RESEARCH ARTICLE

Economic burden and productivity loss related to eczema: A prevalence-based follow-up study in Vietnam

Phuong Hong Le,[1] Trung Quang Vo[2]

Abstract

Objective: Eczema, a chronic dermatologic disease, has been recognized as an economic burden in publications all over the word but only minimally as such in Vietnam. The aim of this prospective study was to quantify the financial hardships and impairments suffered by eczema patients.

Methods: This cross-sectional prevalence-based study involved 136 patients, whose conditions were classified into three severity levels on the basis of the medications that they were prescribed. Prescription therapy was administered for a month, after which there was patient-oriented assessment of effectiveness. The work productivity and activity impairment (WPAI) questionnaire was used to evaluate productivity loss, which was expressed in percentage form. Bootstrapping was conducted to determine continuous variables and demography-based differences in cost values among the patient groups.

Results: For the month-long treatment, each eczema patient needed an average of US$68.1 (range: US$56.2-US$81.5) with the highest proportion being spent on cosmetic treatments. There is noticeable difference between groups among which patients' symptoms demonstrated in distinct levels. The estimates indicated that eczema resulted in 27.8% and 23.1% impairments in work and daily activities, respectively.

Conclusion: The aggravation of disease symptoms can increase the direct costs borne by eczema patients. A decrease in productivity, which is one of the most serious consequences of the condition, should be paid adequate attention to minimize burdens to society.

Keywords: Cost, Eczema, Prescription Therapy, Vietnam, WPAI. (JPMA 69: S-57 (Suppl. 2); 2019)

Introduction

Eczema, also known as atopic dermatitis (AD), is recognized as the most prevalent cutaneous ailment among the populace.[1] The word "eczema" derives from a Greek word that denotes "to boil over," which accurately depicts the disease's symptoms, namely, red, inflamed, and itchy patches that appear during mild to severe eruptions. Recent studies have shown that eczema, with its estimated lifetime prevalence fluctuating between 15% and 20% among children, usually occurs in early childhood and that up to 50% of childhood cases will experience a relapse as they mature.[2] This percentage means that the disease will affect 1% to 3% of grownups worldwide. Alongside the aforementioned corporal symptoms, anxiety, depression, or sleep deprivation results mostly because of the appearance of red, swollen, and non-stop pruritic rashes, thereby diminishing a patient's quality of life.[3] Eczema has likewise been linked to other conditions, such as severe attention-deficit hyperactivity disorder (ADHD), which was indicated as being strongly associated with the skin disease in a 2016 report from the National Survey of Children's Health.[4] The same report indicated that asthma increased the odds of ADHD in adults with AD.[4] Spergel et al. added that, along with allergic rhinitis and food allergy, asthma is a subsequent manifestation of eczema.[4]

Many studies have been carried out globally to estimate the economic burden brought forth by eczema. A British survey found that the yearly individual cost borne by eczema sufferers in the United Kingdom is approximately £297 million, which also covers expenses related to non-prescribed preparations, special clothing, and income losses.[5] The corresponding £42 million incurred by society stems from productivity loss (cost per year unstated).[5] A comprehensive investigation of the financial effects of the skin disease discovered that in 2004, the annual economic burden caused by AD in the US was US$4.228 billion, out of which US$1.009 billion was spent on direct costs and US$3.219 billion was allocated to settling indirect costs, including lost productivity and costs owing to decrements in quality of life.[6] Several similar studies have been performed within the Asian region. For instance, a 2015 Indian survey calculated the average total cost of AD in the country to be approximately US$99.9 ± 56.3

[1]Department of Pharmacy Administration, Faculty of Pharmacy, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam, [2]Department of Economic and Administrative Pharmacy, Pham Ngoc Thach University of Medicine, Ho Chi Minh City, Vietnam.

