

CONCISE COMMUNICATION

**Impact of disease severity on work productivity and activity impairment in Japanese patients with atopic dermatitis**

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**ABSTRACT**

Atopic dermatitis (AD) is a common inflammatory skin disease that is characterized by chronic and persisting pruritic and eczematous lesions. There has been no study of work productivity and activity in AD patients in relation to disease severity. The purpose of this study was to examine the impact of disease severity on work productivity and activity impairment (WPAI) in adult AD patients using the Japanese version of the questionnaire. Data were collected from 112 AD patients who visited the Jikei University Hospital. Outcomes as measured by the questionnaire included employment status, total work productivity impairment (TWPI) and total activity impairment (TAI). We investigated the correlation between TWPI or TAI scores and severity scoring of AD (SCORAD) for disease severity and dermatology life quality index (DLQI) for quality of life impairment. Both TWPI and TAI scores were significantly correlated with the SCORAD and DLQI scores ( $P < 0.001$ ), indicating disease severity is significantly associated with WPAI in Japanese adult AD patients. Further studies are necessary to evaluate the effects of treatments on WPAI for severe AD patients.

**Key words:** atopic dermatitis, dermatology life quality index, Japanese, severity scoring of atopic dermatitis, work productivity and activity impairment.

**INTRODUCTION**

Atopic dermatitis (AD) is a common allergic inflammatory skin disease that is characterized by chronic and persisting pruritic and eczematous lesions and is among the allergic diseases such as asthma and allergic rhinitis/conjunctivitis.<sup>1</sup> The work productivity and activity impairment-specific health problem (WPAI-SHP) questionnaire has been used to evaluate various diseases and its validity and reliability has been established.<sup>2</sup> The WPAI-AD is a six-item tool used to assess the impact of AD on work productivity and activity impairment. Based on this questionnaire, total work productivity impairment (TWPI), calculated from the combined effects of absenteeism (i.e. percentage of work hours missed) and "presenteeism" (i.e. percentage of impairment while working) and total activity impairment (TAI) other than work due to AD during the previous week can be evaluated. The impact of allergic diseases such as allergic rhinitis on work productivity and activity using WPAI allergy-specific (WPAI-AS) has been assessed.<sup>3,4</sup> In addition, the impact of certain skin diseases such as chronic spontaneous urticaria, chronic hand dermatitis and psoriasis using WPAI has been evaluated in Western countries.<sup>5-7</sup> Murota *et al.*<sup>8,9</sup> also determined the impact of antihistamines on the impaired productivity of patients with pruritic skin diseases including eczema/dermatitis, urticaria, AD, pruritus cutanea, prurigo and

**Table 1.** Patient characteristics

Age, year, mean $\pm$ SD	35.6 $\pm$ 10.8
Male, <i>n</i> (%)	56 (50.0)
Duration, year, mean $\pm$ SD	25.2 $\pm$ 12.1
BMI, mean $\pm$ SD	21.4 $\pm$ 3.5
Family histories, <i>n</i> (%)	
Atopic dermatitis	39 (34.8)
Bronchial asthma	27 (24.1)
Allergic rhinitis/conjunctivitis	37 (33.0)
Past histories, <i>n</i> (%)	
Bronchial asthma	42 (37.5)
Allergic rhinitis/conjunctivitis	70 (62.5)
SCORAD, mean $\pm$ SD	35.5 $\pm$ 21.9
DLQI, mean $\pm$ SD	7.8 $\pm$ 5.1
WPAI, mean $\pm$ SD	
Absenteeism, %	0.5 $\pm$ 2.3
Presenteeism, %	32.6 $\pm$ 23.5
TWPI, %	32.8 $\pm$ 23.7
TAI, %	42.9 $\pm$ 25.2

BMI, body mass index; DLQI, dermatological life quality index; SCORAD, scores and severity scoring of atopic dermatitis; SD, standard deviation; TAI, total activity impairment; TWPI, total work productivity impairment.

