SHORT REPORT

Beck Depression Inventory is a useful screening tool for major depressive disorder in Gilles de la Tourette syndrome

A H Snijders, M M Robertson, M Orth

J Neurol Neurosurg Psychiatry 2006;**77**:787–789. doi: 10.1136/jnnp.2005.084657

This study determined the prevalence of and factors associated with comorbid major depressive disorder (MDD) in patients with Gilles de la Tourette syndrome (GTS). How a simple self-report instrument, the Beck Depression Inventory (BDI), correlates with clinical assessment of comorbid MDD in this population was assessed. In a continuous sample of 114 adult patients with GTS, assessed clinically using the Diagnostic and Statistical Manual of Mental Disorders-IV criteria, 26 (23%) patients met criteria for MDD; more severe tics as measured with the Yale Global Tic Severity Scale, conduct disorder in childhood or higher age at the time of assessment were associated with MDD. The BDI score had a high negative predictive value for diagnosis of MDD, but a low positive predictive value. Using the BDI as a screening tool for comorbid MDD in patients with GTS is suggested.

Gilles de la Tourette Syndrome (GTS) is a childhood-onset developmental neuropsychiatric disorder, characterised by multiple motor tics and one or more phonic tics over the course of at least 1 year.¹ Other developmental disorders, such as obsessive-compulsive disorder or attention deficit hyperactivity disorder, often complicate GTS.^{2–3} Several studies have indicated that major depressive disorder (MDD) may also be a common comorbidity.^{4–9} We assessed data from a large cohort of patients with GTS to investigate which factors were associated with a clinical diagnosis of MDD. In addition, we examined whether the Beck Depression Inventory (BDI), a commonly used and well-characterised self-rating scale of depression, may be a useful screening tool for MDD in GTS.¹⁰

PATIENTS AND METHODS

Data were collected from a continuous sample of patients, aiming to include at least 100 patients. No semi-structured instrument such as the structured clinical interview for the Diagnostic and Statistical Manual for Mental Disorders-IV (DSM-IV) (published after we started data collection) was used to maintain uniformity during the study. A total of 167 consecutive, previously unreported adult patients new to the GTS clinic at the National Hospital for Neurology and Neurosurgery, Queen Square, London, UK were assessed using the semi-structured National Hospital Interview Schedule,¹¹ the Yale Global Tic Severity Scale¹² and the Diagnostic Confidence Index.¹³ Patients underwent psychiatric evaluation according to the Diagnostic and Statistical Manual for Mental Disorders-IV criteria for a diagnosis of GTS, attention deficit hyperactivity disorder, obsessive-compulsive disorder, oppositional defiant disorder, conduct disorder and MDD. Of the initial 167 adults, 53 patients were excluded: 10 because they did not fulfil DSM-IV criteria for

GTS and 43 because of incomplete data. Thus, data from 114 patients were included in the study.

Before their clinic appointment, patients completed the Leyton Obsessional Inventory (LOI),¹⁴ the Spielberger State-Trait Anxiety Index (STAI)¹⁵ and the BDI,¹⁰ a 21-item questionnaire with established reliability and validity.¹⁶ The local ethics committee approved patient assessment in the context of a psychopathology study, and patients gave written informed consent.

Data analysis

We examined the association of clinical and demographic factors, or rating scale scores, with a diagnosis of MDD. Effects of the independent variables (see table 1), or BDI, STAI, or LOI scores, on MDD were explored using a backward logistic regression model. To compare clinical assessment with rating scale scores, we used a Kruskal-Wallis test to examine the difference of the scores on the BDI, STAI or LOI self-rating scales between patients with or without MDD. Data were analysed using SPSS V.12.0 with a significance level of $p < 0.05$.

RESULTS

Patients

Table 1 shows the clinical and demographic characteristics. In all, 85 (75%) patients had another DSM-IV diagnosis in addition to GTS (table 1). At the time of assessment 65 patients (57%) were on drugs. The most commonly prescribed drugs for patients were dopamine receptor blockers (38; 33.3%) and selective serotonin reuptake inhibitors (18; 15.8%).

