Alergologia Polska – Polish Journal of Allergology 2023; 10, 4: 243–248
DOI: https://doi.org/10.5114/pja.2023.132926
Received: 24.09.2023, **Accepted:** 8.10.2023.

Alergologia POLSKA
Polish Journal of Allergology

ORIGINAL PAPER/*PRACA ORYGINALNA*

Influence of selected determinants on the quality of life and emotional control in patients allergic to Hymenoptera venom and treated with immunotherapy

Wpływ wybranych determinantów na jakość życia i kontrolę emocji pacjentów z alergią na jady owadów błonkoskrzydłych poddanych immunoterapii

Ewa Szynkiewicz[1,2], Agnieszka Woźniewicz-Grzymała[3], Katarzyna Napiórkowska-Baran[4], Mateusz Topolewski[5]

[1]Chair and Clinic of Allergology, Clinical Immunology and Internal Diseases, University Hospital No. 2, Bydgoszcz, Poland
[2]Department of Nursing in Internal Diseases, Collegium Medicum, Nicolaus Copernicus University, Bydgoszcz, Poland
[3]Department of Geriatrics, Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun, Poland
[4]Department of Allergology, Clinical Immunology and Internal Diseases, Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Torun, Poland
[5]Department of Probability Theory and Stochastic Analysis, Nicolaus Copernicus University, Torun, Poland

ABSTRACT

Introduction: One of the main causes of anaphylaxis in Europe is Hymenoptera stings. Epidemiological data indicate that insect venom hypersensitivity concerns up to 5.0–7.5% of the population.

Aim: To assess the influence of selected clinical and socio-demographic factors on the tests used in the study: WHOQOL-BREF (World Health Organization Quality of Life-Brief) and CECS (Courtauld Emotional Control Scale).

Material and methods: The research was conducted among patients diagnosed with Hymenoptera venom allergy, treated with immunotherapy. The following socio-demographic and clinical factors were evaluated: gender, age, place of residence, marital status, education, professional activity, financial status, type of allergy and duration of therapy. The research was carried out in 2014–2015 in the Chair and Clinic of Allergology, Clinical Immunology and Internal Diseases, Jan Biziel University Hospital No. 2 in Bydgoszcz. The study was conducted by means of a diagnostic survey using an interview.

Results: Quality of life varies significantly depending on age, education, professional activity and financial conditions. The type of allergy significantly differentiates the value of CECS in the sample. People allergic to bee venom have a higher CECS level = 53.54 compared to people allergic to wasp venom, which show a lower CECS level = 49.03.

Conclusions: Quality of life varies depending on age, education, professional activity and financial conditions. A higher quality of life is found in the youngest people, with better education, professionally active and declaring good financial conditions. Patients diagnosed with a bee venom allergy have a higher level of emotional control.

KEY WORDS

determinants, quality of life, emotional control, Hymenoptera venom, immunotherapy.

ADDRESS FOR CORRESPONDENCE

Ewa Szynkiewicz, Chair and Clinic of Allergology, Clinical Immunology and Internal Diseases, University Hospital No. 2, Department of Nursing in Internal Diseases, Collegium Medicum, Nicolaus Copernicus University, Bydgoszcz, Poland, phone: +48 502 358 797, e-mail: ewaszynkiewicz@wp.pl

INTRODUCTION

Allergic diseases change the patients' life, imposing numerous restrictions on them. Allergy symptoms become an important factor determining their life activity. One of the main causes of anaphylaxis in Europe is Hymenoptera stings. Epidemiological data show that hypersensitivity to insect venom affects up to 5.0–7.5% of the population [1, 2]. In central Europe, Hymenoptera whose venom causes allergic reactions include: honey bee (Apis mellifera), bumblebee (Bombus), wasp (Vespula vulgaris and Germanica) and hornet (Vespa crabro). In southern Europe, Hymenoptera includes the Polistes species from the family Vespidae, while in North and South America and Australia – invasive fire ants (Solenopsis invicta) [3].

