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CLINICAL REVIEW

Empirical research evaluating the effects of non-traditional approaches to enhancing sleep in typical and clinical children and young people

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SUMMARY

This paper examines the effects of non-traditional (non-behavioural and non-prescription pharmaceutical) approaches to sleep in children and young people (0–18 y). A systematic search identified 79 studies that met inclusion criteria. Seventeen percent of the studies were rated as having a conclusive level of evidence, forty-two percent with preponderant evidence and forty-one percent with only suggestive evidence. There were promising indications, with certain populations only, for aromatherapy, ketogenic diets, an elimination diet (few foods diet), elimination of cow's milk, avoidance of caffeine, tryptophan with adenosine and uridine, omega-3 and omega-6, valerian, music, osteopathic manipulation and white noise. Bright light therapy and massage returned some positive results. All of these interventions warrant further, more rigorous research. There was limited or no evidence to support acupressure or acupuncture, other diets or dietary supplements, exercise or weighted blankets.

Caution is needed in interpreting some studies because poorer quality studies were more likely to return positive results. Suggestions are made for the improvement of large and smaller scale research, especially conceptualization around multiple physiological measures of sleep and the adoption of research methods which are of use in clinical settings.

Introduction

Prevalence studies into sleep problems in children and young people regularly remark on the low frequency of consultation with medical practitioners such as paediatricians [1]. Given this, it is likely that parents make their own decisions regarding treatment and access non-traditional remedies which are not reliant on contact with health professionals. But do these approaches work and what is the quality of evidence available to answer this question?

Generally such approaches are referred to as complementary and alternative medicine (CAM) but what comprises CAM is sometimes unclear. Most studies exclude psychological treatments as being mainstream and well researched [2] while other models [3] of CAM treatments include cognitive behaviour therapy. Similarly, some studies include melatonin as a CAM, while it is a prescribed medicine in some jurisdictions and is excluded in some reviews [2]. Complementary and alternative medicines are used by 20–40% of typical and more than 50% of chronically ill children [3]. Although regularly used by adults with sleep problems [2], overviews of their use with children scarcely mention sleep [3]. This review poses the question – do such remedies and approaches have an effect on sleep problems, or even an effect on sleep per se in children and young people?

This review adopts the term "non-traditional (i.e., specifically non-prescription pharmacological and non-behavioural) approaches" and investigates their use with both sleep and sleep problems in both typical and atypical children and young people (0–18 y). This descriptor is used instead of CAM, and omits the word "medicine" to reflect the information accessed by families outside of the health professions; to reflect that approaches, such as exercise, are difficult to categorise as "medicine"; and to expand the investigation beyond medically diagnosable sleep problems to include their effects on sleep per se.

Abbreviations: ADHD, attention deficit hyperactivity disorder; ASD, autism spectrum disorder; BLT, bright light therapy; CAM, complementary and alternative medicine; EEG, electroencephalography; IOA, inter-observer agreement; PSG, polysomnography; RCT, randomised controlled trial.

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Even with adults, there are few studies employing randomized controlled trials (RCTs) to investigate this topic. A previous review into the use of CAM in insomnia by Sarris and Byrne [2], found only 20 studies, over eight (of 16) therapeutic approaches, reaching their standards of rigour. Their studies predominantly addressed adult and geriatric populations, so at this point in time, rigorous criteria may function to render the use with children, and some specific approaches, invisible in reviews. So, restricting the inclusion of articles to those using RCTs or similarly rigorous approaches seemed counterproductive. Instead, we catalogue what research has been done in this area, together with the quality of the research involved, in order to demonstrate just what the evidence-base is for these approaches. This may allow researchers to remedy the systematic problems which beleaguer research with such interventions [2]. We therefore seek to ascertain 1) the evidence that any non-traditional approaches affect sleep per se, or sleep problems, and 2) the quality of the research addressing these questions.

Methods

Our review began by compiling a list of non-traditional approaches augmenting those from an earlier review [4] by scrutinizing articles published this century and yielded by a Google-Scholar search into *complementary and alternative medicine + children* and *complementary and alternative medicine + sleep*.

This search yielded several approaches comprising acupuncture/acupressure, aromatherapy, diet (general or specific including elimination, gluten-free, casein free), dietary supplements (for example omega-3, vitamin C/ascorbic acid) exercise, bright light therapy, massage, music, night milk/sleepy milk (cow's milk collected at night and therefore higher in melatonin and tryptophan), osteopathic manipulation, St John's Wort/*hypericum perforatum*, valerian, weighted blankets and white noise.

