Alexithymia and self-reflectiveness in bronchial asthma

Alessitimia e auto-riflessione nell'asma bronchiale

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SUMMARY. The aim of the study was to investigate the role of alexithymia in bronchial asthma (BA) patients with low respiratory functioning hypothesizing that it could be used to differentiate a group of patients with clinically significant anxiety and depressive symptoms. We also aimed to investigate whether alexithymia was associated with reduced cognitive insight. Patients (n=153) were administered the State-Trait Anxiety Inventory-State subscale, the Beck Depression Inventory, the Toronto Alexithymia Scale, and the Beck Cognitive Insight Scale (BCIS). Alexithymia could help differentiate a group of patients with low respiratory functioning. Twenty-two percent of patients included in this subsample had airway obstruction, and 51% reported severe alexithymia. Patients with severe airway obstruction and high alexithymia (compared to other patients) also reported higher self-reflectiveness, and more depressive symptoms. Clinicians have to be aware of the presence of a subgroup of asthma patients with low respiratory functioning who report severe alexithymia. These patients often report moderate to severe depression and frequent doubts about one's own beliefs.

KEY WORDS: asthma, alexithymia, comorbidity, cognitive insight, depression.

RIASSUNTO. L'obiettivo dello studio era di investigare il ruolo dell'alessitimia nei pazienti con asma bronchiale (BA) e scarso funzionamento respiratorio, ipotizzando che essa possa aiutare a differenziare un gruppo di pazienti con livelli clinicamente significativi di ansia e depressione. Lo scopo è stato anche quello di verificare se l'alessitimia fosse associata a un ridotto insight cognitivo. I pazienti (n=153) hanno completato la sottoscala per l'ansia di stato dello State-Trait Anxiety Inventory, il Beck Depression Inventory, la Toronto Alexithymia Scale e la Beck Cognitive Insight Scale. L'alessitimia può aiutare a differenziare un gruppo di pazienti con scarso funzionamento respiratorio. Il 22% dei pazienti inclusi in questo gruppo presenta ostruzione delle vie aeree e il 51% riferisce una grave alessitimia. I pazienti con una grave ostruzione delle vie aeree ed elevata alessitimia (nei confronti di altri pazienti) riportano anche una più elevata autoriflessione e più sintomi depressivi. I clinici devono essere consapevoli della presenza di un sottogruppo di pazienti con asma e scarso funzionamento respiratorio che riferiscono grave alessitimia. Questi spesso riferiscono depressione da moderata a grave e frequenti dubbi sulla realtà dei propri pensieri.

PAROLE CHIAVE: asma, alessitimia, comorbilità, insight cognitivo, depressione.

INTRODUCTION

It is estimated that up to 44.5% of adult patients with bronchial asthma (BA) will report clinically significant anxiety, and up to 24.5% of them will report depression[1,2], while severe and persistent BA in childhood is associated with increased odds of future mental health problems[3]. A recent study reported that around 15% of BA patients could have severe alexithymia[2], a condition due to which the individual experiences difficulty in identifying and describing feelings[4]. Depression, anxiety, and alexithymia have been independently associated with poor asthma control[5-10].

Alexithymia has also been indicated as a risk factor for the development of several chronic diseases[11,12] including asthma[13-15]. In BA patients alexithymia has been associated with a poorer quality of life[13,16], poor compliance[13,17], poor control of the disease[2,13,18,19], and more frequent near-fatal asthma attacks[18]. The effects of alexithymia on asthma symptoms and severity could also be mediated by different mechanisms[2,20-26].

Recent studies in psychiatric and medical samples have also suggested a possible association between alexithymia and reduced insight[27-29], which episodically has been associated with worse physical and psychological health in migraine patients[29]. Nevertheless, to date no studies have investigated this topic in BA patients. Thus, the aim of the study was to investigate the role of alexithymia in BA patients with low respiratory functioning hypothesizing that it could be used to differentiate a group of patients with clinically significant anxiety and depressive symptoms. We also aimed to

investigate whether alexithymia was associated with reduced cognitive insight. This paper adds to the existing literature on the role of psychological factors on asthma control and is intended to deepen our knowledge on the relationships among personality, psychopathology, and impairment in BA considering that past studies in psychiatric and medical samples have suggested a possible association among alexithymia, reduced insight, and physical and psychological health[27-29].

