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Poor adherence to oral and topical medication in 3096 dermatological patients as assessed by the Morisky Medication Adherence Scale-8

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Dear Editor, Recent studies have shown that adherence to treatment is an important factor for good therapeutic outcome in various chronic disorders such as hypertension and diabetes.[1,2] In dermatology, patient nonadherence to therapy is also very problematic and has been associated with poor therapeutic outcomes in common skin diseases.[3–5] Although there is no 'gold standard' to measure medication adherence, an eight-item self-reported scale called the Morisky Medication Adherence Scale-8 (MMAS-8) has been developed by Morisky *et al.*[1] MMAS-8 originally targeted oral medication for hypertensive patients, but it is now applied to measure medication adherence in a wide range of disorders such as diabetes and osteoporosis.[2,6] However, there are no reports of studies investigating dermatological adherence using this scale. Therefore, this study assessed medication adherence for oral and topical remedies using a translated version of MMAS-8 together with other socioeconomic background factors in 3096 Japanese dermatological patients.

This study was conducted among patients registered in a monitoring system established by Macromill Inc. (Tokyo, Japan). The registered individuals (n = 4144) were prescreened in terms of skin diseases and their intention to participate in this study. In total 3096 eligible patients were enrolled, 1327 with atopic dermatitis, 751 with urticaria, 237 with psoriasis and 781 with tinea. Our web-based questionnaire included the following items: age, sex, marital status, annual income, employment status, educational status, smoking habit, alcohol consumption, frequency of hospital visits, main healthcare institution, oral or topical medication, experience of the effectiveness of oral medication, experience of the effectiveness of topical medication, experience of adverse events associated with oral medication, experience of adverse events associated with topical medication, overall satisfaction with treatment, MMAS-8 for oral medication and MMAS-8 for topical medication.

The original MMAS-8 was translated into Japanese according to international guidelines.[7] Forward translation of the original questionnaire was undertaken by translation from English into Japanese to produce a version that was semantically and conceptually as close as possible to the original questionnaire. Translation was carried out by two qualified independent linguistic translators; both are native speakers of Japanese and proficient in English. Back translation from Japanese into English was then carried out by another translator, who is a native speaker of English and proficient in Japanese. The back translation form was sent to the original author. Inconsistencies were resolved after repeated discussion among the original author, the English translator and the Japanese investigators and a final version was generated. According to the MMAS-8 score (range 0–8), adherence was defined as high (score 8), medium (score 6 to < 8) or low (score < 6).[1]

The proportions and frequencies for categorical variables were calculated, while means and SDs were calculated for continuous variables. The characteristics of the whole sample and of the groups with different levels of adherence in terms of the MMAS-8 score are presented. The χ^2-test for categorical variables or ANOVA for continuous variables was used to evaluate the differences in the study variables among the three adherence groups. Internal consistency was assessed using Cronbach's α. An acceptable Cronbach's α value is considered to be $\geq 0{\cdot}7$.[8] Known group validity was assessed through the association of items and MMAS categories using a correlation coefficient and covariance. All analyses were performed using STATA version 9 (StataCorp, College Station, TX, U.S.A.). The significance level was set at $P < 0{\cdot}05$.

The demographic data of the 3096 patients are summarized in Table 1. The mean age of the subjects was 46·3 years (range 17–85), and 50·4% were male. Among the 3096 participants, 1984 took oral medication and 2763 were treated with topical medication. The mean adherence scores by MMAS-8 were 4·8 for oral and 4·3 for topical medication. The reliability scores (Cronbach's α) were 0·710 for oral MMAS-8 and 0·715 for topical MMAS-8,[8] which demonstrates the high reliability of the Japanese version of MMAS-8.

Adherence levels were compared by the type of medication (oral and topical) (Table 2). The percentages of high, medium and low adherence were 9·5%, 24·2% and 66·3% for oral medication, and 6·9%, 17·7% and 75·5% for topical medication, respectively. The overall adherence status was significantly better for oral medication than for topical medication (Table 2).

As shown in Table 3, the adherence to oral medication was significantly associated with age, sex, alcohol consumption, disease classification, frequency of hospital visits, experience of drug effectiveness and overall satisfaction with treatment. Lower adherence was found in younger subjects, female patients, heavier drinkers, cases of atopic dermatitis, those who visited their hospitals less than once per half year or at an unknown frequency, those who had not experienced drug effectiveness and those who were not satisfied with their

Table 1 Basic characteristics of the study subjects (n = 3096)

