# CONCISE COMMUNICATION

# Transient improvement of urticaria induces poor adherence as assessed by Morisky Medication Adherence Scale-8

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# ABSTRACT

Poor adherence to medication is a major public health challenge. Here, we aimed to determine the adherence to oral and topical medications and to analyze underlying associated factors using the translated Japanese version of Morisky Medication Adherence Scale-8 regarding urticaria treatment. Web-based questionnaires were performed for 3096 registered dermatological patients, along with a subanalysis of 751 registered urticaria patients in this study. The adherence to oral medication was significantly associated with the frequency of hospital visits. Variables that affected the adherence to topical medication included age and experience of drug effectiveness. The rate of responses that "It felt like the symptoms had improved" varied significantly among the dermatological diseases treated with oral medications. Dermatologists should be aware that adherence to the treatment of urticaria is quite low. Regular visits and active education for patients with urticaria are mandatory in order to achieve a good therapeutic outcome by increasing the adherence.

Key words: adherence, oral, topical, transient improvement, urticaria.

# INTRODUCTION

Urticaria is one of the most common skin diseases and is characterized by the appearance of itchy wheals and flares that usually disappear within hours.<sup>1</sup> "Spontaneous urticaria" is the most common type, in which wheals develop spontaneously over the course of a day. It consists of acute (spontaneous) urticaria and chronic (spontaneous) urticaria, in which wheals occur for less than 6 weeks or 6 weeks or more, respectively.<sup>2</sup> In Japan, the term "chronic urticaria" is used to represent, on some occasions, urticaria that continues for more than 1 month regardless of the presence of triggers.<sup>1</sup> The medication adherence of patients with acute urticaria does not seem to affect the outcome, because it is usually self-limiting. However, in chronic urticaria, poor adherence often results in the failure of treatment and the relapse of symptoms. Recently, an eight-item self-reporting scale was developed by Morisky *et al.*,<sup>3</sup> called the Morisky Medication Adherence Scale-8 (MMAS-8). Although this scale originally targeted oral medication for hypertensive patients, we recently assessed the medication adherence for oral and topical remedies using a translated Japanese version of MMAS-8.<sup>4,5</sup> We also performed a subanalysis of 751 registered patients with urticaria in this study.

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#### **METHODS**

This study was conducted among patients registered in a monitoring system established by Macromill (Tokyo, Japan) which has been described elsewhere.<sup>4,5</sup> Our Web-based questionnaire included questions on the following items: age, sex, marital status, annual income, employment status, educational status, smoking habit, alcohol consumption, frequency of hospital visits, disease duration, main health-care 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 and overall satisfaction with treatment, as well as MMAS-8 for oral medication and MMAS-8 for topical medication.

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  $\chi^2$ -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 alpha. An acceptable Cronbach's alpha value is considered to be 0.7 or more.<sup>6</sup> Known group validity was assessed through the association of items and MMAS categories using correlation coefficient and covariance. All analyses were performed using STATA version 9 (StataCorp, College Station, TX, USA). The significance level was set at P < 0.05.

#### RESULTS

Demographic data of the 751 patients with urticaria are summarized in Table 1. The mean age of these subjects was 45.4 years (range, 17–80) and 33.6% of them were male. Among these 751 patients, a total of 673 took oral medication and 528 were treated with topical medication. Mean adherence scores by MMAS-8 were 4.9 for oral and 4.2 for topical medication. The reliability scores (i.e. Cronbach's alpha) were 0.683 for oral MMAS-8 and 0.726 for topical MMAS-8, which demonstrated moderate to high reliability of the Japanese version of MMAS-8.

As shown in Table 2, the adherence to oral medication was significantly associated with the frequency of hospital visits. Variables that affected the adherence to topical medication were age, disease duration and experience of drug effective-ness.

Among the 673 urticaria patients with oral drugs, 75 (11.1%) admitted that they ignored doctors' instructions, whereas 124 of the 528 (23.5%) urticaria patients with topical remedies did so. Although 29.0% (36/124) of patients stopped applying topical remedies because they thought their lesion had been cured, significantly more patients (48.0%; 36/75) stopped oral drugs due to the same reason, suggesting that the adherence to oral drugs could be affected more by patients' own decisions regarding continued medication use (Table 3). Factors that influence adherence to oral and topical medication were investigated. Patients' reasons for not adhering to their