Correspondence: Trung Quang Vo. Email: trungvq@pnt.edu.vn

(determined on the basis of the 2015 exchange rate of the Bank of England).[7]

The estimates above, along with the physical, mental, and social effects of eczema, have made the disease one of the main issues of interest among researchers all over the world in general and in Vietnam in particular. A number of retrospective studies have been devoted to the economic burden suffered by Vietnamese eczema patients, but to our knowledge, no prospective research has been conducted on this matter. A prospective, comprehensive, and multi-aspect depiction of AD is necessary to devise a monetary plan for disease treatment and control. Accordingly, the current work provided a general impression of disease status from a prospective angle and identified the underlying factors that most strongly influence the overall cost of care.

Material/Subjects/Patients and Methods

This cross-sectional prevalence-based study was conducted from July to September 2018. To ensure the sufficient supplement of healthcare nationwide, Vietnamese center hospitals are spread in three macro areas, among which the southern region was the focus of the research. Specifically, we recruited participants from Ho Chi Minh City Hospital of Dermato Venereolgy (HCMHDV), which is a well-known dermatology-specific health facility classified as a first-class establishment by the Vietnamese Ministry of Health. In the first six months of 2018, HCMHDV serviced approximately 115,000 patients, of which one-third were composed of eczema patients. The study projects were approved by Ethics Committee of HCMHDV with code research CS/BVDL/18/09. All patients were asked about voluntary consent before collecting information.

Participants were selected on the basis of the following criteria: (i) $\geq$18 years old, (ii) identified as an eczema sufferer receiving outpatient care by dermatologists, (iii) taking prescribed medications, and (iv) expressed consent to take part in the research. Patients were excluded if they arbitrarily stopped treatment at any time during the follow-up period or if they did not supply enough information. To derive a statistical overview of the economic burden endured by Vietnamese eczema patients, the sample size appropriate for this work was determined using the following equation:[8]

$$N = \frac{z^2_{1-\alpha/2}.(1 - p)}{\varepsilon^2 p}$$

(where relative precision $\varepsilon = 0.25$, confidence interval = 95%, $\alpha = 0.05$, and $z^2_{1-\alpha/2} = 1.96^2$)

In the anticipated population proportion indicated in the equation, p denotes the frequency of eczema patients' visits to hospitals (particularly 32% in first six-month of 2018). Therefore, this study needed a minimum of 131 patients; if 10% of deductible losses are considered, a sample of 145 patients would be required. The selected patients were categorized into three groups corresponding to three severity levels that are based on the medications prescribed to the participants (Table-1). The classification method was derived from Sicras-Mainar et al.[9] None of the patients were taking systemic immunosuppressants or biologics as outpatients in HCMHDV, and many were required to take only medications that can remove eczema symptoms (but not specifically intended for eczema treatment) because of the mildness of their AD. These drugs included antihistamines, skin care medications, supplements, and moisturizing cosmetics. Hence, we applied some modifications to the codification of severity levels (Table-1).

To achieve the study's aim, data were collected through face-to-face interviews. In part one of the interview sessions, a self-designed questionnaire was used to obtain demographic characteristics, information on previous eczema treatments, and details regarding travel costs. In part two, the patients were administered the Vietnamese version of the work productivity and activity impairment questionnaire, which is a well-validated tool for measuring impairments in the work and daily activities of patients.[10] Data concerning prescribed medications (topical calcineurin inhibitors, corticosteroids), concomitant medications (antihistamines, antiseptics, antibiotics, antifungal drugs, hepatoprotective drugs, thymomodulin, supplements, skin care medications), and cosmetic treatments were extracted from the hospital database. Unit cost was referenced on the statistical

Table-1: Severity levels based on medications prescribed.

