provided by the Centre of Indian Ministry of Weather Forecasting, Punjabi University Patiala. A diagnosis of EIB was made if there was a significant difference of >10%and 15% in the pre and post recorded values of FEV1and PEF respectively.

RESULTS

The data was analyzed using MS Excel and Stats Direct software's. Mean, SD and percentile were used to prepare summary statistics. Unpaired t - Test was the tool for statistical analysis at the $p<0.05$ level of significance between the age, BMI, pre and post pulse, FEV1pre, post 5 and 12 minutes and PEF pre, post 5, and 12 minutes of free running in the players. Chandigarh Football Club (40%)were found to be the most affected football club with EIB, while on the other hand the percentage of EIB players from remaining football clubs were 26.66% (Youth Club Chandigarh),14.28% (Blue Star Football Club Chandigarh, and DAV Football Club Patiala), and 16.66% (P.S.E.B Patiala).

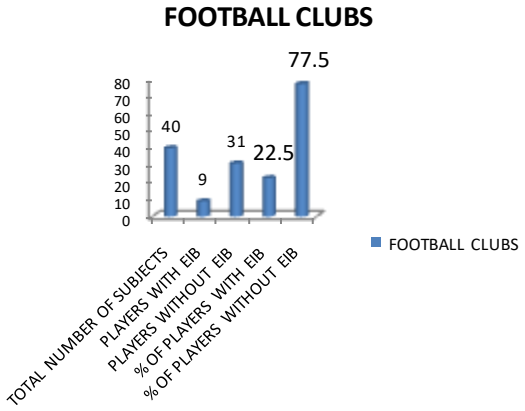

FIG1:-Football Clubs players

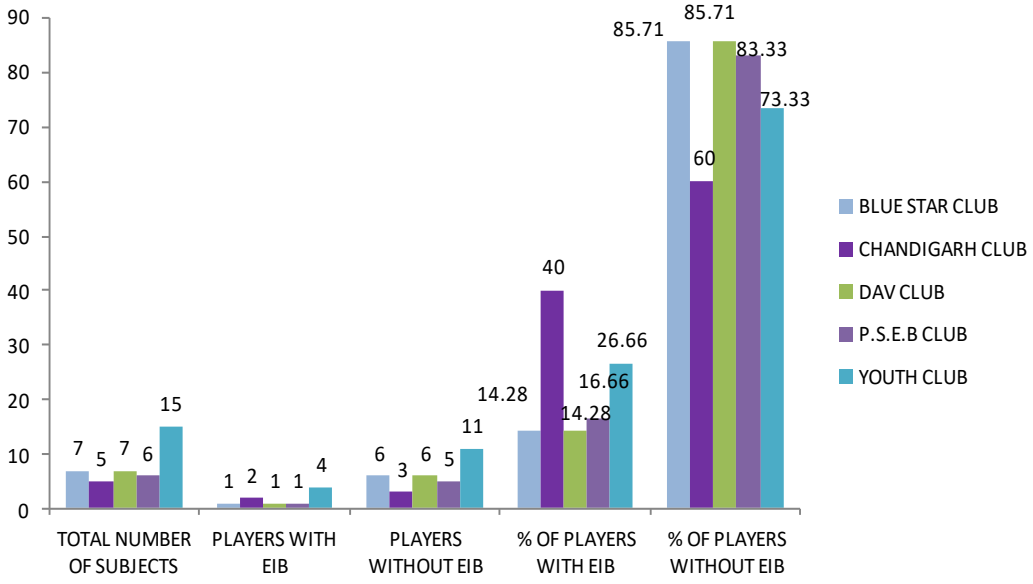

FIG 2:- Total number and prevalence of EIB in the Football Clubs

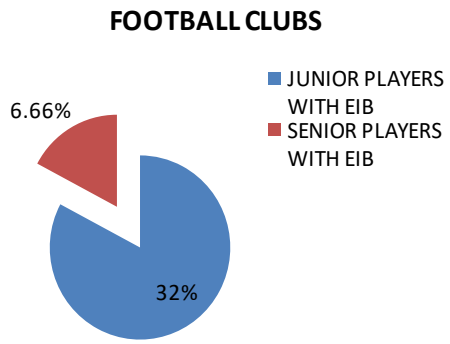

FIG 3:- Total prevalence of EIB among the Football Clubs according to senior and junior player category

Total players from each football club were re-allotted into 2 groups named junior group who constitutes the players between 17 to 20 years of age while senior group consists 21 to 25 years of age. 25 players out of 40 players were comes under junior as well as 15 players comes under senior player category. Total 32% of junior players and 6.66% of senior players were found to be affected with EIB. Similarly, players from the football clubs were divided on the basis of BMI. 7.5% of players were of underweight category and 10% constitutes overweight category, while 82.5% of players were under normal BMI index. Prevalence of EIB was highest (27.27%) among the normal BMI category; where as overweight category constitutes around 25% of EIB players. The total prevalence of EIB among the 5 football clubs was 22.5%.

