

## ORIGINAL ARTICLE

# Burden of chronic urticaria relative to psoriasis in five European countries

M.M. Balp,<sup>1,\*</sup> S. Khalil,<sup>1</sup> H. Tian,<sup>2</sup> S. Gabriel,<sup>2</sup> J. Vietri,<sup>3</sup> T. Zuberbier<sup>4</sup><sup>1</sup>Novartis Pharma AG, Basel, Switzerland<sup>2</sup>Novartis Pharmaceuticals Corporation, East Hanover, NJ, USA<sup>3</sup>Kantar Health, Horsham, PA, USA<sup>4</sup>Department of Dermatology and Allergy, Charité–Universitätsmedizin Berlin, Berlin, Germany

\*Correspondence: M.-M. Balp. E-mail: maria-magdalena.balp@novartis.com

## Abstract

**Background** Quantification of burden of chronic spontaneous urticaria (CSU) vs. psoriasis (PsO) is limited.**Objective** To evaluate the burden associated with CSU vs. PsO of all severities (overall PsO), mild and moderate/severe PsO.**Methods** This retrospective cross-sectional analysis compared data from adult patients with chronic urticaria (CU), used as a proxy for CSU, and PsO from the National Health and Wellness Survey in France, Germany, Italy, Spain and the United Kingdom. Outcomes included mental and physical component summary scores (MCS and PCS) calculated from the Short Form (SF)-36v2 or SF-12v2, SF-6D health utility scores, self-reported psychological complaints (anxiety, depression and sleep difficulties), work productivity and activity impairment, and self-reported healthcare resource utilization. Bivariate and multivariate analyses for each outcome and comparative groups were conducted.**Results** This analysis included 769 CU and 7857 PsO (26.9% moderate/severe) patients. Following adjustment for covariates, CU patients showed a greater health-related quality of life (HRQoL) impairment vs. overall PsO (MCS: –2.4, PCS: –1.6, SF-6D: –0.03; all  $P < 0.001$ ). CU patients showed a higher risk of anxiety, depression and sleep difficulties [odds ratio (OR): 1.63, 1.34 and 1.56, respectively; all  $P < 0.01$ ] and greater healthcare resource use vs. overall PsO. The overall activity impairment was significantly greater in CU patients than in overall PsO patients ( $P = 0.001$ ), while the impact on work was not significantly different. The results vs. moderate/severe PsO group showed no significant differences on all outcomes.**Conclusion** Burden of illness in CU is higher than PsO of all severities but similar to that observed in moderate/severe PsO. Both diseases have a similar negative impact on work productivity.

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## Conflicts of interest

Torsten Zuberbier has acted as a consultant for Ansell, Bayer Schering, DST, FAES, Fujisawa, HAL, Henkel, Kryolan, Leti, Menarini, Merck, MSD, Novartis, Procter and Gamble, Ranbaxy, Sanofi-Aventis, Schering Plough, Stallergenes, Takeda and UCB. Maria-Magdalena Balp and Sam Khalil are employees of Novartis Pharma AG. Haijun Tian is an employee of Novartis Pharmaceutical Corporation, and Susan Gabriel was an employee of Novartis Pharmaceutical Corporation, at the time of study conduct. At the time of the analysis, Jeffrey Vietri was an employee of Kantar Health, to which Novartis paid fees for analysis and reporting.

## Funding sources

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## Introduction

Dermatological diseases are the fourth leading cause of global non-fatal burden, expressed as years lost due to disability,

and the 18th leading cause of global health burden, expressed as disability-adjusted life years (DALYs).<sup>1</sup> Although non-fatal, dermatological diseases have an impact on the health-related quality of life (HRQoL) and daily activities of patients, with a substantial and prolonged impact on the indirect costs to the society.<sup>1,2</sup> However, healthcare regulatory authorities and

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payers focus their resources on diseases with high mortality rates.<sup>1</sup>

