

SHORT COMMUNICATION

Comparative Cut-off Value Setting of Pruritus Intensity in Visual Analogue Scale and Verbal Rating Scale

Makiko Kido-Nakahara¹, Norito Katoh², Hidehisa Saeki³, Hitoshi Mizutani⁴, Akihito Hagihara⁵, Satoshi Takeuchi¹, Takeshi Nakahara¹, Koji Masuda², Risa Tamagawa-Mineoka², Hidemi Nakagawa³, Yoichi Omoto⁴, Kimiko Matsubara⁴ and Masataka Furue¹

Departments of Dermatology, Graduate School of Medical Sciences, ¹Kyushu University, 3-1-1 Maidashi, Higashi-ku, Fukuoka 812-8582, ²Kyoto Prefectural University of Medicine, Kyoto, Departments of Dermatology, ³School of Medicine, Jikei University, Tokyo, ⁴Graduate School of Medicine, Mie University, Mie, and ⁵Department of Health Services Management and Policy, Graduate School of Medicine, Kyushu University, Fukuoka, Japan. E-mail: macky@dermatol.med.kyushu-u.ac.jp

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There are several established methods to estimate the intensity of pruritus quantitatively, including the visual analogue scale (VAS) and verbal rating scale (VRS). High reliability and concurrent validity were recently reported for the VAS and VRS for pruritus assessment (1, 2). Although VAS is one of the most widely distributed methods to estimate the intensity of pruritus, it also has yet to be cleared whether same scores of VAS obtained from different ethnic groups could be considered as same pruritus intensity, and the factors influencing the pruritus scores. Reich et al. (1) recently proposed VAS categories: cut-off values of (4-7-9) to distinguish mild, moderate, severe, and very severe pruritus on the basis of a detailed analysis¹. The authors also reported some differences between Caucasian and Asian subjects.

The factors influencing pain intensity, which is also a subjective symptom, are well studied. Although pruritus is believed to be influenced by factors such as age, sex, and ethnic background as well as pain, these aspects have not yet been addressed.

Based on the report by Reich et al., we analysed the cut-off value setting of pruritus intensity by comparing VAS with VRS in 949 Japanese subjects to address the effect of ethnic demographic and regional influence on the VAS and VRS.

PATIENTS AND METHODS

Consecutive patients who visited dermatology departments at 4 university hospitals, Kyoto Prefectural University of Medicine (KPUM), Mie University (Mie U.), Jikei University (Jikei U.) and Kyushu University (Kyushu U.) from April 2012 to January 2013 were recruited in this study. The inclusion criteria were as follows: informed consent obtained from a patient to participate in the study, age > 10 years. A total of 949 patients with various dermatological diseases were recruited (Table I). The diagnoses of these patients were categorised into 5 groups: “atopic dermatitis (AD)”; “eczema and dermatitis except AD”; “urticaria, prurigo, and pruritus”; “psoriasis and other keratosis”; and “others”. The rates of each disease varied among facilities. Patients were instructed to rate their perception of pruritus

within a 24-h period using the horizontal VAS (3), followed by the 5-point VRS. The 5-point VRS consists of a list of phrases that describe increasing levels of pruritus intensity: no pruritus (0 points), mild pruritus (1 point), moderate pruritus (2 points), severe pruritus (3 points), and very severe pruritus (4 points).

The categories – or bands – of the VAS were defined on the basis of the horizontal VAS, as previously described (1, 4). Multiple regression analysis was performed for VAS and VRS scores using 4 explanatory variables (age, sex, disease, and site) as independent variables. Dummy variables were introduced for sex (male: 0; female: 1), disease [AD: (1,0,0,0); eczema: (0,1,0,0); urticaria: (0,0,1,0); psoriasis: (0,0,0,0); other: (0,0,0,1)], and site [KPUM: (1,0,0); Mie U.: (0,1,0); Jikei U.: (0,0,1); Kyushu U.: (0,0,0)]. The following tests were used: 1-way analysis of variance (ANOVA) with Dunnett’s *post hoc* test, Pearson’s chi-square test with standardised Pearson residual analysis, κ coefficient analysis, and multiple regression analysis.

RESULTS

We calculated the mean, median, and mode of VRS scoring for each VAS score and concluded that the delineation between mild and moderate pruritus should occur at 3 or 4 points on the VAS, the delineation between moderate and severe pruritus should occur at 6 or 7 points, and the delineation between severe and very severe pruritus should occur at 8 or 9 points (Table S1²). Using these cut-off scores, we calculated the κ coefficient to find a suitable VAS categorisation. For all patients,

