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# Anxiety/depression changes are associated with improved asthma control perception in asthmatic adolescents after adequate management

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## KEY WORDS

*asthma; children; anxiety; depression; asthma control; treatment*

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## To the Editor

Asthma is a complex disorder where many pathogenic mechanisms are involved. Historically, asthma was defined a psychosomatic disease until the '50s. However, it is well known that anxiety and depression may significantly affect asthma, mainly concerning frequent exacerbations, pharmaco-economic costs, and uncontrolled asthma. In this regard, Sastre and colleagues explored very recently the relationship between asthma control and anxiety/depression in a Spanish population, and measured changes over a 6-month period of standardized treatment (1). They confirmed the association between anxiety/depression and uncontrolled asthma. Interestingly, specialist-managed treatment improved anxiety/depression, asthma control, and lung function. They concluded that regular specialist care improves both asthma and anxiety/depression. Psychological aspects in asthmatic patients is an emerging topic that deserves adequate attention. There is a body of evidence showing that anxiety and depression significantly worsen asthma outcomes (2). In particular, a real-life study demonstrated that anxiety and depression are a common and relevant comorbidity in asthmatic outpatients and are associated with uncontrolled asthma and lower ACT scores (3). Asthma gender difference consisted mainly in a worse perception of asthma control and more anxiety in females

than in males (4). Moreover, emotional disorders may affect also children and adolescents, so new interventional strategies should be developed to empower children and adolescents to improve their asthma self-management (5).

Therefore, a longitudinal real-world study included 54 consecutive adolescents (31 males, 23 females, mean age  $13.1 \pm 2.2$  years) with allergic asthma and visited for the first time at a third-level pediatric clinic. The inclusion criteria were adolescent age (12-17), asthma diagnosis, and anxiety or depression suggested by positive HADS questionnaire as below described. The procedure was approved by the Ethics Committee and the parents signed an informed consent. Asthma diagnosis was performed according with the Global Initiative for Asthma (GINA) document (6). Anxiety and depression were evaluated by the Hospital Anxiety Depression Scale (HADS) questionnaire; a score  $> 7$  (in the two subscales) could define anxiety or depression (7). Children with anxiety (39) or depression (15) were carefully managed and re-evaluated after 6 and 12 months. Asthma control perception was measured by Asthma control test (ACT) questionnaire. Asthma treatment was tailored personalizing the medication options according to the GINA guidelines. Data are reported as median with inter-quartile range. Difference in the median values between at baseline and after 12-months follow-up was evaluated with the Wilcoxon signed

rank test. Correlation between the HADS-A or HADS-D and ACT was evaluated with Spearman rank-order correlation coefficient. Statistica software 9.0 (StatSoft Corp., Tulsa, OK, USA) was used.

ACT significantly increased in patient with anxiety ( $p = 0.0002$ ) or depression ( $p = 0.0085$ ) as well as HADS-Anxiety and HADS-Depression significantly decreased after 12-months follow-up as reported in **table I**. Notably, there were relevant correlations between HADS and ACT score before and after treatment (**figure 1**). In other words, after adequate therapy the perception of asthma control improved in patients with anxiety

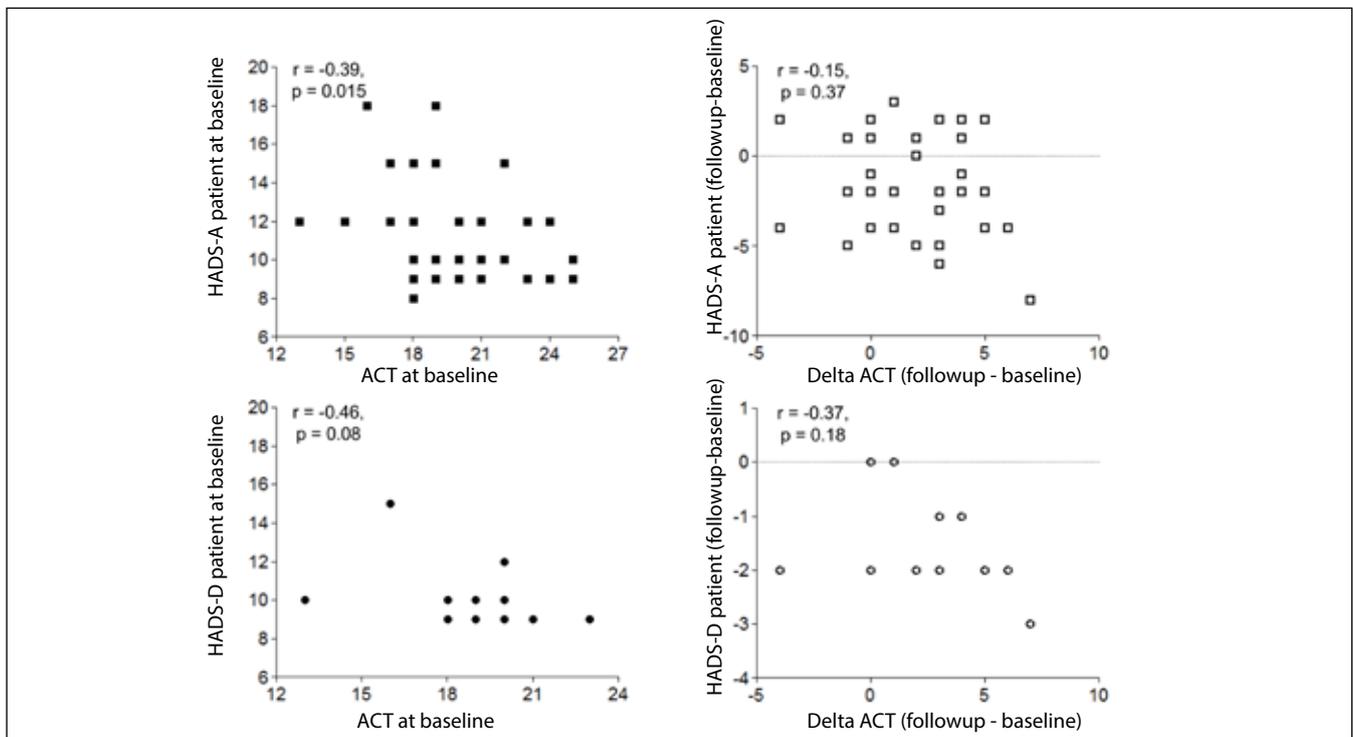
or depression, as well as the scores of these emotional disorders diminished.