Chronic spontaneous urticaria (CSU) is defined as the spontaneous appearance of hives, angio-oedema or both for >6 weeks.<sup>3</sup> The prevalence of CSU is reported to be between 0.1% and 0.8% in European countries, and it represents over two-third cases of chronic urticaria (CU).<sup>3,4</sup> CU primarily affects the working population as the peak age of CU onset is between 20 and 40 years.<sup>4</sup> Patients with CU experience an underestimated emotional and psychological burden which influences sleep and daily activities and restricts work ability and social life.<sup>4–9</sup> HRQoL impairment in CU increases with disease severity,<sup>6,10</sup> prevalence of comorbid psychological conditions<sup>11–13</sup> and several autoimmune conditions.<sup>14,15</sup> Dimensions of HRQoL impairment caused by CU, such as lack of energy, social isolation and emotional disturbances, are comparable with those caused by severe ischaemic heart disease.<sup>16</sup> Compared with atopic dermatitis and psoriasis (PsO) patients, CU patients reported a higher impact on their daily activities and physical discomfort.<sup>17</sup> Broadly, the burden of CU translates into costs to healthcare payers and the society. Medication, outpatient costs and loss of productivity due to the absence from work are major cost drivers and increase with disease severity.<sup>8,18</sup> Work and activity impairment in CU patients is twice as high as reported in non-CU patients.<sup>6,10</sup> Although the burden of CU has been described in previous research, it may fall short of providing sufficient evidence for regulators and payers.

Comparing the burden of CU with a recognized burden of other dermatological conditions will contribute to a better understanding and to an increased awareness of the true impact of CU on patients, healthcare systems and the society. One such condition is PsO, which is considered one of the serious global diseases by the World Health Organisation (WHO).<sup>19</sup> PsO is a chronic, non-communicable, painful, disfiguring and disabling dermatological disease with a negative impact on the quality of life of patients.<sup>19</sup> The prevalence of PsO ranges between 1.5% and 5% in most developed countries.<sup>19</sup> Among PsO patients, 71% of the PsO patients have mild PsO and 27% of PsO patients have moderate–severe PsO, remaining 2% could not be categorized.<sup>20</sup> Reduction in the HRQoL due to PsO is comparable with other chronic diseases such as depression, myocardial infarction, hypertension and even some cancers.<sup>21</sup> Reported annual total cost per PsO patient was €8372 in Italy and €2866–6707 in Germany.<sup>22</sup> PsO contributes to 0.04% of the total global DALY, which is twice the global average DALYs for acute hepatitis C.<sup>19</sup> In Germany, mean working days lost per year due to a PsO patient were 4.9.<sup>23</sup> The socioeconomic burden of PsO increases with the severity of the disease.<sup>24</sup> The rate of hospitalization of patients with severe PsO is twice that of patients with mild PsO.<sup>25</sup> Patients with severe PsO miss a greater number of days from work or school than those with mild PsO.<sup>26</sup> As the burden of PsO is well established and the degree of disability in PsO is

perceived as higher than that in CU,<sup>17</sup> the aim of this study was to analyse the burden of illness associated with CU relative to PsO patients.

## Methods

### Study design and data source

This was a retrospective, cross-sectional analysis of self-reported data obtained from National Health and Wellness Survey (NHWS) conducted in 2010, 2011 and 2013 in France, Germany, Italy, Spain and the United Kingdom. The survey was not conducted in 2012. The NHWS is a large, international, self-reported survey conducted regularly by Kantar Health to assess health conditions in the general population. These surveys are conducted primarily through Internet-based health questionnaires administered to nationwide samples of adults aged 18 years and above.<sup>27</sup> Potential respondents were identified through opt-in online survey panels using a stratified random sampling framework to ensure representativeness in terms of age and gender. In addition, telephonic recruitment was used in countries such as Spain and Italy, where Internet penetration among the elderly population was not considered sufficient to provide an adequate sample of the elderly population. The protocol and questionnaire for the NHWS were reviewed and approved by the Essex Institutional Review Board (Lebanon, NJ, USA).

### Study groups

Data obtained from respondents who reported the diagnosis of either CU (defined as hives lasting for >6 weeks) or PsO, who were able to read and write in the primary language of the country in which the study was conducted, and who provided informed consent, were included in this analysis. Respondents who reported the diagnosis of both conditions were excluded from the analysis. The NHWS questionnaire did not include questions about the exact form of CU particularly CSU and its severity. Hence, respondents with a diagnosis of CU were used as a proxy for CSU but no severity groups could be defined. Severity of PsO was collected in the survey using the affected percentage of body surface area (BSA) as estimated by the patients who were instructed to use the surface of the palm of the hand to represent 1% of BSA. PsO patients were categorized into mild and moderate/severe (BSA > 2% or 3% depending on the year) groups.<sup>28</sup> Outcomes of the CU cohort were compared with PsO of all severities (overall PsO), mild PsO and moderate/severe PsO, respectively.

