Original paper

Analysis of the impact of selected socio-demographic factors on quality of life of asthma patients

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Abstract

Aim: To evaluate the influence of selected socio-demographic factors on quality of life of patients with different degrees of asthma severity.

Material and methods: The study was conducted in 2009–2010 in the Clinic of Allergology, Clinical Immunology and Internal Diseases in Dr J. Biziel University Hospital No. 2 in Bydgoszcz. Patients were divided into a tested group (126) and a control group (86). The criterion for the division was the degree of asthma control according to GINA 2006. The following tools were used: the author's questionnaire containing questions about socio-demographic and clinical data, and the WHOQOL-100.

Results: In the tested group, a statistically significant correlation was observed between quality of life and age ($p < 0.002$ for the entire population), education ($p < 0.05$ in the group with controlled asthma, $p = 0.0005$ for the entire population), professional activity ($p < 0.003$ in the group with partially controlled asthma, $p < 0.05$ with uncontrolled asthma and $p < 0.0001$ in the entire population), marital status ($p = 0.025$ for the entire population) and financial situation ($p < 0.0001$; $p < 0.0002$; $p < 0.009$ in all groups; $p < 0.0001$ in the entire population). There was no significant difference between quality of life, and sex and the place of residence of the respondents.

Conclusions: Age, education, professional activity, marital status and financial situation affect the assessment of quality of life in patients with asthma. Socio-demographic factors such as sex and the place of residence do not influence the assessment of quality of life in patients with asthma.

Key words: socio-demographic factors, quality of life, asthma, degree of control.

Introduction

The issue of quality of life has become one of the most important concepts in medicine in recent years. Being analyzed in many areas of life, it results in a change in the perception of patients. It complements the assessment of patients' health status and allows planning and organizing comprehensive care. It also contributes to patient subjectivity and leads to improving the quality of life in all spheres of human functioning. Identification and treatment of disorders connected with health-related quality of life is considered to be one of the important elements of contemporary conduct in various forms of pathology [1–4]. The literature mentions asthma as a clinical entity and the importance of the research on quality of life in patients with asthma. Unfortunately, few of such reports concern the impact of socio-demographic factors on quality of life in patients with different degrees of asthma severity.

Aim

The aim of this study was to evaluate the influence of selected socio-demographic factors on quality of life of patients with different degrees of asthma severity. The fol-

lowing factors were evaluated: age, sex, education, professional activity, marital status, place of residence and financial situation.

Material and methods

Patients who were hospitalized in the Clinic of Allergology, Clinical Immunology and Internal Diseases, and treated in the Outpatient Clinic were qualified for the study. They also: were diagnosed with bronchial asthma by an allergist, gave written informed consent to participate in the study.

On this basis, 252 patients were included in the study and subjected to the first evaluation. In the next phase of the study, 40 patients were excluded. The exclusion criteria were as follows:
- age under 18 years and over 65 years,
- pregnancy or diagnosis of chronic obstructive pulmonary disease,
- chronic severe organ or systemic diseases (e.g. systemic lupus erythematosus, cancer, renal failure, epilepsy, Parkinson's disease, rheumatoid arthritis, circulatory failure, multiple sclerosis),
- other health conditions that prevent conscious and unassisted completion of the survey questionnaires.

The study began in 2009 and was completed in early October 2010. The respondents were always informed about the purpose and the subject of the research. They had an opportunity to ask questions and withdraw from the study in every of its stages without any consequences. The way of conducting the study ensured freedom of expression and respect for personal dignity while asking the questions. All patients signed the consent to participate in the research. The permission to carry out the research was granted by the Bioethics Committee of *Collegium Medicum* in Bydgoszcz at the Nicolaus Copernicus University (KB/513/2008).

The study included 212 patients with 144 women and 68 men aged 18–64. The average age of the examined group was 44.9 ±12.5 years, including women aged 43.7 ±12.5 years and men aged 47.4 ±12.3 years. The patients were divided into a tested and a control group. The criterion for the division was the degree of asthma control according to the Global Initiative for Asthma 2006 (GINA), evaluated by a doctor, based on the medical examination and analysis of medical records. The tested group comprised patients diagnosed with uncontrolled and partially controlled asthma. The control group consisted of patients with controlled asthma. The study was conducted using a diagnostic survey with an interview technique.

