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• Study Protocol

Health effects of natural spring waters: A protocol for systematic reviews with a regional case example

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ABSTRACT

BACKGROUND: Spring water therapies have been used since at least 1550 BC. Despite the growing body of evidence supporting these therapies for a range of conditions, including musculoskeletal, dermatological, respiratory and cardiovascular conditions, they do not currently form part of mainstream healthcare in many countries. The protocol established in this paper aims to support systematic reviews that examine the health outcomes associated with human exposure to regional spring waters, using the Australia and New Zealand context as a case study.

METHODS/DESIGN: The protocol searches for studies in eight health/medical databases, searches three local health/medical journals, and includes forwards and backwards searching. Standard systematic review methods are used including: specifying pre-determined inclusion criteria and data management plans, appraising the studies for bias, and allocation to a hierarchy of evidence.

DISCUSSION: The protocol supports a review and comprehensive synthesis of the current evidence regarding the health effects of natural spring water, and can be adapted for reviews in other regions. From this evidence, recommendations regarding practice and future research can be made on the therapeutic role of spring water.

Keywords: hot springs; Australia; New Zealand; review; study protocol

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1 Background

Spring water has reportedly been used therapeutically since at least 1550 BC[1]. Hippocrates of Kos reputedly used balneology to cure his patients[2], and reported that "... that cold water warms, ... whilst warm water cools the body; ... that warm shower baths induce sleep, ... and that cold water stimulates; ... he recommended cold water to assuage fever and pain"[3]. Despite the widespread use of spring water as therapy, it was not until 1702 that more formal research into spring water therapies was conducted[3].

In the region used as a case study in this paper, Australia and New Zealand, it is thought that hot springs have been

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used for healing by the Māori since 1300 AD[4]. Since European settlement, the springs have been used and commercially developed starting in Australia from the 1850s[5]. During the later nineteenth century and early twentieth century, spas in both countries were promoted by medical practitioners, with government support[5,6]. At the time, treatment with spring water was a cheaper alternative to conventional treatments, and applied via stream, baths, douches or by ingestion[6].

Although the spa industry fell out of favour internationally from the 1950s, there was a resurgence of interest in the 1980s, and the industry has continued to thrive, resulting in recent investment into springs such as Moree, Peninsula Springs and Hepburn Springs in the State of Victoria[4,6]. At present, most mineral springs in Australia are located within Victoria's central highlands[5]. Additionally, there are less developed springs, such as those controlled by private land-owners, Indigenous communities, and National Parks including Lorella Springs, Hastings (Tasmania), Butterfly Springs and Mataranka (Northern Territory), where facilities are limited to camping areas and pit toilets[5].

It has been repeatedly claimed that specific spring water therapies are effective either as a standalone or add-on treatment in treating a range of health conditions, including respiratory conditions[7,8], osteoarthritis[9,10], chronic low back pain[9,11], fibromyalgia[12], dermatitis[8], psoriasis[13], cardiovascular conditions[8], dyspepsia[8], obesity[8], anxiety[8], and chronic inflammatory pelvic disorders[8,9]. Despite these assertions, currently spring water therapies do not generally form part of traditional medical treatment in the selected study region.

One of the issues with spring water therapies is the location-specific nature of the mineral water itself. Mineral water differs in terms of the mineral composition and temperature, two proposed mechanisms of the benefits of mineral water. Even the environment in which a treatment takes place may influence benefits. Wohlmann[14] reported the indications for particular New Zealand springs; for instance, Rotorua's Priest Bath was indicated for those with psoriasis and chronic dry eczema, and the spring water of Te Aroha for chronic gastric catarrh, gout, glycouria and chronic respiratory catarrh (drinking), and arthritis (bathing). As such, it is important to consider the specific benefits of springs on a local perspective. If spring water sourced from Australia and New Zealand has some of these beneficial effects on human health as demonstrated by systematic review, then medical practitioners and allied health professionals would be able to recommend spring water therapies to their patients in alignment with current evidence-based practice.

The protocol is designed to support a systematic review of studies reporting the health effects of spring water exposure on human health, using Australia and New Zealand as a case study, in order to answer the following research questions: (1) What are the beneficial human health outcomes associated with exposure to regional spring waters? (2) What are the adverse human health outcomes associated with exposure to regional spring waters?

2 Methods

This protocol has been registered with PROSPERO (June 28, 2015; PROSPERO registration number: CRD42015023713)[15].

2.1 Eligibility criteria

The search will include studies which investigate or report the health outcomes relating to spring water exposure, using Australian and New Zealand as a case study. The relevance of studies identified through the searches, will be determined using the inclusion criteria reported in Table 1.

2.2 Sourcing and managing studies

Studies will be sourced through database searching, searching specific local journals, and forwards and backwards searching of included studies.

2.2.1 Database searching

Medline (Ovid; 1946–2015), Embase (Ovid; 1947–2015), Allied and Complementary Medicine (AMED; Ovid; 1985–2015), Cochrane Database (1992–2015), Web of Science Core Collection (1900–2015), Cumulative Index to the Nursing and Allied Health Literature (CINAHL; EbscoHost; 1981–2015), PubMed (1966–2015, and selectively from 1809) and Health Source: Nursing/Academic Edition (EbscoHost; 1952–2015) will be searched. These databases have been selected because of their focus on health and medical research. A comprehensive set of search terms were developed by the three authors, after reviewing the search strategies of a number of systematic reviews on similar topics[7–12,17,18], performing scoping searches, and introductory reading of the topic. Terms were categorised as spring water, exposure, health outcome and Australia/New Zealand terms, with each category combined with the AND Boolean operator (see Appendix 1 for the specific terms, available at http://www.jcimjournal.com/jim). No limits will be applied to the searches. If used for other regions, the Australia/New Zealand terms should be changed to reflect that region.

The studies identified in each database search will be exported into EndNote X6. Within EndNote any duplicates will be manually removed, first automatically, and then manually checked. The titles and abstracts of each of the studies in the EndNote library will then be screened for inclusion, according to the above criteria (Table 1). If there is any uncertainty regarding the inclusion of a study the publication will be retained for full text screening. The list of remaining studies will be exported into a Microsoft