ORIGINAL RESEARCH

Jacquelyn Paquet, BScN, BSc
Dennell Mah, BA
Emad Saad MD, FRCPC
Jeremy Beach, MBBS, FRCPC
Dilini Vethanayagam, MD, FRCPC

Department of Medicine, University of
Alberta, Edmonton, AB

Psychiatric co-morbidity and asthma: A pilot study utilizing a free use tool to improve asthma care

Abstract

Purpose: To assess the prevalence of co-morbid psychiatric disorders in asthmatic patients in a Western Canadian Regional Severe Asthma Center.

Methods: A prospective study was completed of patients evaluated through the Edmonton Regional Severe Asthma Clinic (ERSAC). A standardised evaluation, the Mini International Neuropsychiatric Interview (MINI) screen was used to identify possible psychiatric disorders.

Results: Twenty-four individuals with moderate to severe asthma, who presented for treatment at ERSAC, were recruited and underwent assessment with the MINI screen. The average patient age was 48 years (range 18–81 years). Nine patients were male and fifteen were female. Twenty subjects (83%) screened positive for a possible psychiatric co-morbidity using the MINI screen. The most common psychiatric co-morbidities identified were post-traumatic stress disorder (50% of the sampled population), depressive episode or persistent depressive disorder (42%), substance/alcohol abuse (33%), generalized anxiety disorder (33%), manic episode (25%), agoraphobia (21%), panic disorder (21%) and obsessive-compulsive disorder (17%). Some individuals had more than one concomitant possible psychiatric co-morbidity identified by the MINI screen.

Conclusions: Psychiatric co-morbidity was confirmed to be common in patients with moderate-severe asthma. In individuals with asthma, the MINI screen appeared to be a simple and useful clinical tool to screen for untreated/sub-optimally-managed psychiatric co-morbidities that may impact management.

Manuscript submitted 25th May, 2019
Manuscript accepted 10th September, 2019

Clin Invest Med 2019; 42 (4): E22-E27.

Correspondence to:
Dilini Vethanayagam
Email: dilini@ualberta.ca

Several studies have shown increased prevalence of psychiatric disorders in asthma patients and other somatic chronic illnesses [1-8]. Psychiatric co-morbidity in asthma can take many forms, including panic disorder, post-traumatic stress disorder, generalized anxiety disorder, persistent depressive disorder, depression and other conditions, both current and in the past [9-11]. In the general population, one fifth of Canadians suffer from a mental health concern during their lifetime [12]. Dyspnea related to anxiety and depression can mimic asthma or co-exist with it. Given the broad differential and commonalities of dyspnea, it is a difficult symptom to compartmentalize, often resulting in the misdiagnosis of asthma, with significant psychological, social and lifestyle burdens for those improperly diagnosed [12,13]. Because of this, it may be difficult to determine what exactly is causing the dyspnea, and if there is a multifactorial aetiology for the dyspnea for a given patient. This can result in inappropriate escalation of asthma anti-inflammatory therapy, if the source of the dyspnea is not recognized and effectively managed.

The relationship between asthma and psychiatric disorders is not simple and it is crucial to identify asthmatic patients who have psychiatric co-morbidities. Asthmatics with dysfunctional dyspnea (defined as shortness of breath without or in excess of the magnitude of an apparent underlying cause or disease) have poor control of their asthma, with increased rescue inhaler use and increased symptoms compared with asthmatics without functional dyspnea that may be due to anxiety rather than asthma [14-16]. Both increased depression and anxiety are factors that are associated with poorly controlled asthma [10,17]. Variables that are associated with anxiety or depression in asthmatic patients include older age, concomitant co-morbidities, female sex, worse self-reported health, abstemious individuals and the need for one or more urgent care visits in the last year [12,18-22]. Not only are females more at risk for anxiety and depression with chronic illness, females with depression and anxiety have higher risk for developing chronic illness [22]. Poor dyspnea perception is typically associated with an increased risk of asthma severity and it has been shown that depression status, among other factors such as the worsening of asthma, and the advancement of age, can decrease dyspnea perception [15,23,24].

Previous asthma studies have underscored the presence of co-morbidities of anxiety disorders and depressive disorders with asthma for both adults and children. The estimated general population prevalence of mental health concerns in children and adolescents ranges from 0.6% to 4.7%, whereas many studies have shown a higher prevalence

in children and adolescents with asthma [2]. Asthma can be associated with a two-fold increase in the likelihood of a panic attack in the child/adolescent population, and up to one third of child/adolescent asthmatics may meet the criteria for anxiety disorders [2,8]. For the general adult population, the estimated range of anxiety disorders varies between 1% and 3%, whereas the prevalence in the patients with asthma is estimated at 6.5% to 24% [2]. A previous asthma study in an outpatient asthma clinic in Brazil utilizing the mini International Neuropsychiatric Interview (MINI) noted the prevalence of psychiatric co-morbidities in this sample was 61.6%; a rate that is significantly higher than the estimated rate for the general population [25]. Only small a portion of these individuals sought psychiatric treatment.

