

THE BATH ANKYLOSING SPONDYLITIS PATIENT GLOBAL SCORE (BAS-G)

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SUMMARY

In the absence of an ideal objective measure for assessing ankylosing spondylitis (AS), self-administered measures of disease activity (the Bath Ankylosing Spondylitis Disease Activity Index, BASDAI) and function (the Bath Ankylosing Spondylitis Functional Index, BASFI) have been developed, in addition to an objective measure of spinal mobility (the Bath Ankylosing Spondylitis Metrology Index, BASMI). However, a more global assessment is also desirable. We report on the design and validation of a global measure (the Bath Ankylosing Spondylitis Patient Global Score, BAS-G) which reflects the effect of AS on the patient's well-being. A pilot study was performed to select the most appropriate wording for BAS-G. Using 392 patients with AS, BAS-G's construct and predictive validity and test-retest reliability were assessed. Correlations between BAS-G and BASDAI/BASFI were calculated, and multiple regression was used to examine the significant correlates. The distribution of the responses covered the whole scale. As predicted, BAS-G correlated best with BASDAI ($r = 0.73$), followed by BASFI ($r = 0.54$). The best fitting regression equation included these scales as well as patients' gender and current age. One week and 6 month scores were significantly different ($P < 0.001$). Construct validity was good: BAS-G correlated more strongly with each component of BASDAI and BASFI than with BASMI or with gender. Predictive validity was satisfactory: there was an improvement (mean = 29%) in in-patient BAS-G scores over a 2 week treatment period ($P < 0.001$). Test-retest reliability was excellent (1 week $r = 0.84$, 6 months $r = 0.93$). BAS-G correlates well with both BASDAI and BASFI, suggesting that disease activity and functional ability play a major role in patients' well-being, whereas metrology does not. The score is sensitive to change, reliable, and meets face, predictive and construct validity criteria.

KEY WORDS: Ankylosing spondylitis, Global score, Validation, Well-being, Outcome.

THERE is no ideal objective measure for assessing ankylosing spondylitis (AS). The radiograph is the current 'gold standard', but X-rays are insensitive to change, expensive, time consuming to perform and potentially dangerous [1]. Thus, subjective measures may be better [2, 3].

For example, Hidding *et al.* [4] found only a negligible discordance between self-report questionnaires and observed functional disability in patients with AS, in contrast to patients with fibromyalgia. Further, it has previously been demonstrated that a single-item self-assessment indicator is a better predictor of outcome than assessment by a physician [5]. In recognition of this, two self-administered indices to measure disease activity (the Bath Ankylosing Spondylitis Disease Activity Index, BASDAI) and function (the Bath Ankylosing Spondylitis Functional Index, BASFI) have been created and validated [6, 7]. An objective measure of spinal mobility, the Bath Ankylosing Spondylitis Metrology Index (BASMI), has also recently been developed [8]. However, if clinicians are to obtain a comprehensive summary of the patient's situation, a self-administered global measure is desirable.

In this paper, we report on the design and development of a single-item global assessment (the Bath Ankylosing Spondylitis Patient Global Score, BAS-G) which reflects the effect of AS on patients' well-being over a particular period of time. A firm association between BAS-G and patients' report of disease activity and function is hypothesized, with only a weak association between BAS-G and metrology.

PATIENTS AND METHODS

In a pilot study, the most appropriate wording for the global measure was ascertained. The final question (in two versions) asks patients to indicate the effect of AS on their well-being over the last week/6 months, using a 10 cm horizontal visual analogue scale, where none = 0 and very severe = 10 (Fig. 1). We chose the periods '1 week' to enable comparison with BASDAI and BASFI, and '6 months' because this is often the time between hospital consultations.

Using a sample of 392 patients with AS [mean current age = 50.7 yr, standard deviation (s.d.) = 12.5], the BAS-G was assessed for its variability, temporal reliability and construct validity. The sample consisted of 177 consecutive in-patients attending a 2 week physiotherapy-based programme (mean 1 week BAS-G = 5.18, s.d. = 2.37) and 215 respondents to a postal survey of patients diagnosed with AS (75% response rate; mean 1 week BAS-G = 5.16, s.d. = 2.64).