Prevalence of and factors associated with MDD

On clinical examination, 26 (23%) patients met the DSM-IV criteria for diagnosis of MDD. Of these, 11 patients had recurrent depressive episodes for which they had received treatment in the past; 16 had chronic depression (>6 months); 13 admitted to suicidal ideation; and 7 had made suicide attempts. At the time of first assessment in our clinic, eight (31%) patients with MDD were on anti-depressants. One patient was on lithium. In all, 27% of patients had obsessive-compulsive disorder, while 96% of patients had obsessive or compulsive symptoms. Of all patients with GTS, 51% had been treated for depression in the past (anti-depressants or psychotherapy, but not cognitive-behavioural therapy).

Patients with more severe tics as measured using the Yale Global Tic Severity Scale were more likely to have MDD (odds

Abbreviations: BDI, Beck Depression Inventory; DSM-IV, Diagnostic and Statistical Manual for Mental Disorders-IV; GTS, Gilles de la Tourette syndrome; LOI, Leyton Obsessional Inventory; MDD, major depressive disorder; STAI, Spielberger State Trait Anxiety Index

Table 1 Clinical and demographic characteristics of patients with GTS

	All patients	MDD+	MDD–
N	114	26	88
Male:female ratio	69:31	73:27	68:32
Age* (median)	30	34	28
Age of onset	7.5	7.8	7.4
YGTSS (median)*	46	61	41
DCI	61	64	63
Coprophomena (%)	33	42	31
Echophomena or paliphomena (%)	62	73	59
NOSI (%)	14	12	15
SIB (%)	42	50	40
OCD (%)	25	30	25
ADHD (%)	50	48	51
CD (%)*	8	20	5
ODD (%)	21	24	20
Drug misuse (%)	28	36	25
Alcohol misuse (%)	26	36	24
Social problems (%)	46	54	44
Aggression and rage	31	35	30
FH tics (%)	77	73	78
FH OCB or OCD (%)	63	73	60
FH ADHD (%)	20	33	16
FH LD (%)	17	8	20
FH depression (%)	57	62	56

ADHD, attention-deficit hyperactivity disorder; CD, conduct disorder; DCI, Diagnostic Confidence Index; FH, family history; GTS, Gilles de la Tourette; LD, learning disability; MDD, major depressive disorder; NOSI, non-obscene socially inappropriate behaviour; OCB, obsessive-compulsive behaviour; OCD, obsessive-compulsive disorder; ODD, oppositional defiant disorder; SIB, self-injurious behaviour; YGTSS, Yale Global Tic Severity Scale.

*Factors associated with MDD.

ratio (OR) of 47.3 for the highest score of 94 compared with the lowest score of 7; $p = 0.001$). In addition, the presence of conduct disorder in childhood and higher age at the time of assessment were associated with MDD (OR of 8.7 for conduct disorder ($p = 0.013$) and 11.1 for the highest age of 65 years compared with the lowest age of 16 ($p = 0.03$) years).

BDI as a screening tool for MDD

Patients with MDD scored significantly higher than those without on the BDI (BDI score of 27 ν 11, Kruskal–Wallis test: $\chi^2 = 29.7$; $p < 0.001$), STAI (STAI score of 118 ν 48, $\chi^2 = 17.8$; $p < 0.001$) and the LOI rating scales (LOI score 35 ν 25, $\chi^2 = 7.3$; $p = 0.007$). The BDI score, but not STAI or LOI scores, was associated with a diagnosis of MDD. The OR changed by 1.13 with each point increase on the BDI ($p < 0.001$).

All but one of the patients with MDD rated themselves as having depression on the BDI (median 27, range 9–38). With a cut-off score of 12, the sensitivity of the BDI for MDD was therefore 96% and the specificity was 56%. The negative predictive value of the BDI for MDD was 98% whereas the positive predictive value was only 39%. When taking a cut-off score of 9, the negative predictive value of the BDI was 100%, whereas the positive predictive value remained the same (39%).