Reactions following a sting may pose a direct threat to life. The only form of causal treatment of allergic diseases, apart from the elimination of the allergen, is allergen-specific immunotherapy. Subcutaneous venom immunotherapy treatment (VIT) is an effective method that reduces the frequency of systemic reactions after the next sting. The current European guidelines recommend VIT in people with a systemic allergic reaction that exceeds generalized skin symptoms. However, VIT can also be an option for adult patients with solely generalized cutaneous allergic symptoms who have either a high risk for re-exposure or suffer from a severely impaired quality of life.

Quality of life is subject to constant assessment by an individual. It changes over time. It is susceptible to many factors, both external and internal. It is evaluated by comparing one's own experiences, the value system and comparison with the situation of other people. Research on the health-related quality of life and the factors influencing it have become an element of evaluation of various therapeutic activities in almost all the fields of medicine, including allergology. Evaluation of quality of life in the case of the allergy to Hymenoptera venom enables the selection of optimal treatment methods and, consequently, may improve the effectiveness of the therapy.

The ability to express emotions prevents the accumulation of emotional tension, which is especially important among people struggling with a disease and undergoing long-term therapy. When experiencing negative emotions, it is important to determine the emotional control index, which means the subjective belief of an individual concerning the ability to control one's own reactions, decision-making abilities and beliefs about the right choice.

AIM

The aim of the research was to assess the impact of selected clinical and socio-demographic factors on the tests used in the study: quality of life WHOQOL-BREF and emotional control CECS. The research was conducted among patients diagnosed with Hymenoptera venom allergy, treated with immunotherapy. The following socio-demographic factors were evaluated: gender, age, place of residence, marital status, education, professional activity, financial situation as well as the type of allergy and the duration of therapy.

MATERIAL AND METHODS

The research was carried out in 2014–2015 in the Clinic of Allergology, Clinical Immunology and Internal Diseases, Jan Biziel University Hospital no. 2 in Bydgoszcz. The method of a diagnostic survey with an interview was used in the study. The study was conducted by means of a diagnostic survey using a written interview.

The following questionnaires were used: the author's questionnaire containing questions about socio-demographic and clinical data and standardized questionnaires: WHOQOL-BREF and CECS. The research was approved by the Bioethics Committee of the Nicolaus Copernicus University in Torun (KB 535/2013). Full and informed consent to conduct the research was obtained from all participants before the research began. The guidelines contained in the Helsinki Declaration were followed in the research.

The collected material was statistically analyzed, verifying the hypotheses at the significance level $p < 0.05$. The analyzed sample consists of only 114 patients. The sample

is quite small, but the data are normally distributed and hence parametric statistical tests could be applied.

The WHOQOL-BREF is a universal research tool for assessing the quality of life. It was created on the basis of the WHOQOL-100 questionnaire and commissioned by the World Health Organization, covering the following areas of life: physical and mental health, aspects of functioning, independence, social relationships, environment and religion, as well as global quality of life and health self-assessment. The short version, the WHOQOL-BREF scale, contains 26 questions for the analysis of four domains (somatic, social, environmental and psychological) and separately for the assessment of global quality of life and health self-assessment. Scoring ranges from 1 to 5 and has a positive direction - the bigger the number of points, the better the quality of life. Every sphere has 4–20 points. The quality of life in every area increases with the number of points obtained. The tool was adapted to the Polish conditions by Wołowicka and Jaracz. The obtained scale was characterized by high internal consistency (Cronbach's α coefficient was 0.89 for the first factor and 0.85 for the second factor) [4].

