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ORIGINAL RESEARCH

Prevalence and Medications of Atopic Dermatitis in Germany: Claims Data Analysis

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Background: Information on the prevalence of atopic dermatitis (AD) varies greatly, and so far, only a few studies describe the healthcare of patients with AD in Germany.

Objective: The aim of the study is to describe the prevalence and medications of people with AD in Germany.

Methods: Health insurance data for the year 2019 were examined. Prevalence rates, the severity of disease, comorbidities and pharmaceutical supply were analyzed. Insured persons with AD were identified with at least one outpatient or inpatient International Classification Code of Diseases (L20).

Results: In 2019, 4.21% [95% CI 4.21−4.22%] of insured persons had AD (3.6 million). Women were affected slightly more frequently than men (4.74% [95% CI 4.73−4.74%] and 3.64% [95% CI 3.64−3.65%]). Adolescents and children under the age of 15 had the highest prevalence of AD compared to other age groups (9.44% [95% CI 9.42−9.46%]). Majority of the insured persons with AD were affected by a mild to moderate form of the disease. The most common co-morbidity was infections of the skin (RR 5.00 [95% CI 4.97−5.02%]). Some patients were treated by a dermatologist, while others by a general practitioner, 39.10% and 36.74%, respectively. Of the anti-inflammatory drugs, systemic glucocorticosteroids preparations were used most frequently and were most frequently prescribed by the general practitioner. With a total of 42,841 prescriptions (1.53%), methotrexate (third-line treatment option) was prescribed more frequently than ciclosporin with 19,628 prescriptions (0.70%) or azathioprine with 25,696 prescriptions (0.92%). Ciclosporin (first-line treatment option) was prescribed much more frequently by a dermatologist (44.00% versus 14.32% by general practitioner). The biological dupilumab was prescribed 30,801 times (1,10%) and was also primarily prescribed by a dermatologist (66.67%).

Conclusion: The present results reveal that a specialist treats approximately one-third of the patients with AD and that there is still a drug undersupply in some cases, especially concerning innovative drugs.

Keywords: epidemiology, frequency of illness, pharmaceutical supply, neurodermatitis, statutory health insurance

Introduction

Atopic dermatitis (AD) is a chronic or chronically recurring inflammatory skin disease, which is accompanied by chronically dry skin and itching (pruritus). The condition can lead to considerable physical and psychological impairment for individuals and their families. People with AD also face financial burdens, social problems and a reduction in quality of life.[1,2] In addition to the high personal burden of disease, AD presents with public health burden and economic consequences with both direct and indirect costs (eg, sick days from work).[3] Evidence

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has supported that the burden on working life is significantly higher for those with AD than their counterparts.[4]

The prevalence of AD has sharply increased in industrialized countries in the last three decades, with rates doubling and tripling for some countries.[5,6] There are inconsistent data on prevalence in the literature, ranging from 5% to 20% in children and adolescents and between 1% and 4% in adults.[7–18] Correspondingly, in Germany, up to 2.4 million adults and almost 1.3 million children are affected every year.

Recent patient-level healthcare studies reveal that a large proportion of patients with AD treated by dermatologists in Germany receive a largely guideline compliant treatment. Despite this and the broad access to topical, systemic drugs and phototherapy for other skin diseases, a relevant part of the German patients still suffers from a high burden of disease and a low quality of life which indicates an insufficient medication.[1,19] In particular, researchers have posited that this may be due to a lack of innovative drugs for systemic treatment.[1] However, there are only few studies only including dermatological care and these studies are of limited sample sizes (between 1000 and 2000 in each study). To gain more extensive and longitudinal insights in healthcare for AD in Germany, the current study was conducted based on nationwide claims data from a German statutory health insurance (SHI).

Materials and Methods

Data Source

For the present study, data were analyzed from the largest and nationwide operating SHI, the Techniker Krankenkasse (TK), which insured 10.5 million Germans in 2019. About 90% (73.0 million persons) of the German population are covered by one of the 105 different SHI companies, whereas 10% are covered by substitutive private health insurance.[20] The study population consists of all TK-insured people of the respective observation year (2019) who were continuously insured or died in this year. This current study analyzed health insurance claims data which included sociodemographic information (eg, age, sex), type of care setting (eg, outpatient and inpatient), and prescribed medication and treatments.[21]

Case Definition and Severity of the Disease

We identified insured patients who have AD, based on the following inclusion criteria:

At least one of the outpatient (ambulatory primary care) or inpatient (hospital-based) International Classification of Diseases (ICD-10-GM, 10th Revision, German modification) codes (L20, L20.0, L20.8, or L20.9).

