CASE REPORT

Open water swimming as a treatment for major depressive disorder

Christoffer van Tulleken,[1] Michael Tipton,[2] Heather Massey,[2] C Mark Harper[3,4]

[1]Division of Infection and Immunity, University College London, London, UK
[2]Extreme Environments Laboratory, Department of Sport and Exercise Science, University of Portsmouth, Portsmouth, UK
[3]Royal Sussex County Hospital, Brighton, UK
[4]Brighton and Sussex Medical School, University of Sussex, Brighton, UK

Correspondence to
Dr Heather Massey,
heather.massey@port.ac.uk

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SUMMARY

A 24-year-old woman with symptoms of major depressive disorder and anxiety had been treated for the condition since the age of 17. Symptoms were resistant to fluoxetine and then citalopram. Following the birth of her daughter, she wanted to be medication-free and symptom-free. A programme of weekly open (cold) water swimming was trialled. This led to an immediate improvement in mood following each swim and a sustained and gradual reduction in symptoms of depression, and consequently a reduction in, and then cessation of, medication. On follow-up a year later, she remains medication-free.

BACKGROUND

Physical activity is suggested as an alternative treatment for major depressive disorder (MDD), particularly for forms that are of mild and moderate severity.[1] A number of meta-analyses have demonstrated that exercise is an effective treatment for depression, with a pooled standardised mean deviation ranging from −0.4 to −1.11.[2–5] However the magnitude of effect and activity undertaken varies between individual studies and between meta-analyses.

The use of open water swimming to reduce the symptoms of MDD is a novel alternative therapy. Medical hypotheses have discussed the potential benefit of immersion in cold water to potentially reduce symptoms of MDD.[6 7] There are purported to be a range of physiological and social pathways through which openwater swimming may reduce symptoms of MDD (video 1 in box 1).[8] Physiological mechanisms are linked to cross-adaptation, whereby exposure and adaptation to one stressor impact on the response to another stressor. For instance, proinflammatory responses may be elevated in some patients with symptoms of MDD.[9] However, reductions in cytokine responses in cold-adapted versus non-adapted swimmers have been found[10]; thus, there may be potential for patients with elevated cytokine levels to reduce symptoms of depression by repeated immersion or swimming in cold water.

Other theories suggest that regular open water swimming also results in a postswim 'high', triggered by the release of beta-endorphins, dopamine and serotonin,[11–13] the last of these may be inhibited by elevated inflammatory cytokine levels.[14] Furthermore, facial immersion in cold water stimulates the vagus nerve, resulting in an anti-inflammatory response.[15] This anti-inflammatory effect may underlie the clinical benefits of vagal nerve stimulation (VNS) for MDD, with a significant reduction in symptoms of MDD reported from use of VNS, when followed up 24 months later.[16] It is hypothesised that open water swimming, which involves facial immersion, represents a safer and cheaper means of stimulating the vagus.

Other potential benefits of open water swimming include a sense of achievement and community in participating in a challenging activity,[17] as well as green[18] and blue[19] therapies (access to and use of outdoor space which has vegetation or a body of water). At present, all potential mechanisms remain hypotheses supported by anecdotes. Further empirical study is required to establish the efficacy of the approach and the potential mechanism(s).

CASE PRESENTATION

A 24-year-old woman who was 8 months post partum and otherwise healthy presented with intractable depression and anxiety. Her initial diagnosis was made at age 17; however, symptoms (anger, anxiety, dark mood, misery and self-harm) developed as a much younger teenager. Contributing factors to this include the death of her brother and father, who were also both clinically depressed (father, bipolar). Her symptoms did not improve with antidepressant medications (fluoxetine and then citalopram) and other non-drug treatments (talking therapy). The patient reported the desire to be symptom-free and medication-free, stating that the main side effect of the medication made her feel like she was in a "chemical fog".

INVESTIGATIONS

Depression was diagnosed in primary care, and on interview met the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) and the International Classification of Diseases, Tenth Revision (ICD-10) criteria for major depression. In addition to symptoms of depression and anxiety, the patient was found to be clinically overweight. Poor diet and lack of exercise were highlighted as modifiable lifestyle factors when interviewed. When reassessed 3 months following the start of the intervention, she no longer met the criteria for major depression (DSM-IV or ICD-10) and remains medication-free.