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**The Bath Ankylosing Spondylitis Patient Global Score
(BAS-G)**

1. Please place a vertical mark on the scale below to indicate the effect your disease has had on your well-being over the last week.

NONE _____ VERY SEVERE

2. Place a vertical mark on the scale below to indicate the effect your disease has had on your well-being over the last six months.

NONE _____ VERY SEVERE

THANK YOU

FIG. 1.—The Bath Ankylosing Spondylitis Patient Global Score (BAS-G).

Respondents reflect the whole range from early AS to established late disease [7].

Correlations between BAS-G and BASDAI/BASFI, and between 1 week and 6 month scores, were assessed for the full sample. Since overall disease status is assumed to be multidimensional [9], ordinary least squares (OLS) regression was used to examine the significant correlates of BAS-G. Initial predictors included BASDAI, BASFI, gender, current age and age at disease onset. For ease of interpretation, continuous variables in the regression analysis were standardized.

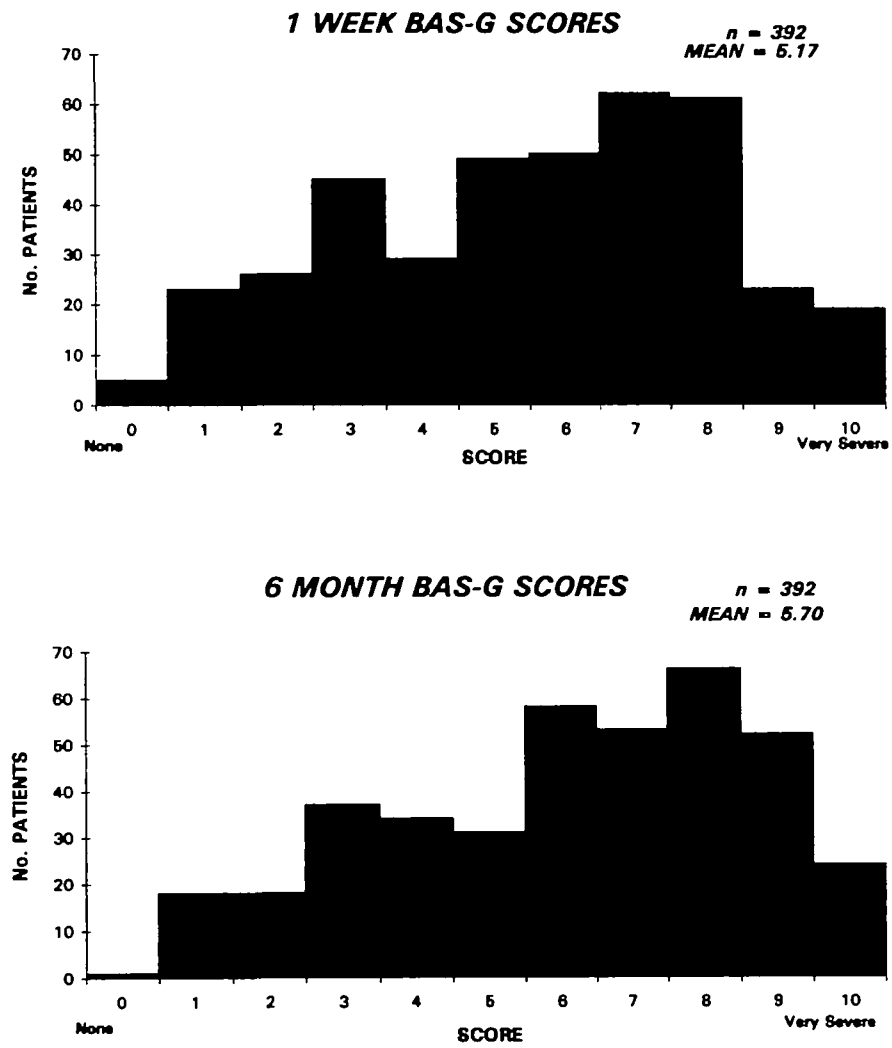
Correlations, OLS regression and analysis of variance (ANOVA) were used to assess construct validity [3]. We hypothesized a stronger association between BAS-G and BASDAI, BASFI and each individual component of the indices than between BAS-G and either BASMI, gender or occupational status [10]. Paired *t*-tests were used to assess sensitivity to change in a representative subsample of in-patients who completed BAS-G at the beginning and end of the

2 week programme. We hypothesized significant change in the 1 week question and little, if any, change in the 6 month question. One-day test-retest reliability was examined in 40 in-patients.