METHODS

Study design

This is a cross-sectional study. The sample is composed of adult outpatients admitted to the Asthma Outpatient Clinic of the University Hospital of Parma between December 2010 and November 2012. Patients were included if they were 18 years and above and had a diagnosis of bronchial asthma according to the international guidelines[30]. Exclusion criteria were the presence of any organic comorbidity, and the denial of informed consent. All patients who failed to complete the psychological and respiratory assessments were excluded from the study.

Medical files were inspected by a senior researcher to assess whether the patient satisfied all inclusion and exclusion criteria. The physician in charge approached the eligible patients, informed them of the scope of the study and requested their consent to participate in the study. All patients were approached during the first visit and completed the assessment within the following month. Screening for medical comorbidities was carried out by the physician in charge during a medical history interview with the support of body (e.g., blood pressure and pulse) and laboratory measurements (e.g., hematological parameters, electrolytes, serum/plasma and urine).

The study protocol was approved by the local ethics committee, and it was conducted in accordance with Good Clinical Practice guidelines and the Declaration of Helsinki and subsequent revisions[31].

Participants

Two hundred twenty-one patients aged 18 and above were recruited. One hundred ninety-one (124 women and 75 men) agreed to participate in the study and completed the assessment (response rate 90%). The age range of patients who agreed to participate in the study was 18-78 years. Those who participated in the study and those who refused informed consent did not differ in terms of sex and age. Thirty-eight patients (27 women and 19 men) failed to complete one or more psychological tests or the spirometry evaluation, so that the final sample was composed of 153 patients (97 women and 56 men). The mean ages of those who completed the assessment and those who did not were 41.24 (*SD*=14.50) and 47.08 (*SD*=14.06), respectively. Those who completed the assessment and those who did not complete it did not differ in sex (one-way Fisher exact test p=0.57), but they differed in mean age (t (197)=2.41; p<0.05). In comparing those who completed the assessment, patients who did not were older, despite the groups did not differ in terms of percentage of people 65 years and above they included (7.9% and 7.0%, respectively, for patients who did not complete the assessment and patients included in the final sample; one-way Fisher exact test p=0.53). The groups also did not differ in years with BA (8.50±9.84 years and 10.77±11.12 years, respectively, for patients who did not complete the assessment and patients included in the final sample; t(197)=1.07; p=0.29).

Measures

All patients were administered the Italian versions of the State-Trait Anxiety Inventory-State subscale (STAI-S)[32], the Beck Depression Inventory (BDI)[33], the Toronto Alexithymia Scale (TAS)[34], and the Beck Cognitive Insight Scale (BCIS)[35]. Socio-demographic and clinical variables were obtained from medical files.

The STAI-form x is a self-rating scale for measuring severity of anxiety and is composed of two 20-item subscales exploring state and trait anxiety. Our sample completed only the subscale measuring state-anxiety, defined as a temporal cross section in a person's emotional stream of life, consisting of subjective feelings of tension, apprehension, nervousness, worry and activation of the autonomic nervous system[36,37]. The respondents are asked to rate each item on a four-point Likert type scale ranging from 1 to 4 (1="Almost Never", 4="Almost Always"). The STAI has demonstrated sufficient psychometric properties.[38-41] Cronbach alpha was 0.86 in the current study.

The BDI is a 21-item self-report scale measuring depression severity. Each item refers to a symptom or an attitude typical of depressed individuals (e.g., sadness, pessimism, sense of failure). The respondents are asked to choose from among four possible statements with increasing intensity (e.g., 0: "I do not feel sad", 1: "I feel sad", 2:"I am sad all the time and I can't snap out of it", 3: "I am so sad or unhappy that I can't stand it"). A score of up to 9 indicates minimal depression, between 10 and 18 denotes mild depression, between 19 and 29 suggests moderate depression, and between 30 and 63 indicates severe depression. The BDI has demonstrated good psychometric properties[42,43]. In the current study, Cronbach alpha was 0.80.