The study was carried out by means of the following questionnaires:
- WHOQOL-100 (World Health Organization Quality of Life) in the Polish version, which examines quality of life and consists of 100 questions divided into 24 subscales falling under the six areas of life: physical, psychological, independence, social, environmental and spiritual. Addi-

tionally, it contains a general subscale, which consists of 4 questions concerning global assessment of quality of life and general health status [5, 6];
- the author's questionnaire containing questions about socio-demographic and clinical data.

The results obtained from asthma patients were statistically analyzed in order to assess quality of life in the compared groups, and to identify any correlations between quality of life and the selected parameters. It has been shown that the distribution of quality of life in the tested groups does not differ significantly from normal ones, which made it possible to use parametric tests to compare the mean values.

Statistical analysis

The following methods and statistical tests were used in the study.
1. Parametric Z-test comparing mean values in two sufficiently large size (≥ 50) groups.
2. Snedecor's and Levene's parametric F-tests to verify the hypothesis of homogeneity of variances in two compared groups. The choice of an appropriate test to compare the means depends on the results of testing.
3. Parametric tests to compare the mean values in the two groups. In the cases of homogeneity of variances in the two groups, the Student's t-test was used to verify the hypothesis of the equality of the means. When this condition was not met (the variances turned out to be different), the modified test of Cochran and Cox was used.
4. The one-way analysis of variance ANOVA to verify the hypothesis about the equality of means in more than two groups, assuming a normal distribution and uniformity of variances.
5. The least significant difference test (LSD test) from the post-hoc group, evaluating the difference between the mean values in several groups.
6. Pearson's correlation coefficient calculated and verified for significance by means of the Student's t-test.

The significance level $p = 0.05$, for which critical values had been given, was accepted as reliable when verifying the hypotheses. The p-values were also given. These are the probabilities with which a mistake can be made by rejecting the hypothesis being checked and noting that differences in the compared populations are significant. At $p < 0.05$, a difference is considered statistically significant. The statistical analysis of the results was conducted by means of the software package "Statistica" v.9.0.

Results

The first determinant submitted for the analysis and study of correlation was age. In order to determine the correlation between quality of life and age, the Pearson correlation coefficients were calculated and verified for the significance. The results of calculations are shown in Table 1.

Table 1. Relationship between quality of life and age

Age and quality of life		Degrees of asthma control			All
		Controlled	Partially controlled	Uncontrolled	
n		86	50	76	212
Correlation coefficient R_{xy}		−0.01	−0.25	−0.16	−0.21
Student's t-test	t_{cr}	1.99	2.01	1.99	1.97
	t	0.09	1.75	1.47	3.27
	p	0.93	0.09	0.15	< 0.002

Table 2. Quality of life and sex

Sex and quality of life		Degrees of astma control						All	
		Controlled		Partially controlled		Uncontrolled			
		n	Mean ± SD	n	Mean ± SD	n	Mean ± SD	n	Mean ± SD
Women		66	0.624 ±0.109	36	0.600 ±0.114	42	0.567 ±0.091	144	0.598 ±0.113
Men		20	0.638 ±0.101	14	0.549 ±0.100	34	0.684 ±0.133	68	0.593 ±0.098
Snedecor's F-test	F	$F = 1.18 < 1.98 = F_{cr}$		$F = 1.28 < 2.36 = F_{cr}$		$F = 1.44 < 1.76 = F_{cr}$		−	
	p	0.36		0.33		0.14		−	
Student's t-test	t	$t = 0.52 < 1.99 = t_{cr}$		$t = 1.45 < 2.01 = t_{cr}$		$t = 1.34 < 1.99 = t_{cr}$		$z = 0.27$	
	p	0.61		0.15		0.18		0.78	

Table 3. Quality of life and education

Education and quality of life		Degrees of asthma control						All	
		Controlled		Partially controlled		Uncontrolled			
		n	Mean ± SD	n	Mean ± SD	n	Mean ± SD	n	Mean ± SD
Primary and vocational		19	0.578 ±0.108	19	0.560 ±0.099	34	0.567 ±0.091	72	0.568 ±0.097
Secondary		33	0.630 ±0.103	21	0.599 ±0.087	38	0.558 ±0.100	92	0.593 ±0.103
Higher		34	0.652 ±0.105	10	0.605 ±0.107	4	0.684 ±0.133	48	0.645 ±0.122
ANOVA test	F	$F = 3.11 > 3.06 = F_{cr}$		$F = 0.80 < 3.19 = F_{cr}$		$F = 3.04 < 3.12 = F_{cr}$		$F = 7.80 > 3.04 = F_{cr}$	
	p	< 0.05		0.46		0.054		0.0005	

In all groups, the calculated coefficients are negative, which indicates that along with age, the quality of life slightly but usually decreases. The significance of correlation was only found for the entire tested population. Another analyzed factor whose relationship with QOL in patients with asthma was examined was sex. The parametric Student's t-test, and z-test based on the normal distribution (the latter one in order to compare the average levels of quality of life in the whole population) were used. There was no significant difference between the quality of life for men and women – calculated values are higher than critical values ($p > 0.05$). The results are shown in Table 2.

