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Impact of allergic reactions and urticaria on mental health and quality of life

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Abstract

Background: Allergic diseases represent a major global health issue with more than one-third of the global population affected by at least one allergic condition. Allergic conditions can not only cause life-threatening anaphylactic reactions but also impact daily life with a significant influence on mental health and the quality of life (QoL).

Objectives: This study aims to evaluate the health-related QoL and depression severity among patients presenting in a tertiary care allergy center.

Methods: A cross-sectional study was conducted among 596 patients presenting with allergic symptoms or previously diagnosed allergies between October 2018 and April 2019.

Patients were screened for depression and the QoL impairment by using three validated scales: the Beck Depression Inventory (BDI), the Dermatologic Life Quality Index (DLQI), and the three-level version of the EuroQol 5-Dimensional (EQ-5D-3L) scale.

Results: One-third (34.8%) of the study population was male and two-thirds (65.2%) were female. About 73.7% (n = 427/579) of the patients suffered from at least one previously diagnosed allergic disease, most frequently to pollen (37.0%, n = 214/579) and food (27.3%, n = 158/579), and 20.0% (n = 116/579) suffered from urticaria. About 19.3% of the total population suffered from depression. Urticaria, as well as insect venom, food/food additives, and drug allergies significantly affected the QoL and depression severity (p < 0.001), reflected by higher DLQI and BDI scores, and lower scores in the EQ5D-3L index.

Conclusion: Our results provide evidence for a possible correlation of allergies (e.g. against insect venom, food/food additives, and drugs) and/or urticaria with a reduced QoL and a higher depression rate. Patients particularly indicated restrictions for the dimensions, pain/discomfort as well as anxiety/depression. It might be beneficial to implement a standardized questionnaire as a regular screening method for evaluating the mental health status of patients with allergies and/or urticaria.

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Introduction

The prevalence of allergies and allergic diseases (e.g., allergic rhinitis) has noticeably increased over the last century, with about 30–40% of the world population affected by at least one allergic condition.¹ Allergies are caused by an aberrant immunological response to an otherwise harmless environmental stimulus and are commonly divided into four different types (I–IV).² Type I hypersensitivity reactions are immediate reactions mediated by preformed Immunoglobulin E (IgE) antibodies on the surface of mast cells crosslinking with the antigen and subsequently leading to the release of inflammatory cytokines within minutes.³ Clinical findings may vary from mild pruritus and rash to severe anaphylaxis, including dyspnea, bronchospasm, and hypotension.⁴ In Western countries—e.g., in the United States—10.7% of children reported allergies against aeroallergens⁵ and 8% against food, mostly against chicken egg white, cow's milk, soy, wheat, fish, walnut, and legumes.⁶ Furthermore, 10–30% of the global population suffers from allergic rhinitis,¹ and in 50% of the cases, pollen allergies are accompanied by cross allergies against food or food additives.⁷ Moreover, one of the most common reasons in adults for severe anaphylactic reactions including hypotension and bronchospasm are hymenopteran venom allergies.⁸ A study from 2005 showed that one-third of the patients with hymenopteran venom allergies developed severe life-threatening symptoms, resulting in a decreased QoL of those patients.^{9,10} Similar to type I allergies, urticaria is also mediated by mast cell activation and belongs to the most common dermatological skin diseases worldwide. It can last for years and then cause considerable distress due to its severe pruritus.¹¹ The etiology of urticaria has not been fully elucidated yet, but different triggers such as type I allergies, pseudoallergies, autoimmunity, drugs, and infections have been identified as causal factors.¹² Urticaria is characterized by highly pruritic wheals with rapid fluctuation within 24 h which may be accompanied by angioedema, with a 2:1 ratio of prevalence in women than men.^{11,13} Therapeutically, the use of antihistamines, mast cell stabilizers, or anti-IgE-receptor antibodies can be considered. Furthermore, for type I allergies, e.g., hay fever and hymenopteran venom allergies, patients can receive a specific immunotherapy.¹⁴ However, type I allergies and urticaria affect a large number of people worldwide and can cause severe distress leading to a reduced QoL.^{9,15–17} In this study, we assessed the health-related quality of life (HRQoL) and the epidemiological characteristics of depression in patients suffering from immediate-type hypersensitivity reactions and/or urticaria.

