



Lifestyle interventions targeting dietary habits and exercise in bipolar disorder: A systematic review



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ARTICLE INFO

Article history:

Received 11 August 2015

Received in revised form

19 November 2015

Accepted 7 December 2015

Keywords:

Bipolar disorder

Physical activity

Nutrition

Wellbeing

Psychosocial intervention

Lifestyle intervention

ABSTRACT

Background: Bipolar disorder (BD) is a serious mental illness associated with a high risk of medical comorbidities, long-term disability and premature death. This systematic review examined the current literature on therapeutic interventions targeting nutrition, physical activity and wellness in BD and collecting health-related measures such as mood and course of illness.

Methods: Scopus (all databases), Pubmed and Ovid Medline were systematically searched with no language or year restrictions, up to June 2015, for studies focusing on lifestyle interventions in BD. Search terms were related to *bipolar disorder, nutrition, physical activity, wellbeing, psychosocial interventions and course of illness*. We hand searched content pages of Bipolar Disorders and Journal of Affective Disorders and checked references of relevant reviews and dissertations to identify additional papers.

Results: After applying inclusion and exclusion criteria to identified hits, this literature search retrieved six papers. Overall findings point towards a beneficial role of lifestyle interventions on mood, weight, blood pressure, lipid profile, physical activity and overall wellbeing. Methodological limitations include small sample size, gender ratio imbalance, inconsistencies in terms of laboratory measures, and lack of randomized controlled trials and absence of follow-up and longitudinal studies to determine the benefits of these factors on clinical and functional outcomes over time

Conclusions: Lifestyle interventions in BD targeting nutrition, exercise, wellbeing alongside beliefs, coping strategies and attitudes towards health show promise in reducing the risk of comorbid ailments in BD. There is still a strong need for studies a) developing interventions which are informed by the patient's input and b) examining the effectiveness of such interventions targeting general wellness using well-controlled trials.

Published by Elsevier Ltd.

1. Introduction

Bipolar Disorder (BD) is a chronic and recurrent mental illness with a 3%–5% lifetime prevalence (Cerimele et al., 2014; Merikangas et al., 2007) and is considered one of the leading causes of years of disability adjusted life years (DALYs) as well as years lived with a disability (YLDs) in young adults (Murray and Lopez,

1997). Alongside mood and cognitive deficits (Bora et al., 2009), BD is associated with a high incidence of medical conditions such as overweight/obesity, type 2 diabetes (T2D), cardiovascular disease (CVD), and stroke (Galvez et al., 2014; McIntyre et al., 2005; McIntyre et al., 2004; Prieto et al., 2014; Sharma et al., 2014; Sylvia et al., 2015). Furthermore, these medical conditions might negatively impact the course of the illness. For example, comorbid T2D is associated with an increased risk of recurrent episodes, frequent hospitalizations, suicidality, and poor response to conventional mood stabilizers in BD (Calkin et al., 2009; Gomes et al., 2010; Kim et al., 2009). Obesity appears to be a risk factor for relapse to depression as shown by the high number of obese patients experiencing a depressive recurrence (Fagiolini et al., 2003). In BD, suboptimal dietary patterns (Kilbourne et al., 2007; Sylvia

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et al., 2014, 2011) and physical inactivity have been correlated with low self-efficacy and high incidence of medical comorbidities (Vancampfort et al., 2013).

Unhealthy lifestyle habits such as smoking, substance/alcohol misuse, poor dietary choices, and sedentary life (Kemp et al., 2010; Sylvia et al., 2011) contribute to the development and severity of the physical ailments and clinical symptoms in BD (Sylvia et al., 2013a). It becomes apparent that these maladaptive behaviors contribute to poor health outcomes and reduce cost-effectiveness of therapeutic interventions in BD (Elmslie et al., 2001; Fagiolini et al., 2008; Hong et al., 2011; Sylvia et al., 2013b).

Current literature suggests that a better understanding of the attitudes and beliefs of BD patients towards food and exercise would assist health professionals in developing better targeted psychosocial interventions that induce lifestyle changes (Ussher et al., 2007; Van Citters et al., 2010). Although research supporting the potential effectiveness of increased physical activity (Daumit et al., 2013) and optimal nutrition control (Davison and Kaplan, 2011, 2012) is growing (Sarris et al., 2015), the question remains as to whether combining interventions aiming to change lifestyle behaviors as part of a multimodal psychosocial treatment in BD is feasible. Thus, we systematically reviewed the existing literature on interventions targeting diet and exercise in patients with BD which collected information on the physical and emotional health of participants as the result of the intervention.