Adherence of urticaria

Table 1.	Basic	characteristics	of	urticaria	patients	(n	=	751	)
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Characteristics	n	%
Age, mean (SD, range), years Sex	45.4 (11.7,	17–80)
Male	252	33.6
Female	499	66.4
Marital status		
Married	270	36.0
Unmarried	481	64.0
Annual income		
≥¥6 million	266	40.6
<¥6 million	389	59.4
Employment		
Employed	453	62.8
Unemployed	268	37.2
Education		
University graduate	306	41.1
Not university graduate	439	58.9
Smoking		
Smoker	147	19.7
Non-smoker	600	80.3
Alcohol		
≥Once a month	430	57.6
<once a="" month<="" td=""><td>317</td><td>42.4</td></once>	317	42.4
Frequency of MD visits		
≥Once a half-year	637	84.8
<once a="" half-year="" or="" td="" unknown<=""><td>114</td><td>15.2</td></once>	114	15.2
Disease duration		
<half a="" td="" year<=""><td>179</td><td>23.8</td></half>	179	23.8
≥Half a year to 1 year	169	22.5
>1–3 years	168	22.4
>3–5 years	71	9.5
>5–10 years	79	10.5
>10–20 years	45	6.0
>20 years	40	5.3
Main health-care institution		
University hospital	25	3.4
Municipal hospital	135	18.1
Private clinic or other	586	78.6
Oral medication		
Experience of drug effectiveness		~~~~
Yes	611	90.8
NO	62	9.2
Experience of adverse events	101	10.1
Yes	124	18.4
NO Taniaal madiaatian	549	81.6
Experience of drug effectiveness	440	00.0
Yes	443	83.9
INO Experience of adverse events	85	16.1
Experience of adverse events	<b>F1</b>	0.7
Yes	51	9.7
INU Overall estisfaction with treatment	477	90.3
	440	50 G
	440	0.00
<salisiled< td=""><td>311</td><td>41.4</td></salisiled<>	311	41.4
Adherence, mean (SD, range)	40/10	0.05.0)
	4.9 (1.9,	0.∠⊃–ŏ) 0. ₽)
Cropbach's alpha of adherence massive	4.2 (2.1,	0-0)
Oral medication	0 683	
Tonical medication	0.000	
ropical modication	0.720	

SD, standard deviation.

