

Measuring the perception of symptom, drug use and allergen immunotherapy efficacy using the Visual Analogue Scale

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The availability of a simple and reliable tool for quantitatively measuring symptom perception is surely very important in the daily practice. Especially, this concept appears to be fundamental in doctor's office and at home, where there are no adequate resources. The Visual Analogue Scale is a very simple and popular tool that could be used by anyone anywhere. The advantage given by the Visual Analogue Scale consists in the translation of a subjective sensation in an objective measure provided by numbers.

Symptom perception & quantitative measure

Allergic rhinitis (AR) and asthma (AA) are the most common chronic disorders in children, adolescents and young adults as their prevalence is up to 40%. Clinical severity is also increasing worldwide despite the wide spread of asthma and AR guidelines. Many allergic patients do not refer to specialized medical centers, so they often do not have an adequate diagnosis or a well-tailored management plan. This is because family pediatricians and general practitioners base the treatment decisions only on reported symptoms and clinical examination. Unfortunately, inaccurate perception of disease severity has often been believed to be a relevant reason for delays in diagnosis and treatment, which may increase asthma morbidity and mortality. Moreover, an accurate symptom perception should be an important component of self-management of asthma, as the recognition of the early stages of asthma allows the patient to make appropriate changes in activity level, to alter the physical environment and to modify the medical regimen in a timely fashion. On the other hand, AR is the most important risk factor for

asthma onset and worsening, so an early recognition of bronchial involvement is mandatory in AR patients.

Large discrepancies have been noted between patient's subjective ratings of asthma symptom severity and objective measure of lung function. Therefore, it appears relevant to translate symptom perception in a quantitative measure. The Visual Analogue Scale (VAS) represents a simple quantitative measure commonly employed in assessing the perception of symptoms. The VAS consists of one 10-cm ruler asking for symptom perception. Patients can use a movable marker to mark any point on the 10-cm segment that best described their perception. VAS has been deeply investigated and validated in both AA and AR. Therefore, VAS may be considered as a simple way to objectively measure the perception of symptoms, obtaining a useful number.

In addition, it is to note that a 4-point scale of symptom score (0 = nothing, 1 = mild, 2 = moderate, 3 = severe) has been preferred in clinical trials till now. However, VAS assessment is more precise as it allows to consider a larger scale of points, considering an interval ranging between 0 and 100 mm.

KEYWORDS: allergen immunotherapy • allergic asthma • allergic rhinitis • patient • score • symptom perception • Visual Analogue Scale

VAS in asthma

VAS was mainly measured and validated against Borg scale, mainly in the model of exercise-induced asthma. In fact, most past studies were conducted in experimental conditions, usually far from real life. However, it has to be considered that asthma symptoms may be compared with lung function that is objectively measured by precise and accurate methods. On the other hand, it should be noted that it is not rare to observe, in the clinical setting, discrepancy between breathlessness perception and lung function. Therefore, to have available a measurable dimension of symptom may be useful for the physician. So several studies investigated asthma symptom perception by VAS. Airway obstruction was measured by spirometry considering as gold standard the parameter forced expiratory volume in 1 second (FEV_1). Baker's group measured perception of asthma symptoms by VAS: 50% of patients were poor perceiver of airflow obstruction [1]. Using VAS, Yoos and McMullen [2] demonstrated that adolescents were more accurate than school-aged children and more accurate children had better morbidity outcomes. Horak *et al.* [3], demonstrated that lung function significantly related with symptom perception by VAS. Van Gent *et al.* [4], compared children with diagnosed and undiagnosed asthma: these last showed poor perception of dyspnea and VAS significantly related with FEV_1 . Fritz *et al.* [5], reported that VAS was easily understood by children and was useful in improving perceptual ability. A survey on 500 pediatricians, using patients vignettes with different asthma status indicators and VAS to rate control and severity, showed that the recommendations, provided by the asthma guidelines of the third expert panel report (EPR-3), to step-down treatment were associated with poorer VAS control ratings and more severe VAS ratings [6]. Rowen *et al.* investigated a new approach to mapping between preference-based measures (PBM) using VAS values as a common yardstick [7]. PBM of health-related quality of life reflects peoples' strength of preference for different outcomes and produces a valuation rather than simply a measurement of health. VAS well related with PBM. Ohta *et al.* performed a cross-sectional multicenter study on 29,518 patients with asthma with the purpose of evaluating whether VAS levels can predict GINA-defined asthma control [8]. VAS measurement was able to discriminate between patients with controlled asthma, partially controlled and uncontrolled asthma: therefore, the VAS score could be a simple guide in clinical situations requiring daily or regular evaluation of asthma control. Finally, a study, conducted in 703 children with asthma, showed moderate relationship between the perception of impaired respiration assessed by VAS and lung function [9]. Particularly, a cut-off VAS value of 6 was able to discriminate accurately patients with bronchial obstruction (defined as FEV_1 value <80% of predicted). Therefore, some practical suggestions may be considered: a VAS value <6 should induce to suspect the possible existence of bronchial airflow limitation. Particularly, a step scale could be constructed defining 4 attention levels. This classification could be useful at home or in family pediatrician office to easily stage the asthma severity. Therefore, VAS

assessment may quickly provide an approximate idea of lung function and suggest the necessary measures: green zone (VAS >8) = do not worry, yellow zone (VAS 6–8) = wait and see, orange zone (VAS 4–6) = refer to pediatrician and think for spirometry, red zone (VAS <4) = treat immediately with relievers. A further study evidenced that VAS assessment of breathlessness well related with the response to bronchodilation testing [9].

