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VIRUS INFECTIONS AND SPORTS PERFORMANCE — A PROSPECTIVE STUDY

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ABSTRACT

There are numerous anecdotal reports relating infection to deterioration in sporting performance. Unexplained failures by top sportsmen are often attributed to recent or current infections. We have carried out a prospective investigation to determine the effect of viral infections on the performance of a group of 68 elite track and field athletes. Athletes were monitored for evidence of viral infection during winter training and their form was assessed subjectively and also semi-objectively by analogue scale questionnaires. Static elevated titres of neutralising antibody to Coxsackie B 1-5 were present in 54% of the athletes and 79% had serological evidence of past viral infection. The raised titres did not relate to poor performance. There was no evidence that loss of form was related to subclinical infection. Elevated antibody levels to Coxsackie B and other common viruses should be interpreted with great caution when assessing athletes complaining of poor performance.

INTRODUCTION

There are numerous reports of viral illneses causing deterioration of athletic performance. A recent investigation was carried out on a group of 12 athletes who presented with loss of form and evidence of viral infection was found in four (Roberts, 1985). In another study, seriological evidence of recent viral infection was sought in patients with knee effusion presenting to an accident and emergency department (Driscoll et al, 1987). Elevated titres of neutralising antibody to Coxsackie B virus were found in patients with spontaneous effusion or with traumatic injury (control group). It is important to recognise viral illness in training athletes as continued strenuous activity may cause increased morbidity or even death (Jokl and McClellan, 1971; Sutton et al, 1967). We monitored a group of 68 track and field athletes during winter training for the 1986 Commonwealth Games. Each was screened for serological evidence of recent viral infection and questioned about level of performance, injury, and upper respiratory tract infection (URTI) symptoms.

METHODS

Track and field athletes who were potential members of the Scottish Athletics Team for the 1986 Commonwealth Games were invited to attend four one-day coaching sessions during the 1985-86 winter, in November and December 1985 and February and March 1986. At each session various subjective parameters of health and fitness were assessed using an analogue scale questionnaire. Athletes were asked whether they had suffered any respiratory symptoms or other illnesses and whether there had been any close contact with illness. Presence or absence of musculo-skeletal injury was also recorded. The health and athletic performance of the athletes was compared with that of training partners and compared with their norm, and an assessment of how training was progressing was marked on a 1-10 analogue scale (Fig. 1). Blood samples were taken at each visit for determination of viral titres. The complement fixation test was used to detect antibody levels to psittacosis, Mycoplasma pneumoniae, influenza A, influenza B, adenovirus, herpes simplex virus, varicella zoster virus, cytomegalovirus (CMV) and measles virus. Levels of antibody to Coxsackie B 1-5 viruses were determined by a neutralisation test (Grist and Bell, 1974). Tests were carried out in parallel on the various samples from each individual. A single radial haemolysis test for antibody to rubella virus (Northumbria) and a Monospot test for Epstein-Barr (EBV) virus were also performed. If the Monospot was positive further EBV serology was undertaken. If titres to Coxsackie B were ≥256 an IgM assay was carried out (McCartney et al, 1986).

Make a mark on these scales which best describes you over the past month:

Rate your health

too ill to train — normal — great

0---------- 5----------10

Rate your training times/distances

very bad — as expected — great

0---------- 5----------10

How do you compare with your training partners?

worse than usual — as usual — better than usual

0---------- 5----------10

How do you feel about training?

very unhappy — OK — very pleased

0---------- 5----------10

Fig. 1: Analogue scales on which athletes made an appropriate mark to indicate: health
performance in training
training compared with partners
feeling and training

The distance along the line was measured in centimetres and used as a measure of each parameter.

After the fourth visit letters were sent to athletes who had attended any session(s) but missed the last, to ensure that illness or injury was not the reason for non-attendance. Reports of infection, injury and loss of form were correlated with serological evidence of virus infection. Statistical analysis was by chi-squared or Fishers exact test depending on cell numbers (Cochran, 1952; Lewontin and Felsenstein, 1965). Summated analogue scores were compared by Students unpaired t-test.