### Demographic and general health characteristics

Demographic characteristics included age, gender, country of residence, marital status, level of annual household income, level of education and employment status. General health characteristics included body mass index (BMI) calculated from the

reported height and weight, cigarette smoking history, frequency of alcohol use and days of exercise in the past month. The Charlson comorbidity index (CCI) was calculated from self-reported physician diagnoses of comorbid conditions to represent the level of comorbidity among the respondents.<sup>29</sup> Higher total index scores indicated a greater comorbidity burden in these patients.

### Outcomes

HRQoL was measured using the 4-week standard recall form of the revised Medical Outcomes Study 12-item Short Form survey instrument, version 2 (SF-12v2) for respondents surveyed in 2010 and 2011 and the Medical Outcomes Study 36-item Short Form survey instrument, version 2 (SF-36v2) for those surveyed in 2013.<sup>30,31</sup> Mental component summary (MCS) and physical component summary (PCS) scores were calculated to summarize mental and physical health, respectively. MCS and PCS scores in the US population have a mean of 50 and a standard deviation (SD) of 10, and these standards are also used for the non-US population;<sup>4</sup> lower scores mean worse health status. Health utility scores were calculated from the SF-12v2 and SF-36v2 using the SF-6D algorithm which provides a preference-based single index measure for health using general population values.<sup>32</sup> The utility score ranges from 0 to 1 with a higher utility score indicating a better health. The minimally important difference (MID) is estimated to provide a measure of the smallest change in the patient-reported outcomes which patients perceive as important.<sup>33</sup> The MID for MCS and PCS scores is 3 and that for health utilities is 0.03.<sup>34</sup>

Self-reported psychological complaints, such as depression, anxiety and sleep difficulties (insomnia and sleep disturbance), in the past 12 months were assessed. Respondents were considered to have anxiety if they reported experiencing general anxiety disorder, panic disorder, phobia, post-traumatic stress, obsessive-compulsive disorder, social anxiety disorder or anxiety.

Impairment of work and non-work daily activities was measured using the General Health version of the Work Productivity and Activity Impairment Questionnaire (WPAI) which estimates the percentage of the absence from work or impairment due to health in the 7 days preceding the survey.<sup>32</sup> Metrics for employed respondents included absenteeism (percentage of work time missed), presenteeism (degree of impairment while at work) and overall work impairment. All respondents, regardless of their employment status, reported activity impairment, the percentage of impairment related to non-work activities.

Healthcare utilization was assessed based on the patient-reported number of visits to different medical practitioners during the past 6 months. Respondents indicated the type of practitioner visited including traditional healthcare practitioners (HCPs) [e.g. general practitioners (GPs), dermatologists and allergists], emergency room (ER) visits and hospitalizations. The number of each type of visit was also reported. Respondents also

indicated the type of alternative HCPs they had visited in the past 6 months, including herbalists, acupuncturists, chiropractors, nutritionists and massage therapists, although the number of those visits was not included in the survey.

### Statistical analyses

The analysis first evaluated the differences between patients with CU and overall PsO independent of their disease severity; later, the CU group was compared with the mild and moderate/severe PsO, respectively. In the bivariate analysis, chi-squared tests were used to compare categorical variables, and independent sample *t*-tests for continuous variables. In addition, regression analyses were conducted after adjustments for demographic and general health characteristics of patients. The type of regression was specific to the type of the outcome variable. Normal distributions and identified link functions were used for HRQoL variables, generalized linear models with the negative binomial distribution and log-link function for WPAI variables, Poisson distribution and log-link function for resource utilization and binary logistic regression for binary outcomes. To aid in interpretation, adjusted means were calculated from the regression models for HRQoL and the number of healthcare visits, with outcome values for each group presented as the mean of the covariates for the respondents included in the model.

### Results

In total, 769 CU patients and 7857 overall PsO patients were identified and included in this analysis. Among the overall PsO patients, 5736 (73.1%) had mild PsO and 2121 (26.9%) had moderate/severe PsO. The CU patients were significantly younger than the overall PsO patients [mean (SD) age: 45.4 (15.2) years vs. 47.9 (15.1) years;  $P < 0.001$ ]. In the CU cohort, the proportion of women was 70.6%, and it was significantly greater than the proportion of women (52.8%) in the overall PsO group ( $P < 0.001$ ). BMI, smoking history and alcohol use differed across the groups, whereas the frequency of exercise was fairly consistent (Table 1).

Compared with the overall PsO patients, the CU patients were more likely to have various comorbidities such as nasal allergies, dermatological conditions other than CU, severe allergic asthma and dyspepsia. The mean (SD) CCI scores were significantly higher in the CU patients than in the overall PsO patients [mean (SD): 0.9 (2.1) vs. 0.5 (1.1),  $P < 0.001$ ] (Table 1).