The TAS-20 is composed of 20 items measured on a five-point Likert type scale (from 1: "strongly disagree", to 5: "strongly agree"). The TAS measures three dimensions of alexithymia: 1) difficulty identifying feelings; 2) difficulty communicating feelings; and 3) externally-oriented thinking. Subjects who obtain a total score ≤50 can be considered non-alexithymic, while a score ≥61 is indicative of severe alexithymia. Scores between 51 and 60 indicate borderline levels of alexithymia. The TAS has demonstrated good psychometric properties, despite some contradictory findings reported in literature[44-49]. Cronbach alpha for the TAS was 0.72 in the current study.

The BCIS is a 15-item self-report questionnaire measuring cognitive insight. The BCIS was developed to evaluate patients' self-reflectiveness and overconfidence in the interpretation of one's own experiences. Each item is rated on a four-point Likert type scale (from 1: "Do not agree at all", to 4: "Agree completely"). In the original study, a principal components analysis yielded a 9-item self-reflectiveness dimension (sample item, "At times, I have misunderstood other people's attitudes towards me") interpreted as an expression of introspection and willingness to acknowledge fallibility, and a 6-item self-certainty dimension (sample item, "My interpretations of my experiences are definitely right") whose items assess patient's certainty about beliefs or judgments. The BCIS displayed sufficient convergent validity with the Scale to Assess Unawareness of Mental Disorder (SUMD)[50] but a not entirely satisfactory internal homogeneity[35].

Assessment of pulmonary functioning

Pulmonary functioning was assessed during routine outpatient visits. The data collected included forced vital capacity (FVC), forced expiratory volume in the first second (FEV_1), FEV_1/FVC ratio, and forced expiratory flow rate over the middle 50% of the FVC (FEF_{25-75}). Pulmonary functioning was measured with a flow-sensing spirometer connected to a computer for data analysis (CPFS/D Spirometer, MedGraphics, St. Paul, MN, USA) which met the American Thoracic Society (ATS) standards. FVC, FEV_1 and FEF_{25-75}, FEV_1/FVC are reported as percentages of predicted values.

Statistical analyses

All analyses were performed with the SPSS 19.0 statistical package for social sciences (IBM, Armonk, NY, USA). In order to reveal groupings of patients with different respiratory functioning and alexithymia (or clusters) within the data set, we used a Two Step Cluster Analysis procedure. To determine which number of clusters is "best", we let the procedure automatically determine the number of clusters and selected log-likelihood distance measure and the Schwarz's Bayesian Criterion (BIC) as the clustering criterion. To create groups we included in the analysis three variables: FEV_1/FVC ratio, FEF_{25-75}, TAS scores to create clusters. Sociodemographic variables, cognitive insight, and depression and anxiety were used to better characterize groups.

Chi-squared (χ^2) tests and ANOVAs were used to compare differences between groups. Benjamini and Hochberg's[51] correction was used for multiple testing When ANOVAs were significant after correction for multi-testing, we used the Tamhane T2 procedure for post-hoc comparisons among groups. Partial eta squared (Partial η^2) and Cramer's V are reported as measures of effect size. Partial η^2 is the variance in the dependent variable explained by the independent variables, it is to prefer to η^2 because it allows a researcher to compare the effect of the same variable in two different studies, which contain different covariates or other factors[52]. When the independent variable is only 1 it is equivalent to the η^2 statistics. Values around 0.01 denote small effect sizes, around 0.06 medium effect sizes, and values of 0.14 and higher large effect sizes. Cramer's V varies from 0 (reflecting complete independence) to 1 (reflecting complete association), with values of 0.20 and lower indicating weak association, values between 0.20 and 0.40 moderate association, values between 0.40 and 0.60 relatively strong association, and values of 0.60 and higher strong association. Multinomial logistic regression analysis was used to assess multivariate association between variables, while controlling for the effect of other variables. Indices of associations are reported as odds ratios (OR) and their 95% confidence interval (95% CI). As indices of model fit, we reported the likelihood ratio χ^2 test and its *p*-value. *P*-values of 0.05 or lower indicate that the model explains the data better than the intercept only model.