Health insurance claims data did not provide sufficient information to characterize the severity of AD. Severity of AD was operationalized through surrogate markers such as: a) the need of hospital treatment, b) periods of days off work due to the condition, c) use of systemic drugs approved for moderate to severe atopic dermatitis only. Greater use or need of these indicators corresponded with higher disease severity. In this study, insured people with a moderate to severe form of the disease were identified by at least one of the following additional criteria in the year of observation:

- one inpatient (hospital-based) ICD-10-GM code (main discharge diagnosis) with AD (L20, L20.0, L20.8, or L20.9) or
- one specific prescription of systemic agents (Table 1 – see ATC for moderate to severe) or
- one day of incapacity to work due to AD (L20, L20.0, L20.8, or L20.9).

Comorbidities, Pharmaceutical Supply and Prescriber

Relevant comorbidities were identified through outpatient ICD-10-GM diagnoses (Table 2). All outpatient drug prescriptions (via Anatomical Therapeutic Chemical (ATC) Classification System) for the treatment of patients with AD were identified (Table 1) and categorized by the prescriber (classification of doctor groups according to KBV (2019): general practitioner (GP) (01/02), dermatologist (21), pediatrician (34−47), internist (03, 23−30, 32−33)). Individual combinations of drug agents were grouped for analyses.

Standards and Ethics

The study was conducted according to the national guidelines for the use of administrative databases.[23,24] Based on these guidelines, no approval of an ethical committee is required.

Statistical Analysis

The annual prevalence rates are reported as percent values with 95% confidence intervals (CI). All results were extrapolated by means of direct standardization according to KM 6 statistics (all SHI-insured people in Germany[25]) by

Table 1 Relevant Drugs in Atopic Dermatitis Care

	Group	ATC	Moderate to Severe Form
Topical	Antibiotics	D06A	
	Antihistamines	D04AA	
	Crisaborol	D11AH06	
	Cromoglicic acid	D11AH03	
	Urea	D02AE	
	Glucocorticosteroids*	D07	
	Class I	D07AA	
	Class II	D07AB	
	Class III	D07AC	
	Class IV	D07AD	
	Combinations with antiseptics	D07B	
	Combinations with antibiotics	D07C	
	Other combinations	D07X	
	Pimecrolimus	D11AH02	
	Psoralene	D05AD	
	Tacrolimus	D11AH01	
	Tars	D05AA	
Systemic, non-anti-inflammatory	Antibiotics	J01	
	Antihistamines	R06A	
Systemic, anti-inflammatory, biologics	Dupilumab	D11AH05	X
Systemic, anti-inflammatory, nonbiologicals	Azathioprine	L04AX01	X
	Ciclosporin	L04AD01	X
	Alitretinoin	D11AH04	X
	Glucocorticosteroids	H02AB	X
	Methotrexat	L01BA01	X
		L04AX03	X
		M01CX01	X
	Mycophenolic acid	L04AA06	X
	Psoralene	D05BA02	X

Notes: *The classes of topical glucocorticosteroids based on the national classification:[22] Class I = weakly effective, Class II = moderately effective, Class III = strongly effective and Class IV = very strongly effective. In practical use, the potency is not necessarily associated with more frequent adverse effects.

Abbreviation: ATC, Anatomical Therapeutic Chemical Classification System.

age, sex and SHI region to the population of all SHI-insured people of the respective year. Differences between the comorbidities of the respective populations considered (AD vs no AD) were presented using rate ratios (RR) with the respective 95% CI. All analyses were performed using the statistical software SAS version 9.4 (SAS Institute Inc., Cary, NC).