RESULTS

Responses to BAS-G covered the whole 0–10 scale, for both time frames (Fig. 2). A paired *t*-test showed that the difference between the 1 week and 6 month scores was statistically significant (1 week minus 6 months, mean difference = -0.53 , *s.e.* = 0.097 , $P < 0.001$). The 1 week BAS-G correlated best with BASDAI ($r = 0.73$, Fig. 3), followed by BASFI ($r = 0.54$). The best fitting regression equation (adjusted $R^2 = 0.55$) included gender, current age, BASDAI and BASFI, suggesting that these are the main identified components of the BAS-G score (Table I).

Regarding construct validity, BAS-G correlated more strongly with each individual component of



1 WEEK BAS-G v BASDAI (n = 392)

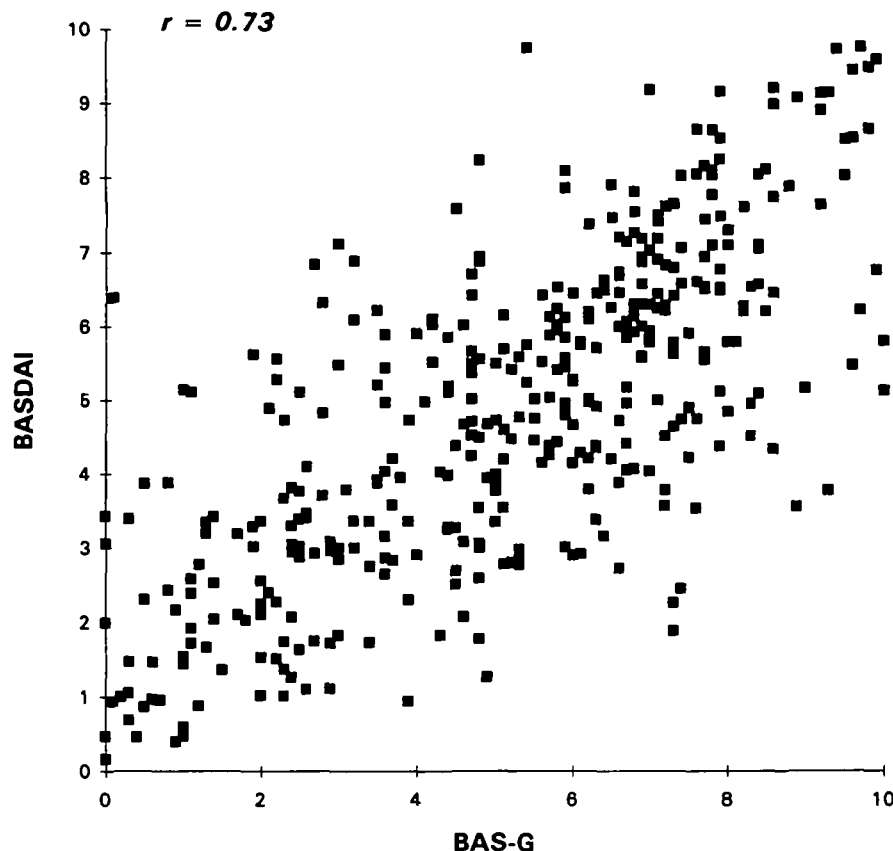


FIG. 3.—Correlation between the 1 week BAS-G score and BASDAI ($r = 0.73$).

BASDAI (Table II) and BASFI ($r = 0.30-0.59$) than with BASMI ($r = -0.16$) or gender ($r = 0.09$). Of the five BASDAI items, spinal pain correlated best with BAS-G ($r = 0.69$), followed by fatigue ($r = 0.66$). One-way ANOVA demonstrated that the association between BAS-G and occupational status was not statistically significant, although it may become so with a larger sample ($P = 0.12$). Comparison of separate regressions of BAS-G on BASDAI, BASFI and occupational categories showed that the R^2 statistics for BASDAI and BASFI (0.51 and 0.30, respectively)

were much higher than the R^2 for occupation (0.06).

