



## Review article

## Exercise in bipolar patients: A systematic review



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## ABSTRACT

**Background:** Sedentary lifestyle is frequent in psychiatric disorders, however the directions of this association and benefits of physical activity are unclear. This is a systematic review about exercise in patients with bipolar disorder.

**Methods:** We performed a systematic literature search of studies published in English (1995 Jan to 2016 Jan) in PubMed, and Cochrane Library combining the medical terms 'physical activity' or 'sedentary' or 'physical exercise' with 'bipolar disorder' or 'mania' or 'bipolar depression'.

**Results:** Thirty-one studies were selected and included 15,587 patients with bipolar disorder. Sedentary lifestyle varied from 40% to 64.9%. Physical activity was associated with less depressive symptoms, better quality of life and increased functioning. Some evidence indicates a relationship between vigorous exercises and mania. Three prospective cohorts were reported; and no prospective randomized controlled trial was identified. Three studies focused on biomarkers in bipolar patients; and one reported the relationship between exercise and sleep in this group. Two assessed physical exercise in adolescents.

**Limitations:** (1) Differences between studies preventing a unified analysis; (2) most studies were cross-sectional; (3) motivation for exercising is a selection bias in most studies; (4) no intervention study assessing only physical exercise; (5) lack of studies comparing exercise across mood states.

**Conclusion:** Generally, exercise was associated with improved health measures including depressive symptoms, functioning and quality of life. Evidence was insufficient to establish a cause-effect relationship between mood and physical exercise. Future research including randomized trials is needed to clarify the role of physical activity in bipolar patients.

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## 1. Background

Bipolar disorder is a chronic psychiatric condition associated with severe disability, high mortality rates and increased demand for health services (Anderson et al., 2012; Price and Marzani-Nissen, 2012) whose therapy generally is based on pharmacological and non-pharmacological interventions (Geddes and Miklowitz, 2013; Kendall et al., 2014; McCormick et al., 2015).

Physical activity is frequently indicated for the prevention and treatment of various mental disorders (Moylan et al., 2013; Ten Have et al., 2011). The anti-inflammatory properties of exercise and the high comorbidity with obesity, diabetes, hypertension and cardiovascular disease (increased by psychotropic action) support this recommendation (Morris and Mohammed, 2005; Petersen and Pedersen, 2005).

Exercise is a good non-pharmacological option to treat depressive disorders (Josefsson et al., 2014; Stanton and Reaburn, 2014; Stubbs et al., in press; Wegner et al., 2014). It is also associated with better cardiorespiratory performance, physical fitness, metabolic syndrome in depressive patients (Kerling et al., 2015; Stubbs et al., 2016b). Studies show that exercise training reduces depressive symptoms in people with cardiovascular and neurological conditions (Adamson et al., 2015; Ensari et al., 2014; Tu et al., 2014). Furthermore, it has been suggested that physical activity increased hippocampal brain-derived neurotrophic factor (BDNF) levels and stimulates neurogenesis, similarly to anti-depressant medications. It can be a neurophysiologic mechanism that can explain the antidepressant properties of exercise (Carek et al., 2011; Lopresti et al., 2013).

Nevertheless, the effect of physical activity on bipolar disorder is unclear. Whereas bipolar disorder may be understood as an inflammatory disease (Drago et al., 2015; Leboyer et al., 2012), it is interesting to consider whether the anti-inflammatory properties of exercise are particularly important for bipolar disorder and could be a specific pathway to improve all its mood states (Kucyi et al., 2010). Conversely, physical activity increases body energy and has been associated with manic episodes (Sylvia et al., 2013a; Wright et al., 2012).

Prior reviews on this subject have only included a limited number of studies, and not research published in the last few years (Thomson et al., 2015; Vancampfort et al., 2013; Wright et al., 2009). Some reviews did not focus specifically on physical activity, but discuss exercise in context of other lifestyle interventions (Bauer et al., 2015; Kemp, 2014; Lopresti and Jacka, 2015; Nierenberg et al., 2015; Ward et al., 2015). Other reviews reported on the effects of exercise in mental illness as an umbrella diagnosis and did not analyze separately and thoroughly bipolar patients (Barbour et al., 2007; Kucyi et al., 2010; Stanton and Happell, 2014).

Considering the current evidence, the relationship between exercise and mood symptoms in bipolar patients needs to be further clarified. The objective of this study is to perform a systematic review in order to investigate the practice of physical exercise in bipolar patients and its influences in bipolar disorder.

## 2. Methods

### 2.1. Search strategies

Two researchers performed an electronic search of PubMed and Cochrane Library. The following keywords were used:

'physical activity' or 'sedentary' or 'physical exercise' and 'bipolar disorder' or 'mania' or 'bipolar depression'. Manual searches were also conducted, using reference lists from identified articles.

We included all articles published since 1995 Jan until 2016 Jan evaluating the relationship between bipolar disorder and physical exercise. Reviews, case reports, conference abstracts, and expert opinions were excluded. Articles that were duplicated or unavailable in English language were eliminated. Studies of patients with mental disorders without analysis according to diagnosis were removed.

### 2.2. Data analysis

The data was classified according to study design and participants. All articles were displayed on a table with the following data: names of authors, publication year, study design, physical activity assessment, main results and limitations, when available.

## 3. Results

### 3.1. Study selection

The initial electronic database search yielded 1671 hits. Five records were found from the reference list of identified studies. Initially, 1676 articles were included. After careful examination, 1542 were excluded: 115 were duplicated; 673 focused on other conditions; 182 referred to animal experiments and 572 were case reports, conference abstracts, and expert's opinions. Thereafter, 94 articles were removed: 8 were unavailable in English language; 1 was not located; 11 were reviews; 47 analyzed bipolar disorder and other mental diseases in the same group and 36 were evaluated physical health and not physical activity or exercise. Thirty-one studies were finally selected and included 15,587 patients with bipolar disorder in total (Fig. 1).

The results were organized considering the relevant topics: (1) physical activity levels in bipolar patients – 15 studies; (2) exercise and biomarkers – 3 studies; (3) comorbidities – 3 studies; (4) beneficial effects of exercise – 7 studies; (5) complications of exercise – 4 studies (Table 1).

### 3.2. Physical activity levels in bipolar patients

Most studies showed that bipolar patients commonly had sedentary lifestyle, defined as absent or irregular practice of physical activity (Table 1). The majority of investigated psychiatric disorders (including bipolar disorder) were associated with lack of exercise (Chwastiak et al., 2011). The percentage of sedentary lifestyle in bipolar disorder varied from 40% to 64.9% in self-reported questionnaires (Cairney et al., 2009; Chwastiak et al., 2011; Gomes et al., 2013; Sylvia et al., 2013a).

Only one study assessed physical activity through objective measures. Motor activity levels of 60 bipolar patients were assessed using an actigraph. Most of them were classified as sedentary (around 78%). Moreover, 21% practiced light physical activity; and 1%, moderate/vigorous (Janney et al., 2014).

Physical activity in children and adolescents was rarely studied. To the best of our knowledge, two studies focused on adolescents and none in children. Jewell et al. (2015) and Subramaniapillai

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