

The relationship between subjective assessment instruments in chronic rhinosinusitis*

Mingyann Lim, Sim Lew-Gor, Yvonne Darby, Natalie Brookes, Glenis Scadding, Valerie J. Lund

Professorial Unit, Royal National Throat, Nose and Ear Hospital, London, United Kingdom

SUMMARY

Problem: To provide an evidence-based definition for the relationship between three subjective instruments for assessing severity of chronic rhinosinusitis- visual analogue scale, 'mild', 'moderate' and 'severe' (MMS) classification and perception of whether quality of life (QoL) is affected.

Method of study: One hundred sixteen subjects with chronic rhinosinusitis filled in a questionnaire rating simultaneously their perception of disease severity based (1) upon visual analogue scale, (2) MMS classification and (3) stating whether they felt their QoL was affected.

Main results: The mean age of subjects was 50. The inter-quartile range of VAS scores for the respective MMS groups were: Mild 0.80-3.50, Moderate 4.40-6.33, Severe 7.70-9.50. In the group who perceived effects on QoL, the inter-quartile range for VAS scores was 5.10-8.68. This range was 1.53-4.57 in the other group with no effects on QoL. 30.3 % of patients in the 'mild' category, 79.6% in the 'moderate' category and 97.4% in the 'severe' category felt that their QoL was affected.

Principle conclusions: We propose a statistically validated definition of the relationship between MMS classification and VAS scoring. Based on our study we would define 'mild' as being 0- 3 inclusive, 'moderate', as >3- 7 inclusive and 'severe' as >7- 10 inclusive on the VAS scoring system. We further propose that in general QoL is more likely to be affected with VAS scores of 5 or more.

Key words: Visual Analogue Scale, 'mild', 'moderate', 'severe', quality of life, chronic rhinosinusitis

INTRODUCTION

Chronic rhinosinusitis is a common condition, affecting about approximately 14% of the population⁽¹⁾. It significantly affects health⁽²⁾ and has a considerable economic burden upon society⁽³⁾.

The diagnosis of chronic rhinosinusitis involves fulfilling historical and/or endoscopic and radiological criteria⁽⁴⁾. Classification of severity of disease, as with most other diseases is less standardised and a variety of methods exist. Both objective and subjective methodology may be used. Subjective methods include the tri-categorical classification of 'mild', 'moderate' and 'severe' (MMS), Visual Analogue Scales (VAS) and Quality of Life evaluation (QoL). Employing more than one method may improve accuracy in determining disease severity.

The EPOS document⁽⁴⁾ has arbitrarily classified VAS 0-4 mild and 5-10 moderate/ severe. We sought to statistically validate this classification and also to examine the relationship between

the (a) VAS score and QoL (b) mild/moderate/severe (MMS) classification and QoL.

MATERIALS AND METHODS

In total, 118 consecutive patients attending clinic for treatment of chronic rhinosinusitis participated. Subjects were asked to fill in a questionnaire in which they (a) rated their overall symptoms of chronic rhinosinusitis on a VAS scale, (b) categorised their overall symptoms as 'mild', 'moderate' or 'severe' (c) indicated whether their symptoms affected the quality of their life. Only 2 patients rated their overall symptoms on the VAS scale as 0 and were excluded from the study.

Statistical analysis

Statistical analyses were performed with Statistical Package for the Social Sciences (SPSS, version 14.0 for windows, SPSS Inc., Chicago, IL, USA). The relationship between (a) VAS and MMS classification and (b) VAS and QoL were examined using box plots showing the median values and the upper and lower quartiles. Receiver Operating Characteristic (ROC) curve

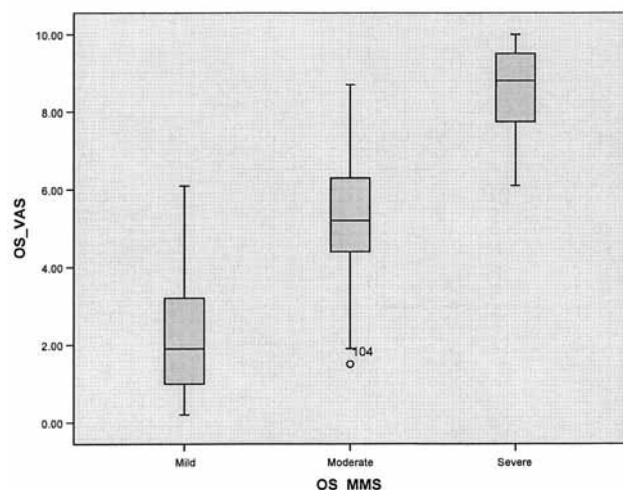


Figure 1. Box and whisker plot for MMS and VAS scores.