Characteristic	n	%
Age (years), mean ± SD (min–max)	46·3 ± 13·0 (17–85)	
Sex		
Male	1559	50·4
Female	1537	49·6
Marital status		
Married	1160	37·5
Unmarried	1936	62·5
Annual income		
≥ 6 million yen[a]	1074	39·7
< 6 million yen	1629	60·3
Employment		
Employed	1969	66·8
Unemployed	977	33·2
Education		
University graduate	1524	49·5
Not university graduate	1556	50·5
Smoking		
Smoker	605	19·6
Nonsmoker	2480	80·4
Alcohol consumption		
More than once per month	1927	62·5
Less than once per month	1158	37·5
Diseases		
Atopic dermatitis	1327	42·9
Urticaria	751	24·3
Psoriasis	237	7·7
Tinea	781	25·2
Frequency of hospital visits		
At least once per half year	2769	89·4
Less than once per half year or unknown	327	10·6
Main healthcare institution		
University hospital	141	4·6
Municipal hospital	555	18·0
Private clinic or other	2381	77·4
Oral medication		
Experience of drug effectiveness, yes/no	1634/350	82·4/17·6
Experience of adverse events, yes/no	349/1635	17·6/82·4
Topical medication		
Experience of drug effectiveness, yes/no	2365/398	85·6/14·4
Experience of adverse events, yes/no	382/2381	13·8/86·2
Overall satisfaction with treatment		
Satisfied	1798	58·1
Unsatisfied	1298	41·9
Adherence, mean ± SD (min–max)		
Oral medication (n = 1984)	4·8 ± 2·0 (0–8)	
Topical medication (n = 2763)	4·3 ± 2·0 (0–8)	
Cronbach's α of adherence measures		
Oral medication	0·710	
Topical medication	0·715	

[a]6 million yen is about £34 000.

Table 2 Adherence levels by type of medication

	High, n (%)	Medium, n (%)	Low, n (%)	P-value
Oral medication (n = 1984)	188 (9·5)	480 (24·2)	1316 (66·3)	< 0·001
Topical medication (n = 2763)	190 (6·9)	488 (17·7)	2085 (75·5)	

treatments. Variables affecting the adherence to topical medication included age, frequency of hospital visits, experience of drug effectiveness and overall satisfaction with treatment. Sex and disease classification tended to be associated with adherence to topical medication; however, they did not reach statistical significance (Table 3).

Poor adherence to treatment may be associated with poor clinical efficacy, increased healthcare costs and unnecessary treatments that include nonstandard folk medicine.[9] In general, a low adherence rate has been reported in patients with chronic dermatological diseases such as atopic dermatitis,[3] psoriasis,[4] urticaria[5] and acne;[9] however, few comparative studies have been performed among dermatological diseases. In the present study, the adherence rates as assessed by MMAS-8 were lower than those in other systemic diseases (Table S1; see Supporting Information). Previous studies have indicated that adherence to topical remedies is poorer than that to systemic drugs.[4,10] The present study supports this.

Younger age was associated with lower adherence in both the oral and topical drug groups. It was also previously implicated in decreased drug adherence in cases of acne.[10,11] As expected, lower adherence was observed in those who had not experienced drug effectiveness and those who were not satisfied with their treatments, both in oral and topical medication. Female sex and heavier drinking were additional factors associated with poorer adherence to oral medication. The adherence to medication tended to be lower in patients with atopic dermatitis than in those with psoriasis or tinea. Although the exact reason for this remains unclear, it is conceivable that topical corticosteroid phobia or anxiety may underlie poor adherence, as suggested by Aubert-Wastiaux *et al.*[12]

There are many limitations in the present study. Although we checked the diagnosis of patients in the web registration system, the diagnosis was still self-reported. Because of the length of the questionnaire, we did not include items about quality of life, the dosage of topical medications or steroid phobia.

In conclusion, medication adherence, especially to topical drugs, was very poor in 3096 dermatological patients. MMAS-8 is likely to be a reliable tool for comparing adherence in various disorders. Poor adherence to dermatological remedies was variably associated with younger age, female sex, heavier alcohol consumption, atopic dermatitis, no experience of drug effectiveness and dissatisfaction with treatment. Further analyses of disease-specific adherence are warranted in order

Table 3 Prevalence of study variables among the three adherence levels: oral and topical medication