The CECS by M. Watson and S. Greer, adapted into Polish by Z. Juczyński, consists of three subscales. Each of them contains seven statements related to the way of expressing anger, anxiety and depression. It is used to measure the subjective control of anger, anxiety and depression in difficult situations. The CECS scale is a self-descriptive tool. By summing up the results of the subscales, the general emotional control index is determined. The essence of the study is to determine the extent to which an individual is subjectively convinced of the ability to control his/her reactions when experiencing particular negative emotions. The overall emotional control index is within 21–84 points. The higher the result, the bigger the suppression of negative emotions. While assessing the reliability of the Polish version of the scale, by estimating its internal consistency and absolute stability, the following Cronbach's α coefficients were obtained: for the anger control 0.80, depression 0.77, anxiety 0.78 and for the total emotion control index 0.87 [5].

RESULTS

A total of 114 respondents participated in the research, including 71 (63%) women and 43 (37%) men. The study included patients with Hymenoptera venom allergies diagnosed according to the EAACI (European Academy of Allergy and Clinical Immunology) standards (history, skin test results, specific IgE levels) who had a history of a grade III or IV reaction to an insect sting according to the Mueller classification. Induction of immunotherapy was performed according to the rush protocol.

Wasp venom allergy was confirmed in 83 (73%) respondents, and bee in 31 (27%). In the first year, 38 (33%) patients received specific immunotherapy, in the second 322%), in the third – 17 (15%), in the fourth – 15 (13%) and in the fifth year – 19 (17%).

The respondents were divided into three age groups: 18–35 years (29 people; 25.5%), 36–55 years (56; 49%) and over 55 years (29; 25.5%). More than half of them lived in urban areas (66; 58%), the others in rural areas (48; 42%). Most of the respondents (79; 69%) were in permanent relationships, 35 (31%) respondents claimed that they were single. Over 3/4 of the respondents were professionally active (79; 69%). A disability pension or a retirement pension was the main source of income for 35 (31%) respondents. Almost all the respondents assessed their financial situation as good (110; 96%). Only a few respondents described their financial situation as bad (4; 4%) [6].

The emotional control scale consists of 3 subscales, in each of them the maximum possible score is 28 and the overall score on the emotional control scale is the sum of 3 subscales, i.e. the maximum possible score is 84 points. The higher the score, the stronger the suppression of negative emotions, that is the person's belief in the ability to control their emotions. Among the respondents, the average score for the entire scale was 50.19, the highest score was obtained in the anxiety subscale 17.91 and the lowest in the anger subscale 15.33, while in the depression subscale it was 16.91 (Table 1).

CECS Cronbach's α in the sample for the entire emotional control scale was 0.85; for the subscales: anger 0.77; depression 0.73; anxiety 0.72 (the authors obtained: for the entire scale 0.87; for the subscales: anger 0.80; depression 0.77; anxiety 0.78).

Quality of life WHOQOL-BREF Cronbach's α: 0.9997 in the research sample. The assessment of quality-of-life domains is presented in Table 2.

The WHOQOL value varies depending on age, education, professional activity and financial conditions. We compare the averages in the groups: WHOQOL-BREF and age.

Age significantly differentiates the statistical value of WHOQOL in the research sample. The highest level of 91.28 was observed in the youngest group (0–35 years),

TABLE 1. Emotional control assessment

Variable	M	SD	Min.	Max.
Emotional control	50.19	10.16	23	80
Anger	15.33	4.19	7	27
Depression	16.91	4.02	7	28
Anxiety	17.91	4.10	8	28

M – mean, Min. – minimum value, Max. – maximum value, SD – standard deviation.

TABLE 2. The assessment of quality of life

WHOQOL-BREF	M	Min.	Max.	SD
Individual overall perception of quality of life	3.83	1	5	0.703
Individual overall perception of one's own health	3.36	1	5	0.873
Physical domain	26.68	8	34	4.318
Psychological domain	21.09	8	28	3.468
Social relationships	11.66	5	15	2.039
Environment	28.41	14	38	4.132

WHOQOL-BREF – World Health Organization Quality of Life-Brief, M – mean, Min. – minimum value, Max. – maximum value, SD – standard deviation.

