



The functional exercise capacity in patients with bipolar disorder versus healthy controls: A pilot study



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ABSTRACT

The aim of the current study was to compare the functional exercise capacity of patients with bipolar disorder with age-, gender- and body mass index (BMI)-matched healthy controls. Thirty patients (16 ♂, 40.8 ± 11.6 years) and healthy controls (16 ♂, 40.5 ± 10.8 years) were included. All participants performed a 6-min walk test to assess the functional exercise capacity and completed the International Physical Activity Questionnaire. Patients were screened for psychiatric symptoms using the Quick Inventory of Depressive Symptomatology and Hypomania Checklist-32. Results demonstrated that patients with bipolar disorder demonstrated a significantly poorer functional exercise capacity (590.8 ± 112.6 versus 704.2 ± 94.3 m). A backward stepwise regression analyses showed that the level of depression and existing foot or ankle static problems and back pain before the test explained 70.9% of the variance in the distance achieved on the 6-min walk test (functional exercise capacity). The current study demonstrates that foot and back pain appear to be important negative predictors of functional exercise capacity in patients with bipolar disorder. Physical activity interventions delivered by physical therapists may help ameliorate pain symptoms and improve functional exercise capacity.

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1. Introduction

Next to a higher risk for cardiovascular diseases (CVD) (Prieto et al., 2014) and associated increased mortality rates (Fiedorowicz et al., 2014), patients with bipolar disorder are more likely to experience an impaired quality of life (IsHak et al., 2012). Relative to the extensive literature now available on many aspects of CVD in bipolar disorder (Swartz and Fagiolini, 2012; Smith et al., 2013; Vancampfort et al., 2013a), there is limited evidence available concerning the influence of increased medical co-morbidities on the functional limitations in daily living in patients with bipolar disorder. In recognition of this, recently a call (Stubbs et al., 2014) was made to consider also the functional outcomes associated with medical co-morbidities in the treatment of bipolar disorder.

Walking, a common activity of daily living, is a convenient functional exercise which might improve mental and physical functioning in patients with bipolar disorder (Ng et al., 2007; Van Citters et al., 2010). Timed walk tests such as the 6 min walk test

(6 MWT) might therefore be ideal to evaluate the functional exercise capacity. The 6 MWT has been used successfully to observe the functional exercise capacity in other mental health populations (Vancampfort et al., 2011a, 2013b; Bernard et al., 2014). The 6 MWT is a safe and easy to administer physical fitness test which evaluates the global and integrated responses of the cardiovascular, peripheral circulation and neuromuscular systems involved during walking (American Thoracic Society, 2002). Although the 6 MWT does not provide specific information on the function of each of the different systems involved in walking or the mechanisms of walking limitations, it assesses the sub-maximal level of the exercise capacity (American Thoracic Society, 2002). Because most activities of daily living are performed at sub-maximal levels of exertion, the test reflects well the functional level for performing daily life physical activities (Bernard et al., 2014) while it is related to lower quality of life (Martín-Sierra et al., 2011).

To date, the functional exercise capacity of patients with bipolar disorder has not been compared with a healthy control group. Also, little is known about which mental and physical factors may influence the functional exercise capacity in patients with bipolar disorder. It might be reasonable to assume that a lower level of physical activity participation (Janney et al., 2014), higher rates of cigarette smoking (Waxmonsky et al., 2005), manic

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and depressive symptoms (Vancampfort et al., 2013c), and an increased prevalence of somatic pain (Stubbs et al., 2014) influence the functional exercise capacity in patients with bipolar disorder. Lastly, previous research in people with schizophrenia demonstrated that also a higher antipsychotic medication dose is associated with a lower functional exercise capacity (Vancampfort et al., 2011b). If all these factors do limit the functional exercise capacity of patients with bipolar disorders, then interventions should be delivered to ensure people with bipolar disorder are not impaired in conducting their activities of daily living.

Considering the unhealthy lifestyle and increased risk for medical co-morbidity, we hypothesize that patients with bipolar disorder are more likely to have a reduced functional exercise capacity compared to healthy controls. In order to meet the current gap within the literature, the primary objective of the current study was to assess and examine differences in functional exercise capacity between patients with bipolar disorder and age-, gender-, and body mass index (BMI) matched healthy controls. The secondary objective was to identify variables that could explain the variability in performance in the 6 MWT.