Table 2 Relevant Comorbidities/Conditions of Atopic Dermatitis Comorbidity

	ICD-10-GM Code
Obesity	E66
Pruritus	L29
Allergic rhinitis	J30
Cataract	H25, H26
Uveitis	H44.1
Alopecia areata	L63
Ulcerative colitis	K51
Crohn's disease	K50
Periodontitis	K05.2, K05.3, K05.4, K05.5, K05.6
Vitiligo	L80
Lymphoma	C81–C85, C88, C90, C96
Herpes virus infection	B00
Infections of the skin	L01
ADHD	F90.0, F90.1, F90.8, F90.9, F98.8
Chronic fatigue syndrome	G93.3
Migraine	G43
Sleep apnea	G47.3
Depression	F32, F33
Disease of the metabolic form circle	E11, E13, E14 E78.0 E78 I10–I13 E79 E66

Abbreviation: ADHD, attention deficit hyperactivity disorder.

Results

Baseline Characteristics

The following analyses are based on an extrapolated insured population of all insured people in the SHI (73.0 million) with approximately 37.9 million women and 35.0 million men.

Prevalence

The prevalence of AD in the year 2019 was 4.21% [95% CI 4.12–4.22%; 3.6 million]. Women were slightly more affected

Table 3 Age Standardized Prevalence of Atopic Dermatitis by Five-Year Age Groups (Insured Persons in SHI in 2019; N = 73,007,114)

Age Group	Male			Female			Total		
	n	%	CI	n	%	CI	n	%	CI
<15 years	471,410	9.62	9.60–9.65	428,653	924	9.21–9.27	900,062	9.44	9.42–9.46
15–19 years	84,536	4.77	4.74–4.81	104,314	6.29	6.25–6.33	188,850	5.51	5.48–5.53
20–24 years	65,604	3.13	3.10–3.15	100,734	5.22	5.19–5.25	166,338	4.13	4.11–4.15
24–29 years	64,905	2.76	2.74–2.78	102,453	4.67	4.64–4.69	167,358	3.68	3.67–3.70
30–34 years	68,066	2.68	2.66–2.70	112,416	4.64	4.61–4.66	180,482	3.64	3.62–3.65
35–39 years	60,990	2.55	2.53–2.57	102,622	4.33	4.30–4.36	163,612	3.44	3.42–3.45
40–44 years	51,597	2.40	2.38–2.42	94,105	4.25	4.23–4.28	145,702	3.34	3.32–3.36
45–49 years	52,663	2.36	2.34–2.38	96,584	4.09	4.07–4.12	149,247	3.25	3.24–3.27
50–54 years	67,900	2.40	2.38–2.42	126,181	4.17	4.14–4.19	194,081	3.31	3.30–3.33
55–59 years	67,314	2.38	2.36–2.39	123,169	4.01	3.99–4.04	190,483	3.23	3.21–3.24
60–64 years	54,896	2.40	2.38–2.42	99,083	3.84	3.82–3.87	153,979	3.16	3.15–3.18
65–69 years	45,509	2.40	2.37–2.42	82,909	3.64	3.62–3.67	128,419	3.08	3.06–3.09
70–74 years	33,335	2.38	2.35–2.40	59,664	3.38	3.36–3.41	92,999	2.94	2.92–2.96
75–79 years	37,561	2.57	2.54–2.59	61,822	3.13	3.11–3.16	99,383	2.89	2.87–2.91
80–84 years	33,328	2.73	2.70–2.76	57,185	3.13	3.11–3.16	90,513	2.97	2.95–2.99
85–89 years	14,528	2.71	2.67–2.76	27,126	2.78	2.75–2.81	41,654	2.76	2.73–2.78
≥90 years	5,540	2.58	2.51–2.65	15,393	2.51	2.47–2.55	20,934	2.53	2.49–2.56
Total	1,279,682	3.64	3.64–3.65	1,794,414	4.74	4.73–4.74	3,074,095	4.21	4.21–4.22

than men (4.74% [95% CI 4.73−4.74%] and 3.64% [95% CI 3.64−3.65%]). For those under the age of 15, sex was more equally distributed, with 9.24% [95% CI 9.21−9.27%] in girls and 9.62% [95% CI 9.60−9.65%] in boys. Prevalence differed by age group; insured people under 15 years of age (9.44% [95% CI 9.42−9.46%]; 900,062; Table 3) had the highest rates. For 15 to 20 year-olds, the prevalence rate was 5.51% [95% CI 5.48−5.53%], and only 2.94% [95% CI 2.92−2.96%] of people between 70 and 75 had an AD diagnosis. From the age of 20 years and older, the prevalence was 3.31% [95% CI 3.30 −3.31%], ie, less than half than among those under 15 years of age.