Characteristic	Oral medication (n = 1984)				Topical medication (n = 2763)			
	High adherence n = 188	Medium adherence n = 480	Low adherence n = 1316	P-value	High adherence n = 190	Medium adherence n = 488	Low adherence n = 2085	P-value
Age (years) mean ± SD	47·28 ± 13·13	46·89 ± 12·27	43·75 ± 12·09	< 0·001	48·01 ± 12·97	47·51 ± 13·76	45·57 ± 12·98	0·001
Sex								
Male	98 (10·7)	239 (26·0)	583 (63·4)	0·030	105 (7·5)	267 (19·0)	1034 (73·5)	0·057
Female	90 (8·5)	241 (22·7)	733 (68·9)		85 (6·3)	221 (16·3)	1051 (77·5)	
Marital status								
Married	80 (10·0)	194 (24·3)	523 (65·6)	0·757	67 (6·4)	205 (19·5)	780 (74·1)	0·121
Unmarried	108 (9·1)	286 (24·1)	793 (66·8)		123 (7·2)	283 (16·5)	1305 (76·3)	
Annual income								
≥ 6 million yen[a]	71 (10·6)	170 (25·4)	428 (64·0)	0·469	70 (7·4)	154 (16·2)	724 (76·4)	0·282
< 6 million yen	96 (9·3)	250 (24·1)	692 (66·7)		98 (6·7)	273 (18·7)	1091 (74·6)	
Employment								
Employed	113 (8·8)	314 (24·4)	860 (66·8)	0·306	122 (7·0)	299 (17·1)	1331 (76·0)	0·624
Unemployed	65 (11·0)	137 (23·1)	391 (65·9)		59 (6·7)	163 (18·6)	655 (74·7)	
Education								
University graduate	80 (8·4)	237 (24·8)	637 (66·8)	0·264	84 (6·1)	245 (17·8)	1046 (76·1)	0·283
Not university graduate	107 (10·5)	241 (23·6)	672 (65·9)		105 (7·6)	242 (17·6)	1027 (74·8)	
Smoking								
Smoker	39 (9·9)	90 (22·8)	265 (67·3)	0·760	32 (5·9)	90 (16·6)	421 (77·5)	0·380
Nonsmoker	149 (9·4)	389 (24·6)	1044 (66·0)		158 (7·2)	398 (18·0)	1653 (74·8)	
Alcohol use								
More than once per month	104 (8·6)	277 (23·0)	825 (68·4)	0·033	112 (6·5)	298 (17·2)	1325 (76·4)	0·244
Less than once per month	84 (10·9)	202 (26·2)	484 (62·9)		78 (7·7)	190 (18·7)	749 (73·7)	
Diseases								
Atopic dermatitis	74 (8·1)	181 (19·7)	664 (72·3)	< 0·001	76 (5·9)	223 (17·3)	993 (76·9)	0·080
Urticaria	62 (9·2)	171 (25·4)	440 (65·4)		33 (6·3)	97 (18·4)	398 (75·4)	
Psoriasis	14 (12·5)	36 (32·1)	62 (55·4)		12 (5·6)	39 (18·1)	165 (76·4)	
Tinea	38 (13·6)	92 (32·9)	150 (53·6)		69 (9·5)	129 (17·7)	529 (72·8)	
Frequency of hospital visits								
At least once per half year	181 (9·9)	431 (23·7)	1210 (66·4)	0·022	178 (7·2)	445 (18·0)	1846 (74·8)	0·031
Less than once per half year or unknown	7 (4·3)	49 (30·3)	106 (65·4)		12 (4·1)	43 (14·6)	239 (81·3)	
Main healthcare institution								
University hospital	13 (13·7)	27 (28·4)	55 (57·9)	0·383	8 (6·6)	17 (13·9)	97 (79·5)	0·336
Municipal hospital	34 (10·0)	81 (23·9)	224 (66·1)		36 (7·3)	101 (20·4)	358 (72·3)	
Private clinic or other	138 (9·0)	369 (24·0)	1031 (67·0)		145 (6·8)	365 (17·1)	1620 (76·1)	
Experience of drug effectiveness								
Yes	168 (10·3)	416 (25·5)	1050 (64·3)	< 0·001	175 (7·4)	423 (17·9)	1767 (74·7)	0·016
No	20 (5·7)	64 (18·3)	266 (76·0)		15 (3·8)	65 (16·3)	318 (79·9)	
Experience of adverse events								
Yes	28 (8·0)	87 (24·9)	234 (67·1)	0·585	24 (6·3)	65 (17·0)	293 (76·7)	0·810
No	160 (9·8)	393 (24·0)	1082 (66·2)		166 (7·0)	423 (17·8)	1792 (75·3)	
Overall satisfaction with treatment								
Satisfied	115 (9·9)	310 (26·6)	740 (63·5)	0·005	126 (7·9)	291 (18·2)	1180 (73·9)	0·023
Unsatisfied	73 (8·9)	170 (20·8)	576 (70·3)		64 (5·5)	197 (16·9)	905 (77·6)	

Values are n (% of row total) unless stated otherwise. [a]6 million yen is about £34 000 (at the time of writing).

to elucidate the disease-specific sociomedical factors that are associated with it.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Table S1. Adherence studies using the Morisky Medication Adherence Scale-8.

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