Severity levels	1	2	3
Drugs	Moisturizing cosmetics	Calcineurin inhibitors	Medications for infection (antibiotics, antifungal drugs)
	Supplements	High-/very high-potency topical corticoids	
	Antihistamines		
	Low-/medium-potency topical corticoids	Oral corticosteroids	

documentation of the pharmaceutical department of the HCMHDV. After one month of prescription treatment, the patients were asked whether they adhered to the therapies prescribed by other medical centers and how many times they visited a health practitioner in HCMHDV. These cost components, when incurred by the patients, were included in the calculation of the total direct medical costs. Clinical outcomes were oriented toward patient assessments, denoted through the following scale: 1 = cured, 2 = remissive, 3 = unchanged, 4 = worse, 5 = cured but relapsed.

Economic burden, expressed in US dollars, was appraised on the basis of the patients' perspectives and encompassed direct medical and non-medical costs. Direct medical costs were computed by multiplying the number of medical visits or medications prescribed with the unit cost of resources, whereas direct non-medical costs were calculated on the basis of travel costs given that the sample composed of outpatients with chronic eczema. Impairment in daily activities was expressed in percentage, while the reduction in work productivity and absences from work due to eczema were evaluated only for the employed patients.

Data Analysis: All analyses were conducted using R software version 3.4.3. Descriptive statistics were used to identify demographic characteristics. Bootstrapping with 10,000 replications was used to ascertain the average of cost variables and differences in this regard among the patient groups. A chi-square test was conducted to determine the factors that affect post-treatment clinical outcomes.

Results

Among the 136 eligible respondents, 8 (5.9%) were elderly and 77 (56.6%) lived in Ho Chi Minh City. The patients classified as having level-three eczema amounted to 58 individuals, whereas those categorized as exhibiting severity levels two and one each numbered 39 patients. More details about the socio-demographic characteristics of the patients are provided in (Table-2).

Each patient was examined by a dermatologist for an average of 1.5 times per month (95% confidence interval [CI: 1.3-1.7), for which a patient spent US$4.3 on transportation. The mean difference in travel costs between patients located in Ho Chi Minh City and other provinces was US$7.7 (95% CI: US$4.4-US$13.1). This difference is illustrated in Figure-1, which also indicates that no statistical difference in direct costs was found among the patient groups. The average monthly cost of medical services for eczema treatment was US$68.1, of which cosmetics accounted for the highest proportion at nearly 18%. The features of the cost components are summarized in Table-3. The mean expenditure of the patients with level-three severity was statistically higher

Table-2: Sociodemographic characteristics of participants [2018, n = 136].

Characteristics	N	%	Characteristics	N	%
Age			Genetics		
Adult	128	94.1	Yes	24	17.6
Elderly	8	5.9	No	112	82.4
Gender			Comorbidity		
Male	61	44.9	Liver disease	13	9.6
Female	75	55.1	Allergic rhinitis	35	25.7
Locality			Sinusitis	30	22.1
Ho Chi Minh city	77	46.6	Asthma	2	1.5
Other provinces	59	43.4	Other dermatology diseases	8	5.9
Jobs			Severity levels		
Income earners	94	69.1	1	39	28.7
Retired	14	10.3	2	39	28.7
Housewives	15	11.0	3	58	42.6
Students	13	9.6	Eczema onset time		
Allergy			More than one year	13	9.5
Food	36	26.5	More than one month	44	32.4
Dust	46	33.8	Around one month	44	32.4
Soap	34	25.0	Around one week	35	25.7
Hay	13	9.6	Pre-treatment		
Medication	13	9.6	In other medical facilities	75	55.1
Weather	34	25.0	Following treatment strategy in HCMCHDV	54	39.7
			None	36	26.5

Table-3: Summary of economic burdens and impairments in daily activities (arithmetic mean [Bootstrap 95% CI], USD).