Severity of Disease

Approximately 12.70% of the TK-insured persons with AD were affected by a moderate to severe form of the disease. Among the under 15-year-olds, 11.34% of the patients with AD were affected by a moderate to severe form of the disease. In the age group of 20-year-olds and older, this proportion was slightly higher with 31.27% without a clear difference between the sexes (male 12.92%, female 13.47%). Among those under 15 years of age, moderate to severe AD appeared in 9.07% of female, compared to around 13.40% of male patients.

Comorbidities/Conditions

Compared with patients without AD, patients with AD had a higher likelihood of the following comorbidities or conditions: infections of the skin (RR = 5.0 [95% CI = 5.0 −5.0%]), pruritus (RR = 2.9 [95% CI = 2.9−2.9%]), alopecia areata (RR = 2.8 [95% CI = 2.8−2.8%]) and allergic rhinitis (RR = 2.6 [95% CI = 2.6−2.6%]) (Figure 1).

Medication

In total, 63.16% of the insured persons with AD were treated with topical or systemic drug therapy. Approximately 60% of the children under the age of 15 years received relevant drug treatment. From the age of over 75 years, more than 70% of the insured persons with AD received relevant drug treatment. Women over 20 years old received a prescription drug for their AD more often than men (66.19% vs 62.59%). With 2.3 million prescriptions, they had a higher total prescription volume than men (1.3 million).

About 41.60% of the insured persons with AD received a topical drug and 41.11% a systemic drug. Most frequently (65.88%), insured people with AD received topical corticosteroids (class III – classification of topical glucocorticosteroids, Table 1). Tacrolimus ointment was administered to 6.31% of the participants. The majority of the insured people with AD got antibiotics (non-anti-inflammatory at

