

The Over-Training Syndrome

What exactly is this phenomenon? What causes it? How can occurrence be minimised? Heidi Meehan explains

Many athletes complain of experiencing a suppressed athletic performance often in conjunction with a number of other symptoms at some time during their career. Among others, these symptoms may include chronic fatigue, disturbed mood states, increased susceptibility to upper respiratory tract infections, changes in resting heart rate and disturbances in sleep patterns.

If these are symptoms that your athletes regularly complain of then they may be suffering from, or at an increased risk of developing, the over-training syndrome.

The aims of this article are to provide an understanding of what the over-training syndrome is, to outline the possible causes of the syndrome, and to provide practical advice for minimising its occurrence.

What Is Over-Training Syndrome?

Some confusion exists in relation to what the over-training syndrome actually is. This is mainly due to a lack of consensus with regard to the terminology that is used to describe the syndrome. Over-training, over-reaching, overtraining syndrome, staleness, burnout and chronic fatigue syndrome are terms that are often used interchangeably when referring to symptoms of the over-training syndrome within the athletic world. So as to prevent further confusion and misinterpretation and to prevent future cases of the over-training syndrome as far as possible, it would be helpful if the correct terms were defined and used appropriately. For the purpose of this article, over-training, overreaching and the over-training syndrome will be defined appropriately.

Over Training

The term 'over-training' is a process involving an excessive training load, coupled with inadequate recovery. The term does not differentiate between over-reaching and the over-training syndrome. The process of over-training may lead to an athlete developing an 'over-reached' state in the short term or the 'over-training syndrome' in the long term (Budgett, 1994).

'Overload training' is a recognised component of athletic training regimens. However, in order for an athlete to recover from, and adapt to, the overload, such training practices must be coupled with adequate rest and large increases in an athlete's training load should be avoided (Bompa, 1999). If such practices are not

considered when planning an athlete's training programme, an athlete may enter an 'over-reached state' and is said to be 'over-reaching' (Fry et al., 1991).

Over-Reaching

An over-reached state is characterised by fatigue and presents itself as a decline in athletic performance during training and/or competition (Snyder, et al., 1995). With a decrease in training load and an extended recovery period, an overreached state can be reversed. Athletes have been reported to recover, and supercompensation has been shown to occur within two weeks (Jeukendrup et al., 1992). As long as recovery is managed appropriately, overreaching is not regarded as a serious problem for athletes.

Although an over-reached state can be reversed, athletes are often diagnosed with the over-training syndrome. One reason for this is that athletes and coaches frequently react to the performance decline associated with an overreached state by increasing the training load. The consequences of such action can be very severe (Lehmann et al., 1993). If an athlete continues training, and indeed increases their training load while in an over-reached state, the 'over-training syndrome' may develop.

The over-training syndrome is characterised by chronically suppressed athletic performance, accompanied by one or more serious symptoms. These symptoms may present themselves physically and/or psychologically. A list of symptoms that were reported by athletes diagnosed with the over-training syndrome in our recent investigations are presented in Table 1 (from Meehan, 2000; Meehan et al., 2000, 2001).

Table 1: Reported symptoms of the over-training syndrome

Chronically suppressed athletic performance	constipation
Chronic fatigue	Dizziness
Prolonged post-exercise fatigue	Abnormal sweating
Muscle tiredness	Painful lymph glands
Muscle weakness	Sleep disturbances
Joint pain	Mood disturbances
Headaches	concentration problems
	Lapses in memory

Sore throat

Constant colds

Full recovery from the over-training syndrome is reported to take a number of weeks or months (Kuipers and Keizer, 1988). For some athletes the outlook may be even bleaker. Athletes involved in our recent investigations have reported suffering from symptoms for as long as two years. In such cases, these athletes have been unable to return to their sport (Meehan, 2000; Meehan et al., 2000, 2001).

Episodes of the over-training syndrome are recognized as a serious problem for endurance athletes (O'toole 1998). Cases are typically reported and diagnosed in endurance runners, cyclists, swimmers, rowers and triathletes.

What Causes Over-Training Syndrome?

Historically, it has been suggested that the overtraining syndrome develops as a result of an intolerance to the training load. As the term suggests, over-training has been reported to be the major contributor to this intolerance (Budget, 1998; Kuipers, 1998). Recently, it has been suggested that non-training stress in the form of environmental and lifestyle stressors such as examination and relationship stress may also contribute to the development of the overtraining syndrome (Kentta and Hassmen, 1998; Meehan, 2000; Meehan et al., 2000, 2001). These suggestions propose that the over-training syndrome is a response to an accumulation of both training and non-training stress.

Training Stress

In terms of the contribution that training stress plays in the development of the over-training syndrome, it is frequently reported that too much training coupled with inadequate recovery, often resulting from a poorly planned training programme, is a major precursor to the syndrome. Foster and Lehmann (1999) report that no cases of the over-training syndrome have been diagnosed in athletes undergoing a period of 'easy' training.

