RESEARCH ARTICLE

Economic burden of eczema in a middle-income country: A public hospital-based retrospective study in 2016-2017 in Vietnam

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Abstract

Objectives: Eczema, which is synonymous with atopic eczema, is classified as a complex, chronic, and relapsing inflammatory skin condition, affecting both adults and children. However, there has not been any research into health-care expenditure to evaluate the medical cost of eczema from patients' perspective in Vietnam. This retrospective study aimed to fill in the gap concerning the medical cost of eczema treatment from patients' perspective.

Methods: Data from Ho Chi Minh City Hospital of Dermato-Venereology's electronic medical database on demographics and drug therapy from June 2016 to May 2017 were collected. The patients who met the study's criteria were included in the study, and were then categorized as mild, moderate, and severe according to received treatment level. Bootstrapping methods were used to evaluate average and emphasized the difference of cost burden adjusted by factors.

Results: A total of 6,212 patients (52.1% women and 85% urban residents) participated in the study; they were divided into three groups according to treatment stage: mild (n = 3,159, 50.9%), moderate (n = 599, 9.6%), and severe (n = 2,454, 39.5%). The evaluated total cost for the three groups was 5,255.82, 1,064.03, and 5,8154.60 US dollars, respectively; the average expenditure per patient per year was around $12.11 ($11.63-12.59).

Conclusions: The results suggested that the estimated direct medical cost of eczema treatment was much lower than that in the Western countries, mostly because of insurance coverage. The findings provide useful insights into health economic evaluations and treatment costs of eczema in Vietnam.

Keywords: Atopic dermatitis; cost-of-illness; direct medical cost; eczema; Vietnam. (JPMA 69: S-28 (Suppl. 2); 2019)

Introduction

Recent decades have witnessed the large looming accompanied with the variation within geographical peculiarity in the prevalence of skin diseases, especially eczema. Its agile wide-spreading popularity, as well as irritating subjective symptoms and complications that follow have introduced it as one of the most well-known dermatosis with the prevalence of 2-4% in adult globally;[1] the one-year prevalence nearly 10%, whereas the lifetime prevalence can reach 15%,[2] without any signs of halting, particularly in developing countries. There are lots of subtypes of eczema, but atopic dermatitis is the most popular. It is the reason why many people called eczema as atopic dermatitis.

Eczema is often characterized by a variety of clinical dermal polymorphic patterns including recurrent inflammation, chronic regressing, and non-communicable and extremely pruritic state;[3] it is also found to be an early manifestation preceding other allergic maladies, such as asthma, food allergy, or allergic rhinitis.[4] From a pathological point of view, the superficial epidermis of people with atopic dermatitis is observed to have a significantly low level of endogenous antimicrobial peptides,[5] which leads to reduced resistance against bacterial, fungal, and viral pathogens and increased susceptibility to skin infection, especially by Staphylococcus aureus.[6] Besides the deficiency within the innate immune system, genetic mutations, along with several exogenous factors, namely irritants and allergens, have been proved to be one of the causes (to the T cells' low activation responses)[7] that are frequently taking responsibility for the disease.

Dermatology researchers worldwide have recently conducted many studies in order to learn about as many aspects of eczema as possible. This growing interest has largely been because eczema has no known cure and it has many economic and mental adverse effects on patients' lives, particularly in the era of industrialization and modernization. Great efforts have been made to answer questions about the mechanics of the disease, to

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learn about its impact beyond its direct clinical features, to understand its consequences for life quality, and to gain insights into the efficacy of new treatments. The main purpose of these efforts has been to seek a more effective yet less risky way to control or treat eczema or even find a cure for it.[7-10]