Methods

Study participants

Following ethical approval granted by the Ethics Committee of Ludwig-Maximilian-University (LMU), Munich, Germany, the anonymous survey was prospectively conducted among 596 patients presenting between October 2018 and April 2019 in the allergy outpatient clinic of the Dermatology and Allergy Department, University Hospital, LMU Munich.

Adult patients, aged ≥ 18 years, were asked by either a physician or a nurse to complete a self-administered five-page questionnaire. Participation was voluntary, not incentivized, and all participants consented verbally before completing the questionnaire. Refusals were not additionally documented. In compliance with the cross-sectional study design, each patient could participate only once in the study.

Survey

The questionnaire included items on individual characteristics, past medical history of specific allergy entities, HRQoL utilizing validated questionnaires (DLQI, EQ-5D-3L), and severity of depression using the Beck Depression Inventory (BDI). In the questionnaire, questions were not distinguished between those pertinent to allergy and those pertinent to intolerance reactions. The 3-level version of the EuroQol 5-dimensional (EQ-5D-3L) questionnaire measured the generic health status with regard to five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression in three levels.¹⁸ We calculated an index for EQ5D-3L with a maximum of 1, representing the best generic health status for the patient. The Dermatology Life Quality Index (DLQI) measures the HRQoL of people suffering from a skin disease within the previous 7 days.¹⁹ A score of zero indicated no impact, while a score of 30 represented a very severe impairment of the QoL. The BDI was a 21-question multiple-choice psychometric test for measuring the severity of depression. A BDI score value from 12 to 18 was interpreted as mild depression, from 19 to 29 as moderate depression, and ≥ 30 as severe depression.²⁰

Statistical analysis

All analyses were performed by using the statistical software package SPSS Statistics 26.0 (IBM Corp., 2019, Armonk, NY/USA). Categorical items were expressed as frequencies and percentages. Descriptive analyses included means with standard deviations (SD), medians, and interquartile ranges. Differences between two groups were assessed by performing chi-quadrat tests for association between two nominal variables or Mann-Whitney-U tests for group differences concerning ordinal or nonnormal data. For multivariable approaches, we used a logistic regression. Each analysis included the number of considered participants to account for missing data. In all cases, a p -value ≤ 0.05 was deemed statistically significant.

Results

Demographics

A total of 595 patients who were referred to the Allergy Center of the Department of Dermatology and Allergy, LMU Munich, between October 2018 and April 2019, participated in this study. One-third (34.8%) was male and two-thirds (65.2%) were female with a mean age of 44 years (range: 18–91 years). Nearly half of the patients were single (42.2%)

or married (46.0%), and a minority were divorced (9.3%) or widowed (2.5%). Most patients visited a secondary school (37.4%) or had a university degree (35.6%). Furthermore, 90.2% had statutory health insurance, and only 9.8% of the patients had a private health insurance (Table 1).

Allergies

The majority (73.8%, $n = 427/579$) of the patients suffered, according to their statements, from at least one previously diagnosed allergic disease (Table 2). The most frequently reported allergens were pollen (37.0%, $n = 214/579$) and food (27.3%, $n = 158/579$) (Figure 1). Women had significantly more often three or more allergies compared to men ($p = 0.006$; 32.3% vs. 19.4%) (Table 2). Allergies against food or drugs were significantly more frequent in women ($p = 0.001$; $p = 0.000$). About 12.5% ($n = 26/207$) of men had drug allergies and 7.2% ($n = 15/207$) had food allergies, whereas the prevalence of drug allergies in women was 30.9% ($n = 120/387$) and the prevalence of food allergies in women was 13.2% ($n = 50/387$) (Table 3). Patients suffering from urticaria ($n = 116$) showed significantly less frequent allergies

against bee ($p = 0.027$; 6.9% vs. 14.7%) or wasp venom ($p = 0.007$; 11.2% vs. 22.4%) than patients without urticaria (Suppl. Table 1). While allergies against pollen or animal hair had no significant impact on the QoL or depression, urticaria, as well as insect venom, food/food additives, and drug allergies significantly affected the QoL and depression severity ($p < 0.001$) (Table 4). Patients affected by these allergies showed higher scores in the DLQI and BDI and lower scores in the EQ5D-3L index (Table 4). Relationship status and school education did not seem to influence the prevalence of allergies and there was no significant correlation between the presence of allergies and the health insurance status ($p = 0.421$) (Suppl. Table 2). The relationship status and status of school education was no statistical analysed as some variables were mentioned to less.

