Psychiatry Research 237 (2016) 304–310

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Factors associated with overweight and obesity in schizophrenia, schizoaffective and bipolar disorders

Virginie-Anne Chouinard [a,b,*], Samira M. Pingali [a], Guy Chouinard [c], David C. Henderson [b,d,e], Sonal G. Mallya [a], Aaron M. Cypess [f], Bruce M. Cohen [a,b], Dost Öngür [a,b]

[a] Psychotic Disorders Division, McLean Hospital, Belmont, MA, USA
[b] Harvard Medical School, Department of Psychiatry, Boston, MA, USA
[c] Clinical Pharmacology and Toxicology Program, McGill University and Mental Health Institute of Montreal Fernand Seguin Research Centre, Montreal, Canada
[d] Schizophrenia Clinical and Research Program, Massachusetts General Hospital, Boston, MA, USA
[e] Harvard T.H. Chan School of Public Health, Boston, MA, USA
[f] Translational Physiology Section, Diabetes, Endocrinology, and Obesity Branch, National Institute of Diabetes and Digestive and Kidney Diseases, NIH, Bethesda, MD, USA

ARTICLE INFO

Article history:
Received 21 April 2015
Received in revised form
17 November 2015
Accepted 13 January 2016
Available online 14 January 2016

Keywords:
Schizophrenia
Bipolar
Affective
Overweight
Obesity
BMI

ABSTRACT

Evidence suggests abnormal bioenergetic status throughout the body in psychotic disorders. The present study examined predictors of elevated body mass index (BMI) across diagnostic categories of schizophrenia, schizoaffective and bipolar disorders. In a cross-sectional study, we studied demographic and clinical risk factors for overweight and obesity in a well-characterized sample of 262 inpatients and outpatients with schizophrenia ($n=59$), schizoaffective disorder ($n=81$) and bipolar I disorder ($n=122$). Across the three diagnostic categories, the prevalence of overweight (29.4%) and obesity (33.2%) combined was 62.6% (164/262). Logistic regression analyses, adjusted for age, sex and ethnicity, showed that schizoaffective disorder, lifetime major depressive episode, presence of prior suicide attempt, and more than 5 lifetime hospitalizations were significantly associated with BMI ≥ 25. Patients with schizophrenia had significantly lower risk for overweight and obesity. Overall, we found that affective components of illness were associated with elevated BMI in our cross-diagnostic sample. Our results show that patients with schizoaffective disorder have a greater risk for obesity. Identifying predictors of elevated BMI in patients with psychotic and mood disorders will help prevent obesity and related cardiovascular and cerebral complications. Future studies are needed to elucidate the mechanistic nature of the relationship between obesity and psychiatric illness.

1. Introduction

Overweight and obesity are prevalent in patients with psychotic disorders and are risk factors for multiple chronic conditions, including diabetes, hypertension, cardiovascular disease and stroke (Crump et al., 2013; Field et al., 2001; Ratliff et al., 2013; Tsai et al., 2012). Patients with severe psychiatric illnesses have been estimated to have 2–3 fold higher mortality rates and a 20% shorter life expectancy compared to the general population, with increased mortality from cardiovascular disease being a major contributor (Daumit et al., 2010; Druss et al., 2011; Laursen et al., 2012; Nordentoft et al., 2013). Elevated body mass index (BMI) in psychotic and bipolar disorders has been associated with multiple factors, including lifestyle (Dipasquale et al., 2013; Elmslie et al., 2001; Vancampfort et al., 2012) and psychotropic medications, particularly atypical antipsychotics (Henderson, 2007; Leucht et al., 2012; Rummel-Kluge et al., 2010). Metabolic abnormalities in psychotic disorders also predate the modern use of drugs and are found in drug-naïve patients and unaffected first-degree relatives (Maina et al., 2008; Spelman et al., 2007; Thakore et al., 2002; van Welie et al., 2013).

Obesity and related metabolic abnormalities are present in the early stages of psychotic disorders, suggesting a need for early interventions (Correll et al., 2014; Srihari et al., 2013) to prevent not only cardiovascular, but also neuropsychiatric complications. Obesity and impaired glucose metabolism have been associated with neurochemical and neuroimaging abnormalities in

* Corresponding author at: Psychotic Disorders Division, McLean Hospital, 115 Mill Street, Mailstop 108, 02478 Belmont, MA, USA.
E-mail address: vchouinard@mclean.harvard.edu (V.-A. Chouinard).

http://dx.doi.org/10.1016/j.psychres.2016.01.024
0165-1781/

schizophrenias (SZ) and bipolar I disorders (BD) (Bond et al., 2014, 2011; Hajek et al., 2013, 2014). In a recent ^{31}P magnetic resonance spectroscopy (MRS) study (Du et al., 2014), we reported a negative correlation between brain intracellular pH and BMI in patients with SZ. Another study found that BD patients with impaired glucose metabolism had more severe brain neurochemical changes measured by proton MRS, compared to euglycemic subjects (Hajek et al., 2013). In SZ and BD, there is evidence for elevated rates of obesity and glucose metabolism abnormalities, along with bioenergetic abnormalities in the brain (Ben-Shachar and Laifenfeld, 2004; Marchbanks et al., 1995; Ongur et al., 2009; Pettegrew et al., 1991), suggesting abnormal bioenergetic status throughout the body. The directional nature of the relationship between obesity and brain abnormalities is not known, but the evidence suggests shared risk factors between severe mental illnesses and obesity and its related metabolic abnormalities.