Because of people's struggle with financial burdens associated with eczema, dermo-researchers worldwide have given eczema priority in the past few years; many international studies conducted to estimate the economic burden of eczema have conclusively shown the enormous treatment costs associated with this illness. A systematic review in 2016 showed that the annual mean cost per patient ranged from €1,712 to €9,792 (direct cost per patient was €521 to €3,829; indirect cost per patient was €100 to €6,846). Specifically, an earlier study in 2011 in Germany had shown that the annual direct and indirect cost per patient was €1,742 and €386, respectively.[11] In Italy in 2013, the overall mean cost was €5,020 for each patient per year with the loss of productivity being 43.7%.[12] The average sum of cost for integrated and usual care for each Dutch patient was €3,613 (± 798) and €1,576 (± 430), respectively. In Asia, a research in India in 2015 estimated that the mean total cost for atopic dermatitis (AD) was 6,235.00 (± 3,514.00) Indian rupees,[13] which was equivalent to 99.9 (± 56.3) US dollars ($) (according to the exchange rates for 2015 from the Bank of England, 2015). It is clear that patients tend to suffer physically from the symptoms associated with AD (e.g., pain, interrupted sleep, encumbered working or swimming, itching, interference with bathing, etc.), emotionally (e.g., irritability, treatment problems, etc.), and even socially (it has been found that both adults and children avoid interacting with children with AD).[14] Moreover, a recent study analyzing data from the 2007 National Survey of Children's Health has revealed a striking association between eczema (or AD) and mental health disorders, including depression, anxiety, conduct disorder, and autism. The results of this study have reinforced other findings that there is a relationship between AD and psychological disturbances, especially attention deficit hyperactivity disorders (ADHD).[15]

Although eczema has been the main focus of skin disease researchers in the past few years, it is still largely underdeveloped in the laboratories in Vietnam. Thus, there is limited to no official clinical data on eczema treatment and financial aspects among Vietnamese patients. Therefore, this study intended to analyze the financial burden of eczema medical care, which is an initial yet an extremely integral step in controlling and devising monetary plans. This was achieved by accessing and analyzing the cost of eczema diagnosis and treatment from 2016 to 2018 in a public hospital, whilst determining the underlying factors that can mostly influence the overall cost.

Patients and Methods

The study was conducted as a cost-of-illness retrospective investigation utilizing Ho Chi Minh City Hospital of Dermato-Venereology's computerized medical database with the intention of estimating the direct medical cost spent for eczema from June 2016 to May 2017 from the perspective of the insured.

For all the patients who were diagnosed with eczema or AD, using International Statistical Classification of Disease and Related Health Problems, 10th edition (ICD-10), version 2016, the following codes were used: L20: Atopic dermatitis (including L20.0, L20.8, and L20.9); L21: Seborrhoeic dermatitis (including L21.0, L21.1, L21.8, and L21.9); L23: Allergic contact dermatitis (containing L23.0 to L23.9); L24: Irritant contact dermatitis (involving L24.0 to L24.9; L25). Unspecified contact dermatitis (comprising L25.0 to L25.5, L25.8, and L25.9); and L30 (collecting L30.1, L30.2, and L30.9). Patients about whom there was limited key information and had been diagnosed but refused the treatment were not included in this study.

Ho Chi Minh City Hospital of Dermato-Venereology was selected for data collection. Ho Chi Minh City (formerly Saigon) has the largest population in Vietnam. In addition to this, it is affiliated to the Department of Health and is the control site of leprosy, sexually transmitted diseases, and cutaneous conditions in Southern Vietnam; these features made Ho Chi Minh City Hospital of Dermato-Venereology an appropriate site for this study.

Statistical Analysis

Demographic Variable General information, such as case ID, patient age, gender, location, insurance code (which will be calculated into discount percentages in total cost), date of visit, as well as the amount of every kind of drug for each individual, was present within the electronic data. Demographical descriptive methods were used for analyzing the continuous and categorical variables, which summarize the data on demographic characteristics, treatment stages, and cost components.

Cost Measurement Direct medical costs were calculated by summing up the expenditures of visit fee, drugs (including therapy drugs and supplements), cosmetics, as well as medical supplies. The average cost and differences in total expenses between groups were determined using Bootstrap with 1,000 replicates, which were calculated

and interpreted using the P value of <0.05 (95% confidence interval), then converted into 2018 US dollar currency using the Consumer Price Index (CPI) (the World Bank in Vietnam, 2016, 2017) and categorized into the major cost components.