Quality of Life and depression

The total population had a medium DLQI score of 4.70 ($n = 695$), a medium BDI score of 6.94 ($n = 527$), and a medium

Table 1 Demographics and patient characteristics.

	n = 596	Percentage
Gender		
Male	207	34.8
Female	387	65.2
Marital status		
Single	250	42.2
Married	273	45.9
Divorced	55	9.2
Widowed	15	2.5
School type		
No or other school degree	15	2.6
Secondary school	226	37.4
Grammar school	138	23.5
University degree	209	35.6
Health insurance		
State	532	90.2
Private	58	9.8
Mean age	44.4 (± 16.1 SD)	

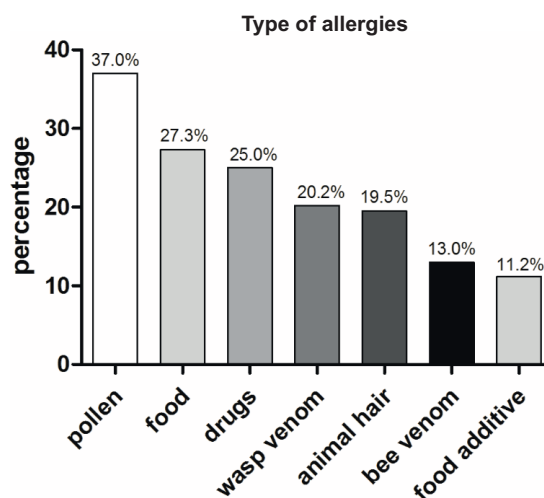


Figure 1 Allergy entities of the patient collective. Pollen (36.2%), food (26.7%), drugs (24.2%), wasp venom (20.1%), animal hair (19.4%), bee venom (12.9%), and food additive (10.9%), Total ($n = 579$).

Table 2 Number of allergies and gender.

Number of allergies	No allergy	One allergy	Two allergies	Three or more allergies
Male				
n	56	59	47	39
Percentage	27.9%	29.4%	23.4%	19.4%
Female				
n	96	100	60	122
Percentage	25.4%	26.5%	15.9%	32.3%
Total population				
n	152	159	107	161
Percentage	26.3%	27.5%	18.5%	27.8%

EQ5D-3L index score of 0.89 (n = 595). Analyzing the five dimensions of EQ5D-3L, the majority of patients showed level one for all five dimensions. About 0.3% of the patients showed level three in mobility, 0.2% in self-care, 1.2% in usual activities, 5.9% in pain/discomfort, and 3.6% in anxiety/depression (Suppl. Table 3). The EQ5D-3L index score correlated significantly with the age of the patients; older patients had a statistically lower score (p.024). About 19.3% (n = 102/527) of the total population suffered from depression, while around 3.2% (n = 17/527) had severe depression (Figure 2). In general, women scored significantly worse in the QoL and depression compared to men (Table 5). In addition, older patients had statistically a higher BDI score compared to younger ones and therefore a higher depression rate (p = 0.041, OR = 1.013). Furthermore, patients with allergies or urticaria significantly showed a tendency to significantly lower life quality and higher depression rates, compared to healthy ones (Table 4). Relationship status and school education did not seem to have an impact on the QoL or depression rate, but some variables were mentioned to be less that statistical quantification could not be performed. Furthermore, patients with private health insurance statistically showed a better QoL rate with lower values for DLQI and higher values for the EQ5D-3L index (Suppl. Table 4).