Due to the fact that the BCIS was created to be used in psychiatric samples and its use in medical patients is not common, we performed a principal axis factoring analysis to assess its structure, setting the number of factors to extract to two and selecting a varimax orthogonal rotation method to be consistent with the original study of Beck et al.[35].

RESULTS

Characteristics of the sample

Socio-demographic and clinical characteristics of the sample are listed in Table 1. Around 18% of the sample had an FEV_1/FVC ratio of less than 70%, denoting the presence of airflow obstruction, and 53.6% of the patients with low FEV_1/FVC ratio had FEV_1 <80%. Furthermore, 37.3% of the sample had FEF_{25-75} <65%, denoting small airway obstruction. Only 2.6% of the sample had moderate to severe depression, while 13.7% were alexithymics (Table 1).

The principal axis factoring analysis confirmed the structure of the original version of the BCIS (not reported in the tables). The two factors explained 29.4% of the variance of the data. To the first factor, explaining 17.0% of the variance (eigenvalue=2.5), were attributed 6 items which originally were associated with the self-certainty factor, and 2 other items originally attributed to the self-reflectiveness factor (item no. 12 "Willing to consider", and item no. 14 "Possible explanations"). The second factor explained 12.4% of the variance (eigenvalue=1.9) and was associated with 5 items originally attributed to the self-reflectiveness factor. Thus, the composition of the factors substantially reflects that of the original study, and also the homogeneity of content is comparable to the original study[35].

A two-step cluster analysis (where we included FEV_1/FVC ratio, FEF_{25-75}, TAS scores to create clusters) re-

Table 1. Descriptive statistics (n=153)

Variables	Mean±SD
Women - %	63.4%
Age	41.24±14.50
Age at onset of asthma	29.99±18.06
Respiratory functioning	
FVC	103.49±16.75
FVC ≤80% - %	5.9%
FEV_1	93.13±14.40
FEV_1 <80% - %	16.3%
FEV_1/FVC	81.10±61.84
FEV_1 / FVC <70% - %	18.3%
FEF_{25-75}	73.56±25.47
FEF_{25-75} <65% - %	37.3%
Psychometric measures	
BDI	6.44±4.96
BDI ≥19 - %	2.6%
STAI-S	37.77±9.77
TAS	43.41±14.25
TAS ≥61	13.7%
Self-certainty	0.01±0.84
Self-reflectiveness	-0.01±0.76

vealed the presence of four natural groupings, but one of the clusters was composed only by one subject and was excluded from the analyses. The first cluster had: 1) lower FEV_1/FVC ratio and FEF_{25-75} values than the third cluster; and 2) higher TAS scores than the other groups (Table 2). The second cluster had: 1) lower FEV_1/FVC ratio and FEF_{25-75} values than the third cluster; and 2) lower TAS scores than the first cluster. Thus, the first cluster consists of patients with low respiratory functioning (22% had an FEV_1/FVC ratio of less than 70% and 39.0% had FEF_{25-75} <65%) and high alexithymia