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High adherence         High adherence         Low ad n = 62 (9.2%) $n = 171 (25.4%)$ $n = 447$ Age, mean (SD), years $4.7 (10.3)$ $46.0 (11.2)$ $45.0 (11.2)$ $45.0 (11.2)$ Age, mean (SD), years $4.7 (10.3)$ $57 (25.5)$ $1144 (66)$ $66 (66)$ $1144 (66)$ Adata $23 (10.3)$ $57 (25.5)$ $1144 (66)$ $296 (66)$ $1144 (66)$ Married $38 (7.4)$ $60 (24.4)$ $20 (66)$ $1144 (66)$ $274 (66)$ Annual income $26 (11.0)$ $30 (8.5)$ $111 (25.9)$ $274 (66)$ $128 (66)$ Annual income $26 (11.0)$ $30 (8.5)$ $111 (25.9)$ $274 (66)$ $128 (66)$ Annual income $26 (11.0)$ $30 (8.5)$ $112 (25.3)$ $232 (6)$ $224 (66)$ Annual income $23 (10.0)$ $27 (24.9)$ $224 (68)$ $128 (58)$ $224 (68)$ $128 (68)$ Mont university graduate $23 (10.0)$ $23 (10.0)$ $23 (10.0)$ $23 (10.0)$ $23 (10.0)$ $23 (10.0)$ $23 (10.0)$ $23 (10.0)$ $23 (26.0)$	Low adherence				
Age, mean (SD), years $47.7$ (10.3) $46.0$ (11.2) $45.0$ (12)           Sax         Sax $38.7$ ) $114$ (25.4) $296$ (36)           Marital status $38.7$ ) $114$ (25.4) $296$ (36)           Marrial status $18$ (7.4) $60$ (24.6) $166$ (36)           Marrial status $18$ (7.4) $60$ (24.6) $166$ (36)           Marrial status $18$ (7.4) $60$ (24.6) $166$ (36)           Annual income $26$ (11.0) $60$ (25.4) $150$ (35)           Annual income $26$ (11.0) $60$ (25.5) $143$ (36)           Annual income $26$ (11.0) $60$ (25.5) $143$ (36)           Annual income $27$ (11.5) $60$ (25.5) $143$ (36)           Employment $23$ (8.0) $107$ (26.1) $274$ (36)           Unwensity graduate $39$ (10.0) $77$ (26.6) $128$ (6)           Non smoker $27$ (11.5) $60$ (25.5) $274$ (8)           Smoking $38$ (6) $72$ (25.8) $254$ (8)           Smoker $52$ (9.6) $33$ (25.8) $356$ (8) <t< th=""><th><math>n = 440 \ (65.4\%)</math></th><th>High adhe <math>P</math> <math>n = 33</math> (6.</th><th>rence Medium adherence 3%) <math>n = 97 (18.4\%)</math></th><th>Low adherence <math>n = 398 (75.4\%)</math></th><th>٩</th></t<>	$n = 440 \ (65.4\%)$	High adhe $P$ $n = 33$ (6.	rence Medium adherence 3%) $n = 97 (18.4\%)$	Low adherence $n = 398 (75.4\%)$	٩
Mate         23 (10.3)         57 (25.5)         144 (6)           Married         39 (8.7)         114 (25.4)         296 (6)           Married         111 (25.9)         224 (6)         166 (6)           Married         44 (10.3)         111 (25.9)         224 (6)           Annual income         26 (11.0)         60 (25.4)         126 (6)           Annual income         26 (11.0)         60 (25.4)         126 (6)           Annual income         26 (11.0)         60 (25.5)         148 (6)           Annual income         26 (11.0)         60 (25.5)         148 (6)           Annual income         26 (11.0)         91 (25.8)         223 (6)           Annual income         26 (11.1)         91 (25.5)         148 (5)           Annual income         28 (10.0)         97 (24.9)         274 (6)           Annual income         22 (7.9)         74 (26.6)         128 (6)           Not university graduate         39 (10.0)         97 (24.9)         234 (6)           Smoking         Nor smoker         52 (9.6)         33 (25.8)         352 (6)           Smoking         Nor smoker         52 (9.6)         33 (25.8)         352 (6)           Smoking         Nor smoker         52 (9.6) </td <td>45.0 (12.1)</td> <td>0.194 48.6 (11.2</td> <td>47.8 (12.4)</td> <td>44.9 (12.3)</td> <td>0.041</td>	45.0 (12.1)	0.194 48.6 (11.2	47.8 (12.4)	44.9 (12.3)	0.041
Female         39 (8.7)         114 (25.4)         296 (8)           Marrial status         111 (25.9)         274 (6)           Marrial status         18 (7.4)         60 (24.6)         166 (8)           Marrial status         18 (7.4)         60 (24.6)         166 (8) $\geq 6$ million $\geq 6$ (11.0)         60 (25.4)         150 (6) $\geq 6$ million $\geq 6$ (11.1)         60 (25.5)         224 (6) $\geq mployed$ $\geq 7$ (11.5)         60 (25.5)         148 (5)           Employed $\geq 7$ (11.5)         60 (25.5)         148 (5)           Unemployed $\geq 7$ (11.5)         60 (25.5)         148 (5)           Not university graduate $\geq 7$ (10.0)         97 (24.9) $\geq 27$ (6)           Smoker $\geq 3$ (10.0)         97 (24.9) $\geq 25$ (6)           Smoker $\geq 2$ (7.9)         74 (26.5) $\geq 25$ (6)           Not university graduate $\geq 3$ (10.0) $\geq 7$ (23.8) $\geq 56$ (6)           Smoker $\geq 20$ (6) $\geq 32$ (6) $\geq 25$ (6) $\geq 25$ (6)           Smoker $\geq 20$ (6) $\geq 22$ (7.9) $\geq 24$ (6) $\geq 25$ (6) $\geq 25$ (6)	144 (64.3)	0.792 8 (4.6)	35 (20.1)	131 (75.3)	0.458
Marrial status         18 (7.4)         60 (24.6)         166 (8)           Warried         44 (10.3)         111 (25.9)         274 (6)         166 (8)           Annual income         26 (11.0)         60 (25.4)         150 (6)         223 (6)           Annual income         26 (11.0)         60 (25.5)         148 (5)         223 (6)         223 (6)           Annuel income         27 (11.5)         60 (25.5)         148 (5)         223 (6)         223 (6)         223 (6)         223 (6)         224 (6)         2	296 (65.9)	25 (7.1)	62 (17.5)	267 (75.4)	