2. Methods

2.1. Participants and procedure

Over a 6-month period, inpatients with a DSM-V diagnosis of bipolar disorder I or II (American Psychiatric Association, 2013) of the bipolar observation unit of the UPC KU Leuven campus Kortenberg in Belgium were invited to participate. Reasons for admission were primarily due to either depressive or manic symptoms thus the individuals were deemed in need of observation within a specialist service. Only patients with a clinical global impression severity scale (Guy, 1976) score of five or less, as assessed by a trained psychiatrist during a semi-structured interview, and who were able to concentrate for at least half an hour were included. Patients admitted to the emergency psychiatric ward were excluded. Since severe substance abuse might impair the functional exercise capacity (Herbsleb et al., 2013), participants were excluded if they had a co-morbid DSM-V diagnosis of substance abuse during the previous 6 months. The somatic exclusion criteria included evidence of significant cardiovascular, neuromuscular and endocrine disorders which, according to the American College of Sports Medicine (2013), might prevent safe participation in exercise testing studies. All participants received a physical examination and baseline electrocardiogram before testing. Healthy control subjects were recruited among the personnel of the participating centers. All control subjects were volunteers who received a general physical examination in the previous year and reported to be free of significant cardiovascular, neuromuscular and endocrine disorders that might hinder safe participation (American College of Sports Medicine, 2013). By selection, gender distribution and mean values for age and body mass index (BMI) did not differ significantly between healthy controls and patients with bipolar disorders. This matching was performed by an independent statistician blinded for the physical activity and 6 MWT outcomes. All participants filled out the International Physical Activity Questionnaire (Craig et al., 2003) and performed afterwards the 6 MWT (American Thoracic Society, 2002). Participants were requested to refrain from eating, drinking coffee or smoking during a two-hour period prior to the tests. Patients with bipolar disorder additionally completed the Quick Inventory of Depressive Symptomatology self-report (Rush et al., 2003) and the Hypomania Checklist-32 (Angst et al., 2005).

The study procedure was approved by the Scientific and Ethical Committee of the UPC KU Leuven, campus Kortenberg, Belgium

and conducted in accordance with the principles of the Declaration of Helsinki. All participants gave their informed written consent. There was no compensation for participation in the study.

2.2. The 6 min walk test (6 MWT)

The 6 MWT was performed according to the American Thoracic Society (2002) guidelines in an indoor hallway with a minimum of external stimuli. Two cones 25 m apart indicated the length of the walkway. Participants were instructed to walk back and forth around the cones during 6 min, without running or jogging. Resting was allowed if necessary, but walking was to be resumed as soon as the participants were able to do so. The protocol stated that the testing was to be interrupted if threatening symptoms appeared, including (a) chest pain, (b) intolerable dyspnea, (c) leg cramps, (d) staggering, (e) diaphoresis, and (f) pale or ashen appearance. The total distance walked in 6 min was recorded to the nearest decimeter. Standardised encouragements were provided at recommended intervals. All supervisions and measurements of the 6MWT were performed by the same mental health physical therapist. Prior to the first 6 MWT participants were asked for conditions that might interfere with their walking capacity. Specifically, participants were asked whether they experienced any foot or ankle static problems or pain. Furthermore, they were asked to state if they experienced any knee or low back pain during the previous 3 months. Directly after the first test musculoskeletal pain in the lower limbs and dyspnea were recorded.

2.3. International physical activity questionnaire (IPAQ)-long version

A structured format (Craig et al., 2003) that asked participants to recall activities for each of the last seven preceding days in morning, afternoon, and evening time periods was used. On the basis of what activities participants self-reported, the interviewer clarified the perceived intensity of that specific activity. A continuous indicator was calculated as a sum of weekly metabolic equivalent (MET)-minutes per week of physical activity. The MET energy expenditure was estimated by weighting the reported minutes per week within each activity category by a MET energy expenditure estimate assigned to each category of activity. The weighted MET-minutes per week were calculated as duration \times frequency per week \times MET intensity, which were then summed across activity domains to produce a weighted estimate of total physical activity from all reported activities per week.

2.4. Smoking behavior

Participants were asked whether they smoked or not, and if so, how many cigarettes they smoke per day on average during the previous week.

2.5. Quick inventory of depressive symptomatology self-report (QIDS-SR)

QIDS-SR (Rush et al., 2003) consists of 16 items each ranging from 0 to 3. Scores range from 0 to 27 with higher scores indicative for higher symptom severity. The QIDS-SR is a standardized measure of depressive symptoms and has demonstrated adequate psychometric validity in patients with bipolar disorder (Trivedi et al., 2004).

2.6. Hypomania checklist-32

The HCL-32 (Angst et al., 2005) consists of 32 yes/no statements regarding a period when the patient remembers he was in a "high" mood. Scores range from 0 to 32. Higher scores reflect more

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