TREATMENT

She undertook regular (once to twice a week) accompanied open water swimming between the months of April and September. The process of acclimatising and getting used to swimming outdoor was challenging for her, and expert support was initially provided (Extreme Environments Laboratory, Portsmouth

Box 1 Videos

The videos are available for viewing on the University of Portsmouth Vimeo account:

- Video 1. Shock to euphoria, a clip taken from the television programme 'The doctor who gave up drugs' produced by RAW TV: https://vimeo.com/277427285.
- Video 2. A soothing swim, a clip taken from the television programme 'The doctor who gave up drugs' produced by RAW TV: https://vimeo.com/277427225.

Permission has been granted by RAW TV, the production company, to use the videos and to host them on the Portsmouth University Vimeo website.

University) to ensure that she felt safe getting into and swimming in cold open water environments. She attended regularly, increasing the duration of swimming as the water temperature increased, and by the end of the summer she was swimming for up to half an hour. Unfortunately, her local open water facilities shut for winter, but she continued to swim indoors and will restart when the lake opens again for the new open water swimming season.

Within a month of open water swimming, she was able to reduce her medication and no longer required drug treatment after 4 months.

OUTCOME AND FOLLOW-UP

Initially she was very nervous and anxious about going into cold water, but felt great pride having done so and enjoyed the experience. Expert support was provided in the form of a coach to ensure she felt safe while swimming, and she later introduced a friend to the sport. The anxiety she initially felt has gone, and she now actively looks for opportunities to swim outdoors. She struggles to swim in the winter as the facilities for open water swimming are not open, but a year on she is still swimming and is medication-free and symptom-free.

DISCUSSION

A recently published case report indicated the remission of postoperative neuropathic pain and associated immobility following a cold water swim.[20] This is the first time a case has been reported where this therapy has been trialled repeatedly for MDD. Clearly adopting a new activity like regular open water swimming involves multiple lifestyle modifications. Additionally, the swimming itself involves blue and green therapy, exercise and companionship, all known to have positive effects on mood. We hypothesise that two specific aspects of this activity may increase the benefit conferred. First is the physiological conditioning of adaptation to immersion in cold water. There is biologically plausible evidence of a cross-adaptation process that may attenuate psychological stress. Second is the sense of empowerment and achievement that comes with the mastery of such a challenging task. However, these hypotheses require empirical investigation. The present report describes a case with symptoms of MDD who was overweight but otherwise healthy. Motivated by wanting to provide a better future for her young child, our case undertook a novel programme of open water swimming (video 2 in box 1).[21] In light of the limited empirical evidence on the positive clinical effect, this case is being documented to raise awareness and to stimulate further research efforts, as well as to highlight potential non-drug pathways to recovery from MDDs.

Potential barriers to the uptake of this form of therapy include medical contraindications to immersion in cold water, for example, patients with cardiovascular disease, or conditions triggered by exposure to cold such as Raynaud's phenomenon and cold water urticaria. In addition, further barriers to cold water swimming include a lack of safe or perceived lack of safe places to swim and the requirement of close, ongoing supervision. These may be addressed by the provision of structured courses which teach the knowledge and skills required to swim safely in open water. This should, as it has in this case, allow the patient to take control of their own therapy, which is both empowering and cost-effective.

Patient's perspective

"I really did struggle with depression and anxiety and have tried everything, CBT, talking, several different drugs and nothing worked or I feel numb and in a chemical fog. Although I didn't enjoy the cold to start with, the effect it had was like a weight being lifted off my shoulders. Open water swimming works for me, it gets me out and about in to the fresh air and has lifted my mood. I still feel down occasionally, but that is more part of what life throws my way rather than the state I was in before."

Learning points

- Continued support from the clinician is required (more time-intensive than medication, hence would be difficult to offer within general practice). It may lend itself more to recovery colleges with links to community open water swimming groups.
- It is important that candidates are confident in the water and that support is given to be in and around the water safely.
- The effects may be seasonal as not all facilities are available for swimming all year-round.
- Further research into the mechanisms underpinning the effect is warranted.
- The activity may not need to be open water swimming, but one that is stimulating, challenging, possibly outdoor and takes place in a social group.

Contributors CvT was responsible for the clinical management of the patient and coauthored the manuscript. MH and MT developed the idea and commented on drafts of the paper and approved the final version of the paper. HM was responsible for patient support, follow-up and drafting the paper.

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