Warred         10 (7.4)         00 (24.0)         100 (00           ∠%6 million         26 (11.0)         60 (25.4)         150 (8           ∠%6 million         28 (11.0)         60 (25.4)         150 (8           ∠%6 million         28 (11.0)         60 (25.5)         148 (8           Employed         27 (11.5)         60 (25.5)         148 (8           Wo unversity graduate         27 (11.5)         60 (25.5)         148 (8           Unemployed         27 (11.5)         60 (25.5)         148 (8           Unemployed         27 (11.5)         60 (25.5)         148 (8           Unemployed         27 (11.5)         60 (25.5)         148 (8           Not university graduate         33 (10.0)         97 (24.9)         254 (8           Smoker         22 (7.9)         138 (25.5)         332 (6           Non-smoker         23 (10.0)         33 (25.6)         332 (6           Smoking         10 (7.8)         33 (25.6)         35 (6           Monichal         28 (6) (10.3)         138 (25.5)         34 (55)           Smoker         20 ce a month         23 (10.1)         23 (6           Smoker         20 ce a month         23 (6)         33 (25.6)           Alcohol					
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Employment       33 (8.0)       107 (26.1)       270 (8)         University graduate       27 (11.5)       60 (25.5)       148 (5)         University graduate       33 (10.0)       97 (24.9)       254 (8)         University graduate       39 (10.0)       97 (24.9)       254 (8)         Smoker       38 (10.0)       97 (24.9)       254 (8)         Smoker       39 (10.0)       97 (24.9)       254 (8)         Smoker       39 (10.0)       97 (24.9)       254 (8)         Smoker       52 (9.6)       138 (25.5)       352 (8)         Non-smoker       52 (9.6)       138 (25.5)       352 (8)         Acohol       200ce a month       29 (10.1)       84 (29.2)       175 (8)         Sonce a month       29 (10.1)       84 (29.2)       175 (8)         Sonce a month       2 (2.2)       35 (38.6)       352 (8)         Sonce a month       2 (10.3)       136 (2.6)       175 (8)         Frequency of hospital visits       60 (10.3)       136 (2.2.8)       36 (8)         Sonce a month       2 (2.2)       35 (38.6)       175 (8)         Frequency of hospital visits       60 (10.3)       136 (2.6.9)       175 (8)         Sonce a month       2 (2.2)	EUE (00.1)				
Unemployed $27$ (11.5) $60$ (25.5)       148 (5)         University graduate $27$ (11.5) $60$ (25.5)       148 (5)         Not university graduate $39$ (10.0) $97$ (24.9) $254$ (6)         Smoker $39$ (10.0) $97$ (24.9) $254$ (6)         Smoker $33$ (10.0) $97$ (24.9) $254$ (6)         Smoker $52$ (9.6) $138$ (25.5) $352$ (6)         Non-smoker $52$ (9.6) $138$ (25.5) $352$ (6)         Alcohol $33$ (8.6) $87$ (22.8) $85$ (6)         Sonce a month $29$ (10.1) $84$ (29.2) $175$ (6)         Frequency of hospital visits $60$ (10.3) $136$ (23.4) $386$ (6)         Conce a half-year $16$ (10.3) $136$ (23.4) $386$ (6)         Conce a half-year $16$ (10.3) $136$ (22.8) $262$ (8)         Alaf a year $15$ (9.4) $36$ (22.6) $149$ (6)         Stasse duration $16$ (10.3) $27$ (23.1) $90$ (8)         Alaf a year $15$ (9.4) $36$ (2.6) $149$ (6)         Stass $313.0$ $313.0$ $326$ (2) $326$ (3)     <	070 (6E 0)	0 2/0 15 /1 0/	60 (10 3)	036 (7E 0)	00100
Outeripologed         Zr (11.3)         OU (23.3)         H2 (8)           University graduate         39 (10.0)         97 (24.9)         254 (8)           Not university graduate         39 (10.0)         97 (24.9)         254 (8)           Smoking         Smoker         39 (10.0)         97 (24.9)         254 (8)           Smoking         Smoker         33 (5.6)         33 (5.5)         352 (6)           Smoker         52 (9.6)         138 (25.5)         352 (6)           Smoker         52 (9.6)         138 (25.5)         352 (6)           Alcohol         20 (10.1)         87 (22.8)         85 (6)           >Once a month         29 (10.1)         84 (29.2)         175 (6)           Frequency of hospital visits         60 (10.3)         17 (20.1)         93 (6)           >Once a half-year         20 (10.1)         87 (22.8)         264 (5)           >Conce a month         29 (10.1)         84 (29.2)         175 (6)           Actions         20         35 (8)         355 (8)         36 (6)           >Once a half-year         16 (10.3)         47 (30.1)         93 (6)           >Ansars         21-3 years         210 (5)         34 (6)           >1-3 years         23 (10.5)			00 (19.0)	(P.O. ) (P.O. )	0.100