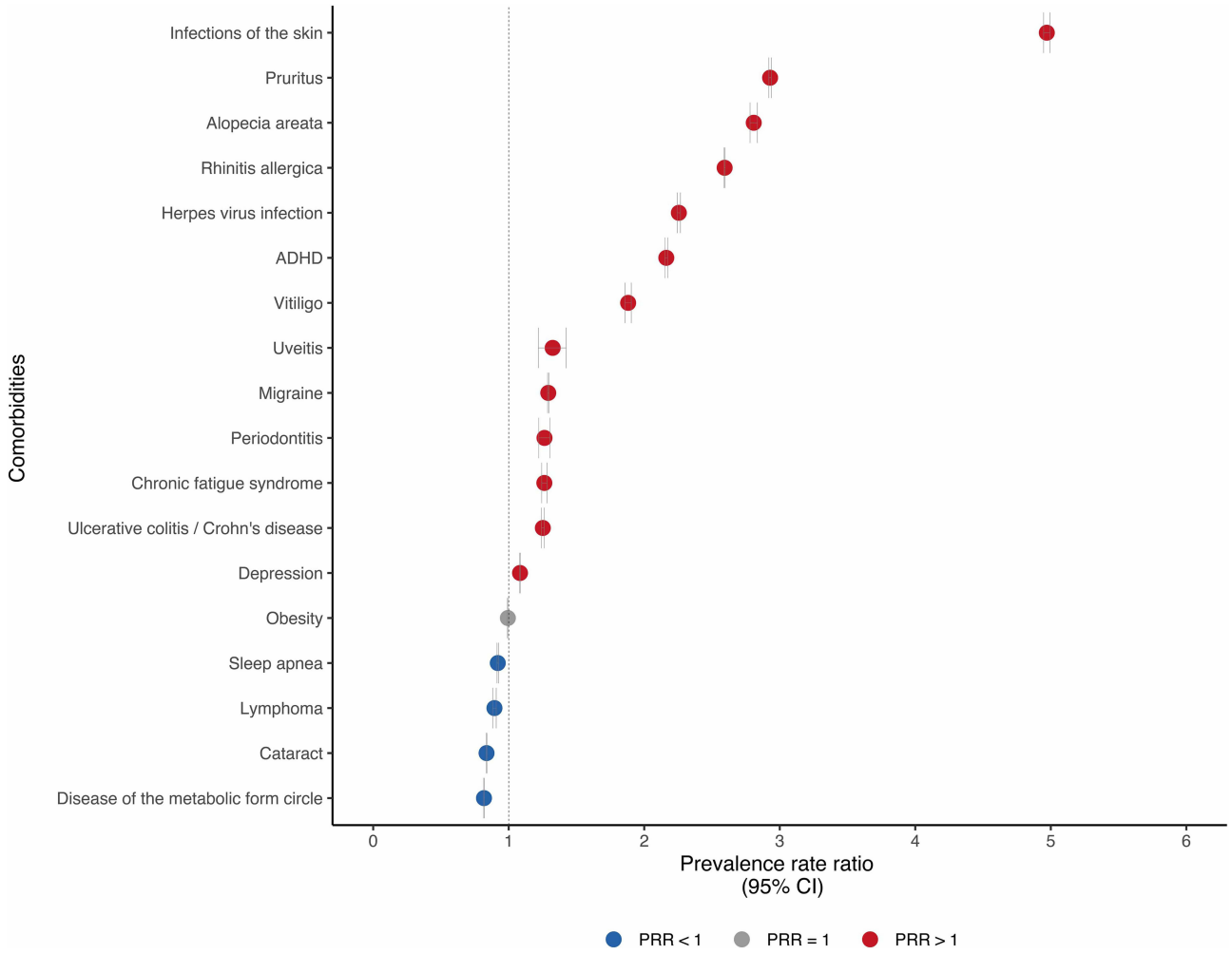

Figure 1 Most frequent comorbidities in 2018 in relation: prevalence among insured people with atopic dermatitis/prevalence among insured people without atopic dermatitis.
Abbreviation: ADHD, attention deficit hyperactivity disorder.

74.20%). About 23.48% received antihistamines with a total of 514,423 prescriptions. Systemic glucocorticosteroids preparations were used most frequently by 24.99% of the insured persons. Biologic therapy using a monoclonal antibody, dupilumab, was used in 0.64% of patients (Table 4).

Prescribers

Almost 40% of the relevant drugs were prescribed by a dermatologist, followed by GPs with 36.74%. Pediatricians and doctors of internal medicine take a lower prescription share in the care of patients with AD with 23.10% and 15.62%, respectively.

Of the anti-inflammatory drugs, systemic glucocorticosteroids preparations are used most frequently and are most often prescribed by a GP (35.67%). The system-therapeutic agent methotrexate is most often prescribed by an internist (58.47%). In comparison, ciclosporin is prescribed by a dermatologist much more frequently, at 44.00%. The biological agent dupilumab, which was approved by the US Food and Drug Administration (FDA) and the European Medicines Agency (EMA) in 2017, has so far been prescribed primarily, at 66.67% by dermatologists (Figure 2).

Tacrolimus was comparatively rarely prescribed. The share of this prescription of tacrolimus and pimecrolimus by pediatricians is comparatively low in comparison to dermatologists, who mainly use urea and topical antibiotics. Within the topical corticosteroid classes, class I and class II drugs will be prescribed more frequently by GPs and pediatricians than by dermatologists (Figure 2).

Table 4 Prescriptions of Relevant Drugs in Atopic Dermatitis Care (Insured Persons with AD in 2019; N = 3,074,095)

Drug Substance		n	%	mo	DDD
Total topical		1,278,832	41.60	2,421,505	82,888,415
	Glucocorticosteroids*	1,132,908	88.59	1,962,611	75,007,526
	Class I	58,933	4.60	74,125	1,808,408
	Class II	148,178	11.59	198,530	4,494,494
	Class III	842,555	65.88	1,328,779	60,003,876
	Class IV	83,885	6.56	126,024	4,404,052
	Combinations with antiseptics	114,517	8.59	146,114	2,145,606
	Combinations with antibiotics	27,340	2.13	35,132	646,916
	Other combinations	37,431	2.93	53,907	1,504,174
	Tacrolimus	80,715	6.31	111,408	2,008,820
	Pimecrolimus	123,567	9.66	171,022	3,099,646
	Urea	13,634	1.07	20,543	1,346,989
	Antibiotics	128,593	10.06	152,964	1,063,297
	Tars	2,151	0.17	2,957	362,137
Total systemic		1,263,857	41.11	2,803,926	63,023,747
Non-anti-inflammatory	Antibiotics	937,824	74.20	1,602,249	13,732,287
	Antihistamines	296,855	23.48	514,423	20,890,776
Anti-inflammatory, biologics	Dupilumab	8,151	0.64	30,801	2,116,818
Anti-inflammatory, non-biologicals	Glucocorticosteroids	315,835	24.99	549,323	21,291,204
	Methotrexat	14,123	1.12	42,841	2,928,436
	Azathioprine	4,639	0.37	25,696	966,059
	Ciclosporin	3,370	0.27	19,628	402,420
	Alitretinoin	2,258	0.18	10,263	380,638
	Mycophenolic acid	1,491	0.12	8,701	315,109