DISCUSSION

In this cross-sectional study of a large cohort of patients with GTS referred to a predominantly tertiary referral centre, about a quarter of patients had MDD. The frequencies of suicidal ideation (50%) and suicidal intent (27%) of patients with GTS and MDD further illustrate that MDD represents a serious and debilitating problem in our patients. Our data are in accord with previous controlled and uncontrolled studies in adults assessed in a similar setting, suggesting a prevalence of MDD in GTS of 18–30%.^{4–8, 17}

Patients with more severe tics (frequency, complexity and interference of tics as measured with the Yale Global Tic Severity Scale), a diagnosis of conduct disorder in childhood or higher age at the time of assessment were more likely to

have MDD. This confirms a previous study¹⁸ indicating that patients with more severe GTS may be more prone to develop MDD. GTS can be a chronic, socially disabling and stigmatising disease with a negative effect on the quality of life.¹⁸ The onset of tics, usually in childhood, results in teasing and bullying, with potentially negative effects on self-esteem and mood similar to other bullied children (eg, Bond *et al*¹⁹), and the development of MDD as a consequence of GTS-related unrelenting adversity in patients who do not improve with time.²⁰ The association between conduct disorder and depression is well recognised, and the two disorders co-occur often. Youngsters with conduct disorder and MDD are more prone to substance misuse, poor social skills and social maladjustment, and poor academic performance, with negative repercussions on their adult mental health.^{21–24}

We next investigated whether the BDI could serve as a screening tool for MDD. All but one of the patients with MDD had an increased BDI score with a cut-off of 12, and all patients had an increased score with a cut-off of 9. Thus, the BDI had high negative predictive value. In our cohort, however, the positive predictive value of the BDI for MDD was low. Our data also show that self-report symptom severity—that is, BDI score, was higher in patients with MDD than in those without MDD. Clinical assessment and self-report may capture different aspects of a spectrum of depressive symptoms; indeed, for example, personality traits or neuroticism may be reflected in higher self-ratings of depressive symptoms compared with clinician ratings,²⁵ and personality disorders possibly occur in patients with GTS more often than in controls.¹⁷ The BDI, however, may be a very useful screening tool for MDD in GTS, which could be used routinely in patient assessment, prompting a thorough psychiatric evaluation for MDD in those patients with increased scores.

A limitation to our study is that we did not employ a standardised clinician-rated instrument for the assessment of psychiatric disorders, including MDD, such as the structured clinical interview for the DSM-IV, which was published after we had begun our investigation. In addition, as a cross-sectional study in adults with GTS the diagnosis of comorbid

disorders in childhood needed to be made retrospectively; their relevance for adult depression has to be shown in longitudinal studies.

ACKNOWLEDGEMENTS

We thank all our patients who participated in this study. We also thank Professor TAB Snijders for help with the statistical analysis and Drs S Bruno and A Münchau for helpful comments on an earlier draft of the manuscript.

Authors' affiliations

A H Snijders, Sobell Department of Motor Neuroscience and Movement Disorders, Institute of Neurology, Queen Square, London, UK

M M Robertson, Department of Mental Health Sciences, University College London, London, UK

M Orth, Raymond Way Unit, Institute of Neurology, The National Hospital for Neurology and Neurosurgery, Queen Square, London, UK

Competing interests: None declared.

Correspondence to: Dr M Orth, Department of Neurology, Universitätsklinikum Eppendorf, Martinistr. 20, 20246 Hamburg, Germany; m.orth@uke.uni-hamburg.de