Diversity graduate $22 (7.9)$ $74 (26.6)$ $182 (6.6)$ Not university graduate $39 (10.0)$ $97 (24.9)$ $254 (6.6)$ Smoking $30 (10.0)$ $97 (24.9)$ $254 (6.6)$ Smoker $52 (9.6)$ $138 (25.5)$ $355 (6.6)$ Smoker $52 (9.6)$ $138 (25.5)$ $355 (6.6)$ Non-smoker $52 (9.6)$ $138 (22.8)$ $85 (6.6)$ Alcohol $33 (8.6)$ $87 (22.8)$ $356 (6.6)$ $\sim Once a month       29 (10.1) 84 (29.2) 175 (6.6) \sim Once a month       29 (10.1) 84 (29.2) 175 (6.6) \sim Once a month       29 (10.1) 84 (29.2) 356 (6.6) \sim Once a month       2 (2.2) 33 (8.6) 87 (22.8) 54 (5.6) \sim Once a month       2 (2.2) 35 (8.6) 47 (30.1) 93 (5.6) \sim Once a month       2 (2.2) 35 (8.6) 47 (30.1) 93 (5.6) \sim Once a month       2 (2.2) 35 (8.6) 47 (30.1) 93 (5.6) \sim Half a year to 1 year       16 (10.3) 47 (30.1) 93 (5.6) $	(0.00) 041	12.61	00 (10.4)	141 (10.4)	
Ontuniversity graduate       22 (7.3)       74 (20.0)       97 (24.9)       254 (6)         Smoking       10 (7.8)       33 (25.5)       85 (6)       352 (6)         Smoking       10 (7.8)       33 (25.5)       352 (6)       352 (6)         Smoking       10 (7.8)       33 (2.6)       37 (2.2.8)       85 (6)         Smoking       20nce a month       29 (10.1)       84 (29.2)       175 (6)         Frequency of hospital visits       20 (10.3)       138 (25.5)       386 (6)         Zonce a month       29 (10.1)       84 (29.2)       175 (6)         Frequency of hospital visits       60 (10.3)       136 (23.4)       386 (6)         Zonce a half-year       0 (10.3)       136 (23.4)       386 (6)         Zonce a half-year or unknown       2 (2.2)       35 (38.5)       54 (5)         Zonce a half-year or unknown       2 (2.2)       35 (38.5)       54 (5)         Zonce a half-year       16 (10.3)       136 (22.6)       140 (6)         Zonce a half-year       16 (10.3)       2 (22.2)       35 (38.5)       54 (5)         Zonce a month       2 (2.2)       3 (2.2.2)       3 (2.6.6)       140 (6)         Zonce a half-year       16 (10.3)       2 (2.2.2)       3 (2.6.6)	100 /06 6/	0 64 6 40 / 6 6/	(100) 11		0010
Not university graduate         33 (0.0)         57 (24.2)         234 (0.0)         57 (24.2)         254 (0.0)         55 (6.0)         56 (6.0) <th56 (6.0)<="" th="">         56 (6.0)         56</th56>	(C.CO) 201	(0.C) ZI 010.0	44 (ZU.4)	100 (/ 4. I)	0.030
Smorey Smorey Smores       10 (7.8)       33 (25.5)       85 (6)         Smores       52 (9.6)       138 (25.5)       352 (6)         Alcohol       33 (8.6)       87 (22.8)       352 (6)         Sonce a month       29 (10.1)       84 (29.2)       175 (6)         Frequency of hospital visits       20 (10.3)       136 (23.4)       386 (6)         Sonce a half-year       60 (10.3)       136 (23.4)       386 (6)         Sonce a half-year       60 (10.3)       136 (23.4)       386 (6)         Sonce a half-year       60 (10.3)       136 (23.4)       386 (6)         Sonce a half-year or unknown       2 (2.2)       35 (38.5)       54 (5)         Sonce a half-year or unknown       2 (2.2)       35 (38.5)       54 (5)         Sonce a half-year or unknown       2 (2.2)       35 (38.5)       54 (5)         Sonce a half-year or unknown       2 (2.2)       35 (38.5)       54 (5)         Sonce a half-year       16 (10.3)       136 (22.6)       149 (6)         Sonce a half-year       16 (10.5)       48 (21.8)       149 (6)         Sonce a half-year       16 (9.4)       36 (2.6)       108 (6)         Sonce a half-year       16 (9.4)       36 (2.6)       140 (2)	(1.00) <del>1</del> 02	(0·0) I Z	10.31		
Smoker $10 (7.8)$ $33 (25.5)$ $32 (25.5)$ $352 (68)$ Alcohol $200$ ce a month $52 (9.6)$ $138 (25.5)$ $352 (68)$ $\geq 0$ conce a month $23 (10.1)$ $84 (29.2)$ $175 (61)$ $\geq 0$ conce a month $23 (10.1)$ $84 (29.2)$ $175 (61)$ $\geq 0$ conce a month $23 (10.1)$ $84 (29.2)$ $175 (61)$ $\geq 0$ conce a half-year or unknown $2 (2.2)$ $35 (38.5)$ $386 (66)$ $\geq 0$ conce a half-year or unknown $2 (2.2)$ $35 (38.5)$ $54 (55)$ $\geq 0$ conce a half-year or unknown $2 (2.2)$ $35 (38.5)$ $54 (55)$ $\geq 0$ conce a half-year or unknown $2 (2.2)$ $35 (38.5)$ $54 (55)$ $\geq 0$ conce a half-year or unknown $2 (2.2)$ $35 (38.5)$ $54 (56)$ $\geq 1-3$ years $16 (10.3)$ $47 (30.1)$ $93 (56)$ $\geq 3 3$ years $15 (32.4)$ $38 (25.6)$ $32 (25.6)$ $\geq 3 3 years$ $2 (10.5)$ $4 (21.8)$ $14 (26)$ $\geq 3 3 years$ $2 (10.5)$ $3 (10.5)$ $3 (13.0)$ $> 3 years$ $2 (10.5)$ $4 (21.3)$		· · · · · · · · · · · · · · · · · · ·			100 0
Non-smoker         52 (9.6)         138 (25.5)         352 (8.6)           Alcohol $200$ ce a month $23 (10.1)$ $87 (22.8)$ $262 (8.6)$ $< Once a month$ $23 (10.1)$ $84 (29.2)$ $175 (6.6)$ $< Once a month$ $23 (10.1)$ $84 (29.2)$ $175 (6.6)$ $< Once a month$ $23 (10.3)$ $136 (23.4)$ $386 (6.6)$ $\geq Once a half-year or unknown         2 (2.2) 35 (38.5) 54 (5.6) \geq Once a half-year or unknown         2 (2.2) 35 (38.5) 54 (5.6) > Once a half-year or unknown         2 (2.2) 35 (38.5) 54 (5.6) > Half a year         16 (10.3) 47 (30.1) 93 (56 (5.6)) > 1-3 years         15 (9.4) 36 (22.6) 100 (6.6) > 1-3 years         23 (10.5) 48 (21.3) 10 (8.6) > 3 years 23 (10.5) 36 (6.6) 129 (6.6) > 3 years 13 (10.5) 48 (21.3) 149 (5.6) > 3 years 13 (10.5) 48 (21.3) 143 (6.6) Municipal hospital         $	(5.00) 020	0.822 0 (5.4)	(19.6)	84 (/ 5.U)	0.861