### HRQoL impairment

The bivariate analysis showed that HRQoL was lower in CU patients compared to overall PsO patients. The mean MCS, PCS and SF-6D utility scores were 3.7, 2.2 and 0.05 points lower ( $P < 0.001$ ) in the CU patients when compared to overall PsO patients. Mean difference scores for both MCS and SF-6D were greater than the MID, except for PCS (Fig. 1a). The regression

**Table 1** Patient characteristics of respondents diagnosed with CU and PsO

	CU (n = 769)	Overall PsO (n = 7857)	P value vs. CU	Mild PsO (n = 5736)	P value vs. CU	Moderate-to- Severe PsO (n = 2121)	P value vs. CU
Age, mean (SD), years	45.4 (15.2)	47.9 (15.1)	<0.001	48.1 (15.2)	<0.001	47.4 (14.7)	0.002
Female, n (%)	543 (70.6)	4148 (52.8)	<0.001	3023 (52.7)	<0.001	1125 (53.0)	<0.001
Country, n (%)			<0.001		<0.001		<0.001
France	184 (23.9)	2461 (31.3)		1898 (33.1)		563 (26.5)	
Germany	185 (24.1)	1818 (23.1)		1252 (21.8)		566 (26.7)	
UK	114 (14.8)	1902 (24.2)		1275 (22.2)		627 (29.6)	
Italy	162 (21.1)	1109 (14.1)		866 (15.1)		243 (11.5)	
Spain	124 (16.1)	567 (7.2)		445 (7.8)		122 (5.8)	
Married/living with partner, n (%)	469 (61.0)	5129 (65.3)	0.017	3768 (65.7)	0.010	1361 (64.2)	0.117
Completed university, n (%)	300 (39.0)	3015 (38.4)	0.728	2312 (40.3)	0.491	703 (33.1)	0.003
Employed, n (%)	409 (53.2)	4446 (56.6)	0.070	3279 (57.2)	0.037	1167 (55.0)	0.381
Household income, n (%)			0.179		0.042		0.974
Below median	405 (52.7)	3897 (49.6)		2782 (48.5)		1115 (52.6)	
Above median	275 (35.8)	3075 (39.1)		2321 (40.5)		754 (35.5)	
Declined to answer	89 (11.6)	885 (11.3)		633 (11.0)		252 (11.9)	
CCI, mean (SD)	0.90 (2.12)	0.50 (1.11)	<0.001	0.47 (1.05)	<0.001	0.59 (1.28)	<0.001
BMI categories, n (%)			<0.001		<0.001		<0.001
Underweight	38 (4.9)	200 (2.5)		147 (2.6)		53 (2.5)	
Normal	336 (43.7)	3037 (38.7)		2291 (39.9)		746 (35.2)	
Overweight	218 (28.3)	2709 (34.5)		1978 (34.5)		731 (34.5)	
Obese	165 (21.5)	1760 (22.4)		1211 (21.1)		549 (25.9)	
Declined to answer	12 (1.6)	151 (1.9)		109 (1.9)		42 (2.0)	
Smoking status, n (%)			<0.001		0.001		<0.001
Current	237 (30.8)	2464 (31.4)		1679 (29.3)		785 (37.0)	
Former	244 (31.7)	2927 (37.3)		2206 (38.5)		721 (34.0)	
Never	288 (37.5)	2466 (31.4)		1851 (32.3)		615 (29.0)	
Alcohol use, n (%)			0.002		<0.001		0.617
Daily	61 (7.9)	767 (9.8)		596 (10.4)		171 (8.1)	
Less than daily	515 (67.0)	5512 (70.2)		4057 (70.7)		1455 (68.6)	
None	193 (25.1)	1578 (20.1)		1083 (18.9)		495 (23.3)	
Exercise, mean (SD), days in past month	6.04 (7.78)	5.70 (7.65)	0.248	5.70 (7.56)	0.256	5.69 (7.88)	0.298

BMI, body mass index; CCI, Charlson comorbidity index; CU, chronic urticaria; PsO, psoriasis; SD, standard deviation.

analysis showed significantly worse HRQoL in the CU patients than in the overall PsO patients, as expressed by lower MCS and PCS scores (−2.4 and −1.6 points difference;  $P < 0.001$ ) (Fig. 1b). Health utility scores in the CU patients were lower by 0.03 points, which was at the MID for the SF-6D. MCS, PCS and SF-6D scores were lower by 3.0, 1.9 and 0.04 points, respectively, in the CU patients in comparison with mild PsO. Compared with moderate/severe PsO patients, CU patients showed a similar reduction in these scores.