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psoriasis using the WPAI-AS in Japan. However, there has been no study of work productivity and activity in adult AD patients using the WPAI-AD in relation to disease severity. Herein, we sought to examine the impact of disease severity on the WPAI in Japanese adult AD patients using the Japanese version of the questionnaire (WPAI-AD-Japan).

**METHODS**

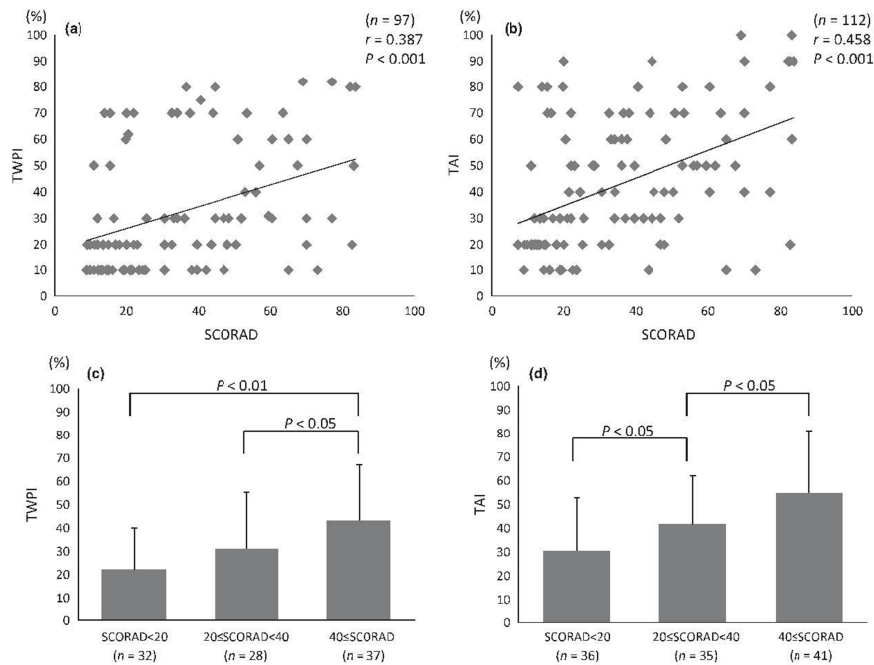
**Patients**

Data were collected from 112 adult AD patients (56 male and 56 female) aged  $35.6 \pm 10.8$  years who visited the Jikei University Hospital in the period between July 2011 and November 2012. All patients gave written informed consent to participate in the study which was approved by the ethics committee at the Jikei University.

**Measures**

The WPAI-AD-Japan was adapted from the WPAI-SHP version 2.0 (available at [http://www.reillyassociates.net/WPAI\\_SHP.html](http://www.reillyassociates.net/WPAI_SHP.html)). The questionnaire first identifies current employment status and asks the following five questions about the past 7 days: (i) the number of hours the patient was absent from work due to AD; (ii) the number of hours absent from work for other reasons; (iii) the number of hours the patient actually worked; (iv) the extent to which AD affected the patient's productivity while at work; and (v) the extent to which AD affected the patient's ability to engage in regular daily activities other than work.<sup>7</sup>

To assess the relationship between WPAI outcomes and severity of AD, two different clinical severity indexes were used: severity scoring of AD (SCORAD) for disease severity, and dermatology life quality index (DLQI) for quality of life



**Figure 1.** Associations between work productivity and activity impairment (WPAI) outcomes (total work productivity impairment [TWPI] and total activity impairment [TAI]) and scores and severity scoring of atopic dermatitis (SCORAD). (a) TWPI and SCORAD. (b) TAI and SCORAD. (c) TWPI and categorical SCORAD. (d) TAI and categorical SCORAD.

(QOL) impairment. The SCORAD is a severity index combining extent, intensity and subjective symptoms and it is scored from 0 to 103, with a larger number indicating greater severity.<sup>10</sup> The DLQI is an instrument that assesses the effect of a skin disease on six different aspects of a patient's QOL. It is scored from 0 to 30, with higher scores indicating a greater impairment on the patient's quality of life.<sup>11</sup> In this study, both continuous SCORAD/DLQI scores and categorical SCORAD (<20, 20–40, and ≥40) as well as DLQI (<5, 5–10, and ≥10) scores were used to assess severity.