²<http://www.medicaljournals.se/acta/content/?doi=10.2340/00015555-1972>

Table I. Characteristics of the study population at 4 university (U) hospitals

	Total	KPUM	Mie U.	Jikei U.	Kyushu U.
Patients, <i>n</i>	949	248*	108*	277	316
Age, years \pm SD	52.6 \pm 19.3	57.8 \pm 22.2	57.9 \pm 18.1	49.1 \pm 16.8	49.8 \pm 18.0
Male:female	446:503	119:129	54:54	145:132	128:188
Male, %	47.0	48.0	50.0	52.3	40.5
Diseases, %					
Atopic dermatitis	181 (19.1)	29 (11.7) ∇	22 (20.4)	70 (25.3) \blacktriangle	60 (19.0)
Eczema	225 (23.7)	94 (37.9) \blacktriangle	26 (24.1)	66 (23.8)	39 (12.3) ∇
Urticaria	120 (12.6)	47 (19.0) \blacktriangle	17 (15.7)	22 (7.9) ∇	34 (10.8)
Psoriasis	141 (14.9)	10 (4.0) ∇	9 (8.3) ∇	85 (30.7) \blacktriangle	37 (11.7)
Others	282 (29.7)	68 (27.4)	34 (31.5)	34 (12.3) ∇	146 (46.2) \blacktriangle

Values derived using ANOVA with Dunnett’s *post hoc* test. * $p < 0.001$ vs. Kyushu U. The Pearson χ^2 -test with standardised Pearson residual analysis. $\chi^2=194.70$, (df)=12, $p < 0.001$; $\blacktriangle p < 0.05$, significantly high; $\nabla p < 0.05$, significantly low.

¹VAS=0: no pruritus; VAS >0–<4: mild pruritus; VAS \geq 4–<7: moderate pruritus; VAS \geq 7–<9: severe pruritus; VAS \geq 9: very severe pruritus.

the most suitable set of VAS bands were (3-7-9) and corresponds to a κ coefficient of 0.64 (Table SII²). For male and female subjects, both (3-7-9) and (4-7-9) were equally suitable. However, we proposed a final set of bands for VAS of (3-7-9) on the basis of data obtained from all patients, which was consistent with that reported by Reich et al. (1) in a population of Caucasian patients.

We analysed the relationship between VAS or VRS and age, sex, disease, and site using multiple regression analysis to determine factors that may influence VAS or VRS scores (Table II). Neither age nor sex had any effect on the VAS or VRS scores. With respect to disease category, patients with AD, eczema, and urticaria rated their itch intensity significantly higher than patients with psoriasis. We also observed that patients at Jikei U. rated pruritus intensity significantly higher than those at Kyushu U. ($p < 0.05$ for VAS, $p < 0.0001$ for VRS), suggesting that there are regional differences in the expression of itch intensity.

DISCUSSION

The primary aim of this study was to define the cut-off value setting of pruritus intensity for VAS categorisation in 949 Japanese patients by using VRS scores. Our results suggest that VAS cut-off values (3-7-9) composed the most suitable set for Japanese patients and corresponded to those determined for Caucasian patients in a previous study by Reich et al. (1). These authors concluded that the cut-off values (3-7-9) were the most appropriate in Caucasians, although they observed that suitable cut-off values changed to (4-7-9) when Japanese patients were included. Since the present study was conducted to revisit the evaluation of this discrepancy by enrolling a large number of Japanese patients, our results support (3-7-9) as the most appropriate set of cut-off values for both Caucasian and Japanese patients. These results indicate that ethnic differences may be negligible when VAS

and VRS are used to assess pruritus. Our results were useful for the evaluation of the clinical investigation in which the endpoint is itch intensity.

Our second aim was to analyse whether age, sex and geographic location influence VAS or VRS scores. In our study, patients at Jikei U. rated pruritus intensity significantly higher than those at Kyushu U. ($p < 0.05$ for VAS, $p < 0.0001$ for VRS). No significant influence of age or sex was observed in this study. Several factors may explain the observed regional differences. First, we could not exclude the influence of severity of diseases between patients at Jikei U. and Kyushu U. The second potential confounding factor is stress levels. Lederbogen et al. (5) recently showed that city living and urban upbringing significantly affect neural social stress processing in humans. In general, perceived stress is widely recognised to trigger or enhance pruritus (6, 7). Moreover, we also cannot exclude the possibility that pruritus rating may be influenced by other cultural and regional aspects that have not yet been determined. Further research is needed to reveal the factors influencing VAS and VRS scores.

In conclusion, the VAS and VRS appear to be valuable methods for pruritus evaluation, irrespective of ethnic differences.

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Table II. Factors affecting visual analogue scale (VAS) or verbal rating scale (VRS) identified by multiple regression analysis

Stratified factor	Unstandardised partial regression coefficient (B)	
	VAS (Adjusted R ² =0.1638)	VRS (Adjusted R ² =0.1764)
Age	0.016	-0.001
Gender	-3.273	0.094
Disease (reference category: Psoriasis)		
AD	20.616*	0.841*
Eczema	24.718*	0.971*
Urticaria	16.467*	0.656*
Others	-3.754	-0.186
Facility (reference category: Kyushu U.)		
KPUM	0.157	-0.067
Mie U.	5.292	0.162
Jikei U.	5.778*	0.259*
Constant	24.022*	1.123*

* $p < 0.05$.

KPUM: Kyoto Prefectural University of Medicine.