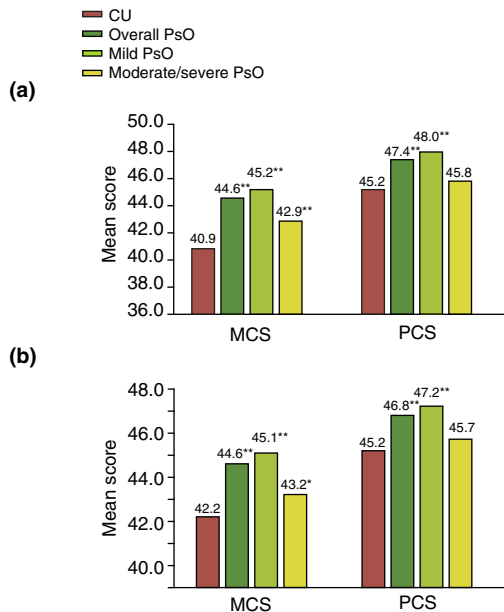
### Self-reported psychological complaints

The bivariate analysis showed that significantly more CU patients reported anxiety, depression and sleep difficulties in the past 12 months compared with overall PsO and mild PsO patients. The difference was still significant compared with moderate/severe PsO patients on depression and sleep difficulty but not on anxiety (Fig. 2).

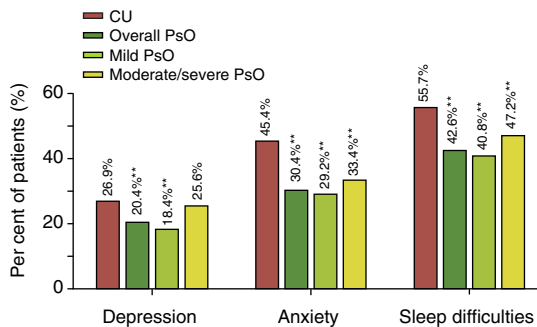
The regression analysis showed that the CU patients had significantly higher adjusted odds of anxiety, depression and sleep difficulties in comparison with overall PsO. Compared with mild PsO, these differences were even higher. The CU and moderate/severe PsO patients showed no significant difference in the odds of psychological complaints (Table 2).

### Work and activity impairment

No difference in the labour force participation was observed between the CU and overall PsO patients (Table 1). Results of the bivariate analysis showed that the CU patients reported significantly higher presenteeism, overall work impairment and activity impairment than the overall PsO and mild PsO patients. Compared with moderate/severe PsO, all scores were not significantly different (Fig. 3). Results of the regression analysis showed that all work-related scores were comparable among CU, overall PsO and its subgroups. The activity impairment



**Figure 1** Mean physical (PCS) and mental (MCS) component summary scores in CU patients relative to PsO patients (overall, mild and moderate/severe). (a) Bivariate analysis. \*\* $P < 0.05$ ; (b) Multivariate analysis, \* $P < 0.05$ ; \*\* $P < 0.001$ ; CU, chronic urticaria; MCS, Mental Component Summary score; PCS, Physical Component Summary score; PsO, psoriasis.

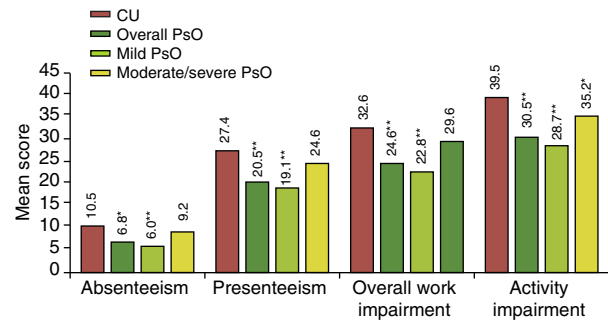


**Figure 2** Self-reported psychological complaints in CU patients relative to PsO patients (overall, mild and moderate/severe): bivariate analysis. \*\* $P < 0.001$ ; CU, chronic urticaria; PsO, psoriasis.

score was significantly higher for CU patients compared to that reported by overall PsO and mild PsO patients, but was similar to that reported by moderate/severe PsO patients (Table 3).