The current study confirms that anxiety and depression are related with the perception of asthma control in adolescents. This outcome underlines the practical relevance of emotional disorders because they are really present at this age. Moreover, this study confirms the results obtained in adult asthmatics. Indeed, adolescents, well managed by pediatricians at a third-level clinic, achieved an improved asthma control as well as emotional symptoms. Notably, asthma control grade significantly correlated with emotional scoring.

**Table I** - HADS-A and HADS-D scores and ACT scores in asthmatic adolescents before and after 12-month optimal therapy.

|  |        | Baseline              | 12-mo follow-up       | p value |
|--|--------|-----------------------|-----------------------|---------|
| Pts with an abnormal HADS-A at baseline (n = 39) | ACT    | 20.00 (18.00 - 23.00) | 22.00 (20.00 - 24.00) | 0.0002  |
|  | HADS-A | 10.00 (9.00 - 12.00)  | 10.00 (8.00 - 10.00)  | 0.0011  |
| Pts with an abnormal HADS-D at baseline (n = 15) | ACT    | 20.00 (18.00 - 20.00) | 22.00 (20.00 - 24.00) | 0.0085  |
|  | HADS-D | 9.00 (9.00 - 10.00)   | 8.00 (8.00 - 9.00)    | 0.0013  |

**Figure 1** - top left, relationship between HADS-A score and ACT score at baseline; top right, relationship between delta HADS-A and delta ACT after treatment; low left, relationship between HADS-D score and ACT score at baseline; top right, relationship between delta HADS-D and delta ACT after treatment.



The present study was open designed, but lung function, inflammatory biomarkers, and clinical parameters were measured over time. Another relevant limitation of the study is that the Italian version of HADS questionnaire has been validated for adults. Therefore, the present findings should be cautiously considered. However, HADS questionnaire has been previously validated for use with adolescents aged 12-17 years (8), and consequently it was used in many pediatric studies, including one Italian investigation. Chan and colleagues used HADS in a large community sample of 5,857 adolescents (10-19 years; mean age 13.4 years) in Hong Kong (9). The HADS showed satisfactory psychometric properties as a screening instrument in assessing anxious and depressive states as two correlated but distinct factors in adolescents. Petronyte and Praninskiene enrolled 253 schoolchildren (13-18 years of age) using HADS; they found 20.6% of adolescents with emotional problems (10). Ayaki and colleagues performed a cross-sectional survey in 486 participants aged from 10 to 59 years (11). In particular, children showed the highest probability of sleep and mood disorders as the HADS analysis disclosed the shortest sleep duration in the high myopia group. Catistini and colleagues used the HADS questionnaire in 127 Italian adolescents with cystic fibrosis (12). They reported that cystic fibrosis increased the risk of developing anxiety and depression in female patients, and that their levels depended on clinical status. Chai and coworkers used HADS in 60 children

(< 15 years of age) with strabismus (13). The authors concluded that HADS questionnaire was a reliable instrument for determining depression and anxiety status in a hospital outpatient clinic setting. Kabra et al. investigated 22 adolescents (age range 10-19 years) with neurogenic bladder dysfunction using HADS (14). The authors concluded that the prevalence of anxiety in adolescents was striking. Mihalca and Pilecka evaluated a group of 146 chronically ill adolescents (12-16 years) using an adapted version of HADS (15). The authors observed different structures in chronically ill versus healthy adolescents. Pizolato studied 40 children (aged 8 to 12 years) with temporomandibular disorder using HADS; anxiety was a predictor factor (OR = 18.59) for this disorder (16). More interestingly, HADS questionnaire was used in a group of adolescents and young adults (12-35 years) with asthma (17). The authors demonstrated that anxiety and depression were associated with impaired quality of life and asthma control. Therefore, the current findings confirm the previous observation in asthmatic adolescents.

In conclusion, the present study documents the clinical relevance of emotional disorders also in asthmatic adolescents, and overall shows that optimal asthma management improves both asthma control and anxiety and depression.

#### Conflict of interest

All authors declare that there is no conflict of interest.

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