The research protocol approval was provided by the Medical Ethics Council at Ho Chi Minh City Hospital of Dermato-Venereology. The study was conducted under the supervision of the Faculty of Pharmacy of the University of Medicine and Pharmacy at Ho Chi Minh City. Because the data were collected through the hospital's records containing personal information, sensitive data were anonymized to maintain patient confidentiality. The collected data were used exclusively for the research purposes.

Results

Among 9,062 patients whose data were electronically collected, a total of 6,212 participants were included into this study after applying the exclusion criteria. The participants were divided into 3 groups, according to their treatment stage whose classification are shown within Table-1, as follows: mild, 50.85% (n = 3,159); moderate, 9.64% (n = 599); and severe, 39.51% (n=2,454).

Table-2 displays the general characteristics of the study population within the three groups. The mean age of the participants was 49.6 (±22.6), 3,236(52.1%) of the participants were women, and the majority of the population 5280(85%) were from urban areas.

Table-3 depicts the number of patients who used a particular treatment in general as well as among other age groups. As being observed from the Table-3, additional pharmaceuticals were mostly prescribed with the percentage of 55.6 of the

Table-1: Classification of severity according to treatment prescribed.

Mild	Moderate	Severe
Emollients	Immune-suppressants for skin	Oral immune-suppressants
Low-/medium-potency topical corticosteroids	High-potency topical corticosteroids	Complication treating medicine
	Oral corticosteroids	

Table-2: Comparison of participants' demographic information across severity groups and the overall total.

Treatment stage	Mild 3,159 (50.85)		Moderate 599 (9.64)		Severe 2,454 (39.51)		Total 6,212 (100)	
	N	%	N	%	N	%	N	%
Age								
0 - 9	164	2.64	29	0.47	96	1.55	289	4.65
10 - 19	224	3.61	47	0.76	155	2.5	426	6.86
20 - 49	1,117	17.98	198	3.19	748	12.04	2,063	33.21
50 -64	1,029	16.56	190	3.06	857	13.8	2,076	33.42
≥65	625	10.06	135	2.17	598	9.63	1,358	21.86
Sex								
Female	1,681	27.06	336	5.41	1,219	19.62	3,236	52.09
Male	1,478	23.79	263	4.23	1,235	19.88	2,976	47.91
Location								
Urban	2,556	41.15	513	8.26	2,211	35.59	5,280	85.00
Rural	603	9.71	86	1.38	243	3.91	932	15.00

Table-3: Mean medical cost (Bootstrap 95% CI) by age groups.

	N (%)	Age groups					All patients
		0 - 9	10 - 19	20 -49	50 - 64	≥ 65	
Therapy drugs	1476 (23.76)	1.38 (0.79 - 2.12)	1.81 (1.64 - 1.99)	1.59 (1.34 - 1.86)	1.79 (1.51 - 2.11)	2.23 (1.75 - 2.78)	1.81 (1.64 - 1.99)
Additional medications	3457 (55.65)	1.89 (1.53 - 2.28)	3.66 (3.49 - 3.83)	2.94 (2.71 - 3.19)	4.34 (4.03 - 4.68)	4.28 (3.89 - 4.69)	3.66 (3.49 - 3.83)
Complication treating medications	2451 (39.46)	1.89 (1.51 - 2.31)	3.07 (2.93 - 3.23)	2.43 (2.21 - 2.67)	3.47 (3.19 - 3.77)	3.73 (3.39 - 4.08)	3.07 (2.93 - 3.23)
Visit fee	3,496 (56.28)	2.64 (2.27 - 3.04)	3.36 (3.27 - 3.45)	3.09 (2.95 - 3.23)	3.47 (3.32 - 3.62)	3.80 (3.61 - 4.00)	3.36 (3.27 - 3.45)
Total cost per patient	6,212	7.84 (6.55 - 9.24)	12.11 (11.63 - 12.59)	10.48 (9.68 - 11.42)	13.08 (12.29 - 13.91)	14.04 (13.01 - 15.10)	12.11 (11.63 - 12.59)

Table-4: Cost distribution (%) and total cost (USD) according to treatment stages.