Notes: *The classes of topical glucocorticosteroids based on the national classification:[22] Class I = weakly effective, Class II = moderately effective, Class III = strongly effective and Class IV = very strongly effective. In practical use, the potency is not necessarily associated with more frequent adverse effects.
Abbreviations: n, number of patients; mo, medication order; DDD, defined daily dose.

Discussion

With a total prevalence of 4.21% in 2019, about 3.6 million persons in Germany had AD. The annual prevalence among adults over 20 years of age was 3.31%. Another prevalence study using health insurance data of adults found marginally higher prevalence rates.[14] Possibly, differences may be attributed to minimum age of the samples (≥20 years vs ≥18 years). Analyses based on survey data showed lower prevalence of 1.45% among employed people in 2017[17] and 2.2% in 2011.[12] In these studies, it could also be shown that women suffered from AD more frequently than men. These databases are only comparable to a limited extent since there are insured members in the SHI population that may not be employed.

The highest prevalence of 9.24% was seen in children under 15 years. The German Health Interview and Examination Survey for Children and Adolescents (KiGGS study) indicates a comparable overall prevalence of 7.0% in children and adolescents under 17 years.[16] Another study with health insurance data with almost 300,000 insured children showed a prevalence of 10.4% in 2009.[13] The authors also reported a high prevalence of 17.1% at a young age (0 to 2 years) and a marked decrease to 7.3% at the age of 14 to 18 years.[13] Comparable distributions in childhood were also found in Korea. Here, the highest prevalence was found in preschool (11.3%) and school-age children (14.6%).[18]

Patients with AD have an increasing risk of skin infections, pruritus, alopecia areata and rhinitis allergica[14,26–29] which has also been shown in other studies. According to the recommendations of the German S2k guideline on diagnosis and treatment of AD, allergic rhinitis should be considered as a contributing factor. Furthermore, the guideline refers to the association of AD with mental illness.[30]