Table 1. MMS and VAS scores.

VAS scores	Mild	Moderate	Severe
Lower extreme	0.2	1.9*	6.1
25 th percentile	0.8	4.4	7.7
Median	1.9	5.2	8.8
75 th percentile	3.5	6.3	9.5
Upper extreme	6.1	8.7	10

*with a single off scale value of 1.5

was employed in further analysing the relationship between VAS and QoL.

RESULTS

Demographics and overall results

Of the 116 patients analysed, 58 were male and 58 were female. The age ranged from 10 to 81 and the mean age was 50. Twenty-three patients rated their symptoms as mild, 54 as moderate and 39 as severe. The VAS scores ranged from 0.2 to 10, with a mean VAS score of 5.8. A total of 88 subjects described their symptoms as affecting their quality of life.

VAS scores and MMS

As expected, the median VAS values varied between the 3 MMS categories. Table 1 and Figure 1 illustrate the median values, upper/ lower quartiles and extreme values of the VAS scores for the 3 categories of MMS.

The inter-quartile ranges for the respective MMS groups were: Mild 0.80-3.50, Moderate 4.40-6.33, Severe 7.70-9.50. Median values for the respective MMS groups were: Mild 1.9, Moderate 5.2, Severe 8.8.

VAS scores and QoL

For the group in which QoL was affected the reported VAS scores had a median of 6.65 and an inter-quartile range of 5.10-

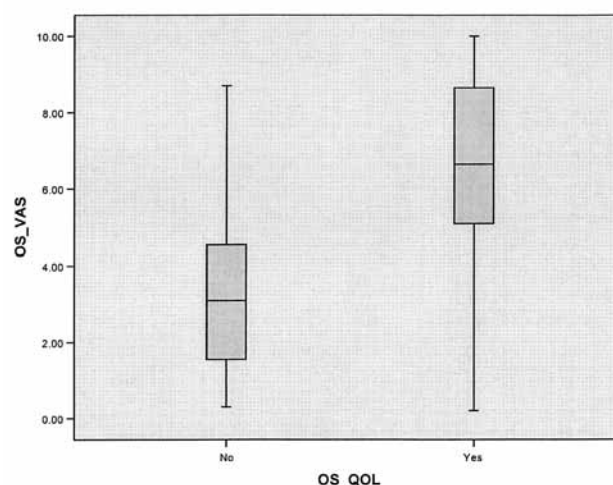


Figure 2. Box and whisker plot for QoL and VAS scores.

8.68. The group of subjects in which QoL was not affected had VAS scores with an inter-quartile range of 1.53-4.57 and a median value of 3.1 (Figure 2).

MMS and QoL

Seven out of 23 subjects in the ‘mild’ category felt that their quality of life was also affected. Quality of life was affected in 43 out of 54 patients in the ‘moderate’ group and 38 out of 39 patients in the ‘severe’ group

ANALYSIS

VAS scores and MMS

Based on the inter-quartile results of our study and employing whole numbers only for simplicity two alternative classifications for definition may now be proposed:

(1) ‘Mild’ being defined on the VAS as 0- 4 inclusive, ‘moderate’ as > 4- 7 inclusive and ‘severe’ as > 7- 10 inclusive. Using this definition means that 20/29 = 69% patients in our study with a score of 0-4 also classified their symptoms as ‘mild’, 40/46 = 87% of patients with a score of > 4-7 classified their score as ‘moderate’ and 35/40 = 87.5% of subjects with a score of > 7-10 classified their score as ‘severe’.