Table 2. Differences among groups

Variables	Cluster 1 – Low respiratory functioning high alexithymia (n = 41)	Cluster 2 – Low respiratory functioning low alexithymia (n = 53)	Cluster 3 – Good respiratory functioning low alexithymia (n = 58)	*Tests*	*p*	Partial η^2	12	13
Variables entered in the cluster analysis								
FEV_1/FVC	74.00±8.72	70.53±6.97	82.83±6.32	***F*** (2;149) = 42.26	<0.001	0.36	-	↓
FEV_1/FVC < 70% - %	22.0%	34.0%	1.7%	χ^2_2 = 19.62	<0.001	0.36 [a]		
FEF_{25-75}	68.20±23.43	53.77±12.68	95.41±18.10	***F*** (2;149) = 75.45	<0.001	0.50	↑	↓
FEF_{25-75} < 65% - %	39.0%	77.4%	0.0%	χ^2_2 = 70.77	<0.001	0.68 [a]		
TAS	62.29±7.81	37.81±8.20	35.40±9.12	***F*** (2;149) = 139.51	<0.001	0.65	↑	↑
TAS ≥ 61 - %	51.2%	0.0%	0.0%	χ^2_2 = 65.97	<0.001	0.66 [a]		
Differences among groups	Cluster 1 – Low respiratory functioning high alexithymia (n = 41)	Cluster 2 – Low respiratory functioning low alexithymia (n = 53)	Cluster 3 – Good respiratory functioning low alexithymia (n = 58)	*Tests*	*p*	Partial η^2	12	13
Women - %	70.7%	58.5%	63.8%	χ^2_2 = 1.50	0.47	0.10 [a]		
Age	43.07±15.30	43.89±13.41	37.46±14.46	***F*** (2;149) = 3.22	0.05	0.04		
Age at onset of asthma	31.21±18.79	31.84±18.67	27.28±17.10	***F*** (2;149) = 0.95	0.39	0.01		
Psychometric measures								
BDI	10.08±6.35	5.15±3.87	5.04±3.24	***F*** (2;149) = 18.55	<0.001**	0.20	↑	↑
BDI ≥ 19 - %	9.8%	0.0%	0.0%	χ^2_2 = 11.12	0.01**	0.27 [a]		
STAI-S	40.93±11.00	37.19±8.94	36.03±9.28	***F*** (2;149) = 3.23	0.05	0.04		
Self-certainty	0.13±0.93	0.04±0.84	-0.12±0.79	***F*** (2;149) = 1.04		0.36	0.01	
Self-reflectiveness	0.27±0.89	-0.02±0.66	-0.22±0.66	***F*** (2;149) = 5.07	0.01*	0.07	-	↑

Benjamini and Hochberg correction for multi-testing: *p<0.05; **p < 0.01. Tamhane *T2* post-hoc tests. [a]Cramer's V; ↑ indicates that the first group of patients considered in the analysis reported higher scores than the second group of patients considered in the analysis.
FVC= forced vital capacity; FEV_1= forced expiratory volume in the first second; FEV_1/FVC= FEV_1/FVC ratio; FEF_{25-75}= forced expiratory flow rate over the middle 50% of the FVC; BDI= Beck Depression Inventory; STAI-S= State-Trait Anxiety Inventory-State; TAS= Toronto Alexithymia Scale.

(51.2% of the patients had significant alexithymia), the second cluster consists of patients with low respiratory functioning (34.0% had an FEV_1/FVC ratio of less than 70% and 77.4% had FEF_{25-75} <65%) but low alexithymia (none had significant alexithymia), and the third cluster consists of patients with good respiratory functioning (only 1.7% of the patients had an FEV_1/FVC ratio less than 70% and none had FEF_{25-75} <65%) and low alexithymia (none had significant alexithymia).

Differences among groups

Differences among the three groups are listed in Table 2. Patients with low respiratory functioning and high alexithymia (compared to other groups) had: 1) higher BDI scores; and 2) higher self-reflectiveness. Patients with low respiratory functioning and low alexithymia had: 1) lower BDI scores than the first cluster. Thus, in the first cluster the presence of alexithymia and low respiratory functioning is also associated with higher psychopathology (9.8% had moderate to severe depression) when compared to other clusters. The groups did not differ for self-certainty or state anxiety.