Components	Arithmetic mean (Bootstrap 95% CI)	Economic burden
Direct medical cost 68.1 (56.2-81.5)	9,280.7	
Medical visit	5.0 (4.5-5.5)	675.8
The number of visit(s)	1.5 (1.3-1.7)	
Specific medications	6.0 (4.0-8.5)	827.5
Low-/Medium-potency topical corticosteroids	0.1 (0.1-0.2)	19.8
High-potency topical corticosteroids	0.6 (0.3-1.0)	85.5
Very high-potency topical corticosteroids	0.1 (0.0-0.2)	11.9
Calcineurin inhibitors	3.2 (2.0-4.8)	437.4
Oral corticosteroids	0.2 (0.1-0.5)	32.1
Concomitant medications	35.7 (27.4-46.0)	4,929.5
Antihistamines	9.1 (7.2-11.6)	1,241.1
Medication for skin care	1.0 (0.1-2.7)	154.4
Antiseptics	0.2 (0.1-0.3)	21.1
Hepatoprotective medications	1.9 (0.9-3.2)	263.5
Supplements	6.8 (4.8-9.9)	950.0
Thymomodulin	1.0 (0.4-1.7)	131.2
Antibiotics	3.3 (1.9-5.0)	448.4
Antifungal medications	0.9 (0.1-2.4)	132.0
Cosmetics 12.2 (9.0-16.3)	1,661.2	
Self-treatment in other facilities (N=48)	24.4 (18.7-32.9)	1,186.7
Direct non-medical cost	4.3 (2.7-6.9)	600.2
Travelling cost	4.3 (2.7-6.9)	600.2
Direct cost	72.6 (60.0-87.7)	9,880.9
Work impairment (N=94)		
Percentage of work time missed		8.6 (3.8-13.8)
Percentage of impairment while working		26.3 (20.0-32.7)
Percentage of overall work impairment		27.8 (21.5-35.4)
Activity impairment		
Percentage of activity impairment		23.1 (18.7-28.0)

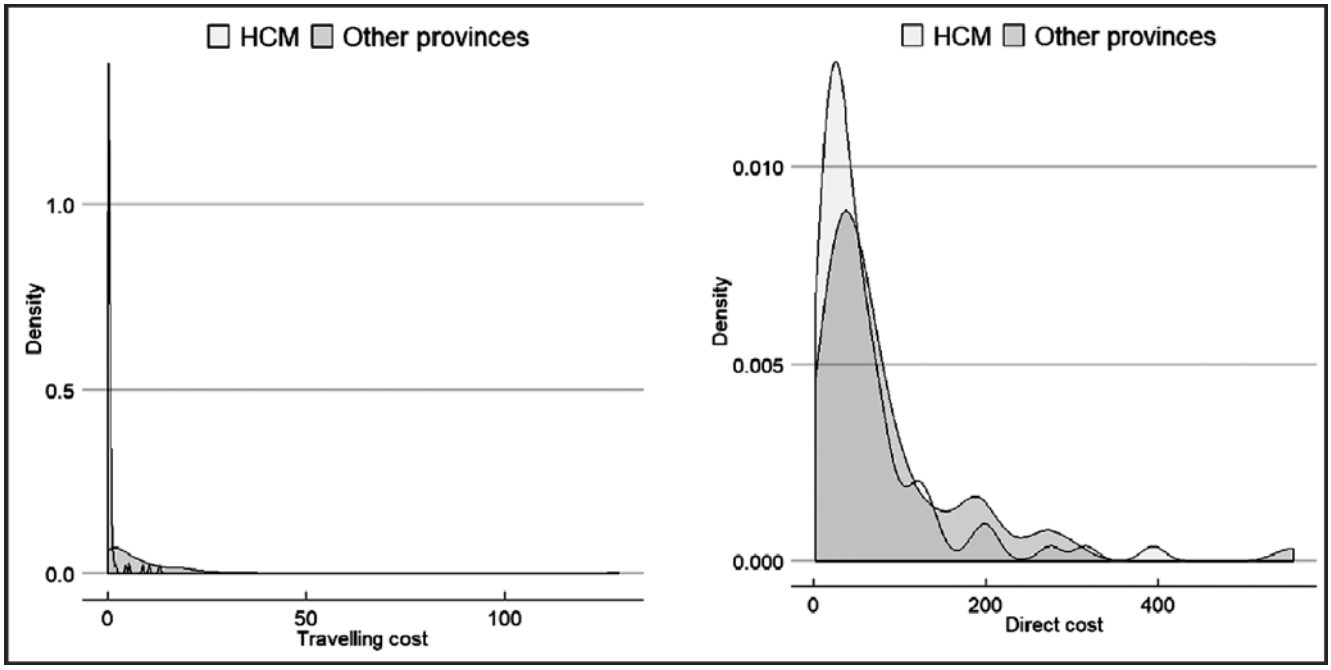

Figure-1: Assessment of the effects of locality on eczema treatment expenses.