Received 20 November 2005

Revised version received 6 February 2006

Accepted 11 February 2006

Published Online First 24 February 2006

REFERENCES

- 1 **American Psychiatric Association**. *Diagnostic and Statistical Manual of Mental Disorders. DSM-IV*. Washington, DC: American Psychiatric Association, 1994.
- 2 **Robertson MM**. Tourette syndrome, associated conditions and the complexities of treatment. *Brain* 2000;**123**(3 Pt):425–62.
- 3 **Leckman JF**. Tourette's syndrome. *Lancet* 2002;**360**:1577–86.
- 4 **Eapen V**, Fox-Hiley P, Banerjee S, *et al*. Clinical features and associated psychopathology in a Tourette syndrome cohort. *Acta Neurol Scand* 2004;**109**:255–60.
- 5 **Robertson MM**, Trimble MR, Lees AJ. The psychopathology of the Gilles de la Tourette syndrome. A phenomenological analysis. *Br J Psychiatry* 1988;**152**:383–90.
- 6 **Comings BG**, Comings DE. A controlled study of Tourette syndrome. V. Depression and mania. *Am J Hum Genetics* 1987;**41**:804–21.
- 7 **Freeman RD**, Fast DK, Burd L, *et al*. An international perspective on Tourette syndrome: selected findings from 3,500 individuals in 22 countries. *Dev Med Child Neurol* 2000;**42**:436–47.
- 8 **Chee KY**, Sachdev P. The clinical features of Tourette's disorder: an Australian study using a structured interview schedule. *Aust N Z J Psychiatry* 1994;**28**:313–8.
- 9 **Rickards H**, Robertson M. A controlled study of psychopathology and associated symptoms in tourette syndrome. *World J Biol Psychiatry* 2003;**4**:64–8.
- 10 **Beck AT**, Ward CH, Mendelson M, *et al*. An inventory for measuring depression. *Arch Gen Psychiatry* 1961;**4**:561–71.
- 11 **Robertson MM**, Eapen V. The National Hospital interview schedule for the assessment of Gilles de la Tourette syndrome. *Int J Methods Psychiatr Res* 1996;**6**:203–26.
- 12 **Leckman JF**, Riddle MA, Hardin MT, *et al*. The Yale Global Tic Severity Scale: initial testing of a clinician-rated scale of tic severity. *J Am Acad Child Adolesc Psychiatry* 1989;**28**:566–73.
- 13 **Robertson MM**, Banerjee S, Kurlan R, *et al*. The Tourette syndrome diagnostic confidence index: development and clinical associations. *Neurology* 1999;**53**:2108–12.
- 14 **Snowdon J**. A comparison of written and postbox forms of the Leyton Obsessional Inventory. *Psychol Med* 1980;**10**:165–70.
- 15 **Spielberger CD**, Gorsuch RL, Lushene RE. *Manual for the State-Trait Anxiety Inventory ('self evaluation questionnaire')*. Palo Alto: Consulting Psychologists Press, 1970.
- 16 **Beck AT**, Steer RA, Garbin MG. Psychometric properties of the Beck Depression Inventory: twenty-five years of evaluation. *Clin Psychol Rev* 1988;**8**:77–100.
- 17 **Robertson MM**, Banerjee S, Hiley PJ, *et al*. Personality disorder and psychopathology in Tourette's syndrome: a controlled study. *Br J Psychiatry* 1997;**171**:283–6.
- 18 **Elstner K**, Selai CE, Trimble MR, *et al*. Quality of Life (QOL) of patients with Gilles de la Tourette's syndrome. *Acta Psychiatr Scand* 2001;**103**:52–9.
- 19 **Bond L**, Carlin JB, Thomas L, *et al*. Does bullying cause emotional problems? A prospective study of young teenagers. *BMJ* 2001;**323**:480–4.
- 20 **Turner RJ**, Lloyd DA. Stress burden and the lifetime incidence of psychiatric disorder in young adults: racial and ethnic contrasts. *Arch Gen Psychiatry* 2004;**61**:481–8.
- 21 **Bardone AM**, Moffitt TE, Caspi A, *et al*. Adult physical health outcomes of adolescent girls with conduct disorder, depression, and anxiety. *J Am Acad Child Adolesc Psychiatry* 1998;**37**:594–601.
- 22 **Marmorstein NR**, Iacono WG. Major depression and conduct disorder in a twin sample: gender, functioning, and risk for future psychopathology. *J Am Acad Child Adolesc Psychiatry* 2003;**42**:225–33.
- 23 **Renouf AG**, Kovacs M, Mukerji P. Relationship of depressive, conduct, and comorbid disorders and social functioning in childhood. *J Am Acad Child Adolesc Psychiatry* 1997;**36**:998–1004.
- 24 **Riggs PD**, Baker S, Mikulich SK, *et al*. Depression in substance-dependent delinquents. *J Am Acad Child Adolesc Psychiatry* 1995;**34**:764–71.
- 25 **Enns MW**, Larsen DK, Cox BJ. Discrepancies between self and observer ratings of depression. The relationship to demographic, clinical and personality variables. *J Affect Disord* 2000;**60**:33–41.