

Brief Communication

Medical problems detected during Pre-participation Physical Evaluation of school athletes in the Galle District

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Abstract

In Sri Lanka, four athletic deaths were reported in 2013. All four deaths took place while participating in school marathon competitions and the victims were teenaged school children. The Ministry of Health and Ministry of Education took steps to temporarily remove marathon events from school athletic competitions in 2014. Three more athletic deaths were reported after the marathon events were resumed in 2015, which led to the development of guidelines in conducting Pre-Participation Physical Examination (PPE) for school athletes. There were no further deaths reported since the implementation of these guidelines.

In the present study on 2000 school athletes, 11% had potential problems which, if undetected, may have led to morbidity and mortality. Thirty (1.5%) had cardiovascular abnormalities, 240 (12%) had respiratory and 140 (7%) suffered from musculoskeletal problems. There were no reported school athlete deaths during sports events after implementation of PPE, which illustrates the success of conducting PPE.

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Introduction

Sports Medicine is a well-established field in developed countries and deals with the health and wellbeing of athletes. There are five subdivisions; fitness assessment, exercise prescription, injury prevention, treating the injured athletes and rehabilitation of the sports injuries [1].

The Ministry of Health in Sri Lanka has identified Sports Medicine as an essential specialty to improve sports related health and prevent sudden deaths among athletes. Sudden deaths of athletes occurring when participating in or during

training for competitive sports or during a practice session shocks the community, family members, team mates and the rest of the athletes. There are thirteen sports medicine units in Sri Lanka. Pre-participation Physical Examination (PPE) is one of the main services expected from those units. The objective of PPE is to allow athletes to participate in their sport of choice safely, without harming themselves or others. In most developed countries, fitness for participation' or 'clearance' following PPE is mandatory prior to participation in competitive sports.

During PPE athletes are evaluated to ascertain their fitness for the specific sports item that they are going to participate in. Competitive athletes of all ages and participants of all levels of organized sports competitions should undergo PPE. It should be done, ideally, at least six to eight weeks prior to the beginning of practices to allow time for appropriate rehabilitation or treatment. PPE should include history, physical examination and necessary diagnostic tests. PPE should be done by a medical practitioner who has skills in both musculoskeletal and cardiovascular evaluation, preferably a medical officer with postgraduate qualifications in sports medicine [2,3].

The requirements and the procedure for PPE vary worldwide. The American College of Paediatricians has published guidelines to aid decision making when giving clearance, deferring or limiting participation in the requested sport by individual athletes [2,4]. An ECG is a mandatory investigation during the PPE of athletes participating in endurance running more than 1500m, swimming more than 400m, cycling, contact and contact collision sports like soccer, rugby and martial arts. It can be used as a valuable investigation in other sports as well. However, use of advanced investigations such as exercise ECG, 2D-echocardiography to detect cardiac problems is costly and time consuming.

Approximately 10% of the athletic population have detectable cardiovascular abnormalities varying from simple partial right bundle branch block (RBBB), which is a common benign variation, to significant structural cardiac problems[5,6,7]. Bronchial asthma, exercise induced asthma and exercise induced bronchoconstriction has been reported amongst athletes [8]. Biomechanical problems such as flat feet, valgus or varus leg deformity may sometimes be first detected at PPE. Single organs (e.g. single kidney, eye, and testis) may limit the participation in certain sports and this is a major preventive aspect of a significant possible future disability.

PPE can serve an individual athlete in many ways; (i) as an entry point to the health care delivery system, (ii) diagnosis and initiation of treatment for medical conditions, (iii) provision of sports and exercise health education.

In Sri Lanka, it is mandatory to have pre-participation medical clearance before recruitment for training and participation in all competitive sports [9,10]. The "clearance" for a particular sport is issued considering the athlete's overall health at the time of the PPE and following international guidelines [2,4,5,6,7,8,11]

Currently, there is no published data on medical problems among Sri Lankan school athletes requesting PPE. The aim of this study was to describe the demographic characteristics, popularity of various sports prevalence of cardiovascular, respiratory and musculoskeletal problems and clearance rate among school athletes requesting pre-participation medical clearance in the Galle District.

Methods

A descriptive study was conducted at the sports medicine clinic of Teaching Hospital, Karapitiya during a one year period from 1st March 2013 to 28th February 2014. Permission from the Director of Teaching Hospital Karapitiya was obtained. Ethics approval was granted by the Ethics Review Committee, Faculty of Medicine, University of Ruhuna.

All school athletes from the Galle District, aged 12 to 18 years, who attended the sports medicine clinic requesting for pre-participation medical clearance during the period of study were invited to participate in the study. Parental consent with assent from the school athlete was obtained. Those with acute medical conditions, like fever or diarrhoea and vomiting, within the last 72 hours or those on any medication were excluded from the study.