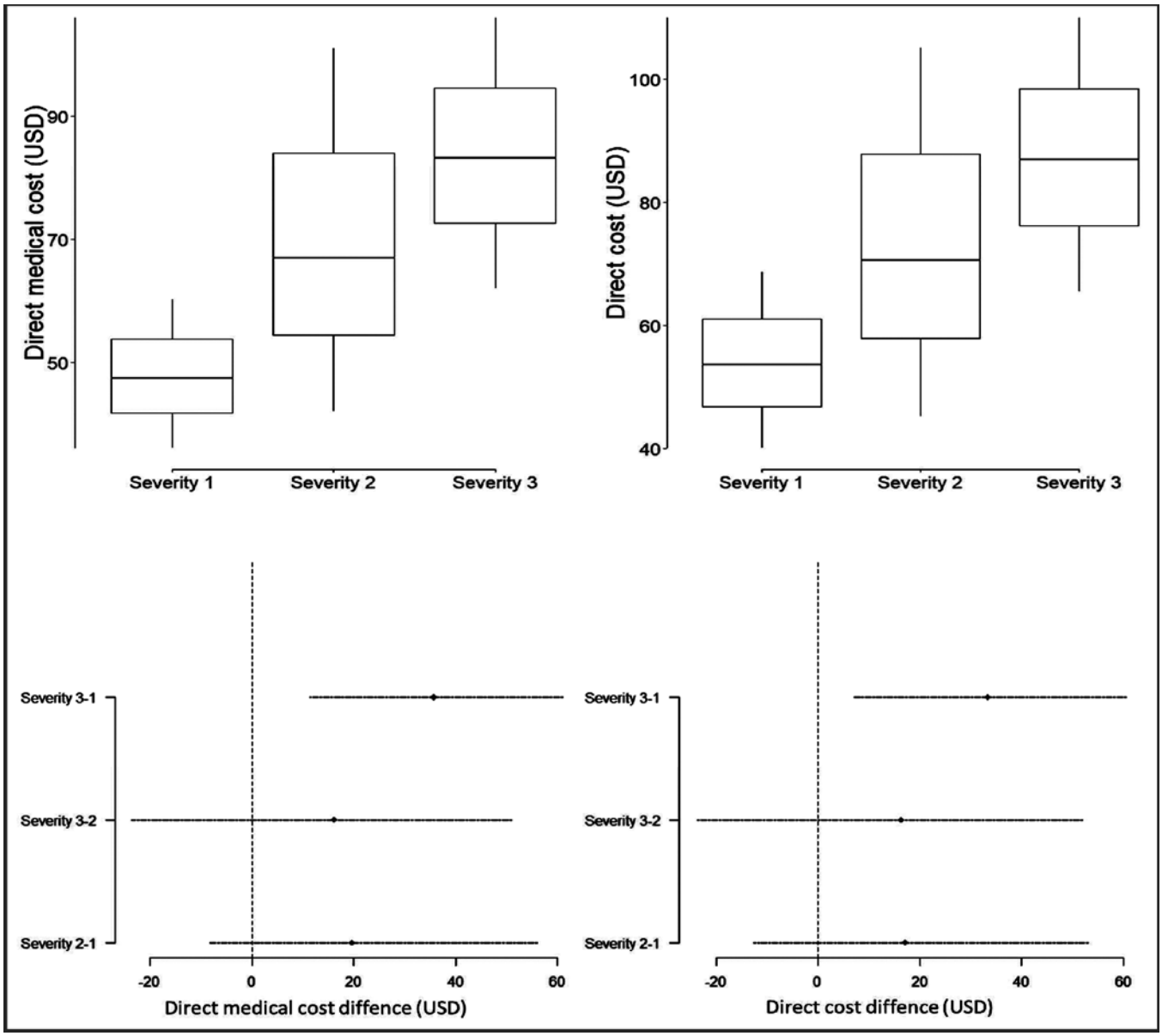

Figure-2: Distribution of costs according to severity.