There was satisfactory sensitivity to change, in that improvement over a 2 week intensive self-management programme was expected, and observed, in pre/post global scores for the week prior to questioning (pre-course minus post-course, mean difference = 1.54, s.e. = 0.31, $P < 0.001$). Overall, there was a 29% improvement in 1 week scores (70% of patients improved; Fig. 4) and a 6% improvement in 6 month scores. The 24 h test-retest reliability was excellent (1 week $r = 0.84$, 6 months $r = 0.93$).

TABLE I
Results of regression of 1 week global score on relevant correlates (n = 392, adjusted $R^2 = 0.55$)

Variable	Coefficient (S.E.)
Male	-0.12 (0.08)
Current age	-0.08 (0.04)*
BASDAI	0.61 (0.04)***
BASFI	0.19 (0.05)***

Male is a dummy variable; all others are continuous and have been standardized; * $P < 0.05$, *** $P < 0.001$; S.E. = standard error.

TABLE II
Correlations between BAS-G and all components of BASDAI (n = 200)

Variable	Correlation with BAS-G (r)
BASDAI	Total 0.73
	Spinal pain 0.69
	Fatigue 0.66
	Morning stiffness 0.53
	Entheses 0.53
	Peripheral joint pain 0.38

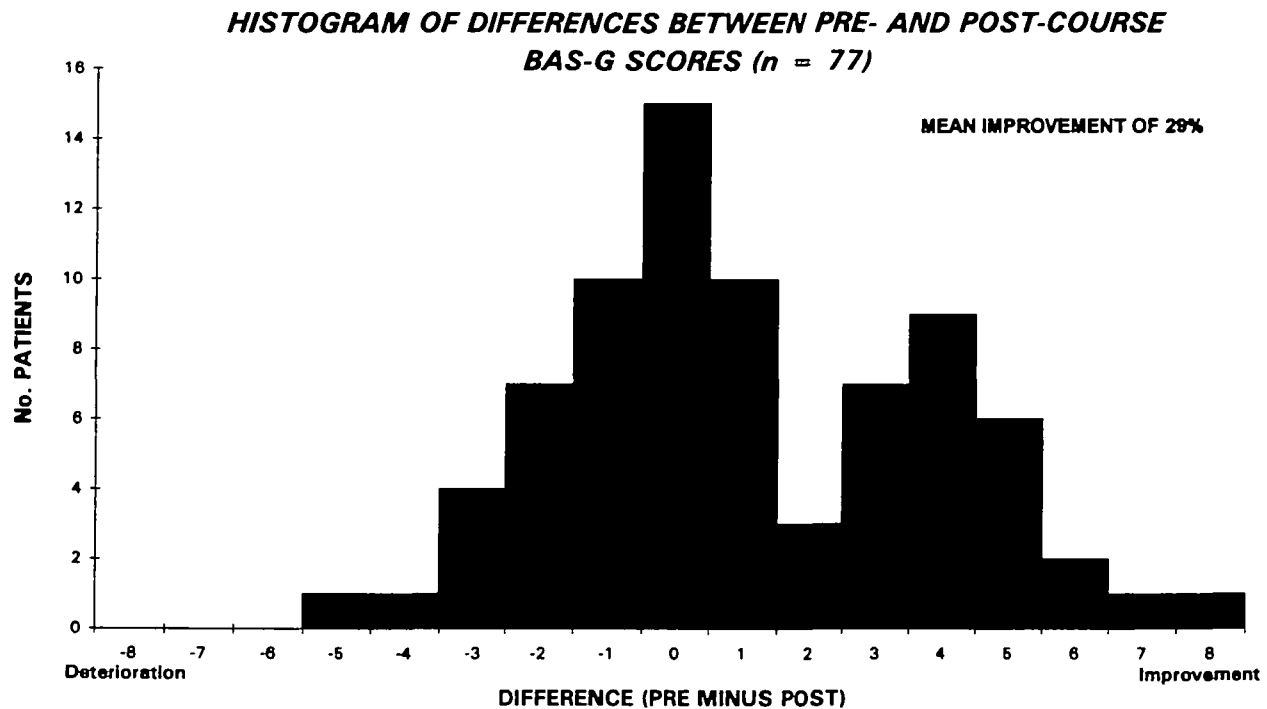


FIG. 4.—Differences between pre- and post-treatment BAS-G scores.