A further search of electronic databases was then conducted in order to identify the empirical research evidence relating to each treatment. This search initially included the terms, "sleep" plus the specific treatment (e.g., sleep + acupuncture). The articles located were scrutinized for studies including children or young people, then an additional search specifically targeting children (e.g., sleep + child + acupuncture) was carried out.

The databases that were searched for the purpose of this review include PsycINFO, Education Resources Information Center (ERIC) and Education Research Complete. A search of Google Scholar was also conducted. This search included all date ranges that were included within each database. This process was adhered to for all treatment domains. Ancestry searches were also conducted from the reference sections of all literature found (Fig. 1).

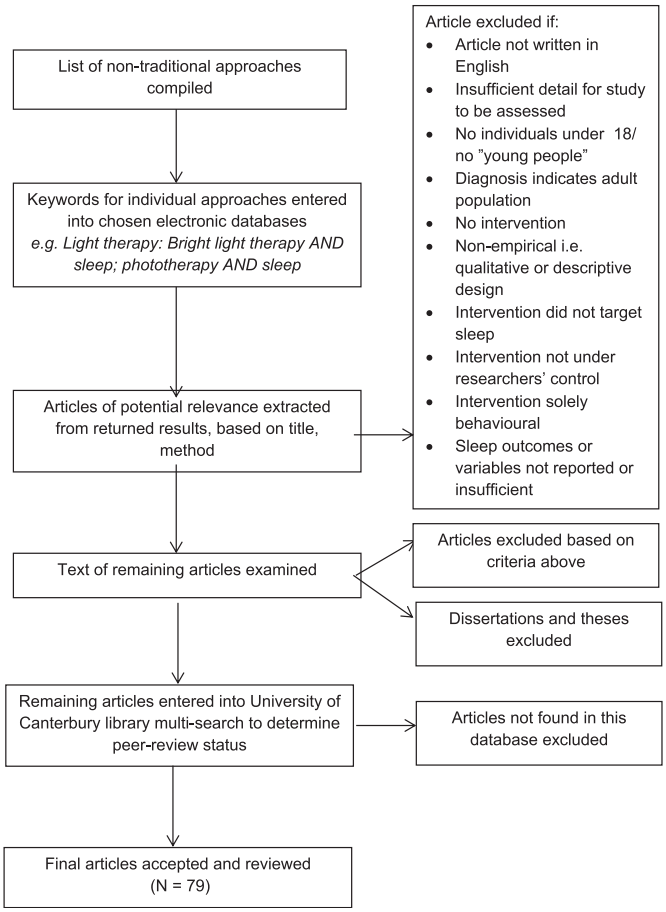

Fig. 1. CONSORT diagram of search and inclusion/exclusion processes.

Inclusion and exclusion criteria

In order to ensure studies were from recognized, peer reviewed journals, only peer reviewed, English language, journal articles, accessible through the extensive data-bases recognized by the University of Canterbury library, were selected. This process excluded three articles. All articles selected were empirical, and provided prospective quantitative data on sleep or data which were contemporaneous with treatment. Some aspect of sleep (e.g., sleep onset latency, sleep duration, night-time awakening) needed to be included as a dependent variable.

Articles were included if they involved children or young people where at least one of the participants was 18 y of age, or younger. In order to ensure the approach was suitable for a younger group, studies including participants who were both under and over 19 y needed to describe the population of interest as being young-i.e., young adults, students or the like. Eligible articles included both typical and clinical populations and children with or without measured sleep problems at baseline. Articles were included regardless of whether sleep was being directly targeted or was an incidental effect of the intervention.

Approaches included needed to be non-behavioural and to not involve the use of substances which were prescribed medicines. Any approach (such as relaxation or hypnosis) utilising a recognized behavioural (i.e., respondent or operant) mechanism was excluded. Although behavioural treatments were excluded, in several cases interventions were used with well-established behavioural components (e.g., bright-light therapy (BLT)) and gradually advancing rise times [5]. Melatonin is an endogenous hormone and a controlled medicine in Australia and New Zealand so that was also excluded.

Because of the paucity of rigorous research and the authors' intention to determine the quality of the research evidence presented, designs such as case studies, and uncontrolled group designs were included along with the more rigorous double-blinded, placebo-controlled or within-participant experimental trials. The intervention needed to be deliberately introduced during the trial as opposed to comparing, for example, naturally occurring high and low exercise groups.

Data extraction

Each of the articles located by JEH and MLSF as a result of the database searches, was initially reviewed by KGF, together with MLSF to determine eligibility for inclusion in the study. Three articles were excluded because of insufficient detail. The articles

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