Evidence supporting the role that training stress plays in the development of the overtraining syndrome is provided by anecdotal reports and findings from investigations carried out in an attempt to investigate the process of over-training (e.g., Barron et al., 1985; Hooper et al., 1993; Ryan et al., 1983). Typically, investigations have manipulated athletes' training loads in terms of intensity and volume. A review of the findings suggest that athletes may be at an increased risk of developing the overtraining syndrome following a training overload (increased

intensity or volume) of three weeks or more. Important to note from the findings of these investigations is the fact that individual differences in response to the training load exist. A training load that constitutes over-training for one athlete may constitute optimal training for another. As the primary goal of athletic training is to enhance performance as far as possible, it is essential that the balance between training and over-training is identified for each athlete. One of the most problematic parts of the training process for an athlete and their coach is finding this balance. Unfortunately, as of yet there are no consistent or reliable markers that indicates an optimal training load for an athlete or indeed that indicates that they are entering an overtrained state.

Non-Training Stress

Despite the tremendous amount of evidence that exists to suggest that training stress is the major contributor in the development of the over-training syndrome, some evidence does exist to suggest that non-training stress may also have a role to play in the development of the syndrome.

Evidence to support this notion is provided by those investigations that demonstrate the existence of individual differences in response to the training load. These investigations have reported that a small number of such athletes were experiencing additional non-training stress at the time of the study (Gabriel et al., 1998; Mackinnon and Hooper, 1996; Urhausen et al., 1998a; 1998b). In addition to these findings, athletes diagnosed with the over-training syndrome reported the existence of lifestyle stressors in the months leading up to the presentation of symptoms in our recent investigations (Meehan, 2000; Meehan et al., 2000, 2001). Examples of the stressors that the athletes reported include divorce, financial debt, studying for finals at University and redundancy.

None of the athletes reported their training loads to have been any different from previous years.

Although at present there is a lack of evidence supporting the role of non-training stress in the development of the over-training syndrome, an abundance of literature does exist that provides evidence to suggest that life stress may increase the incidence of illness and athletic injury, and although limited, there is evidence to suggest that life stress may be involved in the development of the chronic fatigue syndrome (e.g., Bramwell et al., 1975; Chen et al., 1995; Houdenhove et al., 1995). Symptoms of the chronic fatigue syndrome are similar to many of those reported by athletes diagnosed with the over-training syndrome. In light of such

evidence, it does not seem improbable to suggest that non-training stress may indeed have a role to play in the development of the overtraining syndrome.

The over-training syndrome may be a response to an accumulation of both training and non-training stress where an athlete's ability to adapt to their normal training regimen has been compromised.

Due to this conflict in opinion that exists with regard to the study of causes of the over-training syndrome, there is confusion as to whether the symptoms associated with the over-training syndrome can always be due to over-training. As a direct result of such confusion Budgett et al., (2000) have redefined the over-training syndrome as the 'unexplained underperformance syndrome'.

Minimising The Over-Training Syndrome?

Unfortunately, despite numerous studies being carried out to identify reliable markers that indicate when an athlete is unable to tolerate the training load, a single consistent marker has not yet been identified. Therefore, an ongoing problem for coaches is to confidently devise a training programme that optimises an athlete's performance, while at the same time avoiding the detrimental effects of over-training. Despite these difficulties there are a number of practical strategies that a coach can employ to avoid as far as possible the effects of over-training.

An obvious measure that a coach and athlete should take in avoiding the ill effects of overtraining is to ensure that the training programme is well structured. Any training programme should provide an athlete with an appropriate balance between training stress and recovery. Although often overlooked, the recovery process is one of the most important aspects of a training programme as it is when adaptation takes place. If sufficient attention is not given to this process then the body will have little time to adapt to the training stress imposed upon it and the ill effects of over-training may be difficult to avoid.

A further consideration that should be taken into account when devising an athlete's training programme is to recognise that individual differences exist with regard to training load tolerance. Athletes are able to tolerate different levels of training and also require different lengths of recovery time. A training programme that has led to optimal performance for one athlete may be the demise for another. It is therefore vitally important that athletes' training programmes are individualised.

In terms of non-training stress, coaches must consider modifying their athletes' training loads when they are experiencing periods of stress outside the confines of

their training (e.g., examinations, relationship difficulties, financial worries). Such modifications to the training load may enable an athlete to accommodate the accumulation of stress that they are experiencing, ensuring that their ability to adapt is not compromised in any way. Alterations to the training load should occur irrespective of whether such a training load has optimised performance in the past. The athlete may not have been experiencing stress from their nontraining environment when the same training load led to such optimal performances.

A final piece of advice for every coach that is trying to optimise performance is to ensure that athletes listen to their body. An athlete's body is the most useful tool for detecting maladaptations to the training load. A suppressed performance and/or complaints of other symptoms indicative of an over-reached state or the over-training syndrome that do not usually occur in response to training may indicate that an athlete is intolerating the training load. Modifications should be made to the training programme in response to such symptoms in order for adaptation to be facilitated.

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