TABLE 3. Analysis of selected questionnaires and clinical and socio-demographic determinants

Selected determinants Socio-demographic and clinical	WHOQOL-BREF *P*-value	CECS *P*-value
Gender	0.08	0.55
Age	0.01	0.62
Place of residence	0.83	0.43
Marital status	0.17	0.64
Education	**0.01**	0.76
Professional activity	**0.01**	0.33
Financial conditions	**0.01**	0.53
Type of allergy	0.50	**0.04**
Duration of therapy	0.05	0.80

Data in **bold** indicate statistical significance. WHOQOL-BREF – World Health Organization Quality of Life-Brief, CECS – Courtauld Emotional Control Scale.

slightly lower 88.39 in the group of people between 36 and 55 years old, and the lowest 83.39 in the oldest group (> 56 years old).

The level of education significantly differentiates the statistical value of WHOQOL in the group. The highest level of 91.81 was observed in the group of people with university education, 86.67 with secondary education, and 84.09 with vocational or primary education.

Professional activity significantly differentiates the WHOQOL value in the sample. Professionally active people show a higher WHOQOL level of 89.76, while people who do not work are characterized by a lower level of 83.51.

Financial situation significantly differentiates the WHOQOL value in the research sample. People with a good financial situation show a higher level of WHOQOL of 88.56, while people living in worse financial conditions are characterized by a lower level of WHOQOL of 68.00. The differences are statistically significant at the p-value < 0.05. They were determined using the t-test.

The type of allergy significantly differentiates the CECS value in the sample. People allergic to bee venom have a higher CECS level of 53.54 compared to people allergic to wasp venom, which show a lower CECS level of 49.03.

The differences are statistically significant at the $p < 0.05$ level. They were determined using the t-test (Table 3).

DISCUSSION

For most patients and their families, an allergic reaction connected with a Hymenoptera sting is a highly stressful, frightening experience. It negatively affects the quality of life. It leads to a lack of a sense of security, increases emotional anxiety related to everyday activities. Prior experience of anaphylaxis symptoms and anxiety related to their recurrence play a significant role [6].

The evaluation of the quality of life, the level of anxiety and depression among patients desensitized to Hymenoptera venom is raised in allergy research. The most frequently used questionnaires include: WHOQOL-BREF, VQLQ (Vespid Allergy Quality of Life Questionnaire), HADS (Hospital Anxiety and Depression Scale), STAI (State-Trait Anxiety Inventory for Adults) and Cantril ladder.

In the presents study, the respondents assessed the quality of life at an average and good level. The results are in agreement with the studies by Guz *et al.* (research sample of 100 people) using the WHOQOL-BREF questionnaire. The vast majority of respondents assessed the quality of life as good or very good [3].

The aim of the study by Nowak *et al.* was to assess the quality of life of patients after an intense anaphylactic reaction. The research involved 61 patients. The mean value of the VQLQ parameter was 4.57 in women and 5.29 in men, the difference was not statistically significant [7].

Patients treated with immunotherapy have a higher quality of life. This is confirmed by the research conducted by Mikulski *et al.*, who were trying to compare the quality of life (VQLQ) of people with indications for specific immunotherapy with venom vaccine (according to EAACI guidelines). The studies were conducted among patients who refused treatment and in those treated with

immunotherapy. The analysis of the quality of life in the group subjected to VIT and the group that refused it, showed that the level of VQLQ in patients after the end of treatment is significantly higher than in the untreated ones (4.6 ±1.5 vs. 3.2 ±0.9). The difference was statistically significant (p = 0.001). The level of quality of life was also higher when comparing those who started therapy (VQLQ = 4.3 ±1.9) and those who were not treated (VQLQ = 3.2 ±0.9), the difference was not statistically significant (p = 0.06) [8].