Table 3 shows the results concerning QOL and its relationship with patient education. In all groups and in the entire population, the level of quality of life increases along with the level of education. A significant increase was shown in the group with controlled asthma, and in the whole population – the average assessment of quality of life is significantly higher in the subgroups with higher education compared with a subgroup with primary and vocational education.

Another group of data that was subjected to a statistical analysis concerned the place of residence of the patients. It was examined whether living in the country-

Table 4. Quality of life and the place of residence

Place of residence and quality of life		Degrees of asthma control						All	
		Controlled		Partially controlled		Uncontrolled			
		n	Mean ± SD	*n*	Mean ± SD	*n*	Mean ± SD	*n*	Mean ± SD
City		65	0.637 ±0.102	40	0.594 ±0.109	53	0.555 ±0.099	158	0.599 ±0.109
Village		21	0.596 ±0.116	10	0.550 ±0.108	23	0.600 ±0.097	54	0.589 ±0.107
Snedecor's *F*-test	*F*	$F = 1.27 < 1.74 = F_{cr}$		$F = 1.06 < 2.13 = F_{cr}$		$F = 1.01 < 1.75 = F_{cr}$		–	
	p	0.23		0.41		0.47		–	
Student's *t*-test	*t*	$t = 1.56 < 1.99 = t_{cr}$		$t = 1.13 < 2.01 = t_{cr}$		$t = 1.81 < 1.99 = t_{cr}$		$z = 0.58$	
	p	0.12		0.27		0.07		0.56	

Table 5. Quality of life and professional activity

Profesional activity and quality of life		Degrees of asthma control						All	
		Controlled		Partially controlled		Uncontrolled			
		n	Mean ± SD	*n*	Mean ± SD	*n*	Mean ± SD	*n*	Mean ± SD
Does not work		21	0.597 ±0.113	31	0.559 ±0.107	43	0.548 ±0.085	95	0.562 ±0.100
Works		64	0.637 ±0.105	19	0.630 ±0.102	32	0.596 ±0.114	115	0.624 ±0.108
Snedecor's *F*-test	*F*	$F = 1.16 < 1.74 = F_{cr}$		$F = 1.07 < 2.11 = F_{cr}$		$F = 1.80 > 1.72 = F_{cr}$		–	
	p	0.32		0.45		0.04		–	
T-Student's test and Cochran-Cox's test	*t*	$t = 1.49 < 1.99 = t_{cr}$		$t = 2.28 > 2.01 = t_{cr}$		$C = 2.10 > 2.03 = C_{cr}$		$z = 4.32$	
	p	0.14		< 0.003		< 0.05		< 0.0001	

Table 6. Quality of life and marital status

Material status and quality of life		Degrees of asthma control						All	
		Controlled		Partially controlled		Uncontrolled			
		n	Mean ± SD	*n*	Mean ± SD	*n*	Mean ± SD	*n*	Mean ± SD
Single		33	0.645 ±0.100	19	0.620 ±0.124	13	0.570 ±0.146	65	0.623 ±0.118
Married		53	0.616 ±0.111	31	0.565 ±0.100	63	0.568 ±0.090	147	0.585 ±0.102
Snedecor's *F*-test	*F*	$F = 1.23 < 1.73 = F_{cr}$		$F = 1.54 < 1.96 = F_{cr}$		$F = 2.67 > 1.91 = F_{cr}$		–	
	p	0.27		0.15		0.006		–	
T-Student's test and Cochran-Cox's test	*t*	$t = 1.25 < 1.99 = t_{cr}$		$t = 1.72 < 2.01 = t_{cr}$		$C = 0.04 < 2.17 = C_{cr}$		$z = 2.24$	
	p	0.22		0.09		0.95		0.025	

side or in the city has an impact on quality of life. The parametric Student's *t*-test and *z*-test based on the normal distribution (the latter one in order to compare the average levels of quality of life in the whole population) were used. There was no significant difference between the quality of life of the inhabitants of cities and villages – calculated values are lower than the critical values ($p > 0.05$). The results are shown in Table 4.