**Statistical analyses**

Correlation and linear regression analyses were used to assess the association between the continuous WPAI outcomes (TWPI and TAI) and the severity of AD (SCORAD and DLQI). The associations between WPAI outcomes and categorical SCORAD (<20, 20–40, and ≥40) or DLQI (<5, 5–10, and ≥10) scores

were also assessed using the ANOVA with SNK test.  $P < 0.05$  was considered statistically significant.

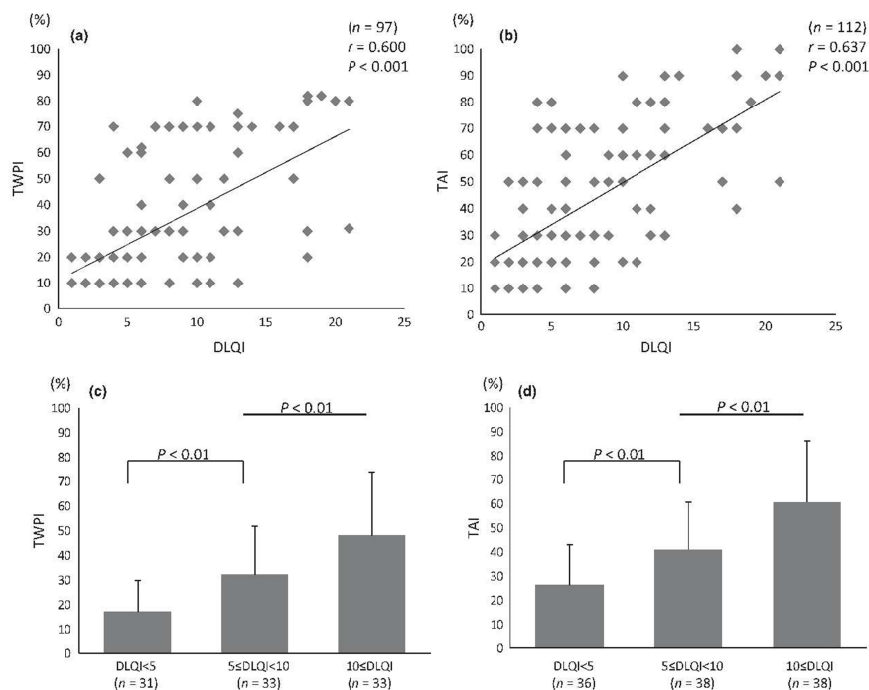
**RESULTS**

**Patient characteristics**

Patient characteristics are shown in Table 1. Patients' mean age was  $35.6 \pm 10.8$  years, duration of AD  $25.2 \pm 12.1$  years, SCORAD  $35.5 \pm 21.9$ , DLQI  $7.8 \pm 5.1$ , absenteeism  $0.5 \pm 2.3\%$ , presenteeism  $32.6 \pm 23.5\%$ , TWPI  $32.8 \pm 23.7\%$  and TAI  $42.9 \pm 25.2\%$ .

**Associations between WPAI and SCORAD**

Associations between WPAI outcomes (TWPI and TAI) and SCORAD score are shown in Figure 1(a,b). Both TWPI and TAI scores were significantly correlated with the SCORAD score. Associations between WPAI outcomes and categorical



**Figure 2.** Associations between work productivity and activity impairment (WPAI) outcomes (total work productivity impairment [TWPI] and total activity impairment [TAI]) and dermatology life quality index (DLQI). (a) TWPI and DLQI. (b) TAI and DLQI. (c) TWPI and categorical DLQI. (d) TAI and categorical DLQI.