than those of the patients under the remaining levels (Figure-2). Among the respondents, 78 used emollient cosmetics in accordance with offers from doctors, but more patients took antihistamines and supplements (minerals or vitamins) as treatments.

Figure-1. Assessment of the effects of locality on eczema treatment expenses.

Figure-2. Distribution of costs according to severity.

Of the 94 salary-earning patients, 14 needed to take a leave from work because of eczema symptoms that interfered with how they completed their jobs or because of eczema-related examinations in medical centers. Out of these individuals, 59.6% stated that suffering from eczema diminished their performance-a figure that translated to a 27.8% reduction in patient productivity and approximately US$137 of average loss per month (Table-3). With respect to daily activities, eczema compelled the patients to perform at only 76.9% of their capacity (Table-3).

Figure-3 delineates the effects of the month-long therapy, with consideration for the classification of clinical

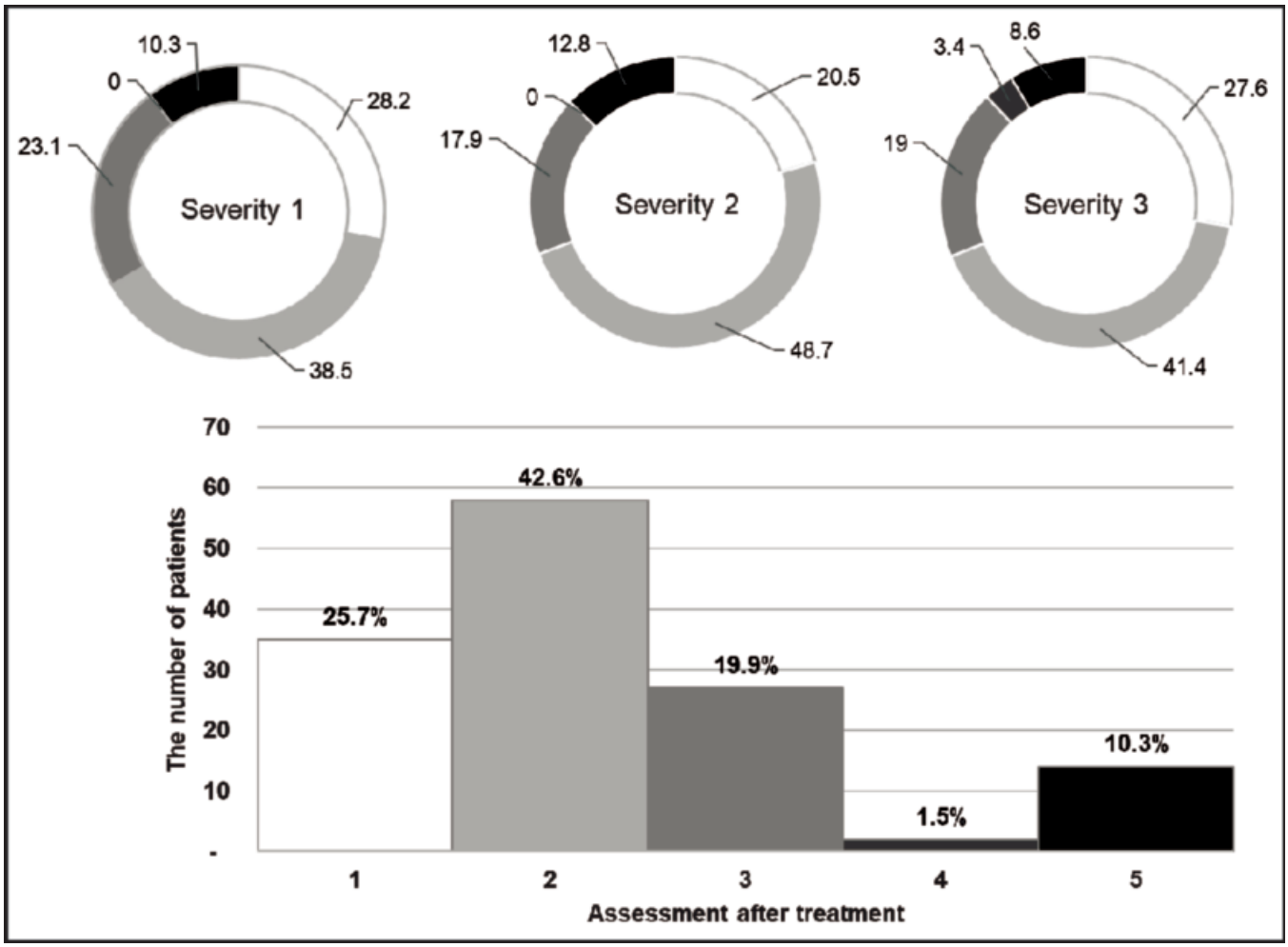

Figure-3: Effectiveness of prescription therapy for different severity levels (1 = cured, 2 = remissive, 3 = unchanged, 4 = worse, 5 = cured but relapsed).

attributes. The results showed that roughly 70% of the patients felt better after the treatment. No difference in the percentages of positive clinical outcomes (cured and remissive) was found among the three severity groups ($\chi^2 = 0.08$, $p = 0.96$) or between the two locality groups (i.e., Ho Chi Minh City and provinces) ($\chi^2 = 2.61$, $p = 0.11$).

Discussion

The eczema treatments implemented by medical centers in different countries can vary, thus preventing commensurable comparisons. The patients in the present study did not undergo non-pharmacological therapies, and 61 of them were not prescribed medications specifically for eczema treatment. Various studies also calculated the economic burden originating from eczema therapies and services other than prescription treatment.