The results concerning professional activity of patients were also statistically analysed. Professional life is an important factor which may affect quality of life. The parametric Student's *t* test, Cochran-Cox test and *z*-test based on

Table 7. Quality of life and financial situation

Financial situation and quality of life		Degrees of asthma control						All	
		Controlled		Partially controlled		Uncontrolled			
		n	Mean ± SD	n	Mean ± SD	n	Mean ± SD	n	Mean ± SD
Good		74	0.644 ±0.094	41	0.612 ±0.096	63	0.581 ±0.095	178	0.614 ±0.098
Bad		11	0.496 ±0.093	8	0.460 ±0.105	12	0.500 ±0.108	31	0.488 ±0.100
Snedecor's F-test	F	$F = 1.01 < 2.61 = F_{cr}$		$F = 1.20 < 2.25 = F_{cr}$		$F = 1.28 < 1.95 = F_{cr}$		$F = 1.04 < 1.52 = F_{cr}$	
	p	0.54		0.32		0.26		0.42	
Student's t-test	t	$t = 4.89 > 1.99 = t_{cr}$		$t = 4.03 > 2.01 = t_{cr}$		$t = 2.67 > 1.99 = t_{cr}$		$t = 6.55 > 1.97 = t_{cr}$	
	p	< 0.0001		0.0002		0.009		< 0.0001	

the normal distribution (the latter one in order to compare the average levels of quality of life in the whole population) were used. In all cases, the levels of quality of life are numerically higher for the employed people. A significant difference was observed in three cases: in the groups with partially controlled and uncontrolled asthma and in the entire population. The results of the calculations and the analysis of this issue are presented in Table 5.

Another determinant of quality of life subjected to an examination and assessment was marital status. In all cases, the average levels of quality of life of singles are higher than these of married people. A significant difference was observed only in the entire population. The results of the statistical analysis are shown in Table 6.

One of the important elements affecting a person's life is financial situation. It was also taken into account while examining the relationship between quality of life and socio-demographic factors. The data presented in Table 7 show that in all groups and in the entire population, the average level of quality of life is significantly higher in patients whose financial situation is rated as good.

Discussion

Studies of quality of life in asthma are a valuable source of information about patients. They provide a large number of data on various areas and aspects of patient's life. They identify threats, allow to choose an appropriate way of therapy and individualize the treatment process. They are determinants of planning and implementing holistic care for particular patients or groups of patients. The studies also indicate changes taking place over time and differentiate patients, giving an opportunity to predict the consequences of the disease in the future. Hence, it becomes reasonable to indicate socio-demographic factors relevant to the assessment of quality of life of patients.

The age of patients in the author's own material ranged from 18 to 65 years and is comparable to the materials by Lewandowska et al. [7] (the youngest subject was 19, the oldest – 75 years old), Schatz et al. [8] (the youngest – 18, the oldest – 54), Chełmińska et al. [9] (the youngest – 18, the oldest – 40), Pietras et al. [10, 11] (the youngest – 22, the oldest – 80), Uchmanowicz et al. [12] (the criterion for inclusion in the study – age over 18 years) [13].The average age in the author's study (44.9 ±12.5) is comparable with the results of other authors [10, 14–17], in other publications, the average was 30 years [9, 18], or 36 [19].

Older people, more than any other age groups, suffer deficiencies in satisfying their needs. They often have a bad financial situation. Over the years, health status and overall performance deteriorates, which affects their life situation and social position. According to Szatur-Jaworska [20], lifespan has the greatest impact on psychological well-being of Poles. A mental condition, which is connected with the social situation, deteriorates with age. Also a physical condition gradually gets worse with age. Slavin indicates that age is an important factor that affects the anatomy and physiology of lungs [21].

The World Health Organization regards the age of 60 as the beginning of old age while the United Nations – 65. In Poland, the beginning of old age is associated with retirement (60 years for women and 65 for men) [22]. According to Lindner et al. [23], asthma is a common disease in the elderly people, and its symptoms are less specific or altered by co-morbidities. Presentation of the disease is not typical and is often unrecognized [24–27]. Kowalski et al. [18] in their research indicate the average occurrence of asthma symptoms being four times a week. Greater frequency was seen among adults aged 55–64 years. In the studies conducted by Uchmanowicz et al. [15] in 2008–2009 in Wroclaw, selected socio-demographic characteristics (age, sex, education) were evaluated as well as their impact on the quality of life of patients with asthma using the general questionnaire EuroQol (EQ-5D) and the disease-specific Asthma Quality of Life Questionnaire (AQLQ). It was observed that with age, the assessment of quality of life is lower in more than one domain (environmental stimuli, activity limitations). Deterioration in quality of life in all areas occurred in people over 50 years of age. Other authors confirm these data [28, 29].