Alconol       33 (8.6)       87 (22.8)       262 (65)         <0nce a month	352 (64.9)	27 (6.6)	75 (18.2)	310 (75.2)	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
<ul> <li></li> <li>&lt;-Once a month <li>29 (10.1) 84 (29.2) 175 (6) Frequency of hospital visits ≥Once a half-year &lt;0 (10.3) &lt;0 (10.3) &lt;0 (10.3) </li> <li>&lt;0 (10.3) </li> <li>&lt;0 (10.3) </li> <li>&lt;0 (10.3) </li> <li></li></li></ul>	262 (68.6)	0.104 18 (5.9)	49 (16.1)	238 (78.0)	0.190
Frequency of hospital visits       50 (10.3)       136 (23.4)       386 (60 (50.5)         ≥Once a half-year       60 (10.3)       136 (23.4)       386 (60 (50.5)         ≥Once a half-year or unknown       2 (2.2)       35 (38.5)       54 (55 (50.5)         > Charle a year       16 (10.3)       136 (29.0)       93 (55 (50.5))       93 (55 (50.5))         > Half a year       16 (10.3)       47 (30.1)       93 (55 (50.5))       90 (65 (50.5))       90 (65 (50.5))         > 1-3 years       23 (10.5)       48 (21.8)       149 (51 (50.5))       149 (51 (50.5))       149 (51 (50.5))         > 3 years       23 (10.5)       48 (21.8)       143 (50 (50.5))       143 (50 (50.5))       143 (50 (50.5))       143 (50 (50.5))       143 (50 (50.5))       143 (50 (50.5))       143 (50 (50.5))       143 (50 (50.5))       143 (50 (50.5))       143 (50 (50.5))       143 (50 (50.5))       144 (50.5))       143 (50 (50.5))       144 (77 (50.5))       144 (77 (50.5))       144 (77 (50.5))       144 (77 (77 (50.5)))       144 (77 (77 (75 (50.5)))       144 (77 (75 (50.5)))       144 (77 (77 (75 (50.5)))       144 (77 (77 (75 (50.5)))       144 (77 (77 (75 (75 (75 (75 (75 (75 (75 (75	175 (60.8)	15 (6.8)	48 (21.9)	156 (71.2)	
≥Once a half-year       60 (10.3)       136 (23.4)       386 (66 <once a="" half-year="" or="" td="" unknown<="">       2 (2.2)       35 (38.5)       54 (56         <once a="" half-year="" or="" td="" unknown<="">       2 (2.2)       35 (38.5)       54 (56         &gt;Half a year       16 (10.3)       47 (30.1)       93 (55         ≥Half a year       16 (10.3)       47 (30.1)       93 (55         ≥Half a year       16 (10.3)       47 (30.1)       93 (55         &gt;1-3 years       15 (9.4)       36 (22.6)       108 (55         &gt;1-3 years       23 (10.5)       48 (21.8)       149 (56         &gt;3 years       23 (10.5)       48 (21.8)       149 (56         Nain health-care institution       3 (13.0)       5 (21.7)       15 (66         Municipal hospital       10 (8.6)       27 (23.1)       80 (86         Private clinic or other       48 (9.1)       139 (26.2)       343 (6-         Yes       58 (9.5)       157 (25.7)       396 (6-         Yes       10 (8.1)       32 (25.8)       44 (7-         Yes       10 (8.1)       32 (25.8)       44 (7-</once></once>					
<ul> <li><once (2.2)="" (38.5)="" (56)<="" 2="" 35="" 54="" a="" half-year="" li="" or="" unknown=""> <li>Disease duration</li> <li>Disease duration</li> <li>Half a year</li> <li>⇒Half a year to 1 year</li> <li>&gt;Half a year to 1 year</li> <li>&gt;Half (10.5)</li> <li>&gt;Ha (21.8)</li> <li>H2 (5.8)</li> <li>H2 (7.7)</li> <li>H2 (5.8)</li> <li>H2 (7.7)</li> <li>H2 (7.7)</li> <li>H2 (5.8)</li> <li>H2 (7.7)</li> <li>H2 (7.7</li></once></li></ul>	386 (66.3)	0.001 29 (6.6)	76 (17.2)	336 (76.2)	0.276
Disease duration <hr/> <hr/>	54 (59.3)	4 (4.6)	21 (24.1)	62 (71.3)	
<ul> <li><a (alaff="" 1="" a="" analysis)<="" brackweetener="" by="" li="" the="" to="" year=""> <li><a (alaff="" 1="" a="" analysis)<="" brackweetener="" by="" li="" the="" to="" year=""> <li><a (alaff="" 1="" a="" analysis)<="" brackweetener="" by="" li="" the="" to="" year=""> <li><a (alaff="" 1="" a="" analysis)<="" brackweetener="" by="" li="" the="" to="" year=""> <li><a (alaff="" 1="" a="" analysis)<="" brackweetener="" by="" li="" the="" to="" year=""> <li><a (alaff="" 1="" a="" analysis)<="" brackweetener="" by="" li="" the="" to="" year=""> <li><a (alaff="" 1="" a="" analysis)<="" brackweetener="" by="" the="" to="" year=""></a></li> <li><a (alaff="" 1="" a="" analysis)<="" brackweetener="" by="" li="" the="" to="" year=""> <li><a (alaff="" 1="" a="" analysis)<="" brackweetener="" by="" the="" to="" year=""></a></li> <li><a (alaff="" 1="" a="" analysis)<="" brackweetener="" by="" li="" the="" to="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" li="" the="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" li="" the="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" li="" the="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" li="" the="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" li="" the="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" li="" the="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" li="" the="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" li="" the="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" li="" the="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" li="" the="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" li="" the="" year=""> <li><a (alaff="" a="" analysis)<="" brackweetener="" by="" the="" year=""></a></li> <li< td=""><td></td><td>~</td><td></td><td>-</td><td></td></li<></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></a></li></ul>		~		-	