[9,11,12] The estimates in the current work were lower than those in other research, but because each research was carried out in a different country, the unit cost applied varied. An Italian study[12] on chronic hand eczema found that a patient with the severe form of the disease needs €418.3 per month (US$556.3) for treatment, which is six times higher than the value calculated in the present study (severity three at US$86.9). Another study carried out in central Massachusetts[11] reported that the direct medical cost incurred by a patient with eczema of average severity is US$78.9 (versus US$68.1 in the current research); this figure is applicable to patients taking prescription drugs. The study further indicated that 91.21% of patients use skin moisturizers or lubricants. In contrast to our research, the two aforementioned studies discovered that topical corticosteroids are consumed more frequently than antihistamines.[11,12]

In this study, 14 patients reported that they missed work given that the severity of their eczema symptoms prevented them from carrying on with their tasks or required visits to dermatologists. These absences resulted

in an 8.6% work impairment-double the amount found by Fowler et al. (4.08%).[11] Some of the participants claimed that eczema was an obstacle to work for different reasons, depending on profession. Those who are usually exposed to chemicals or work under sunlight (e.g., farmers, hairdressers, mechanical workers) complained that eczema reduced their productivity; the itching accompanying the condition worsened as they went about their work. The officers and customer care staff could not be confident, and among the housewives, smoke from cooking caused pruritus. These problems resulted in a 26.3% impairment in daily work and is similar to the percentage found by Fowler et al.[11] However, this figure is higher than that calculated by Reilly et al. (18%±22%).[10] The typical characteristic of eczema is that it is a chronic condition that often recurs. In this respect, locality was a factor, which should be paid serious attention because it directly affects sustained therapeutic practice and economic status. A patient living in a province of Vietnam typically paid an average of US$8.5 for treatment, whereas one living in Ho Chi Minh City was required to spend US$0.9. Therefore, the number of visits among patients living in remote areas should be reduced.