Data was collected using the standard PPE questionnaire based on guidelines of the American College of Paediatricians [3,9]. A single consultation was held initially for PPE and subsequent visits were arranged as necessary for any medical conditions requiring further evaluation, testing or referral to specialists.

The standard PPE self administered questionnaire was given to all eligible athletes to be answered with the assistance of their parents if necessary. Evaluation of the clinical history and other clinical data, physical examination, ordering, analysis and interpretation of all investigations was performed by postgraduate sports medicine qualified medical officers and/or a Consultant Orthopaedic Surgeon. Blood and urine tests, chest X-ray and ECG were requested based on the findings in the history and physical examination. ECG was made mandatory by the Ministry of Health only for the participants of running events of more than 1500m, swimming events of more than 400m, cycling and contact and contact collision sports such as soccer, rugby and martial arts. Apart from diagnosing major medical illness, minor medical problems like dental caries, skin conditions and communicable diseases if identified were referred to relevant specialties if those were detected at the time of PPE.

Results

2153 school athletes attended the Sports Medicine Unit requesting PPE during the study period and 2000 athletes participated in the study. The commonest categories of athletes requesting PPE were school cadets and long distance runners (Table 1).

Table 1: Different categories of athletes requesting PPE

Category of sports	N (%)
School cadets	840 (42)
Long distance runners	540 (27)
Swimming	200 (10)
Martial arts	101 (5)
Soccer	79 (4)
Rugby	80 (4)
Cycling	40 (2)
Diving	40 (2)
Others	80 (4)

In this study 30 (1.5%) athletes had cardiovascular abnormalities, which included previously undiagnosed congenital heart defects, while 240 (12%) had respiratory and 140 (7%) had musculoskeletal problems (Table 2).

Table 2: Type and prevalence of medical problems/injuries detected at PPE

Type of medical problem/injury	N (%)
Cardiovascular problems	30 (1.5%)
Right bundle branch block	12
Mitral valve prolapse	7
Ectopic beats	6
Atrial septal defects	3
Ventricular septal defects	2
Respiratory problems	240 (12%)
Bronchial asthma	231
Exercise induced asthma	7
Exercise induced bronchoconstriction	2
Musculoskeletal problems	140(7%)
Ankle sprain	80
Knee injuries	40
Shoulder injuries	10
Back injuries	10

Majority of athletes (89%) were fully cleared at the PPE while 10% were temporarily deferred from participating in the requested sport (Table 3).

Table 3 - Clearance category of athletes who underwent PPE

Clearance category	N (%)
Cleared for Participation	1784 (89%)
Limited Participation	11 (0.5%)
Clearance withheld	201 (10%)
No participation	4 (0.002%)

Discussion

There were four reported athletic deaths during year 2013 in Sri Lanka. All four deaths took place while participating in school marathon competitions and the victims were teenaged school children. This alarmed the Ministry of Health and Ministry of Education which led to temporary removal of marathon events from the school athletic competitions in 2014. It was restarted in 2015 but led to 3 more athletic deaths which prompted the Ministry of Health to develop guidelines for conducting PPE for school athletes [3].

Postmortem examinations conducted on the deceased athletes revealed four different causes of deaths; hypertrophic obstructive cardiomyopathy, viral myocarditis, arrhythmogenic right ventricular dysplasia and aberrant coronary arteries. Out of these four causes of deaths the first three causes could have easily been identified if the victims were subjected to systematic PPE. Clinical history and physical examination combined with an ECG is useful to diagnose most of the life threatening cardiovascular causes.

In this study population of 2000 school athletes, 11% had potential problems which, if undetected, would have led to morbidity and mortality. Thirty (1.5%) had cardiovascular abnormalities, 240(12%) had respiratory and 140(7%) suffered from musculoskeletal problems.

There are 13 sports medicine clinics in Sri Lanka which cover 6 of the 9 provinces. All these clinics are manned by Postgraduate Diploma holders in Sports Medicine (PG. Dip Sports Medicine). The standard PPE questionnaire is being used in all 13 sports medicine clinics. At present there are no sports medicine clinics in the North Central, Uva and Sabaragamuwa Provinces. The Ministry of Education has instructed school principals to refer school athletes to these sports medicine clinics as a mandatory requirement [3,9,10]. Currently, PPE is a routine practice which is functioning smoothly and effectively. There were no reported school athlete deaths in Sri Lanka after the implementation of PPE programme on 8th April, 2015.

Currently there are 27 doctors with PG. Dip in Sports Medicine engaged in sports medicine services in Sri Lanka. In addition, around 900 other doctors have received special training in conducting PPE by the Sports Medicine Development Committee of the Ministry of Health. They are authorized to issue the sports

medical fitness certificate after conducting a PPE. Some of them provide sports medicine care for the three provinces with no sports medicine clinics.

Conclusions

There were no reported school athlete deaths during sports events after implementation of PPE, which illustrates the success of conducting PPE.

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