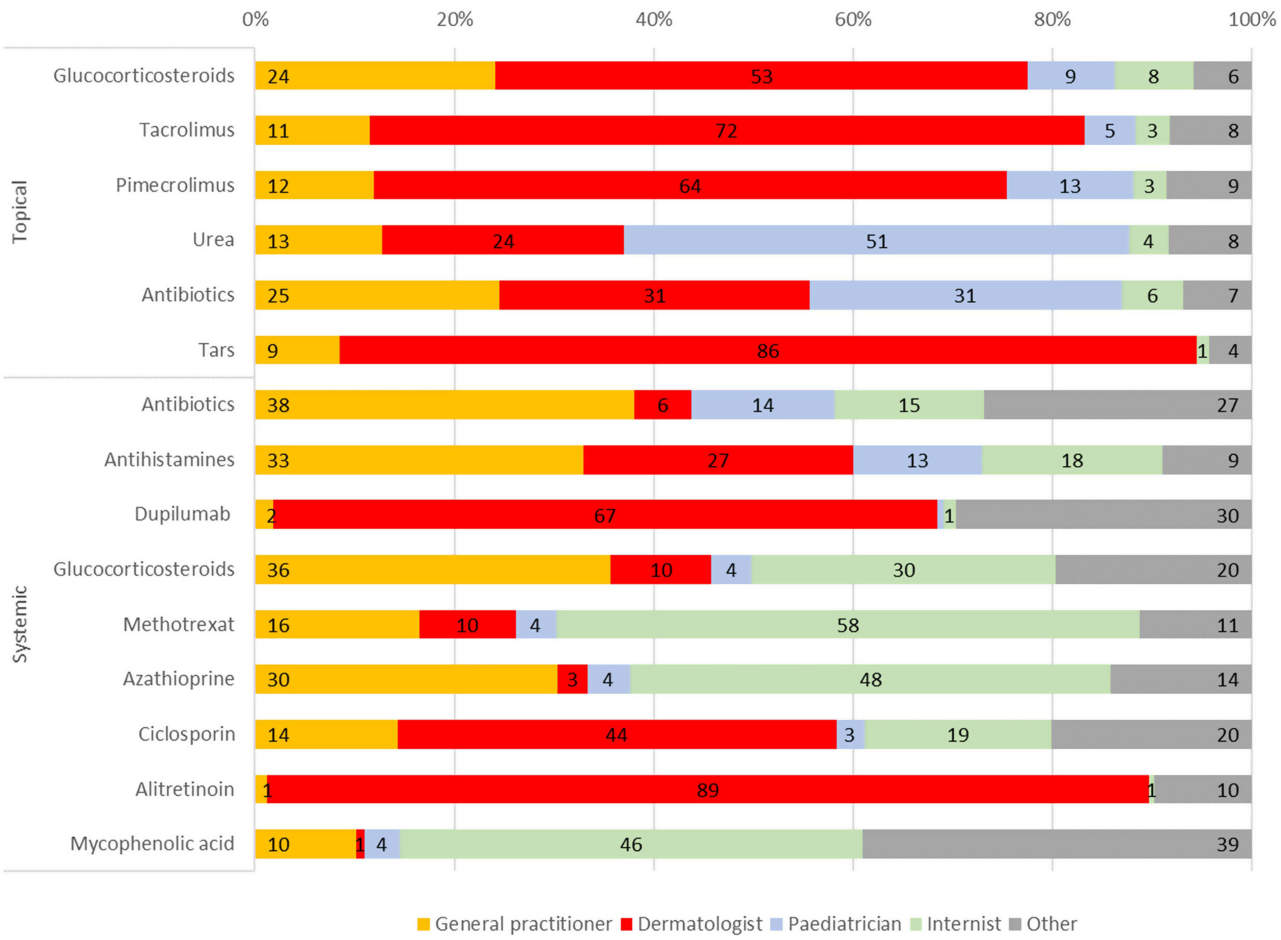

Figure 2 Prescriptions of relevant drugs (DDD in %) in atopic dermatitis care by medical specialist designation.

Tracing back prescriptions predominantly to glucocorticoid steroids and calcineurin inhibitors, the analyses of topical therapies indicated a guideline-appropriate supply in the majority of cases.[30,32] Most frequently, the patients received ointments containing topical glucocorticosteroids, especially class III. The authors of a cross-sectional study on healthcare science came to a similar conclusion.[19] At the same time, therapies which are useful according to guidelines and clinical studies, especially the tacrolimus or pimecrolimus ointment, which only 6.31% and 9.66% of the insured receive, are not sufficiently used.[33,34] In contrast, the proportion of tacrolimus by pediatricians is comparatively low. However, urea and topical antibiotics are most frequently used by pediatricians. Their indication must be critically reviewed in further analyses, as they do not represent a standard in care. Within the prescribed topical corticosteroid classes, it is positive that preparations of drug class III are used most frequently, which also corresponds to the guidelines.

Again, it should be questioned that preparations of the corticosteroid classes I and II are more often prescribed by GPs and paediatricians than by dermatologists. In children and adolescents, as well as in adults in general, it is better to use class III or class IV topical treatments while maintaining the maximum duration of use rather than class I continuous administration. Clinical studies show that the use of moderate to potent topical glucocorticosteroids can lead to shorter treatment times, indicating greater success and possibly fewer side effects, resulting in greater success with fewer side effects.[31,32]

Of the anti-inflammatory drugs, systemic glucocorticosteroid preparations are used most frequently and are most often prescribed by a GP. Since systemic glucocorticosteroids should only be used in acute attacks and were associated with a lower quality of life and lower satisfaction parameters,[19] their use should be reconsidered. Other systemic therapeutic agents (ciclosporin, azathioprine, methotrexate, mycophenolic acid), which are usually

associated with more severe side effects, were prescribed to a small proportion of the insured persons (1.9%). Methotrexate, which is classified as a third-line treatment option for moderate to severe AD, is most often prescribed by a GP. Although these are not approved for permanent use, the average number of daily doses (defined daily dose per insured person) showed that methotrexate or azathioprine are used as permanent therapy. It should be noted that systemic therapeutics such as methotrexate are also approved to treat other conditions; the database does not contain reasons for each prescription. Ciclosporin as first-line treatment option[35,36] is prescribed significantly more frequently by a dermatologist in the present analysis.