2. Systematic search

To systematically identify and review studies investigating the notion of interventions in BD targeting dietary habits and physical activity which examined health-related outcomes such as mood and course of illness, we searched Pubmed, Ovid Medline and Scopus (all databases) with no language or year restrictions, up to June 2015, for articles containing the words *bipolar*, *depression*, *mania*, *mood* cross-referenced with *nutrition*, *food*, *obesity*, *diet*, *hunger*, *eating* and/or *weight*, *physical activity*, *sedentary*, *exercise*, *dietary* and *lifestyle*, *functioning*, *trial*, *intervention*, *therapy*, *adjunct*, *psychosocial*, *longitudinal*, *prospective*, *follow-up*, *coping*, *outcome*, and *course of illness*. Based on existing guidelines for conducting systematic reviews (including The Cochrane Guidelines for Systematic Reviews of Health Promotion and Public Health) (Armstrong et al., 2007; Booth et al., 2011; Greenhalgh and Peacock, 2005) we additionally hand searched content pages of key journals in psychiatry which usually publish research about treatments for BD (*Bipolar Disorders* and *Journal of Affective Disorders*) to yield articles that would not have been otherwise detected.

Abstracts were used to screen papers, and in cases where this information was not provided in abstracts, full texts were obtained. Review papers and dissertations were excluded but we checked reference lists to identify potential additional literature. We did not include studies that did not focus on an intervention targeting nutrition and exercise. Studies assessing the broader effects of psychotherapy and medication on clinical outcomes in BD were discarded. Inclusion was restricted to studies with a) clinical populations with a diagnosis of BD (regardless of subtypes) and b) diagnoses were based on formal diagnostic criteria such as DSM (e.g. ideally using instruments such as the SCID or WMH-CIDI-10). We only included studies which had specified their samples as being individuals with BD. Studies were excluded if they focused on a) using animal models, b) clinical populations with neurological diseases; c) cardiovascular diseases when this was the primary inclusion criteria to take part in the lifestyle intervention study c) children aged <13 because there are additional factors to be considered in preadolescent samples, or d) pregnant or lactating mothers. During pregnancy and lactation, a

number of physiological changes take place and this physiological state and the interventions targeting this specific group are likely to be different. Given our specific interest in nutrition and physical activity, we considered studies associated with circadian rhythms and interventions targeting sleep quality in BD as falling outside the scope of the review. All data were extracted by two reviewers (IB & TDM) to determine if studies met inclusion criteria. All papers identified were published in English. The details of the search strategy are depicted in Fig. 1.

3. Lifestyle intervention programs currently used in bipolar disorder

3.1. Characteristics of the included studies

Studies retrieved as part of the current review are presented in Table 1. Sample sizes ranged from one to 116. Participants' mean ages ranged from 28.87 (SD = 7.86) to 60 (SD = 6.7) years. Overall, males outweighed females, with the number of women in the studies ranged from two to ten. Only three studies used a randomized controlled trial (RCT) design, and the duration of the interventions varied from 12 weeks to 24 months. Studies included a variety of outcome measures such as body mass index (BMI), mood, estimates of autonomic functioning (e.g. blood pressure), inflammation (e.g. C-reactive protein), glucose levels, sleep quality, quality of life, exercise, thoughts and beliefs towards food and weight loss.

3.2. Findings of the included studies

In this section we will first present the results from the RCTs and proceed by describing less well controlled or treatment development studies.

Gillhoff and colleagues tested the effects of a 5-month multimodal lifestyle intervention on BMI compared with standard care (Gillhoff et al., 2010). This intervention included three modules focusing on nutrition, motivation, and physical activity. Using a randomized controlled design the authors tested 50 participants with BD prior to and following the intervention. Participants were assessed again four months after the end of the intervention (month 11). The primary finding of this study was a significant decrease in BMI in the treatment group compared to the control group. Looking at potential predictors, it emerged that this decrease was only observed in females and not in males. The authors speculated that women might be more driven to lose weight compared to men and therefore may have been more motivated to adhere to the intervention. Furthermore, given that participants were medicated it is possible that some medications may have interfered with the efforts to lose weight. There were no changes in cardiovascular and metabolic measures over time. In sum, this study provided evidence of the feasibility and efficacy of a multimodal lifestyle intervention targeting BMI decrease in a medium-sized sample of individuals with BD over a period of 5 months. This seems to be the first RCT in this field.

Kilbourne and colleagues also conducted a RCT in the field of lifestyle management in BD and reported positive effects of an intervention involving patient self-management on physical health called 'Life Goals Collaborative Care' (LGCC) compared to treatment as usual. This trial collected physiological measures such as blood pressure parameters and non-fasting total cholesterol, and wellness measures such as self-reported physical health-related quality of life in patients with BD at risk for CVD (Kilbourne et al., 2013). LGCC is based on a chronic care model that aims to help individuals set their personal wellness goals by enhancing collaboration among health care providers, patients and community services. The LGCC

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