VAS in allergic rhinitis

VAS was investigated and validated also in AR patients. The gold standard to measure nasal symptoms is the 4-point scale as mentioned above; VAS was validated comparing with total symptom score assessed with that scale and also considering the ARIA classification. A first study enrolled 3052 AR patients seen in primary care and investigated whether VAS for global rhinitis symptom could be used to assess the disease severity according to ARIA guidelines [10]. Clinical severity had more impact on VAS levels than other parameters. ROC curve findings showed that patients with VAS <5 could be classified as 'mild' rhinitis and those with >6 as 'moderate/severe' rhinitis. VAS significantly correlated with quality of life. A further study compared the responsiveness of VAS between baseline and treatment with symptom score and quality of life in 586 AR patients seen in primary care [11]. The optimal cut-off in VAS score change discriminating the patients without improvement from those with improvement was 0.3, difference >1 was significant.

VAS was also used for validating ARIA classification in 1269 children with AR: there was good correlation between ARIA severity and VAS assessment [12]. A Spanish study on patients with seasonal AR compared 758 adult subjects, who were visited by primary care physicians, with 739 subjects, who were visited by allergists [13]. Patients completed a VAS to evaluate AR severity. No significant differences were found among patients visited by GPs or allergists about ARIA classification and AR severity. Another study assessed VAS and quality of life in 671 patients with nasal symptoms [14]. There was a good correlation between VAS score and quality of life.

Demoly *et al.* [15], recently showed that VAS is a practical, sensitive and valid tool to monitor the burden of AR in clinical practice. Changes in VAS greater than 2 cm after treatment should be considered for clinical importance, highlighting the usefulness of measuring VAS in clinical practice for assessing AR symptom severity, as VAS can detect with high sensitivity the variations of symptom and quality of life. In particular, a cut-off variation of 23 mm for VAS was significantly associated with a cut-off variation of 0.5 (such as a value clinically relevant) for Rhinoconjunctivitis Quality of Life Questionnaire. In addition, this group evaluated 990 AR patients consulting in primary care; VAS and Total Symptom Score measures were compared with Rhinoconjunctivitis Quality of Life Questionnaire. Both severity and duration of rhinitis had an impact on quality of life and VAS levels [16].

The clinical relevance of using VAS in AR patients has been reported also by other studies. A study verified the suitability of

VAS as a surrogate for rhinomanometry in quantifying nasal obstruction, as this tool is scarcely available in the common practice [17]. VAS assessment of nasal obstruction perception correlated with the nasal airflow measurement very strongly ($r = 0.879$). Thus, VAS allows with good reliability the quantification of nasal obstruction also in the absence of rhinomanometry.

Another fruitful application of VAS in AR patients concerns the link between upper and lower airways. Thus, it has a meaningful value to detect early marker suggestive for bronchial impairment in AR patients. In this regard, lung function measurement by spirometry should be performed in AR patients for precociously detecting subjects developing asthma, but it seems to be scarcely feasible for practical reasons. A study, conducted on large cohort of AR patients (1728), provided evidence that a VAS value (assessing nasal obstruction perception) <3.3 might identify with good reliability patients with initial bronchial airflow limitation [18]. This outcome highlights the suitable use of nasal obstruction VAS assessment for defining candidates for spirometry.

VAS & allergen immunotherapy

Allergen immunotherapy (AIT) is the unique causal treatment for respiratory allergy. The judgment of AIT efficacy is mainly based on symptom improvement and drug use. Therefore, the possibility of quantitatively measuring them by VAS could be very relevant in the clinical practice. A first study reported that patients treated with AIT are characterized by perception of severe symptoms assessed by VAS, even though doctors scored

mild severity [19]. This finding suggests that it is always relevant to pay attention to the complaints referred by patients, as severe symptoms represent a relevant indication to AIT. Moreover, VAS may be usefully assessed for identifying patients who are responder to AIT. In fact, a very recent study demonstrated that patients' perception of both symptom severity and drug use, assessed by VAS, may be a practical approach to evaluate AIT efficacy [20]. In other words, the patient's point of view about the AIT efficacy evaluation may be a new way in the management of allergy.

Conclusion

The availability of a simple and reliable tool for quantitatively measuring symptom perception is surely very important in daily practice. Especially, this concept appears to be fundamental in the doctor's office and at home, where there are no adequate resources. VAS is a very simple and popular tool that may be used by everyone everywhere. The advantage given by VAS consists in the translation of a subjective sensation in an objective measure provided by numbers.

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