Discussion

Our results showed a significant correlation of allergies and/or urticaria with reduced QoL and a higher depression

rate for these patients as previous studies already claimed for urticaria and allergic rhinitis.¹⁵⁻¹⁷ A study from 2019 stated that nearly one out of three patients with chronic urticaria had at least one underlying psychiatric disorder.¹⁵ Interestingly, 16% of our patients collective suffered from mild to severe depression, which is higher compared to the 1-year prevalence in Germany. Jacobi et al. showed in 2016 that the 1-year prevalence of depression in adults is around 8.2%, in contrast to the lifetime prevalence which is around 17.1%.^{21,22} Nevertheless, the number of depressions in our patient collective, measured over a period of 7 months, is higher compared to the whole population in Germany over 1 year. One bias might be that our survey took place during the winter period, having a higher prevalence due to the “winter blues,” but still the difference is striking.²³ Furthermore, the most common allergies in our patient collective were pollen and food allergies, which is concordant with the literature,^{24,25} as well as the higher prevalence of allergies in women as our collective significantly showed more often over three allergies and more often allergies against drugs and food in women.²⁶ Especially, allergies against wasp/bee venom, food/food additives, drugs, as well as urticaria were significantly more stressful for the study group. For wasp/bee venom allergies, it has already been shown that specific immunotherapy can improve the QoL and that it represents a severe allergy with one-third of the patients showing serious life-threatening symptoms.⁹ Furthermore a recent study from 2020—AWARE study—showed that antihistamines can improve the QoL of patients suffering from resistant chronic spontaneous urticaria.²⁷ In contrast to our single-center study, the AWARE study was conducted globally. In addition, other limitations are that we only analyzed self-reported previous allergy diagnoses without evaluation of the current therapy. Nevertheless, analyzing the five different dimensions of the EQ5D-3L in more detail, especially for the dimension of pain/discomfort as well as anxiety/depression, our patient collective showed more often level three compared to the other dimensions indicating having extreme problems, especially regarding mental health and not in mobility/self-care or usual activities. This again reflects the results of our study showing a significant correlation of depression and lower QoL with allergies and urticaria. In conclusion, a standardized questionnaire for evaluating the mental health status of patients with allergies and/or urticaria might be beneficial to be implemented as a regular screening method, as it

Table 3 Type of allergies and gender.

	Food	Food additive	Drugs
Male			
n	38	15	26
Percentage	18.9%	7.5%	12.5%
Female			
n	120	50	120
Percentage	31.7%	13.2%	30.9%
p-values*	0.001	0.036	<0.001

*Pearson-Chi Quadrat test.
p-value ≤ 0.05

Table 4 Correlation between allergies/urticaria and the QoL and depression.

		(n = 579)		EQ5D	DLQI p-values* (r)	BDI
Allergies	Pollen	214	37.0%	0.157 (-0.06)	0.723 (-0.02)	0.333 (-0.04)
	Animal hair	113	19.5%	0.204 (-0.05)	0.797 (-0.01)	0.246 (-0.05)
	Wasp venom	117	20.2%	<0.001 (-0.18)	<0.001 (-0.22)	<0.001 (-0.19)
	Bee venom	75	13.0%	<0.001 (-0.16)	<0.001 (-0.21)	<0.001 (-0.20)
	Food	158	27.3%	<0.001 (-0.19)	0.119 (-0.06)	<0.001 (-0.20)
	Food additives	65	11.2%	<0.001 (-0.21)	0.004 (-0.12)	<0.001 (-0.16)
	Drugs	145	25.0%	<0.001 (-0.17)	<0.001 (-0.15)	<0.001 (-0.18)
	Urticaria	Urticaria	116	20.0%	<0.001 (-0.20)	<0.001 (-0.38)

*Mann-Whitney U-test.

Table 5 Correlation between patient characteristics and the QoL and depression.

	n	Mean	Standard deviation	p-values* (r)
Gender:				
Male				
EQ5D	207	0.93	± 0.13	0.001 (-0.17)
DLQI	207	3.80	± 5.37	0.019 (-0.10)
BDI	188	5.25	± 7.58	<0.001 (-0.13)
Female				
EQ5D	387	0.88	± 0.20	0.001 (-0.17)
DLQI	387	5.19	± 6.58	0.019 (-0.10)
BDI	338	7.90	± 9.16	<0.001 (-0.13)
Allergies				
With allergies				
EQ5D	517	0.89	± 0.18	0.057 (-0.08)
DLQI	517	4.84	± 6.14	0.004 (-0.12)
BDI	456	7.00	± 8.83	0.180 (-0.06)
Without allergies				
EQ5D	54	0.95	± 0.89	0.057 (-0.08)
DLQI	54	3.02	± 5.59	0.004 (-0.12)
BDI	52	4.75	± 5.56	0.180 (-0.06)
Urticaria				
With urticaria				
EQ5D	116	0.83	± 0.22	<0.001 (-0.20)
DLQI	116	8.91	± 6.77	<0.001 (-0.38)
BDI	95	12.61	± 11.51	<0.001 (-0.29)
Without urticaria				
EQ5D	464	0.91	± 0.16	<0.001 (-0.20)
DLQI	464	3.60	± 5.57	<0.001 (-0.38)
BDI	421	5.54	± 7.33	<0.001 (-0.29)