	Drugs	Mild	Moderate	Severe
Treatment medicine	Topical medicine	17.82	1.97	1.71
	Immune-suppressants	-	27.19	4.94
	Emollients	1.68	1.63	0.71
	Oral immune-suppressants	-	-	0.02
	Oral corticosteroids	-	0.48	0.21
	High-potency corticoids	-	8.46	1.53
	Low-potency corticoids	4.15	0.68	0.71
Additional pharmaceuticals	H1 anti-histamines	26.61	21.84	26.28
	Mineral and vitamin	4.78	2.65	2.26
	Anti-anxiety	2.04	1.53	2.24
	Insecticide	0.15	0.14	0.31
	Hepatic supplements	0.10	0.03	0.08
	NSAIDS*	0.01	0.04	0.03
	Anti-anaemia medication	0.07	0.01	0.02
	Electrolytes	0.01	0.02	0.02
Complication treatment medications	Antibiotics	-	-	30.97
	Antifungal	-	-	1.88
	Antivirus	-	-	0.01
Total (USD)		5,255.82	10,645.03	58,154.60

Table-5: Average medical cost according to gender and location along with their bootstrap mean differences.

	Gender		Bootstrap mean difference	Location		Bootstrap mean difference
	Female	Male	(according to gender)	Urban	Rural	(according to location)
Therapy drugs	1.47 (1.27 - 1.67)	2.18 (1.88 - 2.51)	0.71 (0.35 - 1.09)	1.82 (1.62 - 2.02)	1.76 (1.33 - 2.27)	0.05 (-0.45 - 0.52)
Additional pharmaceuticals	3.51 (3.29 - 3.74)	3.82 (3.58 - 4.08)	0.32 (-0.03 - 0.65)	3.93 (3.74 - 4.12)	1.79 (1.42 - 2.14)	1.80 (1.42 - 2.15)
Complication treating medications	2.71 (2.52 - 2.90)	3.47 (3.23 - 3.72)	0.77 (0.47 - 1.08)	3.30 (3.13 - 3.48)	1.53 (1.21 - 1.85)	1.53 (1.21 - 1.85)
Visit fee	3.30 (3.18 - 3.41)	3.43 (3.30 - 3.56)	0.13 (-0.03 - 0.31)	3.49 (3.40 - 3.58)	2.63 (2.40 - 2.89)	0.85 (0.58 - 1.11)
Total	11.25 (10.62 - 11.94)	13.03 (12.32 - 13.76)	1.77 (0.82 - 2.73)	12.55 (12.09 - 13.03)	8.31 (7.39 - 9.33)	4.25 (3.16 - 5.29)