#### Healthcare resource use

Results of the bivariate analysis showed that significantly more CU patients had HCPs visits and ER visits or were hospitalized in the past 6 months than the overall PsO patients. The mean



**Figure 3** Work Productivity and Activity Impairment (WPAI) scores in CU patients relative to PsO patients (overall, mild and moderate/severe): bivariate analysis. \*\* $P < 0.05$ ; \* $P < 0.001$ ; CU, chronic urticaria; PsO, psoriasis.

number of visits to any type of HCPs (overall HCP) was significantly higher in the CU patients [mean (SD): 9.05 (9.83) vs. 7.66 (9.38),  $P = 0.001$ ] than in the overall PsO patients. The number of visits to allergists and psychiatrists was also significantly higher in the CU patients than that in the overall PsO patients (Table 4a).

The regression analysis showed that the CU patients were more likely to visit HCPs, ER and be hospitalized compared with the overall PsO patients [odds ratio (OR): 1.74, 1.72, 1.31, respectively, all  $P < 0.05$ ] and mild PsO patients (Table 4b). The CU and moderate/severe PsO patients had similar odds of hospitalization. The CU patients had a higher but non-significant odds of ER visits and higher odds of HCP visits overall (OR: 1.74,  $P = 0.02$ ) than the moderate/severe PsO patients (Table 4b). The odds of visiting an allergist were significantly higher in the CU patients than in the overall PsO patients; no significant difference was observed for other specialties. Except for GP visits, the odds of visiting other specialists were significantly higher in the CU patients than in the mild PsO patients. No significant differences in specialists visited between the CU and moderate/severe PsO patients, except for dermatologist visits which were significantly higher in the moderate/severe PsO patients.

According to the bivariate analysis, the frequency of alternative HCP visits was higher in the CU patients than in the overall PsO patients. However, visits to an acupuncturist, chiropractor and massage therapist were similar between the CU and moderate/severe PsO patients (Fig. 4). Odds of visiting alternative HCPs were significantly higher in the CU patients than in both overall PsO and mild PsO patients but were not different when compared with the moderate/severe PsO patients (Table 4b).

#### Discussion

This is one of the first analyses of patient-reported real-world data comparing the burden of illness in CU and PsO from the



**Table 2** Risk of psychological complaints in the CU vs. PsO patients (overall, mild and moderate/severe): Multivariate analysis

	CU vs. Overall PsO OR (95% CI)	P value	CU vs. Mild PsO OR	P value	CU vs. Moderate/Severe PsO OR	P value
Anxiety	1.63 (1.39–1.92)	<0.001	1.70	<0.001	1.45	0.109
Depression	1.34 (1.12–1.60)	0.002	1.44	<0.001	1.12	0.315
Sleep difficulties	1.56 (1.33–1.82)	<0.001	1.63	<0.001	1.36	0.329

CU, chronic urticaria; OR, odds ratio; PsO, psoriasis.

**Table 3** Work Productivity and Activity Impairment (WPAI) results in the CU patients vs. PsO patients (overall, mild and moderate/severe): Multivariate analysis

	CU vs. overall PsO RR (95% CI)	P value	CU vs. Mild PsO RR	P value	CU vs. Moderate/Severe PsO RR	P value
Absenteeism	1.31 (0.78–2.19)	0.305	1.45	0.163	0.99	0.972
Presenteeism	1.15 (0.92–1.42)	0.223	1.22	0.077	0.97	0.808
Overall work impairment	1.15 (0.93–1.42)	0.190	1.22	0.061	0.97	0.830
Activity impairment	1.21 (1.07–1.37)	0.002	1.26	<0.001	1.08	0.259

CI, confidence interval; CU, chronic urticaria; PsO, psoriasis; RR, relative risk.

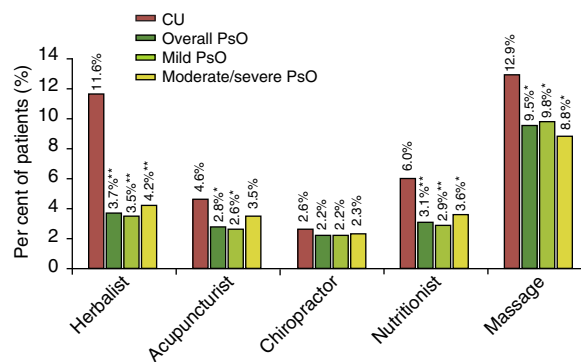
humanistic and economic perspective in five European countries. The burden of illness measured in terms of HRQoL, psychological complaints, work and non-work daily activities, and healthcare utilization presents a holistic view on how patients report the impact of their disease and the economic consequences. This analysis suggests that patients with CU and PsO report an overall negative impact of their disease confirmed by the bivariate and multivariate analyses. These findings are consistent with the results of a recent comparative analysis of CU and PsO patients in US NHWS.<sup>6</sup>