According to the research by the Allergology Clinic, University Hospital Groningen and the Department of Clinical Epidemiology and Biostatistics, University of McMaster, in Hamilton, immunotherapy for Hymenoptera venom resulted in a clinically significant improvement in quality of life of patients allergic to the venom of wasps [9].

The present study did not obtain statistically significant results regarding the influence of gender, place of residence, marital status and the length of therapy on the assessment of quality of life and emotional control. The lack of statistical influence of gender on a quality of life could be affected by the quality of data. Two-samples t-test should be applied when both samples have a similar number of observations, but the number of male respondents is almost twice lesser than that of females. On the other hand, Oude Elberink *et al.* in their research, also draw attention to the lack of influence of the respondents' gender on the quality of life [9]. A small sample size could also be the reason of lack of a significance of correlation between quality of life and the length of therapy. Since p-value is 0.05, the result of the test is vague.

In the study conducted among 71 patients, Niedoszytko *et al.* assessed the quality of life (VQLQ) during VIT initiation and after 1 year of treatment. The initial level of quality of life in patients with a wasp venom allergy was 3.7 and did not depend on the severity of the anaphylactic reaction. After 1 year of VIT, the VQLQ index increased to 4.3 at the level of statistical significance. Initially, women evaluated their quality of life lower, but after a year of therapy the sense of improvement was clearly visible. After 1 year, 43% showed clinical improvement in VQLQ, in 41% no change was observed, and in 15% deterioration in the quality of life was noticed. According to the studies by Oude Elberink and Mikulski *et al.*, the duration of therapy improves the quality of life. This is also confirmed in the research by Nowak *et al.* It is important that along with the duration of venom immunotherapy, the intensity of the fear of subsequent stings decreased.

The obtained results in the present study were confirmed in the available literature of other authors [10–13].

In the present study, the value of WHOQOL varies depending on age, education, professional activity and financial conditions. Age significantly differentiates the statistical value of WHOQOL in the research sample. The highest level was observed in the group of the youngest respondents whereas the lowest in the group of the oldest patients (> 56 years old). According to Oude Elberink *et al.*, age did not affect the quality of life [9]. The important result of the present study is that professional activity significantly differentiates the quality of life in the sample. Professionally active people show a higher quality of life level than people who do not work. This result emphasizes that it is important to remain professionally active, despite the difficulties associated with coping with the symptoms of the disease, especially in periods of their intensification.

According to Nowak *et al.*, better-educated people reached higher results in terms of knowledge about anaphylaxis, but it did not influence their quality of life, the severity of anxiety or better compliance with the rules of pre-exposure prophylaxis. In our own research, different results were obtained. People with university education declared a higher quality of life similarly to people who were professionally active and in a better financial situation [7].

The study included 180 adult patients undergoing VIT at the Department of Internal Diseases, Asthma and Allergy of the Medical University of Lodz. Significantly more patients were allergic to wasp than bee venom (146 vs. 34, $p < 0.0001$). Early and late adverse events occurred more frequently during maintenance therapy (48 patients, 26.7%) than during VIT induction (32 patients, 17.8%), and were more common in patients allergic to bees [11].

In the present study, the type of allergy significantly differentiates the value of CECS in the research sample, which is novel. People allergic to bee venom show a higher level of CECS – 53.54 compared to people allergic to wasp venom whose level of CECS is lower – 49.03. It is confirmed by the research of Nowak *et al.* People allergic to wasp venom showed significantly higher impairment of quality of life than people allergic to bee venom [7].

Patients with a bee venom allergy showed a significantly higher VQLQ before the beginning of immunotherapy than those allergic to the venom of Vespidae, and it did not improve significantly after 1 year of VIT. This is most likely connected with the fact that the questionnaire was designed with regard to the Vespidae allergy [7, 14–16]. Due to the size of the sample and the questionnaires used, there are some limitations in the design of our study. The study included 114 patients, which is a sufficient number for the use of standard questionnaires. In a situation where there are no studies using similar scales, the issue requires further research. Moreover, the recruited patients were at different stages of VIT, which made the group heterogeneous.