There is little Canadian information on this issue and different health systems may manage this issue differently and have different models of care that influence chronic disease management [26,27]. In Canada, there is a larger focus on preventative care; however, as a compulsory state-run insurance funded by tax dollars, there is increased wait times for non-urgent issues that differs from private healthcare systems such as the United States [26,27]. The Canadian population is also more heterogeneous, with regional variations in needs and service requirements that make delivery different from more homogeneous countries [27]. Valenca and colleagues noted that 6.5% of individuals with asthma who also had a mental health concern were under the longitudinal management of a psychiatrist. In the same study, 80% of the patients with co-morbid asthma and mental disorders who were taking psychotropic medications were not currently under the care of a psychiatrist [7]. There is an increased mortality rate in individuals with asthma with depression (compared with those without depression), with higher rates of prednisone-resistant asthma and higher corticosteroid doses and lethal attacks, indicating that there is a need to properly screen and diagnose asthmatics for potential psychiatric co-morbidities as a patient's asthma management based on respiratory symptoms may be affected [20,28].

The evaluation of patients with severe asthma benefits from a systematic approach that includes the identification and co-management of co-morbid illness [16]. The use of psychometric tools aids in assessment of difficult to control airway disease should be included as a standard of care [16].

Methods

Patients assessed and managed through the Edmonton Regional Severe Asthma Clinic (ERSAC) between 2008 and 2009 completed a standardized protocol for assessment and optimization. As part of this process, psychiatric co-

morbidities were formally evaluated. A number of different evaluation tools were assessed. Psychiatric diagnoses were determined using the MINI screen, a shortened version of the complete MINI, as well as a structured diagnostic interview (for DSM-5 and ICD-10 psychiatric disorders) that was administered by the research assistant. The MINI has high specificity (0.86 for generalized anxiety disorder to 0.95 for mania) and sensitivity (0.82 for mania to 0.96 for major depressive disorder) across multiple psychiatric diagnoses and high interrater reliability (0.79–1.00) [29].

Prospective clinic-based recruitment was done through the ERSAC, and charts were reviewed for recent physiology, imaging and immunology tests results. All individuals were 18 years of age or older and had confirmed asthma diagnoses as per Canadian Thoracic Society guidelines. Institutional research ethics approval was provided (Pro 00006665).

The principal investigator (DV) and research assistant (DM) contacted the developers of the MINI screening tool and underwent their training for test administration. Because there was a change from MINI 5.0 to MINI 6.0 during the time of data collection, half of the patients were administered MINI 5.0 and the other half MINI 6.0. Comparison of these two versions of the tool showed only very slight differences. The MINI screen consisted of 21 or 25 questions (versions 5.0 and 6.0, respectively), and included all of the DSM-5 categories assessed by the full version of the MINI. The MINI screen was designed to meet the need for a short but accurate structured psychiatric interview for multicenter clinical trials and epidemiology studies and to be used as a first step in outcome tracking in non-research clinical settings. A patient screening positive on the MINI screen should be further assessed using the related section in the full MINI [30]. The subjects who had a positive screening on the MINI were then referred to psychiatry or psychology for further evaluation if not already linked to these services through their primary care provider.

Results

Charts were reviewed for 24 individuals seen at ERSAC with moderate to severe asthma (Table 1). The average age was 48 years (range 18–81 years). There were nine males and fifteen females. Seven (29%) were using continuous systemic corticosteroids over the previous 12 months, five (21%) subjects had intermittent corticosteroid use, and twelve had not been on systemic corticosteroids at all. Fourteen of the patients were classified as severe asthmatics and 10 as moderate asthmatics. Fifteen patients had adult-onset asthma and nine had child-onset asthma. Fifteen were atopic and nine were non-atopic. Spirometry results closest to the date

of administration of the MINI screen were also examined and the average forced expiratory volume in 1 second was 2.41 L (76% reference) and the forced vital capacity was 3.76 L (110% reference). The average IgE level of the patient group analyzed was 373 kU/L (normal is <120 kU/L).