DISCUSSION

As concluded by Bakker *et al.* [2], health professionals should pay greater attention to the patient's point of view. Historically, clinicians have at least asked their patients the question 'How have you been over the last months?'. The main purpose of this study was to formalize this question and to provide health professionals with a quick, quantifiable and valid way to obtain the patient's perspective and monitor it over time. Thus, we developed the BAS-G. The secondary aim was to examine the relationship between this measure of overall patient well-being and other measures of specific components of disease in patients with AS.

The BAS-G was assessed for relevant validity criteria [face, discriminant, predictive (sensitivity to change) and construct] [11]. Neither content validity nor criterion validity were assessed, the former because the score resulted from a single question and was not a composite measure, the latter because there is no gold standard available. However, construct validity was more than satisfied: not only did BAS-G correlate well with BASDAI and BASFI but, appropriately, it correlated more strongly with these measures than with BASMI or any demographic variable.

Our results indicate that spinal pain and fatigue have the most influence on patients' well-being. Whilst pain has always been recognized as the main symptom in AS, it has only recently been demonstrated that fatigue is also a major component of disease activity [12]. Thus, intervention to reduce either should result in improved patient perception of health.

Several limitations to this study should be considered. First, although previous research suggests that our patients are representative of the whole AS population [13, 14], the possibility of sampling bias must be acknowledged. It is unlikely that hospital patients and members of a self-help group are perfectly representative of people with AS, some of whom may have the disease so mildly that it has yet to be diagnosed. However, as we would expect the main application of BAS-G to be in the environment of clinical consultations, this limitation should not be overestimated. Second, because it is hospital practice to develop continually the patient database, we relied on different sample sizes for these analyses. At every stage, the analysis utilized the fullest available data set at that point (e.g. 77/177 in-patients used to test predictive validity). This should not bias the results since no differences were found between patients included, and those omitted, in terms of a variety of demographic and clinical data.

Third, the psychological status of the patients involved in this research was not defined, but would be likely to increase understanding of what contributes to patients' perception of well-being. Finally, it is obvious that BAS-G cannot stand alone. It should be taken as only one element of a complete assessment of patient status.

There are two ways for clinicians to consider these results. The first is to treat them as simplistic and obvious answers to a simplistic and obvious question. What can be gained from asking patients to write down the effect their disease has on their well-being, when the

physician can just as easily obtain an adequate verbal answer? The value of BAS-G, and thus the second way of considering these results, is that with patients answering the question on a visual analogue scale, numerical scores can be entered into the medical notes to compare with scores at the previous or next consultation. From a practical perspective, this may be helpful where patients do not necessarily consult the same rheumatologist on each occasion. The patients should not have access to previous scores when answering the question at a later date.

Theoretically, it will now be possible to plot the scores over time to track changes in the perceived effect of the disease on patient well-being. The most subtle changes—certainly changes more subtle than those showing up in radiographs or in laboratory tests—should be detected. We propose the BAS-G as a valuable quantitative measure, developed to aid the clinician in assessing how patients perceive the effects of AS on their well-being. BAS-G may also be a useful instrument in clinical studies of AS. Further research could lead to an understanding of how the patient's perception compares to the physician's assessment. Finally, BAS-G is not disease specific in content (as are BASDAI, BASFI and BASMI), and may thus be applicable to other chronic or rheumatic diseases.

In conclusion, we have formalized and validated a simple question universally asked of patients by clinicians. The BAS-G generates a measurable answer in the form of a numerical score which lends itself to subtle comparisons over time. The score records change where change is expected, is reliable, and meets face, predictive and construct validity criteria. BAS-G correlates well with both BASDAI and BASFI, suggesting that disease activity and functional ability play a major role in the patient's perception of well-being. The contribution of pain and fatigue to this perception is particularly significant, and merits further study.

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