RESULTS

A total of 92 athletes attended on one or more coaching days. Four were unwilling to give blood samples. Attendances were as follows: 63 in November, 53 in December, 50 in February and 48 in March. Twenty-one attended all four training days, 24 on three days, 23 on two occasions and 20 on one day only. As there was only one data point for each

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measurement in the last group these subjects could not be included in the analysis reducing the number in the study to 68.

Of the athletes analysed, 47/68 (68%) reported one or more upper respiratory tract infections (URTIs), 34/68 (49%) reported an injury and 41/68 (59%) recorded a change of > 1 analogue scale unit in performance.

A majority, 54 (79%) of the athletes had elevated titres against one or more of the organisms tested. Specific IgM was detected in only one of these athletes with Coxsackie B neutralising titres of ≥ 256. In two individuals a ≥4-fold rise in titre to influenza A was detected, in one case associated with a positive Monospot and serological evidence of recent EBV infection. In another three individuals there was a ≥4-fold change in titre to either CMV (8-32), adenovirus (64-16) or Mycoplasma pneumoniae (32-8). There was no significant change in serological findings in any of the other athletes during the study nor were any complement fixing antibody titres ≥256. The evaluation of symptoms of infection, performance and injury was correlated with the viral titres. The athlete with detectable Coxsackie IgM was training and performing satisfactorily. Changes in analogue scores between training days were used as a semi-quantitative estimate of the change in performance and were compared with clinical and serological evidence of infection. The only significant correlation was between reported URTI and elevated viral titre in month one ($X^2 = 5.89$, $P < 0.05$). In particular, there was no relationship between loss of performance and high viral titre — X^2 was 2.21 ($P = 0.7$) for month two, 2.26 ($P = 0.69$) for month three and 3.16 ($P = 0.20$) for month four. In most cases these high titres were due to Coxsackie B virus neutralising antibody.

DISCUSSION

This study was designed to investigate the role of viral infections in the unexplained periods of poor performance common in track and field athletes as well as many other sportsmen and women. Almost any below-par performance by well-known track or field athletes is attributed to 'a virus', 'flu' or 'bronchitis', by the media, and often by the athletes. Although this has become established dogma there is little hard evidence in the literature apart from anecdotal case reports about the role of infection in form loss.

Epstein-Barr virus (EBV) is a common infection in the age group participating in top level athletics (Douglas and Hanson, 1978) and is often asymptomatic (Lehane, 1970; Henle et al, 1974). In a recent report on athletes complaining of loss of form EBV infection was detected in two athletes suffering from unexplained loss of form. Two more had evidence of past Coxsackie B virus infection (Roberts, 1985). There are numerous reports of viral infections affecting various parameters of physical and mental performance (Astrom et al, 1976; Thomasi et al, 1982; Jeamott et al, 1983; Friman et al, 1985).

In the present study a group of athletes has been followed prospectively. Serological evidence of past infection and Coxsackie B was present in 46% although only one had evidence of recent infection as assessed by IgM. These athletes were drawn from all over Scotland and England so this was not a local phenomenon. There was no correlation between elevated titres to Coxsackie B virus and poor performance. This suggests that the prolonged disability reported after Coxsackie B and other virus infections (Behan et al, 1980) was not a cause of poor performance in this group of athletes. There was no relationship between injury and elevated titres to Coxsackie B viruses although a recent study in the West of Scotland (Driscoll et al, 1987) had suggested this as a possibility. In the latter study 58% of a normal control group of individuals had neutralising antibody titres to Coxsackie B 1-5 of ≥ 256. There was no correlation between high viral titres suggestive of recent infection and loss of form. As only one athlete had raised IgM titres the athletes studied had past rather than current infection with Coxsackie B. This suggests that the prolonged disability reported after Coxsackie and other virus infections did not cause poor performance in the cohort studied.

This study presents evidence that virus infection particularly with Coxsackie B is common in the young gregarious population who participate in top level athletics. The lack of relationship between infection and performance indicators may reflect the importance of other factors in determining performance. Due to the enormous diversity of human viruses it is possible to screen for only the most common infections which cause only a minority of URTIs. Psychological factors may also play a role. The finding of raised viral titres should be interpreted with caution when assessing athletes complaining of loss of form.

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