TABLE 1. Patient demographics (n=24)

Demographics	Number (%)
Age average (range) (years)	48 (18–81)
Gender (male)	9 (37.5%)
Asthma classification <ul style="list-style-type: none"> Severe Moderate 	14 (58.3%) 10 (41.7%)
Medications <ul style="list-style-type: none"> Systemic corticosteroids (12 months continuous) Systemic corticosteroids (intermittent) Inhaled corticosteroids Long-acting beta agonist Leukotriene receptor antagonists Combination (inhaled corticosteroids and long-acting beta agonist) Short-acting beta agonist 	7 (29%) 5 (21%) 16 (67%) 8 (33%) 9 (38%) 10 (42%) 18 (75%)
Asthma onset <ul style="list-style-type: none"> Adult Child 	15 (62.5%) 9 (32.5%)
Atopic status (positive)	15 (62.5%)
FEV1 (forced expiratory volume in 1 second) <ul style="list-style-type: none"> Absolute (L) % Reference 	2.41 76
FVC (forced vital capacity) <ul style="list-style-type: none"> Absolute (L) % Reference 	3.76 110
IgE level (n-19) (UI/ml)	373

Twenty of 24 (83%) patients screened positive for a possible psychiatric co-morbidity using the MINI screen. The most common possible psychiatric co-morbidities (Table 2) identified included post-traumatic stress disorder, depressive episode or dysthymia, substance/alcohol abuse, generalized anxiety disorder manic episode, agoraphobia, panic disorder and obsessive-compulsive disorder. Some individuals had multiple possible psychiatric co-morbidities identified by the MINI screen.

TABLE 2. Most common possible psychiatric comorbidities identified by the MINI screen

Disorder	Number of patients identified (%)
Post-traumatic stress disorder	12 (50%)
Depressive episode/dysthymia	10 (42%)
Substance/alcohol abuse	8 (33%)
Generalized anxiety disorder	8 (33%)
Manic episode	6 (25%)
Agoraphobia	5 (21%)
Panic disorder	5 (21%)
Obsessive-compulsive disorder	4 (17%)

To test for reproducibility of the MINI screens, eight of the screens were repeated on the same day and eight were repeated on a different day (an average of 12 months later). When the MINI screen was repeated on the same day, all had the same screen result; however, when the MINI screen was given on a different day only half (four out of eight) had the same screen result.

Discussion

Psychiatric co-morbidity is common in patients with asthma, and even more common in patients with moderate or severe asthma. The MINI screen appears to be a simple and useful clinical tool to screen for untreated/sub-optimally managed psychiatric co-morbidities in individuals with asthma. This is significant as psychiatric co-morbidities may significantly

impact asthma management decisions; both common and complex issues that may present in primary care.

Several studies have concluded that patients with asthma have a higher prevalence of anxiety and depressive disorders than controls [1-7]. The screening tools previously used to look for anxiety and depression were time consuming and difficult to apply in the clinical setting. Examples of these tools are Health and Life Experiences Questionnaire [1], The Stat-Trait Anxiety Inventory and Zung Questionnaires [4]. The advantage of the MINI screen is not only that it is shorter in duration, but it covers many psychiatric conditions beyond depression and anxiety [29,30]. Furthermore, it is a free use tool, and can thus be used in clinical settings. This reduces the cost of healthcare and thus makes the tool more accessible in daily encounters. Furthermore, it means that our research represents a real world evidence study [29].

Despite the high prevalence of psychiatric disorders in chronic disease patients, these disorders are rarely identified, and adequate psychosocial and mental health care is difficult to obtain [3,31]. This is a reflection of a publication system that rarely addresses patient-centered issues [31], and a medical education system that provides inadequate training of medical residents in this important domain of patient care [31]. Our study suggests that the MINI screen could improve patient-centred care in individuals with asthma and may be effectively applied to the Canadian public healthcare system [26,27]. In a tax-supported system that is fraught with long waits for non-emergent issues, including mental health services, this tool may be effective in both specialty and generalist practices to screen for psychiatric co-morbidities among people presenting with symptoms of asthma or dyspnea [26,27]. The American system functions differently, with a multi-payer system, with options for private services, that is dependent on private insurance [26,27].

The extensive cost of referring every asthma patient to a psychiatrist for the purpose of screening for psychiatric co-morbidities can be avoided with more education for primary care physicians and asthma specialists, who are better able to assess asthma patients suffering from co-occurring psychiatric disorders. More studies are needed to investigate the barriers that prevent physicians, either in the primary care or specialists' clinics, from assessing and managing the psychiatric co-morbidities in patients with asthma.