The multinomial logistic regression analysis indicated that the groups could be well discriminated by BDI scores (Table 3). Patients with low respiratory functioning and high alexithymia were 1.3 times more likely to have more severe depressive symptomatology (95% CI: 1.13 / 1.42; p<0.001) than patients with good respiratory functioning and low alexithymia, while patients with low respiratory functioning and low alexithymia did not differ from patients with good respiratory functioning and low alexithymia. The BCIS self-reflectiveness could not independently differentiates groups.

DISCUSSION

In our sample of BA patients, we differentiated three groups of patients according levels of respiratory functioning and alexithymia. Nearly 44% of the patients with low respiratory functioning were grouped together according to their high levels of alexithymia, one out of 2 patients included in this group reported severe alexithymia. Although clinically significant depression was reported (only 2.6% of the sample reported moderate to severe depression) to a lesser degree in our study than in past studies,[1] all the depressed patients were included in the subsample of patients with low respiratory functioning and high alexithymia, representing almost 10% of all patients included. Significant differences in respiratory functioning and alexithymia were not associated with differences in state anxiety, a variable that is generally associated with symptoms of hyperarousal, including disordered respiratory patterns. These results are consistent with previous studies which suggested that alexithymia could be a risk factor for poorer quality of life[13,16], poor compliance[13,17], poor control of the disease[2,13,18,19], and more frequent near-fatal attacks[18] in BA patients. Nevertheless, why alexithymia could affect the presentation of pathology in patients with asthma is not completely clear. For example, due to the fact that alexithymia is a sign of presence of difficulties in emotion regulation these latter could be associated with the use of maladaptive coping strategies while facing life stressors and managing asthma symptoms[2]. However, it is also possible that the effect of alexithymia is mediated through the overreactivity of the sympathetic system[20-23] which is also implicated in bronchial hyperreactivity[24-26]. Nevertheless, the objective to understand the ways alexithymia influence health in asthma patients may be very complicated. In fact, alexithymia could represent a complex phenomenon with different etiologies. For example, Freyberger[53] suggested to differentiate two types of alexithymia: primary alexithymia, and secondary alexithymia. The first one attributed to an organic substratum and the latter secondary to psychiatric disorders.

In our study we also evaluated cognitive insight. Indeed, we think that poor cognitive insight, defined as a patient's current low capacity to correctly evaluate his or her anomalous experiences and atypical interpretations of events[54] could help explain why BA patients with higher alexithymia have difficulties in perceiving asthma symptoms[11,55], or why they tend to adopt maladaptive coping strategies[2], regardless of past experiences. Our results indicate that groups differed for self-reflectiveness but not for self-certainty, although in the multivariate analyses self-reflectiveness was not useful in explaining differences between groups when controlling for depressive symptoms. Patients with low respiratory functioning and high alexithymia reported higher self-reflectiveness than patients with good respiratory functioning, and although not significant the difference with patients with low respiratory functioning and low alexithymia was medium (Cohen's d=0.37). Thus, patients with high alexithymia have higher willingness to be introspective and to acknowledge their fallibility. These conterintuitive results are consistent with results from some studies using the BCIS in patients with psychosis[56] which suggested that deficits in self-reflectiveness could be associated with the presence of some specific psychotic symptoms (e.g., delusions) but not others (e.g., hallucinations), while the presence of depressive symptoms could be associated with higher self-reflectiveness[57-60]. To explain the association between depression and self-reflectiveness, we may see that in the first component of the BCIS

Table 3. Multinomial logistic regression with backward stepwise removal method (reference category: low respiratory functioning low alexithymia)

					95% Confidence Interval for Odds Ratio	
		B	Sig.	OR	Lower Bound	Upper Bound
Low respiratory functioning high alexithymia	BDI	0.24	<0.001	1.27	1.13	1.42
	Self-reflectiveness	0.34	0.24	1.41	0.80	2.48
Low respiratory functioning low alexithymia	BDI	0.10	0.86	1.01	0.91	1.12
	Self-reflectiveness	0.22	0.34	1.24	0.79	1.95

Model statistics: -2 Log Likelihood= 287.68; Likelihood ratio χ^2_4= 31.22; p<0.001; Nagelkerke R^2=0.22.
BDI= Beck Depression Inventory.