(2) ‘Mild’ being defined on the VAS as 0- 3 inclusive, ‘moderate’ as > 3- 7 inclusive and ‘severe’ as > 7-10 inclusive. Using this definition 17/20 = 85% patients in our study with a score of 0-3 classified their symptoms as ‘mild’, 46/55 = 83% of patients with a score of > 4-7 classified their symptoms as ‘moderate’ and 35/40 = 87.5% of subjects with a score of > 7-10 classified their symptoms as ‘severe’.

It is clear that the second definition significantly increases the correlation between VAS scoring and the MMS tri-categorical classification in our study. The increase in correlation is most marked for the ‘mild’ category.

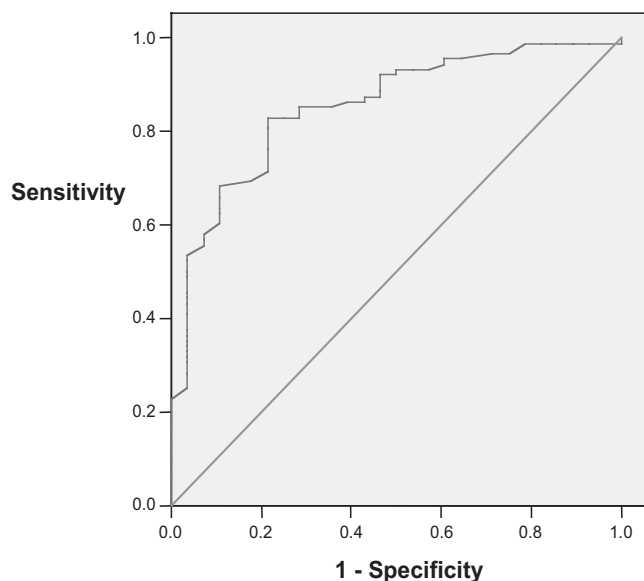


Figure 3. ROC plots for QoL and VAS scores.

VAS scores and QoL

In examining the relationship between QoL and VAS scores, ROC analysis shows that VAS scoring is a good discriminator of whether QoL is affected (area under curve 0.853, 95% CI 0.776-0.930, Figure 3) The definition with the best performance was when VAS was dichotomised at 4.75 generating a sensitivity of 83% and specificity of 78.6%.

MMS and QoL

Examining the relationship between MMS categorisation and QoL reveals that 30.3 % of patients in the ‘mild’ category, 79.6% in the ‘moderate’ category and 97.4% in the ‘severe’ category feel their QoL is affected.

DISCUSSION

Defining symptom severity is important for several reasons. It aids clinicians in the decision making process of choosing appropriate pharmacotherapy. It also allows evaluation of success of therapy and aids the advancement of research.

A variety of subjective and objective methods for classifying symptom severity in chronic rhinosinusitis exist. For subjective classification methods the Sinonasal Outcome Test-22 (SNOT-22) has been shown to be the best available methodology based on its reliability, validity and responsiveness⁽⁵⁾. However, use of this instrument may be time-consuming and hence may not be practically feasible in routine clinics. Instead, employing simple subjective instruments such as VAS scoring, MMS and QoL may be more feasible in obtaining a quick and simple understanding of severity of disease and response to medication.

Because these three simple instruments may not always be used concomitantly, it is useful to obtain some idea of the rela-

tionship between them. The EPOS document⁽⁴⁾ has defined symptom scores of 0-4 on the VAS as mild and 5-10 as moderate/ severe.

There are 3 potential problems with this definition. Firstly the definition is arbitrary rather than based on validated epidemiological studies. Secondly, no differentiation is made between the ‘moderate’ and ‘severe’ categories. Finally, the definition does not allow for a continuous range of VAS scores with scores between 4-5 unsatisfactorily left without classification. The problem arises as the VAS scale normally has no demarcations along it⁽⁶⁾, inevitably generating non whole numbers when employed.

Our analysis proposes the evidence-based classification of ‘mild’ being defined on the VAS as 0-3 inclusive, ‘moderate’ as > 3-7 inclusive and ‘severe’ as > 7-10 inclusive. There are 3 advantages of this definition: (a) It is a statistical construct based upon an epidemiological study, (b) it is a definition that allows differentiation between ‘moderate’ and ‘severe’ categories and (c) it provides an appropriate classification for the continuous range of scores the VAS instrument generates. We would propose this as a more suitable definition than what has been arbitrarily defined in EPOS⁽⁴⁾.

