

Hyperbaric oxygen effects on sports injuries

Pedro Barata, Mariana Cervaens, Rita Resende, Óscar Camacho and Frankim Marques

Abstract: In the last decade, competitive sports have taken on a whole new meaning, where intensity has increased together with the incidence of injuries to the athletes. Therefore, there is a strong need to develop better and faster treatments that allow the injured athlete to return to competition faster than with the normal course of rehabilitation, with a low risk of re-injury. Hyperbaric therapies are methods used to treat diseases or injuries using pressures higher than local atmospheric pressure inside a hyperbaric chamber. Within hyperbaric therapies, hyperbaric oxygen therapy (HBO) is the administration of pure oxygen (100%) at pressures greater than atmospheric pressure, i.e. more than 1 atmosphere absolute (ATA), for therapeutic reasons. The application of HBO for the treatment of sports injuries has recently been suggested in the scientific literature as a modality of therapy either as a primary or an adjunct treatment. Although results have proven to be promising in terms of using HBO as a treatment modality in sports-related injuries, these studies have been limited due to the small sample size, lack of blinding and randomization problems. HBO seems to be promising in the recovery of injuries for high-performance athletes; however, there is a need for larger samples, randomized, controlled, double-blinded clinical trials combined with studies using animal models so that its effects and mechanisms can be identified to confirm that it is a safe and effective therapy for the treatment of sports injuries.

Keywords: hyperbaric oxygen therapy, sports injuries

Introduction

In the last decade, competitive sports have taken on a whole new meaning, where intensity has increased together with the incidence of injuries to the athletes. These sport injuries, ranging from broken bones to disrupted muscles, tendons and ligaments, may be a result of acute impact forces in contact sports or the everyday rigors of training and conditioning [Babul *et al.* 2003].

Therefore, a need has emerged to discover the best and fastest treatments that will allow the injured athlete to return to competition faster than the normal course of rehabilitation, with a low risk of re-injury.

Hyperbaric oxygen therapy (HBO) is the therapeutic administration of 100% oxygen at pressures higher than 1 absolute atmosphere (ATA). It is administered by placing the patient in a multiplace or in a monoplace (one man) chamber and typically the vessels are pressurized to 1.5–3.0 ATA for periods between 60 and 120 minutes once or twice a day [Bennett *et al.* 2005a]. In the monoplace chamber the patient

breathes the oxygen directly from the chamber but in the multiplace chamber this is done through a mask. At 2.0 ATA, the blood oxygen content is increased 2.5% and sufficient oxygen becomes dissolved in plasma to meet tissue needs in the absence of haemoglobin-bound oxygen, increasing tissue oxygen tensions 10-fold (1000%) [Staples and Clement, 1996]. HBO is remarkably free of untoward side effects. Complications such as oxygen toxicity, middle ear barotrauma and confinement anxiety are well controlled with appropriate pre-exposure orientations [Mekjavic *et al.* 2000].

HBO has been used empirically in the past, but today information exists for its rational application. This review aims to analyse the contribution of HBO in the rehabilitation of the different sports injuries.

Hyperbaric oxygen therapy

Hyperbaric therapies are methods used to treat diseases or injuries using pressures higher than local atmospheric pressure inside a hyperbaric chamber. Within hyperbaric therapies, HBO is

Ther Adv Musculoskel Dis
(2011) 3(2) 111–121

DOI: 10.1177/
1759720X11399172

© The Author(s), 2011.
Reprints and permissions:
[http://www.sagepub.co.uk/
journalsPermissions.nav](http://www.sagepub.co.uk/journalsPermissions.nav)

Correspondence to:
Pedro Barata
Universidade Fernando
Pessoa, Faculdade
Ciências da Saúde, Rua
Carlos da Maia 296, Porto
4200, Portugal
pedro.barata@gmail.com

Mariana Cervaens
Universidade Fernando
Pessoa, Faculdade
Ciências da Saúde, Porto,
Portugal

Rita Resende
Hospital Pedro Hispano,
Unidade Medicina
Hiperbárica, Porto,
Portugal

Óscar Camacho
Hospital Pedro Hispano,
Unidade Medicina
Hiperbárica, Porto,
Portugal

Frankim Marques
Faculdade Farmácia U.P.,
Biochemistry, Porto,
Portugal