The limitations of this study are worth noting. The time allocated to cost evaluation was only one month. This timeframe should be expanded to enable a more accurate assessment and the identification of factors that are relevant to eczema-related economic burdens. Although this study was conducted in one of the most famous dermatological hospitals in Vietnam, multiple centers should be involved, and evaluations should be conducted at the national level to have a comparison between hospitals in several regions.

Conclusion

Locality was a considerable factor in minimizing the financial burden caused by eczema and ensuring that patients completed their therapies. A patient spent an average of US$68.1 for one month of pharmacological treatment. Such expense was affected by the severity of eczema. The disease significantly affected work and daily activities, thereby generating indirect costs from social factors and degrading the quality of life of the patients. The further study could expand this study in several medical centers to generalize figures under social perspective, which can be a proof for decision-makers.

Acknowledgement: The authors acknowledged the support of Director Board of Hospital and healthcare staffs at Ho Chi Minh City Hospital of DermatoVenereolgy for their help in collecting data and all patients for taking their time to attend to this study. The authors would like to thank Ms. Tran Thi Hong Duyen — Head of Pharmacy Department for her contribution toward making this project a success.

Disclaimer: None to declare.

Conflict of Interest: None to declare.

Funding Disclosure: None to declare.

References

1. Silverberg JI, Hanifin JM. Adult eczema prevalence and associations with asthma and other health and demographic factors: a US population-based study. J Allergy Clin Immunol 2013;132:1132-8.
2. Williams HC. Clinical practice. Atopic dermatitis. N Engl J Med 2005;352:2314-24.
3. Chamlin SL, Chren MM. Quality-of-life outcomes and measurement in childhood atopic dermatitis. Immunol Allergy Clin North Am 2010;30:281-8.
4. Strom MA, Fishbein AB, Paller AS, Silverberg JI. Association between atopic dermatitis and attention deficit hyperactivity disorder in U.S. children and adults. Br J Dermatol 2016;175:920-929.
5. Herd RM, Tidman MJ, Prescott RJ, Hunter JA. The cost of atopic eczema. Br J Dermatol 1996;135:20-3.
6. Bickers DR, Lim HW, Margolis D, Weinstock MA, Goodman C, Faulkner E, et al. The burden of skin diseases: 2004 a joint project of the American Academy of Dermatology Association and the Society for Investigative Dermatology. J Am Acad Dermatol 2006;55:490-500.
7. Handa S, Jain N, Narang T. Cost of care of atopic dermatitis in India. Indian J Dermatol 2015;60:213.
8. Lwanga SK, Lemeshow S. Sample size determination in health studies: A practical manual. Geneva, Switzerland: WHO Press, 1991.
9. Sicras-Mainar A, Navarro-Artieda R, Carrascosa Carrillo JM. Economic Impact of Atopic Dermatitis in Adults: A Population-Based Study (IDEA Study). Actas Dermosifiliogr 2018;109:35-46.
10. Reilly MC, Lavin PT, Kahler KH, Pariser DM. Validation of the dermatology life quality index and the work productivity and activity impairment-chronic hand dermatitis questionnaire in chronic hand dermatitis. J Am Acad Dermatol 2003;48:128-30.
11. Fowler JF, Ghosh A, Sung J, Emani S, Chang J, Den E, et al. Impact of chronic hand dermatitis on quality of life, work productivity, activity impairment, and medical costs. J Am Acad Dermatol 2006;54:448-57.
12. Cortesi PA, Scalone L, Belisari A, Bonamonte D, Cannavò SP, Cristaudo A, et al. Cost and quality of life in patients with severe chronic hand eczema refractory to standard therapy with topical potent corticosteroids. Contact Dermatitis 2014;70:158-68.