Nonetheless it is important to be aware that there will always be a small percentage of patients who do not obey the definition proposed. Hence it may be prudent to obtain for each patient both VAS and MMS scores to improve accuracy of overall global subjective assessment. In addition it is realised that the proposed definition is based upon a small dataset, and that further larger studies might be appropriate.

In analysing the relationship between VAS scores and QoL we find good corroboration between ROC analysis and inter-quartile range analysis. Based on both these analyses we propose that in general QoL is more likely to be affected with VAS scores of 5 or more. It will be noted however that 17 out of the 88 patients (19%) who felt their quality of life to be affected gave a VAS score less than 5, so again there is a proportion of patients who will not fulfil this definition.

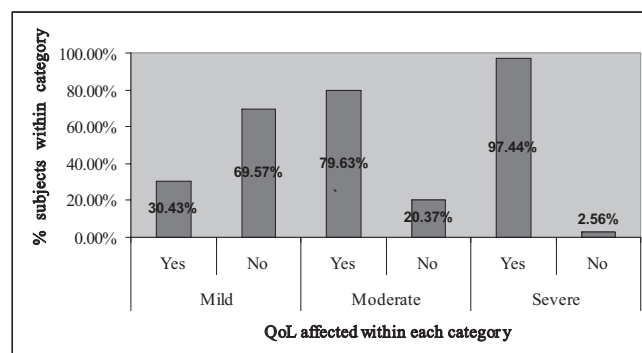


Figure 4. Percentage of subjects QoL is affected in each MMS category.

Exploring the relationship between MMS categorisation and QoL reveals that there is an expected increase in percentage of subjects in whom QoL is affected in moving from the mild to severe categories. However it is clear from our analysis that individual perception of effects on QoL is not always proportional to perceived severity of symptoms. Nearly one-third of all patients who described their symptoms as 'mild' also perceived an effect on their quality of life. This highlights the importance of eliciting effects on quality of life as well and not severity of illness only during consultation to gain a balanced understanding of disease impact.

CONCLUSION

Our study provides a statistically based definition of the relationship between VAS scoring, MMS classification and QoL perception. Based on our study we would define 'mild' as being 0-3 inclusive, 'moderate', as > 3-7 inclusive and 'severe' as > 7-10 inclusive on the VAS scoring system. This is in contrast to the current definition arbitrarily proposed in the EPOS document⁽⁴⁾. We further propose that in general QoL is more likely to be affected with VAS scores of 5 or more. Further larger studies might be useful to validate our proposed definitions.

ACKNOWLEDGEMENT

We would like to thank Dr Richard Morns, Department of Primary Care and Population Sciences, Hampstead Campus, University College London for his help with the statistics.

REFERENCES

1. Ray NF, Baraniuk JN, Thamer M et al. Healthcare expenditures for sinusitis in 1996: contributions of asthma, rhinitis, and other airway disorders. *J Allergy Clin Immunol* 1999; 103: 408-414.
2. Metson RB, Gliklich RE. Clinical outcomes in patients with chronic sinusitis. *Laryngoscope* 2000; 110: 24-28.
3. Bhattacharyya NI. The economic burden and symptom manifestations of chronic rhinosinusitis. *Am J Rhinol* 2003; 17: 27-32.
4. Fokkens WJ, Lund VJ et al. European Position Paper on Rhinosinusitis and Nasal Polyps. *Rhinol Suppl.* 18; 2005: 1-87.
5. Morley AD, Sharp HR. A review of sinonasal outcome scoring systems - which is best? *Clin Otolaryngol* 2006; 31: 103-109.
6. Linder A. Symptom scores as measure of the severity of rhinitis. *Clin. Allergy* 1988; 18: 29-37.

Valerie J. Lund
Institute of Laryngology and Otology
Royal National Throat Nose and Ear Hospital
330 Grays Inn Rd
London, WC1X 8EE
United Kingdom

Tel.: +44-20-7915-1497
Fax: +44-20-7833-9480
E-mail: v.lund@ucl.ac.uk