Validation of the Italian Version of the Test of Adherence to Inhalers

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Effective management of asthma requires long-term adherence to inhaled drug therapies [1]. Regular use of maintenance treatment is associated with disease control, reduction in morbidity and costs, and, therefore, improvement in health-related quality of life [2]. Despite these benefits, nonadherence to asthma therapy is still frequent in clinical practice, ranging from 40% to 80% [3].

Although no gold standard exists, the various ways of assessing the level of adherence include laboratory values, pharmacy refill, electronic monitoring, and self-report questionnaires. These approaches are all characterized by strengths and limitations. In clinical practice, there is a need to assess adherence and improve the patient’s engagement in shared decision-making and self-management. For a tool to be incorporated into the workflow of routine care, it must be valid, reliable, and inexpensive, as well as short and easy to complete, score, and interpret.

Most available self-reported measures of medication have been developed to assess patient’s behavior independently of the drug or route of administration [4]. The Test of Adherence to Inhalers (TAI) [5] is the only tool for evaluation of adherence to inhalers that is tailored to patients with chronic obstructive pulmonary disease or asthma. It is composed of 12 items: the first 10 are completed by the patient and evaluate the level of adherence; in the remaining 2, health professionals are asked to detect 2 possible causes of unwitting nonadherent behavior (patient’s knowledge of the prescribed regimen and inhaler technique). The questionnaire was originally developed in Spain [5] and is available in many languages. The original Spanish TAI proved to be a valid and reliable instrument [6], and its validity was recently confirmed in Farsi [7]. Here, we describe the psychometric properties of the Italian version of the TAI in terms of validity and reliability [8].

Adult asthmatic patients (≥18 years) in treatment with inhaled therapy for at least 2 months and visiting community pharmacies that employed clinical pharmacy specialists were
The results of our study confirm that the Italian version of the TAI meets the standards for good validity, internal consistency, and reliability. The factor analysis maintained the original distinction between items completed by the patient (items 1-10) and those completed by the health professionals (items 11 and 12). However, the first 10 items were grouped into 3 factors that refer to well-known subtypes of nonadherence. The first factor combined the items related to memory problems; the second factor grouped items with respect to the influence of subjective experiences; and the third factor encompassed the items that detected the presence of practical difficulties. Moreover, on the basis of the factor analysis results, only item 9 (assigned to the fourth factor) might have been allocated to another domain (factor 3). As expected for 2 instruments that provide a measure of different constructs, the correlation between TAI and ACT was low but significant, with the sign in the expected direction. The internal consistency of the TAI is good, with Cronbach α values that exceeded the recommended threshold [10]. While lower than the values seen for the original instrument and for the Farsi version, the ICC recorded indicates satisfactory reliability.

In conclusion, we confirmed that the Italian version of the TAI is a valid and reliable tool for identifying and monitoring nonadherence. Considering its psychometric characteristics, the questionnaire is suitable for use in both research and clinical practice in Italy. Future studies should aim to confirm our findings in larger cohorts. Moreover, it would be of considerable interest to explore the psychometric properties that have not yet been determined, namely, responsiveness and minimal detectable change in TAI scores, which may improve health outcomes.

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**Conflicts of Interest**

Dr Canonica reports grants and personal fees from Menarini, Alk Abelló, Anallergo, Boehringer Ingelheim, Chiesi, Circassia, Genentech, Guidotti Malesci, GSK, Hal Allergy, Meda, Merck, Merck Sharp & Dome, Novartis, Recordati-InnuvaPharma, Roche, Sanofi, Stallergenes, UCB Pharma, Uriach Pharma, Teva, AstraZeneca, Thermo Fisher, Valeas, and Vibor Pharma outside the submitted work.

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The remaining authors declare that they have no conflicts of interest.

**References**

Allergy to *Ailanthus altissima* Pollen: A Local Allergen to Consider

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The diagnostic work-up for pollen allergy must include species with allergenic potential that are specific to an area. Although the most prevalent pollens are well-known and studied in our geographical area (Barcelona, Spain), in order to achieve an accurate diagnosis, we should also take into account recently introduced species.

We present the case of a 42-year-old woman who had experienced rhinoconjunctivitis (sneezing, rhinorrhea, nasal and ocular pruritus, and tearing) between May and June for the previous 3 years. She related her symptoms to the presence of certain trees near her home. The trees were identified as *Ailanthus altissima*.

*A altissima*, also known as the tree of heaven, is a dioecious plant that is native to China and was introduced as an ornamental species in Spain in the XIX century. It has become naturalized and invasive [1]. Some plants produce hermaphrodite flowers, and others only male flowers, which tend to be 4 times more abundant than plants that produce female flowers. The pollen grain is spheroidal and isopolar, medium-sized (26 μm, varying from 24.3-28.7 μm), tricolporate, and striato-reticulate. Pollination is from May to July [2]. The database of the Catalan Aerobiological Network (http://lap.uab.cat/aerobiologia) shows that for the Barcelona area and the period 1994-2019, the pollen grains from *Ailanthus* species are airborne from the second week of May until the end of June, with a sporadic presence during July.

In order to study *A altissima* sensitization in the present case, we collected pollen from male trees during the pollen season and obtained a protein extract. The protein content measured by the Bradford method was 0.14 mg/mL of extract. After obtaining the patient's consent, we performed skin prick tests with the most prevalent aeroallergens in our environment (*Cupressus, Platanus, Olea, Parietaria*). Manuscript received April 9, 2020; accepted for publication April 24, 2020.

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