Studies have shown inadequate identification and treatment of medical illnesses in patients with psychotic disorders (Crawford et al., 2014; Mitchell and Lord, 2010). Knowledge of clinical factors predicting a risk for obesity is critical to target patients with psychotic disorders that are more susceptible to weight gain, metabolic syndrome and related brain dysfunction. In addition, the identification of higher risk groups may provide phenotypes for studying the relationship between obesity and neuropsychiatric diseases. Studies in SZ and BD have separately identified psychiatric clinical characteristics associated with obesity, mostly by cross sectional or retrospective design.

In patients with BD, elevated BMI has been associated with longer (Goldstein et al., 2011) and greater number of (Fagiolini et al., 2002, 2003) depressive episodes, chronic illness course (Calkin et al., 2009; Fagiolini et al., 2003) with decreased response to treatment (Calkin et al., 2009), suicidal ideation and history of suicide attempts (Fagiolini et al., 2004; Wang et al., 2006), comorbid anxiety disorders (Calkin et al., 2009; Goldstein et al., 2011), and greater functional impairment (Bond et al., 2010; Calkin et al., 2009). Some studies have found a negative association between obesity and substance use in patients with BD and severe mental illness (McIntyre et al., 2007; Susce et al., 2005). However, one large cross-sectional study looking at correlates of overweight and obesity in bipolar disorder did not find associations with psychiatric comorbidities (McElroy et al., 2002). In patients with SZ, studies have reported a decrease in quality of life associated with obesity (Allison et al., 2003; Kolotkin et al., 2008; Strassnig et al., 2003). Negative symptoms (Sicras-Mainar et al., 2014), deficit SZ (Arango et al., 2011), and severe insomnia (Palmese et al., 2011) have also been linked to higher BMI in patients with SZ. Baseline data from the Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE) Schizophrenia Trial did not find an association between metabolic syndrome and symptom severity, depressive symptomatology, nor quality of life in patients with SZ (Meyer et al., 2005), although they did not look at correlations with BMI.

The present study examines predictors of elevated BMI across three diagnostic categories in a well-characterized sample of patients with SZ, schizoaffective disorder (SZA) and BD. As SZ and BD share some genetic determinants (International Schizophrenia Consortium et al., 2009; Ivleva et al., 2010), we looked at possible risk factors across these disorders. We hypothesized that overweight and obesity would be associated with psychiatric diagnosis, and indicators of illness severity including lifetime hospitalizations, prior suicide attempt and family history of psychotic disorders.

2. Methods

2.1. Participants

We studied 262 patients aged 18–65 with SZ ($n=59$), SZA ($n=81$), and BD ($n=122$). Subjects were recruited for an ongoing genetic association study of mood and psychotic disorders from 2006 to 2013. At the time of this study, the genetic association study included 848 patients with idiopathic mood and psychotic disorders. Of these patients, 262 SZ, SZA and BD patients had BMI data with brain imaging assessments and were included in this study. 184 inpatients were recruited from McLean Hospital's Psychotic Disorders Division units and 78 outpatients were recruited through advertisements posted at McLean Hospital and referred from the hospital community. Patients were excluded if symptoms could be attributable to a general medical condition or substance use, or if they had a diagnosis of developmental disorder or history of significant head trauma. No patients were excluded from the study because of MRI constraints on weight. The study was approved by the McLean Hospital Institutional Review Board, and subjects provided written informed consent.

2.2. Assessments

Weight and height were obtained by self-report from patients at the time of their evaluation. BMI was calculated as weight in kilograms divided by height in meters squared. Overweight was defined by a BMI of 25.0 to 29.9 and obesity by a BMI of 30.0 or higher (WHO Expert Committee on Physical Status, 1995). For descriptive purposes, obesity was further classified into grade 1 (30.0–34.9), grade 2 (35.0–39.9) and grade 3 ($\geq$40.0). In our analyses, we combined patients with overweight and obesity since overweight is associated with increase in risk for obesity related illnesses, such as diabetes, hypertension and dyslipidemia (Haslam and James, 2005). The Structured Clinical Interview for DSM-IV-TR (SCID) (First et al., 1995) was used for diagnosis and symptom identification. This assessment was based on all available information, including hospital records and information from family and outpatient psychiatrists. The Edinburgh Handedness Inventory (Oldfield, 1971) was used to assess handedness. Medication information was obtained from hospital discharge medication lists for inpatients and self-reported for outpatients. Psychotropic medication was analysed using the following categories: presence of atypical antipsychotic, two or more atypical antipsychotics, typical antipsychotic, clozapine, or mood stabilizer. Medications for diabetes, hypertension and dyslipidemia were combined into one variable, which was coded positive if patients were taking any medications for these conditions. A sleep disturbance variable was created using all items related to sleep in the SCID.

Trained research staff conducting the assessments included research assistants, a clinical psychologist and attending psychiatrists who assessed patients in their care. Research staff underwent monthly diagnostic reliability exercises. Perfect interrater reliability was achieved for SCID diagnoses, near-perfect agreement was observed for current (major depression, 1.0; mania, 0.93) and past mood episodes (major depression, 0.90; mania, 1.0), and excellent agreement was observed for specific psychotic symptoms (persecutory delusion, 0.8; auditory hallucination, 0.85).

2.3. Statistical analyses

We performed statistical analyses using SPSS (PASW) version 22 (SPSS, Chicago, IL). We used chi-square tests for categorical variables and t tests for continuous variables to compare demographic and clinical characteristics between normal and overweight/obesity groups (not corrected for multiple comparisons