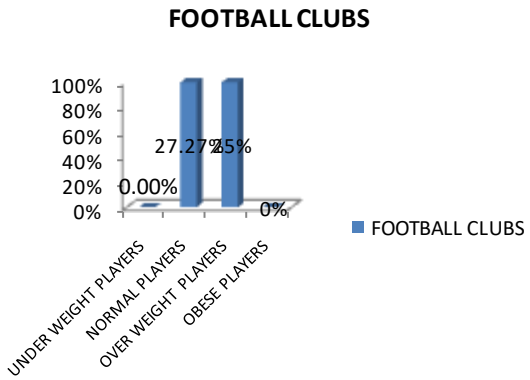

FIG 4:- Prevalence of EIB among the football clubs on the basis of BMI

Table 1:- Mean, SD, SE, of players with and without EIB

DEMOGRAPHIC PARAMETERS	FOOTBALL PLAYERS WITH EIB (n=9)			FOOTBALL PLAYERS WITHOUT EIB (n=31)			At 95% (0.05) of Significance Level	
	MEAN	STANDARD DEVIATION	STANDARD ERROR	MEAN	STANDARD DEVIATION	STANDARD ERROR	t value	p value
AGE	20.7	2.24	0.354	20.24	2.34	0.174	1.133	p>0.05
HEIGHT	170.6	6.65	1.051	170.91	6.32	0.471	0.1894	p>0.05
WEIGHT	63.33	10.05	1.589	63.17	8.49	0.633		
BMI	21.67	2.78	0.44	21.59	2.33	0.174		
PRE PULSE	69.23	5.43	0.859	69.04	4.94	0.368	0.2160	p>0.05
POST PULSE	179.45	6	0.949	181.26	6.91	0.515	1.5326	p>0.05
FEV1 (PRE)	90.69	13.44	2.125	83.17	10.94	0.815	3.765	p<0.05
FEVI POST 5 MIN	75.74	11.72	1.853	83.55	11.59	0.864	3.847	p<0.05
FEV1 POST 12 MIN	78.97	14.87	2.351	84	10.98	0.818	2.445	p<0.05
PEF (PRE)	114.13	20.29	3.208	101.15	16.75	1.248	4.258	p<0.05
PEF POST 5 MIN	95.41	23.7	3.747	104.71	18.91	1.409	2.680	p<0.05
PEF POST 12 MIN	98.75	21.47	3.395	102.83	17.76	1.324	1.263	p>0.05

DISCUSSION

Football is a high ventilation sport and very common game amongst the young population in India, but to the best of our knowledge there is no literature is available that have examined EIB among the footballers in India. So in view of explaining the importance of diagnosis and to know the prevalence of EIB among the elite football players of football clubs in Punjab State, the present study was designed. Some sports are more likely to trigger EIB than others for example cross country Skiing, football, Swimming and long distance running (Holzerand Brukner, 2004)in which ventilation is increased for long periods of time during training and competition, allowing for relatively more evaporative water loss and subsequent airway narrowing. Exercise induced asthma

is an intermittent narrowing of the airways, accompanied by a decrease in some measure of airflow that the individual experiences as wheezing, chest tightness, or dyspnea that is triggered by exercise (Weiler, 1966). EIA is most evident in recreational and competitive athletes as it shows marked decrease in athletic performance and also athletes are most likely to get affected in winters (Wilber et al. 2000). Before discussing results, comes on to the methodology of the study, which shows that the standard spirometry was performed pre exercise and at post 5, and 12 minutes of free running of 10 minutes. Both FEV1 and PEF were checked. A similar methodology was used by Kukafka et al. (1998) but they have checked FEV1 and PEF at post 5, 15 and 30minutes. EIA was confirmed when post exercise decrement of FEV1 and PEF/MMEF by 10% and 15 %respectively (Rundell and Jenkinson, 2002).In this study the overall prevalence was 22.5%among the elite football players of different football clubs of Punjab. We recognize that factors such as weather conditions and length and intensity of exercise are important in EIB. Seasonal variability affects the occurrence of EIB. Similar type of results were also confirmed by the Weiler et al.(1986) which concluded that 12% football players of Lowa University were found affected from EIB. Another factor for the prevalence of EIB in this study may be the harvesting period (pollen season) which is another factor responsible for the provocation of the EIB symptoms. This study shows that prevalence of EIB in senior football players of several Football clubs (21-25 years) was 6.66% and of junior players (17-20years) was 32% which is supported by Afshar et al. (2002) which accounts 6% prevalence of EIB among the soccer players of Tehran. The reason for low prevalence was due to negative history of allergy and pulmonary diseases. It is also concluded that soccer players will develop bronchospasm even if they do not have any history of asthma and allergy. The present study was done from the month of January to March. The average minimum temperature was 18^0C and average relative humidity was 45%. Stroms, (1999) has concluded that EIB is more common in cold weather sports. The prevalence differs between regions and seems to be dependent on air humidity levels.

CONCLUSION

Elite football players are prone to EIB, and the possible cause can be the temperature, relative humidity, duration and intensity of exercise. Players should take some effective measures such as warm up, stretching prior to the game in order to prevent themselves from EIB.

LIMITATIONS

Age group was limited; study was conducted in the limited area of Punjab, only male subjects were taken, study was conducted on football players only, study was conducted in winter season and can be replicated in other seasons also, and more spirometric parameters such as FVC and FEF can be included.

FUTURE SCOPE

This study can also be replicated by ruling out the differential diagnosis with EIB, such as vocal cord dysfunction, exercise induced laryngeal dysfunctions, cardiac arrhythmias and pulmonary and cardiac shunts. The similar study can also be done on other aerobic as well as anaerobic sports such as basketball, kabaddi, boxing, cross country runners to rule out the effects of aerobic and anaerobic sports on exercise induced bronchospasm.

ACKNOWLEDGEMENT

We would like to pay our sincere thanks to the teachers, staff and my colleagues (Physiotherapy Department, Punjabi University Patiala) who provide their sincere efforts and last but not the least the coaches and players who provide their valuable time and support for the completion of this project.

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How to cite this article: Trivedi V, Jayaraman G, Singh S. Prevalence of exercise induced bronchospasm among the football clubs of Punjab. Int J Health Sci Res. 2017; 7(2):208-214.

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