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ORIGINAL RESEARCH

Mood, Illness and Injury Responses and Recovery with Adventure Racing

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Objective.—Exercise stress, immune status, and mood are interrelated. The stress of adventure racing is unique; exercise is very prolonged and competitive, with severe sleep deprivation and sustained cognitive demands, usually in arduous terrain and environmental conditions. The purpose of this prospective, descriptive study was to identify mood changes along with symptoms of illness and injury during and in the weeks following an international-level adventure race.

Methods.—Mood, sleep, injury, and illness data were collected using questionnaires before, during, and for 2 weeks following New Zealand's Southern Traverse Adventure Race in November 2003.

Results.—Mood was variable between athletes, but peaks of altered mood subscores were evident ($P < .05$) during the first 24 hours of racing, around race completion, and, as was hypothesized, 3 days after racing. Altered mood subscores resolved within 2 weeks. Symptoms of upper respiratory illness were most common immediately before (25/60, 42%) and after (28/49, 57%) racing, and largely resolved over the 2-week follow-up (5/27, 19%). Skin wounds and infections were common (43/49, 88%) immediately after the race but settled quickly. Pain was universal (100%), and musculoskeletal injury was common (38/48, 79%). Gastrointestinal complaints were common at the finish (8/49, 16%) and during the next 5 days but settled more quickly than upper respiratory symptoms.

Conclusions.—Adventure racing of approximately 100 hours causes significant symptomatic injury and illness and mood state disruption, which generally resolve within a fortnight following racing. Disrupted mood and symptoms of illness and injury indicate athlete susceptibility to overreaching or overtraining without sufficient recovery.

Key words: adventure race, endurance exercise, illness, mood state

Introduction

Adventure racing is a unique and popular form of stress.[1] It involves very prolonged competitive exercise, typically undertaken with severe sleep deprivation (ie, loss of sleep) and sustained cognitive demands (especially navigational), usually in arduous terrain and environmental conditions. Exercise includes running, trekking, kayaking, mountain biking, and rope skills for a total period from several hours to several days. Teams often consist of 4 athletes who travel together, making strategic decisions on navigation, pace, and sleep. Thus, wilderness multisport and adventure races provide unique challenges, require their own skill set, and apparently have distinct illness and injury profiles.[2–7] Acute and chronic injury is frequent,[2] especially of the lower limbs.[8] Illness appears more common in those competing with injury.[2] The time course of recovery from this volume of sustained exercise and the associated afflictions has not previously been reported.

When athletes' recovery is insufficient for their exercise impulse (in the context of their other stressors), they develop a short-term decrement in performance capacity known as ''overreaching.''[9–11] Sustained overreaching leads to the more protracted condition of ''overtraining.'' Both states are characterized by decreased exercise performance, altered immune function, and increased global disturbance of mood.[12] These changes may result from as few as 7 days intensified exercise with limited recovery.[11] Therefore, it seems plausible that competing in an adventure race would mandate significant physical and psychological recovery and that repeated racing with inadequate recovery might lead to symptoms similar to those seen in overtraining. However, with increasing sponsorship and prize money,

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athletes are doing more of these multiday races in a year and, while uncommon, can do more than 1 in a month. It is therefore important to develop an appreciation not only of the physiological, psychological, and health effects of such races, but also the requirements of recovery and recuperation.

Sleep deprivation degrades mood,[13,14] but whether exercise does[14] or does not[13] exacerbate the mood disruptions is not entirely clear. Moreover, the aforementioned studies involved less exercise or sleep deprivation stress than is encountered in expedition-style adventure racing and tested those effects using people who were not highly trained or participating in self-motivated circumstances. Furthermore, athletes appear more susceptible to mood state changes in the early postrace period,[15] but the mood states during racing and recovery are undetermined. Measuring mood states has successfully identified athletes showing signs of distress due to intense training of high volume.[9] The mucosal immune system plays an important role in protecting the body from upper respiratory tract infection (URTI) and is affected by both exercise and psychological stress/anxiety. A reduction in salivary immunoglobulin A (SIgA) may be seen with either, and low levels of SIgA are associated with an increased risk of URTI, which is, along with low mood, a feature of overtraining.[16]

The main purposes of this study were to record athletes' mood states and record and categorize their symptoms of illness and injury in racing and recovery from an international-level adventure race. A secondary purpose was to identify the possible occurrence of ''postrace blues'' reported in anecdote at approximately day 3 after the race. We hypothesized that alterations in mood subscores would be evident around the third recovery day, specifically with an increase in depression and reduced vigor.

Methods

This was a prospective descriptive study conducted at the ''Southern Traverse Adventure Race,'' in Otago, New Zealand, in November 2003. The race was over a course of ~411 km. It required athletes to race as continuously as possible in mixed-gender teams of 4 (racing concurrently) through wilderness terrain. Disciplines involved kayaking, coasteering (traversing rugged sections of coastline below the high-tide mark), mountain-biking, and running/trekking. Navigation between check points and transition areas was aided by maps and compasses. Sleep was obtained in discipline-transition areas and out on the course.

PARTICIPANTS

There were 2 participant groups. A primary group of 12 athletes from 3 teams was recruited in the weeks preceding the race, referred to as ''science teams.'' They were recruited from registered race entrants on the basis that they lived locally (within 300 km) and were studied before, during, and after the race for this study and a wider project on physiological effects.[1] Their experience and ability spanned that of the overall race population; one team (team A) all had international experience, another team had extensive Southern Traverse experience (team B), while the third team was comprised of adventure racing novices (team C). A second group consisted of athletes approached at the race registration and invited to participate in the study. Of 116 athletes who started the race, prerace data were obtained from 60 (52%), and all but 1 of these provided finish-line data. Twenty-seven athletes from both groups submitted repeated questionnaires for the 2 weeks following the race. Ethical approval was obtained prospectively through the University of Otago Human Ethics Committee, and athletes provided their informed consent in writing before participation.

PROCEDURES

Illness, injury, and mood data were obtained using questionnaires. Questionnaires were first administered and completed 2 days before the race, once teams had undergone prerace registration. During the race, the science teams were intercepted on a daily basis, usually at check points and transition areas, for immediate completion of questionnaires. At the finish line, participants from both groups completed the questionnaires within 60 minutes of finishing. Athletes were invited at the postrace prizegiving ceremony to participate in the follow-up part of the study. They were given a pack including questionnaires for 2 weeks of follow-up. They were asked to complete the questionnaires at the same time each day and were reminded on the day of assessment by electronic mail. Questionnaires were completed on recovery days 1, 2, 3, 4, 7, 10, and 13 after most athletes finished the race.

MEASUREMENTS

Mood state was assessed using the Brunel Mood Scale (BRUMS).[17,18] The BRUMS was used because of its brevity and ease of administration compared to other longer mood scales because the athletes were required to complete it during the race. The BRUMS contains 24 adjectives relating to 6 elements of mood (confusion,