CONCLUSIONS

The quality of life of patients allergic to Hymenoptera venom treated with immunotherapy differs depending on age, education, professional activity and financial conditions. The type of allergy significantly statistically differentiates the level of emotional control in the sample. Patients diagnosed with a bee venom allergy have a higher level of CECS.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Panesar SS, Javad S, de Silva D, et al. The epidemiology of anaphylaxis in Europe: a systematic review. Allergy 2013; 68: 1353-61.
2. Antolín-Amérigo D, Moreno Aguilar C, Vega A, et al. Venom immunotherapy: an updated review. Curr Allergy Asthma Rep 2014; 14: 449.
3. Guz E, Brodowicz-Król M. Quality of life of patients undergoing hymenoptera venom immunotherapy. J Educ Health Sport 2019; 9: 210-20.
4. WHOQOL-BREF: introduction, administration, scoring and generic version of the assessment: field trial version, December 1996 World Health Organization.
5. Grassi L, Watson M, Greer S. La Courtauld Emotional Control Scale (CECS) di Watson e Greer [Watson and Greer's Courtauld Emotional Control Scale]. Giunti Organizzazioni Speciali 1985; 176: 3-10.
6. Woźniewicz A, Szynkiewicz E, Pałgan K, et al. Fear of stinging insects in relation to state anxiety and trait anxiety in a group of patients with hymenoptera venom allergy undergoing immunotherapy. Adv Dermatol Allergol 2019; 36: 472-7.
7. Nowak N, Bazan-Socha S, Pulka G, et al. Evaluation of the quality of life in subjects with a history of severe anaphylactic reaction to the Hymenoptera venom. Pneumonol Alergol Pol 2015; 83: 352-8.
8. Mikulski D, Smorawska-Sabanty E, Kowalski ML. Jakość życia pacjentów z alergią na jad owadów błonkoskrzydłych odmawiających leczenia za pomocą immunoterapii swoistej. Quality of life in patients allergic to Hymenoptera venom who refuse specific immunotherapy Alergia Astma Immunol 2016; 21: 133-7.
9. Oude Elberink JN, De Monchy JG. Venom immunotherapy improves health-related quality of life in patients allergic to yellow jacket venom. J Allergy Clin Immunol 2002; 110: 174-82.
10. Sahiner UM, Durham SR. Hymenoptera venom allergy: how does venom immunotherapy prevent anaphylaxis from bee and wasp stings? Front Immunol 2019; 10: 1959.
11. Kołaczek A, Skorupa D, Antczak-Marczak M, et al. Safety and efficacy of venom immunotherapy: a real life study. Adv Dermatol Allergol 2017; 34: 159-67.
12. Niedoszytko M, Majkowicz M, Chełmińska M, et al. Quality of life, anxiety, depression and satisfaction with life in patients treated with insect venom immunotherapy. Adv Dermatol Allergol 2012; 29: 74-9.
13. Aurich S, Dölle-Bierke S, Francuzik W, et al. Anaphylaxis in elderly patients – data from the European anaphylaxis registry. Front Immunol 2019; 10: 750.
14. Nowak N, Bazan-Socha S, Pulka G, et al. Evaluation of the quality of life in subjects with a history of severe anaphylactic reaction to the Hymenoptera venom. Pneumonol Alergol Pol 2015; 83: 352-8.
15. Sturm GJ, Varga EM, Roberts G, et al. EAACI guidelines on allergen immunotherapy: Hymenoptera venom allergy. Allergy 2018; 73: 744-64.
16. Eitel T, Zeiner KN, Assmus K, et al. Impact of specific immunotherapy and sting challenge on the quality of life in patients with hymenoptera venom allergy. World Allergy Organ J 2021; 14: 100536.