The MINI screen may have overestimated the prevalence of psychiatric co-morbidities, such as post-traumatic stress disorder, in our study. However, high sensitivity is usually considered a desirable characteristic in a screening tool, and additional assessment using the appropriate related section in the MINI can be used to confirm the presence of psychiatric illness. Additional

sections take less than five minutes each to administer. Patients who test positive on the MINI interview may require referral to a specialist for further assessment and treatment, promoting more effective management [26].

Limitations

This study has some limitations. First, the sample size is small and all participants were taken from a single severe asthma clinic in Edmonton followed longitudinally (as opposed to a single time point assessment), so the results may not reflect the broader population of individuals with asthma and in particular those with mild-moderate disease. However, our results are consistent with previously reported data of high prevalence of psychiatric disorders in those with asthma. Similarly, a control population of patients with only mild asthma and/or healthy adults was not feasible in this pilot study, given the nature of the clinic-based recruitment. Another potential limitation is the use of two different versions of the MINI screen during the duration of the study, but no difference in the findings between the two versions was noted. Many patients did not demonstrate the same results on the MINI screen when it was administered on two different days. We chose to add this comparison as the MINI screen was undergoing changes to the 6.0 version during the period of evaluations. The difference in results obtained on different days could be due to a change in the status of an individual's psychiatric illness between the assessments, as the average time to reassessment was 12 months, or it could suggest that there are other factors contributing to results on the MINI screen that are transitory in nature. We recognize that systemic corticosteroids can affect mood and sleep in some individuals; however, these patients were followed longitudinally and were assessed in a stable state.

Clinical implications

This is one of the few studies of its type done in Canada and can inform Canadian healthcare practitioners. This study highlights the feasibility of the application of the MINI screen for use in evaluation individuals with asthma who may be at risk for psychiatric co-morbidities. This group of patients may be at risk of over-treatment of asthma due to psychogenic dyspnea, and may require alternate treatment pathways, as opposed to escalation of asthma-specific therapy. The high prevalence of psychiatric co-morbidities in asthma patients supports the incorporation of an appropriate screening tool as part of patient management. As the MINI is both free to use in clinical settings and requires little time to administer (approximately 15 minutes),

it could be used regularly in clinic without being burdensome [29,30].

Acknowledgement

Drs. Nicholas Mitchell, Mary Cummins, and David Sheehan.

References

1. Wainwright N, Surtees P, Wareham N, Harrison B. Psychosocial factors and asthma in a community sample of older adults. *J Psychosom Res.* 2007;62(3):357-361.
2. Katon W, Richardson L, Lozano P, McCauley E. The relationship of asthma and anxiety disorders. *Psychosom Med.* 2004;66(3):349-355.
3. Kiviruusu O, Huurre T, Aro H. Psychosocial resources and depression among chronically ill young adults: Are males more vulnerable? *Soc Sci Med.* 2007;65(2):173-186.
4. Smith A, Nicholson K. Psychosocial factors, respiratory viruses and exacerbation of asthma. *Psychoneuroendocrinology.* 2001;26(4):411-420.
5. Kenton S, Di Marco F, Castagna F, Boveri B, Casanova F, Piazzini A. Psychological issues in the treatment of asthmatic patients. *Respir Med.* 2000;94(8):742-749.
6. Rubin N. Severe asthma and depression. *Arch Fam Med.* 1993;2(4):433-440.
7. Valença A, Falcão R, Freire R, et al. The relationship between the severity of asthma and comorbidities with anxiety and depressive disorders. *Braz J Psychiatry.* 2006;28(3):206-208.
8. Aydemir Y, Gungen A, Gungen B, Aras, Y, Sengul A. Evaluation of asthma and COPD patients in emotional status: A cross-sectional study. *European Journal of General Medicine.* 2016;13(3):12-15. doi: 10.29333/ejgm/81897
9. Spitzer C, Gläser S, Grabe H, et al. Mental health problems, obstructive lung disease and lung function: Findings from the general population. *J Psychosom Res.* 2011;71(3):174-179.
10. Di Marco F, Verga M, Santus P, et al. Close correlation between anxiety, depression, and asthma control. *Respir Med.* 2010;104(1):22-28.
11. Alonso J, de Jonge P, Lim C, et al. Association between mental disorders and subsequent adult onset asthma. *J Psychiatr Res.* 2014;59:179-188.
12. Holgate S, Bisgaard H, Bjermer L, et al. The Brussel declaration: the need for change in asthma management. *Eur Respir J.* 2008;32:1433-1442. doi: 10.1183/09031936.00053108
13. Lindensmith J, Morrison D, Deveau C, Hernandez P. Overdiagnosis of asthma in the community. *Can Respir J.* 2004;11(2):111-116.
14. Martínez-Rivera C, del Carmen Vennera M, Cañete C, Bardagí S, Picado C. Psychological profile of patients with bronchial asthma and functional dyspnea: A comparison with a non-