≥Half a year to 1 year       8 (5.3)       40 (29.0)       90 (65)         >1-3 years       15 (9.4)       36 (22.6)       108 (65)         >3 years       23 (10.5)       48 (21.8)       149 (65)         Main health-care institution       3 (13.0)       5 (21.7)       15 (65)         University hospital       3 (13.0)       5 (21.7)       15 (65)         Municipal hospital       3 (13.0)       5 (21.7)       15 (65)         Private clinic or other       48 (9.1)       139 (26.2)       343 (6.         Yes       58 (9.5)       157 (25.7)       396 (6.         Yes       16 (6.5)       14 (22.6)       44 (7.         Yes       10 (8.1)       32 (25.8)       82 (6.	93 (59 6)	0.311 17 (11 5	0 28 (18 9)	103 (69 6)	0 017
>1-3 years       15 (9.4)       36 (22.6)       108 (6)         >3 years       23 (10.5)       48 (21.8)       149 (6)         >3 years       23 (10.5)       48 (21.8)       149 (6)         Main health-care institution       3 (13.0)       5 (21.7)       15 (6)         University hospital       3 (13.0)       5 (21.7)       15 (6)         Municipal hospital       3 (13.0)       5 (21.7)       15 (6)         Private clinic or other       48 (9.1)       139 (26.2)       343 (6)         Fxperience of drug effectiveness       58 (9.5)       157 (25.7)       396 (6)         No       4 (6.5)       14 (22.6)       44 (7)         Yes       10 (8.1)       32 (25.8)       82 (6)	90 (65.2)	4 (3.1)	28 (21.4)	99 (75.6)	
<ul> <li>&gt;3 years</li> <li>&gt;3 years</li> <li>&gt;3 years</li> <li>Main health-care institution</li> <li>University hospital</li> <li>University hospital</li> <li>University hospital</li> <li>(6.6)</li> <li>(7.17)</li> <li>(7.16)</li> <li>(7.17)</li> <li>(7.16)</li> <li>(7.17)</li> <li>(7.</li></ul>	108 (67.9)	6 (5.4)	24 (21 6)	81 (73.0)	
Main health-care institution         3 (13.0)         5 (21.7)         15 (6)           University hospital         3 (13.0)         5 (21.7)         15 (6)           Wunicipal hospital         10 (8.6)         27 (23.1)         80 (6)           Private clinic or other         48 (9.1)         139 (26.2)         343 (6)           Experience of drug effectiveness         58 (9.5)         157 (25.7)         396 (6)           Ves         58 (9.5)         14 (22.6)         44 (7)           Yes         10 (8.1)         32 (25.8)         82 (6)	149 (67.7)	6 (4.4)	17 (12.3)	115 (83.3)	
University hospital         3 (13.0)         5 (21.7)         15 (63)           University hospital         10 (8.6)         27 (23.1)         80 (63)           Municipal hospital         10 (8.6)         27 (23.1)         80 (63)           Private clinic or other         48 (9.1)         139 (26.2)         343 (65)           Experience of drug effectiveness         58 (9.5)         157 (25.7)         396 (64)           No         4 (6.5)         14 (22.6)         44 (7)           Yes         10 (8.1)         32 (25.8)         82 (64)					
Municipal hospital         10 (8.6)         27 (23.1)         80 (8.7)           Private clinic or other         48 (9.1)         139 (26.2)         343 (6.7)           Experience of drug effectiveness         58 (9.5)         157 (25.7)         396 (6.7)           Ves         58 (9.5)         14 (22.6)         44 (7.7)           No         4 (6.5)         10 (8.1)         32 (25.8)         82 (6.7)	15 (65.2)	0.859 <sup>†</sup> 0 (0.0)	5 (29.4)	12 (70.6)	0.474 <sup>†</sup>
Private clinic or other         48 (9.1)         139 (26.2)         343 (5.2)           Experience of drug effectiveness         58 (9.5)         157 (25.7)         396 (6.5)           Yes         66         14 (22.6)         44 (7.7)           No         4 (6.5)         14 (22.6)         44 (7.7)           Yes         10 (8.1)         32 (25.8)         82 (6.7)	80 (68.4)	6 (6.5)	20 (21.5)	67 (72.0)	
Experience of drug effectiveness       58 (9.5)       157 (25.7)       396 (6.5)         Yes       44 (7-5)       14 (22.6)       44 (7-5)         No       4 (6.5)       11 (22.6)       44 (7-5)         Experience of adverse events       10 (8.1)       32 (25.8)       82 (66-5)	343 (64.7)	27 (6.5)	69 (16.6)	319 (76.9)	
Yes 58 (9.5) 157 (25.7) 396 (6 No 44 (7 Experience of adverse events 10 (8.1) 32 (25.8) 82 (6					
No 44 (7. Experience of adverse events 10 (8.1) 32 (25.8) 82 (6	396 (64.8)	0.575 30 (6.8)	88 (19.9)	325 (73.4)	0.049
Experience of adverse events 10 (8.1) 32 (25.8) 82 (66	44 (71.0)	3 (3.5)	9 (10.6)	73 (85.9)	
Yes 10 (8.1) 32 (25.8) 82 (60					
	82 (66.1)	0.887 2 (3.9)	10 (19.6)	39 (76.5)	$0.864^{\dagger}$
No 52 (9.5) 139 (25.3) 358 (65	358 (65.2)	31 (6.5)	87 (18.2)	359 (75.3)	
Overall satisfaction with treatment					
>Satisfied 37 (9.4) 109 (27 8) 246 (6)	246 (62 8)	0 205 22 (7 0)	GD (19-1)	232 (73 0)	0.558
<ul> <li>Satisfied</li> <li>25 (8.9)</li> <li>62 (22.1)</li> <li>194 (6)</li> <li>194 (6)</li></ul>	194 (69.0)	11 (5.1)	37 (17.3)	166 (77.6)	
	6				