There were significant differences between the CU and PsO patients of all severities on mental and physical health status. The scores were significantly lower (i.e. worse) in the CU patients than the overall PsO patients or mild PsO, but similar to the scores reported by moderate/severe PsO patients. These findings are consistent with the results of previous studies which showed that CU patients have a poorer HRQoL in certain dimensions than patients with PsO<sup>6,10,17</sup> and atopic dermatitis.<sup>17</sup> CU patients report worse scores than PsO patients on mood and physical discomfort in a comparative study published by Grob *et al.*<sup>17</sup> In our study, the risk of having anxiety, depression and sleep difficulties in CU patients was greater when compared with overall and mild PsO and similar to moderate/severe PsO.

The impact of dermatological conditions such as PsO on work, including absenteeism, loss of productivity while at work and the impact on daily activity, increases with the disease severity and is well documented.<sup>35</sup> The results of absenteeism, presenteeism and overall work impairment scores in CU patients suggest that the impact of CU is comparable to PsO in these aspects. Therefore, the extent of economic impact from the productivity loss due to CU is likely to be significant, similar to that

seen with PsO. In this study, both CU and overall PsO patients reported having at least one HCP visit (visits to GPs, allergists, or ER or hospitalization) in the past 6 months, and CU patients had more frequent visits with an additional three HCP visits per patient within a 6-month period. Overall, when comparing CU cohort with PsO patient cohort of all severity levels, CU patients have consistently and significantly lower scores on all outcomes, but when comparing only with the moderate/severe PsO group, the scores reflected similar impairment and impact.

Although the NHWS is representative of the adult population from the included countries in terms of age and gender, the panel-based recruitment may introduce a potential bias for variables, such as education, which were not incorporated into the



**Figure 4** Alternative HCP visits in CU patients relative to PsO patients (overall, mild and moderate/severe): bivariate analysis. \*\*\* $P < 0.05$ ; \*\* $P < 0.001$ ; CU, chronic urticaria; HCP, healthcare practitioner; PsO, psoriasis.

**Table 4** Healthcare visits in CU patients vs. PsO patients (overall, mild and moderate/severe) (a) Bivariate analysis (b) Multivariate analysis