- asthmatic population and impact on the disease. *Arch Bronconeumol*. 2011;47(2):73-78.
15. Moullec G, Lavoie K, Malo JL, Gautrin D, L'Archeveque J, Labrecque M. Long-term socioprofessional and psychological status in workers investigated for occupational asthma in Quebec. *J Occup Environ Med*. 2013;55(9):1052-1064. doi: 10.1097/JOM.0b013e31829904ab.
 16. Stoop C, Nefs G, Pommer A, Pop V, Pouwer F. Effectiveness of a stepped care intervention for anxiety and depression in people with diabetes, asthma or COPD in primary care: A randomized controlled trial. *J Affect Disord*. 2015;184:269-276. doi: 10.1016/j.jad.2015.05.063.
 17. Chhabra S, Chhabra P. Gender differences in perception of dyspnea, assessment of control, and quality of life in asthma. *J Asthma*. 2011;48(6):609-615.
 18. Nowobilski R, Furgal M, Czyż P, et al. Psychopathology and personality factors modify the perception of dyspnea in asthmatics. *J Asthma*. 2007;44(3):203-207.
 19. de Miguel Díez J, Barrera V, Maestu L, Garrido P, García T, García R. Psychiatric comorbidity in asthma patients: associated factors. *J Asthma*. 2011;48(3):253-258.
 20. Ciprandi G, Schiavetti I, Rindone E, Ricciardolo F. The impact of anxiety and depression on outpatients with asthma. *Ann Allergy Asthma Immunol*. 2015;115:408-414. doi: 10.1016/j.anai.2015.08.007.
 21. Pilipenko N, Karekla M, Georgiou A, Feldman J. Impact of psychiatric illness upon asthma patients' health care utilization and illness control. Are all psychiatric comorbidities created equal? *Psychol Health Med*. 2016; 21(7):787-799. doi: 10.1080/13548506.2015.1131995.
 22. Paine N, Bacon S, Pelleter R, Arsenault A, Doidati J, Lavoie K. Do women with anxiety or depression have higher rates of myocardial ischemia during exercise testing than men? *Circ Cardiovasc Qual Outcomes*. 2016; 9: S53-S61.
 23. Foschino Barbaro M, Lacedonia D, Palladino G, Bergantino L, Ruggeri C, Martinelli D, Carpagnano G. Dyspnea perception in asthma: Role of airways inflammation, age and emotional status. *Respir Med*. 2011;105(2):195-203.
 24. Amore M, Antonucci C, Bettini E, et al. Disease control in patients with asthma is associated with alexithymia but not with depression or anxiety. *Behav Med*. 2013; 39:138-145. doi: 10.1080/08964289.2013.818931.
 25. Nascimento I, Nardi A, Valença A, et al. Psychiatric disorders in asthmatic outpatients. *Psychiatry Res*. 2002;110(1):73-80.
 26. Duffin, J. The impact of single-payer health care on physician income in Canada, 1850-2005. *Am J Public Health*. 2011;101(7): 1198-1208. doi: 10.2105/AJPH.2010.300093.
 27. Weil T. What can the Canadians and Americans learn from each other's health care systems? *Int J Health Plann Manage*. 2016;31:349-370. doi: 10.1002/hpm.2374.
 28. Walters P, Schofield P, Howard L, Ashworth M, Tylee A. The relationship between asthma and depression in primary care patients: A historical cohort and nested case control study. *PLoS One*. 2011;6(6):e20750.
 29. Lecrubier Y, Sheehan D, Weiller E, et al. The Mini International Neuropsychiatric Interview (MINI). A short diagnostic structured interview: reliability and validity according to the CIDI. *Eur Psychiatry*. 1997;12(5):224-231.
 30. Smith R, Laird-Fick H, D'Mello D, et al. Addressing mental health issues in primary care: An initial curriculum for medical residents. *Patient Educ Couns*. 2014;94(1):33-42.
 31. Smith R, Dwamena F, Grover M, Coffey J, Frankel R. Behaviorally defined patient-centered communication—A narrative review of the literature. *J Gen Intern Med*. 2010;26(2): 185-191.
 32. Canadian Mental Health Association. <https://cmha.ca/about-cmha/fast-facts-about-mental-illness> (Accessed 2019).