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Oral medication	Atopic dermatitis, n = 177 (61.9%)	Urticaria, <i>n</i> = 75 (26.2%)	Psoriasis, <i>n</i> = 13 (4.5%)	Tinea, <i>n</i> = 21 (7.3%)	Р
It felt like the symptor	ms had improved				
Yes	69 (39.0)	36 (48.0)	4 (30.8)	2 (9.5)	0.009
No	108 (61.0)	39 (52.0)	9 (69.2)	19 (90.5)	
Topical medication	Atopic dermatitis, n = 349 (50.7%)	Urticaria, <i>n</i> = 124 (18.0%)	Psoriasis, <i>n</i> = 73 (10.6%)	Tinea, <i>n</i> = 143 (20.8%)	Р
It felt like the symptor	ns had improved				
Yes	122 (35.0)	36 (29.0)	24 (32.9)	45 (31.5)	0.650
No	227 (65.0)	88 (71.0)	49 (67.1)	98 (68.5)	

 Table 3. Factors that influence poor adherence to oral and topical medication

doctors' instructions were explored. As shown in Table 3, the rate of responses that "It felt like the symptoms had improved" varied significantly among the four skin diseases treated with oral medications. There was no significant difference in the rates of patient adherence to topical treatment plans among the four diseases.

### DISCUSSION

Demographic data showed that at least 76.2% of patients suffered from chronic urticaria (for half a year or longer, Table 1), although the subtypes of urticaria (e.g. spontaneous or inducible) were unknown. Previous reports showed that approximately 70% of patients with urticaria suffered from the spontaneous type.<sup>7,8</sup> Therefore, at least half of the patients with urticaria in this survey could be classified as having chronic spontaneous urticaria. The proportion of female patients (66.4%) was approximately double that of the male ones (33.6%). In addition, the percentage of patients aged in their 30s to 50s, in the prime of life, was 82.3%. These demographic data are compatible with previous investigations on chronic urticaria.<sup>9,10</sup>

In our Web-based guestionnaires, the patients were asked whether or not they had received medical treatment at a medical institution in the past year. The patients who answered that they had received medical treatment for atopic dermatitis, urticaria, psoriasis or tinea were asked the following additional question: "How much time has passed since you were diagnosed with that skin disease?". Thus, patients who answered this question might have included patients with acute urticaria. Because the symptom of acute urticaria resolves in a short time, these patients have fewer adherence-related problems, and may have better adherence to medication. Actually, in topical medication, patients with a disease duration of less than 6 months demonstrated significantly better adherence. However, in oral medication, no significant difference was observed in adherence between patients with different disease durations. This implies that patients with urticaria who require oral medication have poor adherence to medication irrespective of disease duration. In future study, we believe that we need to perform specific selection of patients with chronic spontaneous urticaria, in whom poor adherence is often observed (Table 2).

Adherence refers to patients actively participating in the therapeutic decision-making process and being treated accordingly.<sup>11</sup> Improving adherence via patient-doctor communication is essential for proper treatment. Common causes of poor adherence include a high frequency of medication administration, denial of the existence of an illness, a lack of understanding of the benefits of medication and cost.<sup>12</sup> In Europe, treatment in accordance with guidelines improved adherence, so the early application of guideline-based chronic urticaria management may be a cost-effective way to improve outcomes.<sup>13</sup>

For urticaria, the dose of oral medication (antihistamines) required for remission is dependent on the individual. Interminable treatment may lead to poor adherence. Among the four groups of dermatology patients (atopic dermatitis, urticaria, psoriasis and tinea), those with urticaria showed the poorest adherence, followed by those with atopic dermatitis.<sup>4</sup> Compared with patients with hypertension and diabetes, with whom comparative studies were conducted, patients with urticaria showed poorer adherence.<sup>3,14</sup> The reasons for such poor adherence are believed to be as follows: symptoms with fluctuating severity, the ease with which patients can stop treatment by themselves and low disease severity (not life-threatening). Although advances in Japanese health care have made treatment accessible at any time at low cost, atopic dermatitis and urticaria are diseases that significantly impair the quality of life of patients,<sup>15</sup> so poor adherence should not be ignored.

In conclusion, to improve adherence to urticaria treatment, patients should be aware of the importance of continuing oral medication for a certain period proactively, even if they do not have any symptoms. Concurrently, evidence is needed to show how long patients should continue oral medications depending on the severity and duration of urticaria. Furthermore, the evidence-based treatment guidelines for urticaria should be widely accepted by not only dermatologists, but also primary physicians.

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#### CONFLICT OF INTEREST: None declared.

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