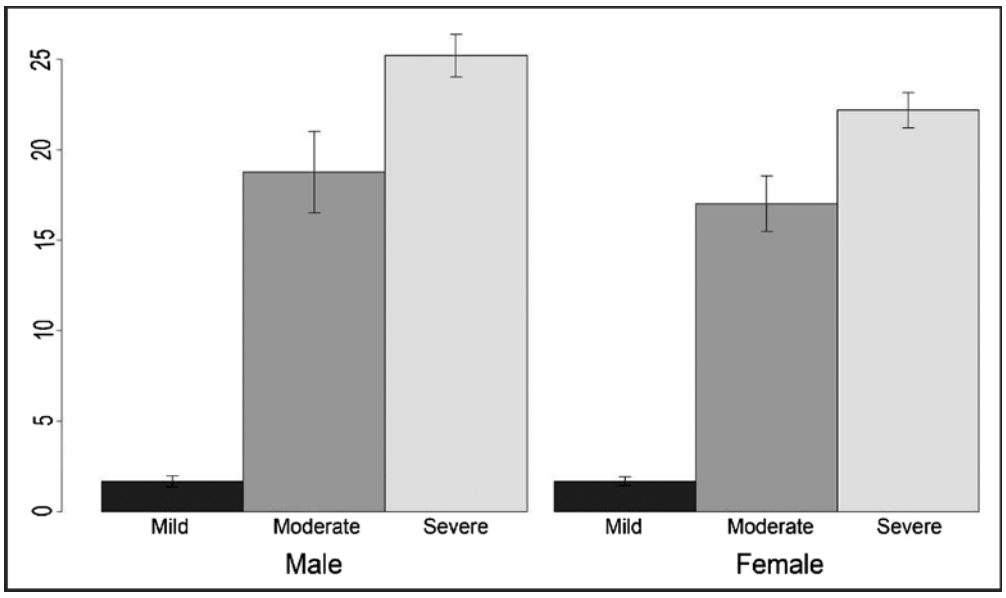

Figure-1: Total cost distribution according to treatment stages between two genders.

included patients; these pharmaceuticals were also the components that incurred the highest expenditure with the mean of $3.66 per patient per year. Visit fee came second with the average cost of $3.36 and was being one of the most popular components for 56.3% of the patients. In total, the mean budget for each individual per year was approximately $12.1 ($11.6 - 12.6). Figure-1 illustrates the allocation of total treatment cost in accordance with the severity of treatment between the two genders. It was evident that there was

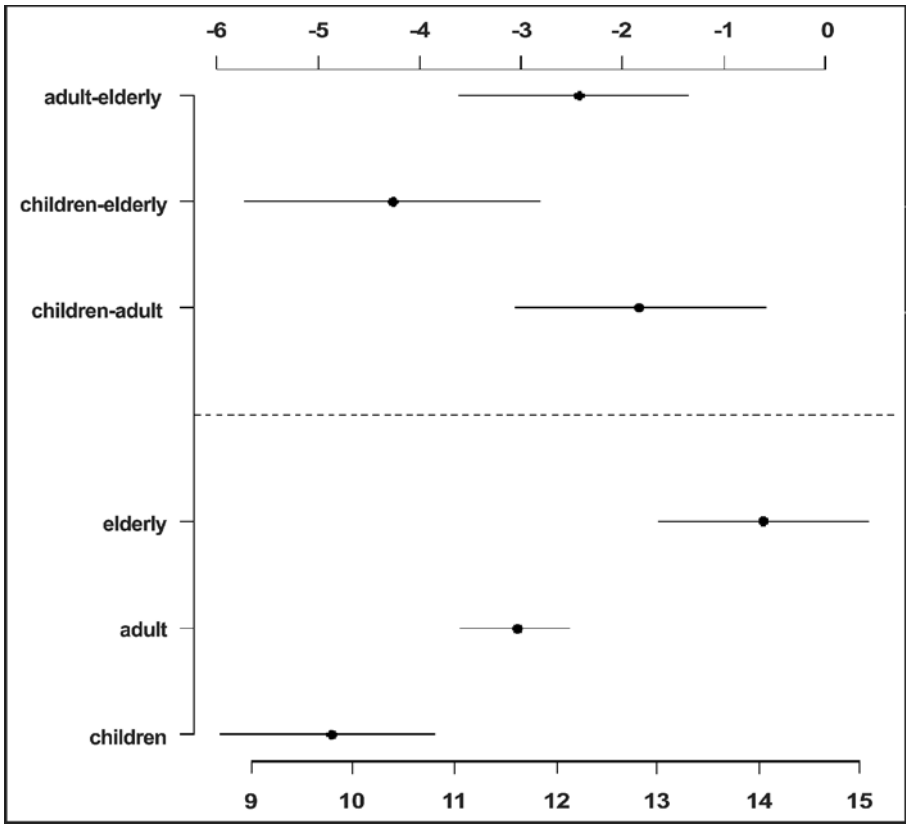

Figure-2: Average cost (USD) differences among age groups by Bootstrap method.

an escalation in the total cost as the severity got increased.