("self-reflectiveness"), interpreted by Beck et al.[35] as a measure of positive expressions of introspection and willingness to acknowledge fallibility, most of the items assess more specifically the presence of low self-efficacy in understanding one's own experiences (e.g., "At times, I have misunderstood other people's attitudes towards me"), or attributions of difficulties to stress and emotional factors (e.g., "My unusual experiences may be due to my being extremely upset or stressed"). Thus, we could hypothesize that depressive rumination and doubting may induce the individual to spend more time reflecting on the self and acknowledging one's own fallibility.[57,61] In our study, almost 10% of the patients with low respiratory functioning and high alexithymia were clinically depressed, and these results could help to explain why BA patients with higher alexithymia may have difficulties in perceiving symptoms and in estimating physical and emotional components of asthma exacerbations[11,55], in fact the inability to perceive their emotional states, and the doubts about their beliefs may render difficult to learn from past experiences[11,55], and to select adaptive coping strategies[2]. Although associated with depression, groups of patients did not differ for anxiety after correction for multitesting. This is consistent with a previous study conducted in the same population[2], and could be explained by the fact that we only considered state anxiety at the moment of the assessment and not the presence of anxiety disorders. On the contrary, patients with low respiratory functioning reported more severe depression than other patients, maybe either because people with alexithymia have difficulties in recognizing negative emotions and this results in delays in seeking mental health treatment and more severe depression[62], or because alexithymia could define a specific subgroup of depression[63] associated with more severe suicide risk[64].

Although our results are interesting, there are some limitations in generalizing them. First, the design of our study is correlational in nature and does not support causal explanation, so the nature of the relationships between cognitive insight, psychopathology, and respiratory functioning was not investigated and we could only assume that a psychoeducational intervention aimed at improving cognitive insight and reducing the burden of depressive symptoms may also have a positive effect on respiratory parameters and the course of asthma. Secondly, we used self-report measures to assess depression and anxiety and did not assess the presence of psychiatric disorders with structured interviewing according to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition-text revised (DSM-IV-TR) criteria[65]. Thus, we cannot say whether there were patients with major depression or psychosis among those with low respiratory functioning and high psychopathology. Thirdly, although the BCIS is frequently used in studies on psychosis, as far as we know it has never been used in patients with asthma, so its psychometric properties in this population are not known. Furthermore, we have to mention the fact that self-report measures are potentially biased by social desirability. Fourthly, we did not investigate the self-perception of asthma control and the fraction of exhaled nitric oxide (FeNO) as other potential interesting variables assessing respiratory functioning. Fifthly, few patients reported moderate to severe depression in our sample when compared to previous studies, which could have moderated the effect of alexithymia and insight on asthma. Sixthly, we did not consider patients with good respiratory functioning and high alexithymia. and despite this subgroup of patients was extremely limited in our sample the comparisons among this subgroup of patients and other groups could have answered to the question whether cognitive insight is either associated with asthma or alexithymia. Furthermore, we may have not considered important variables such as educational attainment which could mediate the association among the variables investigated. Despite these limits, our study has a number of strengths: the sample size was large and we investigated an interesting variable never studied before in this population while checking for other psychological variables that have been frequently associated with respiratory functioning in patients with asthma.

In conclusions, clinicians have to be aware of the presence of a subgroup of asthma patients with low respiratory functioning who report clinically significant depression and severe alexithymia, and of the need to differentiate them from other patients who have low respiratory functioning but low alexithymia. In this group of patients with more severe respiratory limitations, alexithymia is associated with more doubting about one's own beliefs and depression. In these patients interventions able to ameliorate alexithymia and insight could improve the perception of asthma control, reduce the risk of exacerbation of asthma and help the individual in using more adaptive coping strategies to cope with the illness. However, we need prospective studies to investigate the role of cognitive insight in the course of the asthmatic illness.

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Conflicts of interest

The authors have no competing interests to report.

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