The new treatment option dupilumab is the first approved biological agent (April 2017) for the treatment of adult and adolescent patients with moderate to severe AD, whose disease is not adequately controlled by topical prescription therapies or when such therapies are not advisable.[37,38] With a relatively low share of 0.64%, insured people were treated with dupilumab, which has so far been primarily prescribed by dermatologists. Although it is not possible to estimate the proportion of people for whom the therapy is advisable, the low percentage is still worth increasing. In comparison, the majority of patients with severe AD in the Treatment of Atopic eczema (TREAT) Registry are treated with dupilumab or ciclosporin.[26,39] It should be noted that the registry contains only patients with moderate to severe AD treated in dermatological clinics or by dermatological GPs and thus in a specialized setting.

Strengths and Limitations of the Work

Epidemiological and scientific data are needed to improve healthcare planning and a more targeted use of existing resources of the German healthcare system. SHI data can be used to analyze or describe morbidity estimates, utilization of health services, care patterns, quality of healthcare, resource consumption and costs.[24,40] The data are based on a large population, are cross-sectoral (eg, outpatient and inpatient care, prescribed treatments) and insured people can be viewed over a long period. Another advantage of routine SHI data is the absence of recall or selection bias. Furthermore, a number of limitations has to be considered. The reliability of the estimated prevalence and the care situation may be limited by a) the encryption of the diagnoses b) underserved morbidity c) over-the-counter (OTC) drugs or d) the considered population. The proportion of people with AD could be higher and limits the reliability of the statements.[40] (a) For example, due to insufficient or missing differential diagnosis (misdiagnosis, eg, psoriasis or eczema) or due to the coding behavior of the practitioner. (b) The influence of under-reporting due to untreated morbidity is estimated to be relatively low as AD is considered a severe disease that significantly restricts the patient's quality of life. Thus, patients are likely to make use of healthcare services. (c) A large proportion of patients with AD were treated with topical drugs. Many topical drugs used in the treatment of AD are available without prescription. From other primary studies, many patients reported treating their AD with OTC drugs.[1] Unfortunately, it is not possible to determine or estimate how often this occurs within the present SHI data. We presented data on people insured through a public system and therefore cannot make statements about those insured with private healthcare (10% of the German population[20]). Furthermore, the analysis conducted here is based on data of only one health insurance company. The prevalence estimate may not be generalizable to the entire SHI system, or the German population. Even the standardization of data according to age and sex cannot fully eliminate this assumption.[41] For internal consistency checks, a comparison of administrative morbidity rates from different data sources should be sought.

Conclusion

The present results show that AD is a common skin disease affecting mainly children. Patients with AD often suffer from comorbidities that should be considered when choosing treatment. In addition, our results show that only one-third of patients are treated by a specialist and in some cases there is still a significant underuse, especially with regard to innovative drugs. Interdisciplinary care provided by specialists such as dermatologists could address the underuse as well as establishing innovative drugs as an option in standard AD care. Furthermore, a reduction of systemic glucocorticosteroids, which are mainly prescribed by GPs, should be aimed at against the background that alternatives already conforming to the guidelines are available.

Children, who suffer most frequently from AD, are particularly limited in their quality of life. A guideline-based therapy, therefore, plays a particularly important role for these patients. Innovative drugs will also be approved more frequently for this age group in the future. Furthermore, the limited number of studies on this vulnerable patient group therefore be given more scientific attention in the future. Further research projects should aim to

describe the healthcare of children to identify undersupply and to derive recommendations for action.

Abbreviations

AD, atopic dermatitis; SHI, statutory health insurance; TK, Techniker Krankenkasse; ICD-10-GM, International Classification of Diseases codes German modification; ATC, Anatomical Therapeutic Chemical; CI, 95% confidence intervals; RR, rate ratios; FDA, Food and Drug Administration; EMA, European Medicines Agency; GP, general practitioner; OTC, over-the-counter.

Data Sharing Statement

The data of the statutory health insurance (SHI) are primarily documented for billing purposes. According to § 287 of the German Social Code, Book V, the statutory health insurance funds are allowed to evaluate their data files under certain conditions for scientific research projects according to § 303 a (data transparency).

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