Table-4 exhibits cost disposal, according to the three treatment levels and types of drug therapy. It was apparently shown that antibiotics, which is in the complication treatment class, obtained the highest percentage of total fee (30.2%) of severe treatment; being among the moderate medical care group, immune-suppressants were ranked first by forming 27.19% of the total cost. For the mild group, most of the patients' cost was spent on H1 anti-histamines (26.61%) and topical medicine (17.82%).

Average expenditure, according to gender and location, is exhibited in Table-5. Bootstrap was also used to identify the differences within therapy drugs, complication-treating medications, and the total cost between the two genders. The differences in costs of additional pharmaceuticals, complication-treating medication, visit fee, and total expenditure were also found between the two groups of location whilst average cost differences among groups of age, determined by Bootstrap method, are shown in Figure-2.

Discussion

This study presented essential data on eczema direct medical expenditure, which, to the researchers' best knowledge, is the first study to lay a solid foundation for future studies on insurance-covered expenses from the outpatients' perspectives in Vietnam. As for the study population, data was collected from a prestigious health-care facility that is well-perceived for excellence in managing dermatological diseases like eczema. Thus, the data used for analysis served to demonstrate a more guideline-complying treatment plan than other settings.

The configured statistical results showed that an individual's average expenditure was $12.108 ($11.365 - 12.591) for one year, and the value of the severity level escalated according to treatment stage. There were limited data on patients' assessment of severity, such as physician's global assessment (PGA), modified total lesion symptom score (mTLSS), or photographic guide's (PG) recorded results, which were crucial instruments for the determination and classification of clinical features shown by many previous studies.[11] The overall results of our study, which drew on severity categorization based on the hospital's treatment record, are consistent with other studies, suggesting that severe-state eczema patients have to endure an immense burden as the average expenditure per patient per year was $22.934 ($23.683-24.469). However, compared to other international results, the evaluated cost for eczema treatment was clearly lower. In Asia, Kim et al.'s (2015)[16] study in Korea showed that the mean direct medical cost was 457,038 Korean won (KRW), with severe AD patients being affected by the highest expenditure of 668,682 KRW. In their retrospective study in the US,[17] reported that the average annual direct cost for outpatient services was $176.19 (± $13.79), following the prescribed drugs expenditure of $78.90 (± $5.84). Elsewhere in Germany,[11] utilized a multicenter approach, which showed that the total cost per year per patient was €2,128, including €1,742 direct cost, and the total cost increased with treatment stages I-IV.

It is important to bear in mind that extrapolating these findings to other settings is complicated, mainly because of the distinctness in population groups, data variations, and ways in which health-care systems operate in different countries. The reasons behind the observed variety of the

estimated values can be due to these factors. First, all of our patients were insured (more than one third of the total participants did not have to pay for the treatment, as they were fully covered by the government's insurance policies). Second, only drug prescriptions, medical supplement, and visit fee records were documented, which provided useful information about testing cost components, other hospital treatment service utilization, and out-of-pocket expenses. Finally, cost-effective medication plans were given priority according to the patients' financial circumstances at the time of treatment.

Limitations

This study has several limitations. The main limitation of the study is the deficiency in the recorded data, which precluded a more accurate and complete picture of the the whole aspect of total medical costs. The second limitation is associated with categorizing the disease into mild, moderate, and severe, according to the drugs prescribed; this type of classification can lead to miscalculation of disease severity, despite the fact that considering severity by treatment stage clearly illustrates the impact of expenditure management.

Despite the limitations noted above, the results of this study can be extended to other contexts regarding the burden of eczema on patients from both finance and life quality aspects; the findings in this setting may also be used to explain the key factors contributing to the cost of eczema treatment in other contexts.

Conclusion

Compared to the Western countries, eczema treatment expenditure in Vietnam is largely covered by health insurance, leading to low direct expenditure on eczema treatment. However, a considerable number of patients still have to take on a high burden of their treatment and an increase in total direct cost regarding treatment stages. Hence, great consideration is needed to comprehensively evaluate the effect of eczema on individuals and society in general.

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