*Mann-Whitney U-test.

can facilitate early diagnosis of mental health disorders and thus prevent the socioeconomic consequences as psychiatric disorders are the most common reason for incapacity to work.²⁸ Furthermore, it might be a future investigative task if regular patient training—teaching how to deal with allergies and urticaria including mental training—can improve the QoL and ameliorate the depression rate of patients suffering from these diseases like it is already implemented in the therapy for atopic dermatitis in Germany.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

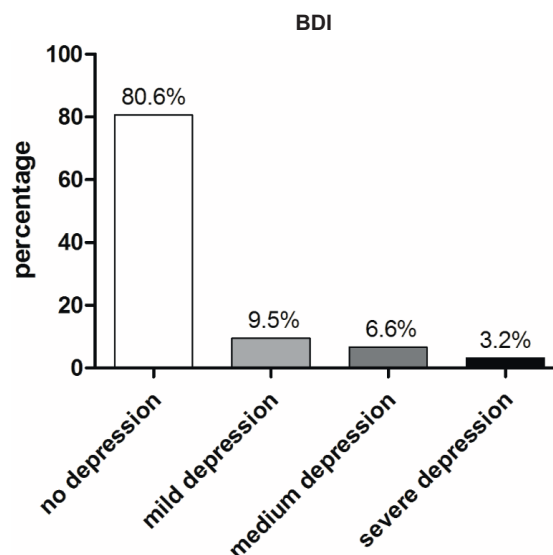


Figure 2 Depression rate of the patient collective. None (80.6%), mild depression (9.5%), medium depression (6.6%), and severe depression (3.2%), Total (n) = 527.

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Supplementary Tables

Suppl. Table 1 Correlation between urticaria and hymenopteran venom allergies.

Allergies against	Bee venom	Wesp venom
With urticaria (n = 116)		
n	8	13
Percentage	6.9%	11.2%
Without urticaria (n = 464)		
n	68	104
Percentage	14.7%	22.4%
Total population (n = 580)		
n	76	117
Percentage	13.1%	11.1%
p-value*	0.027	0.007

*Pearson-Chi Quadrat test.

Suppl. Table 2 Correlation between allergies and health insurance.

Health insurance	Allergies	No allergies
Statutory insurance (n = 512)		
n	465	47
Percentage	90.8%	9.2%
Private insurance (n = 56)		
n	49	7
Percentage	87.5%	12.5%
Total population (n = 580)		
n	514	54
Percentage	90.5%	9.5%
p-value*	0.421	

*Pearson-Chi-Quadrat test

Suppl. Table 3 Total number of patients categorized in EQ5D-3L dimensions and levels.

	Level 1 n (%)	Level 2 n (%)	Level 3 n (%)
Mobility	526 (90.1)	56 (9.6)	2 (0.3)
Self-care	574 (98.1)	10 (1.7)	1 (0.2)
Usual activities	435 (74.9)	139 (23.9)	7 (1.2)
Pain/discomfort	302 (52.6)	238 (41.5)	34 (5.9)
Anxiety/depression	399 (68.9)	159 (27.5)	21 (3.6)

Suppl. Table 4 Correlation between the QoL and depression with health insurance.

Scores	Statutory insurance	Private insurance	p-value
BDI (n = 524)			
n	470	54	<0.001
Mean ± SD	7.44 (± 8.94)	2.48 (± 4.61)	
DLQI (n = 590)			
n	532	58	<0.001
Mean ± SD	4.93 (± 6.33)	2.59 (± 4.77)	
EQ5D (n = 590)			
n	532	58	<0.001
Mean ± SD	0.89 (± 0.18)	0.95 (± 0.13)	

*Mann-Whitney U-test.