(a)	CU (n = 769)	Overall PsO (n = 7857)	P value	Mild PsO (n = 3468)	P value	Moderate/severe PsO (n = 2121)	P value
<b>Traditional HCP</b>							
Number of visits, mean (SD)	9.05 (9.83)	6.85 (8.46)	<0.001	6.55 (8.08)	<0.001	7.66 (9.38)	0.001
Visited, n (%)	735 (95.6)	7160 (91.1)	<0.001	5234 (91.2)	<0.001	1926 (90.8)	<0.001
<b>General practitioner</b>							
Number of visits, mean (SD)	3.08 (3.93)	2.52 (3.21)	<0.001	2.47 (3.17)	<0.001	2.68 (3.32)	0.007
Visited, n (%)	601 (78.2)	5998 (76.3)	0.258	4396 (76.6)	0.350	1602 (75.5)	0.143
<b>Allergist</b>							
Number of visits, mean (SD)	0.21 (0.59)	0.06 (0.50)	<0.001	0.06 (0.52)	<0.001	0.08 (0.44)	<0.001
Visited, n (%)	103 (13.4)	273 (3.5)	<0.001	173 (3.0)	<0.001	100 (4.7)	<0.001
<b>Dermatologist</b>							
Number of visits, mean (SD)	0.38 (0.97)	0.37 (1.31)	0.818	0.27 (0.92)	0.002	0.64 (1.99)	0.001
Visited, n (%)	164 (21.3)	1474 (18.8)	0.083	918 (16.0)	<0.001	556 (26.2)	0.007
<b>Psychiatrist</b>							
Number of visits, mean (SD)	0.33 (1.75)	0.25 (1.75)	0.273	0.22 (1.49)	0.073	0.34 (2.33)	0.879
Visited, n (%)	64 (8.3)	400 (5.1)	<0.001	273 (4.8)	<0.001	127 (6.0)	0.026
<b>Psychologist/psychotherapist</b>							
Number of visits, mean (SD)	0.57 (2.96)	0.36 (2.34)	0.018	0.34 (2.35)	0.013	0.41 (2.28)	0.116
Visited, n (%)	56 (7.3)	375 (4.8)	0.002	244 (4.3)	<0.001	131 (6.2)	0.286
<b>Other traditional HCP</b>							
Number of visits, mean (SD)	4.49 (6.28)	3.28 (5.08)	<0.001	3.19 (4.92)	<0.001	3.51 (5.47)	<0.001
Visited, n (%)	624 (81.1)	5738 (73.0)	<0.001	4213 (73.4)	<0.001	1525 (71.9)	<0.001
<b>Non-traditional HCP, %</b>							
Visited, n (%)	217 (28.2)	1397 (17.8)	<0.001	1016 (17.7)	<0.001	381 (18)	<0.001
<b>ER</b>							
Number of visits, mean (SD)	0.75 (3.11)	0.25 (1.04)	<0.001	0.23 (1.02)	<0.001	0.30 (1.10)	<0.001
Visited, n (%)	198 (25.7)	1070 (13.6)	<0.001	736 (12.8)	<0.001	334 (15.7)	<0.001
<b>Hospitalization</b>							
Number of visits, mean (SD)	0.43 (2.37)	0.17 (0.75)	<0.001	0.15 (0.64)	<0.001	0.23 (0.99)	0.001
Visited, n (%)	117 (15.2)	841 (10.7)	<0.001	552 (9.6)	<0.001	289 (13.6)	0.277
(b)	CU vs. overall PsO OR (95% CI)	P value	CU vs. Mild PsO OR	P value	CU vs. Moderate/ Severe PsO OR	P value	
Traditional HCP	1.74 (1.22–2.50)	0.003	1.74	0.012	1.75	0.020	
GP	1.12 (0.93–1.36)	0.218	1.11	0.715	1.17	0.130	
Allergist	3.22 (2.49–4.15)	<0.001	3.79	<0.001	2.20	0.328	
Dermatologist	1.03 (0.85–1.24)	0.765	1.27	<0.001	0.63	<0.001	
Psychiatrist	1.37 (1.03–1.84)	0.032	1.44	0.013	1.23	0.836	
Psychologist/psychotherapist	1.15 (0.85–1.57)	0.363	1.27	0.013	0.93	0.129	
ER	1.72 (1.43–2.08)	<0.001	1.82	<0.001	1.50	0.184	
Hospitalization	1.31 (1.05–1.65)	0.018	1.45	<0.001	1.05	0.119	
Alternative HCP	1.40 (1.18–1.68)	<0.001	1.43	<0.001	1.32	0.192	

CU, chronic urticaria; ER, emergency room; GP, general practitioner; HCP, healthcare professionals; OR, odds ratio; PsO, psoriasis; SD, standard deviation.

sampling strata. However, because cases of both CU and PsO were drawn from the same panel, this limitation would be expected to have a minimal impact on the estimated comparative burden of these conditions. The major limitations of the NHWS are the self-reported data, which are based on patient recall of diagnoses and self-reporting of outcomes which cannot be confirmed. One of the influencing factors which affect QoL is

patient–physician relationship in both CU and PsO patients, and this has not been accounted for in this study.<sup>36–38</sup> Another limitation might be that medical resource use was not collected for each individual comorbidity, but for the general health of the respondent. As the exact type of CU was not collected, the study was conducted in respondents diagnosed with CU and used as a proxy for CSU. Patients with confirmed CSU may have different

specific characteristics than CU, and therefore, these study results may underestimate the full impact of CSU on patients. In addition, this study did not include data on severity of CU; moreover, diagnosis of CU and its severity levels are more challenging than that of PsO.<sup>3</sup> A quick self-assessment method of disease activity/severity does not exist yet in CU. The sample size of PsO was much larger than that of CU in this study. Even if this might be due to variation in the NHWS sampling method, it reflects the difference of prevalence between these diseases.<sup>4,19</sup> Self-assessment of severity in PsO based on a validated, accepted method reflected a higher proportion of mild PsO patients compared to moderate/severe, but this is consistent with real-world data.<sup>20</sup> Other possible reason for this might be, as NHWS is a 30-min online survey, PsO patients with high disease severity might be less able to participate in the survey. However, there is no reason to believe our study has unusually mild psoriasis representation or unusually severe urticaria patients, especially as both patient populations are obtained from the same survey (NHWS) representative for the general population in the respective countries. Advanced and efficacious medications are available for PsO; hence, many PsO patients may report current severity as mild.

In conclusion, the results of the current study provide further evidence that CU is associated not only with a significant detrimental impact on the HRQoL but also with a considerable impairment of productivity and high use of healthcare resources as PsO patients. Better management of CU will benefit the well-being of patients and potentially reduce its impact on employers, payers and the healthcare system.

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