SCORAD score are depicted in Figure 1(c,d). TWPI in the SCORAD  $\geq 40$  group was higher than those in SCORAD  $< 20$  and  $20 \leq$  SCORAD  $< 40$ . TAI in the  $20 \leq$  SCORAD  $< 40$  group was higher than that in SCORAD  $< 20$  and TAI in SCORAD  $\geq 40$  was higher than that in  $20 \leq$  SCORAD  $< 40$ .

#### Associations between WPAI and DLQI

Associations between WPAI outcomes and DLQI score are shown in Figure 2(a,b). Both TWPI and TAI scores were significantly correlated with the DLQI score. Associations between WPAI outcomes and categorical DLQI score are depicted in Figure 2(c,d). TWPI in the  $5 \leq$  DLQI  $< 10$  group was higher than that in DLQI  $< 5$ , and TWPI in DLQI  $> 10$  was higher than that in  $5 \leq$  DLQI  $< 10$ . Likewise, TAI in the  $5 \leq$  DLQI  $< 10$  group was higher than that in DLQI  $< 5$ , and TAI in DLQI  $\geq 10$  was higher than that in  $5 \leq$  DLQI  $< 10$ .

#### DISCUSSION

The impact of psoriasis on work productivity and activity has been well assessed in Western countries. Wu *et al.*<sup>7</sup> showed that psoriasis patients had significantly more overall work impairment and more impairment in activity than non-psoriasis patients using the WPAI instrument. Kimball *et al.*<sup>12</sup> evaluated the association between psoriasis severity and WPAI outcomes and showed that all WPAI measures were positively and significantly associated with psoriasis severity. Very recently, we demonstrated that psoriasis severity was also significantly associated with WPAI in Japanese psoriasis patients.<sup>13</sup> However, there has been no study to evaluate the association between WPAI and the severity of other skin diseases including AD. This is the first study to assess the impact of disease severity on WPAI in adult AD patients using WPAI-AD. We demonstrated that both TWPI and TAI were positively and significantly associated with AD severity.

Murota *et al.*<sup>8,9</sup> evaluated the impact of sedative and non-sedative antihistamines on the impaired productivity in patients with pruritic skin diseases using WPAI-AS. Their study included patients with eczema/dermatitis ( $n = 75$ ), urticaria ( $n = 50$ ), AD ( $n = 43$ ), pruritus cutanea ( $n = 14$ ), prurigo ( $n = 8$ ), psoriasis ( $n = 7$ ) and others ( $n = 9$ ). Due to the relatively small sample size of each disease group, statistically significant differences in impairment at baseline between these groups were not detected. However, their results indicate that TWPI and TAI tended to be larger in the AD, eczema/dermatitis and urticaria disease groups.<sup>9</sup> For example, TWPI in AD ( $n = 31$ ) tended to be higher than that in psoriasis ( $n = 3$ ;  $40.4 \pm 23.8\%$  vs  $28.9 \pm 21.7\%$ ), and TAI in AD ( $n = 43$ ) was also higher than that in psoriasis ( $n = 7$ ;  $50.2 \pm 26.9\%$  vs  $44.3 \pm 26.8\%$ ). Interestingly, our previous and present results showed the same tendency, TWPI in AD ( $n = 97$ ) tended to be higher than that in psoriasis ( $n = 134$ ;  $32.8 \pm 23.7\%$  vs  $27.2 \pm 24.6\%$ ), and TAI in AD ( $n = 112$ ) was significantly higher than that in psoriasis ( $n = 213$ ;  $42.9 \pm 25.2\%$  vs  $35.9 \pm 27.8\%$ ,  $P < 0.05$  by an

unpaired Student's *t*-test), although the age and sex were not matched between two groups. The reason WPAI in AD tended to be higher than that in psoriasis is not clear, but we speculate that one reason might have been the more frequent and more severe itching in AD.

In summary, AD negatively impacts a patient's work productivity and activity and the impact tends to be larger than that of psoriasis and is even larger in patients with severe AD. Further studies are necessary to evaluate the effects of treatments including cyclosporin on WPAI for severe AD patients.

#### ACKNOWLEDGMENTS

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