In our own study, the level of quality of life decreased with age. Significance of the correlation was only found for the entire study population ($p < 0.002$).

Taking into consideration sex, 144 women (67.9%) and 68 men (32.1%) were examined. In the study by Schatz *et al.* [8], the percentage of women was 68%, in Uchmanowicz *et al.* [15] – 72%, in Laforest *et al.* [19] – 62%, in Chełmińska *et al.* [30] – 66%, in Ferreira *et al.* [16] – 70% and in Kowalski *et al.* [18] – 63%. Epidemiological studies conducted by Melgert *et al.* [31] show that women are at increased risk of developing asthma in early adulthood. They suffer from the disease more often than men. It seems that these differences are caused by biological differences between two sexes (genetic, pulmonary, immunological causes) as well as socio-cultural and environmental dissimilarities [32]. The researchers highlight the role of sex hormones as the main determinants of risk of the disease in adolescence [33, 34]. Differences in the frequency and expression of asthma depending on sex, according to Sozańska *et al.* [30] indicate a male predominance before puberty (2 : 1) and female during puberty (3 : 1). The research by Kowalski *et al.* [18] shows the average more frequent occurrence of asthma symptoms in women.

The results of the present study do not show differences in quality of life in relation to sex ($p = 0.78$), which is consistent with the results obtained by other authors [15, 35], but some [19, 32, 36–41] observed a lower level of quality of life in women and more frequent use of medical care compared to men, despite receiving similar treatment.

In the further stage of the research, an attempt was made to determine the extent to which education affects the assessment of quality of life. The results of the study show that in all groups and in the entire population, the level of quality of life increases with the level of education. A significant increase was observed in the control group ($p < 0.05$) and in the whole population ($p < 0.0005$).

There is a consensus among researchers on the impact of education on quality of life in patients with bronchial asthma. Previously cited studies by Uchmanowicz *et al.* [15] showed a statistically significant correlation between education and the following domains concerning the symptoms: activity limitations and environmental stimuli. Self-esteem is lower in people with vocational education than in those with a higher level of education. Also, Chen *et al.* [42], using in their research the questionnaires AQLQ and EQ-5D, have proved that a low level of education results in a lower quality of life in patients with bronchial asthma. A similar view is shared by Ferreira *et al.* [16], indicating that quality of life is better in patients with higher education and higher income. This is confirmed by the research conducted by Blozik *et al.* [43], in which greater limitations of quality of life were associated with lower education.

Another type of analyzed data concerned the place of residence. The study showed no significant difference between the quality of life of inhabitants of towns and villages ($p > 0.05$). This is confirmed by the studies conducted by Hans-Wytrychowska *et al.* [44] on a population of 275 patients with asthma using the SGRQ. This may prove that in modern times, rural population is not only agricultural population. The studies by Yen *et al.* [45] which assessed the impact of the place of residence on an adult population with asthma in northern California are interesting on this background. The relationship between quality of life, physical functioning and depressive symptoms and various problems in the surrounding environment (traffic, noise, pollution, smell, fires) was evaluated by 435 respondents. A higher level of perceived difficulties in the area was associated with a lower quality of life, worse physical functioning and an increase in depressive symptoms. Previously brought up studies by Ferreira *et al.* [16] also point out to a link between quality of life and the place of residence, indicating a higher assessment of quality of life by people from urban areas.

Some studies have reported that professional activity [16, 19] leads to a higher assessment of quality of life, while other studies have not supported this relationship [44]. Inability to perform work due to the limitations caused by an illness may result in lower self-esteem and socioeconomic status.

In our study, there was a statistically significant correlation between professional activity and perception of quality of life. The difference was found in three cases – in the group with partially controlled ($p < 0.003$) and uncontrolled asthma ($p < 0.05$) and in the whole population ($p < 0.0001$). Self-assessment of quality of life of employed people is higher than of those who do not work (unemployed, pensioners).

The study by Archea *et al.* [46] showed the impact of negative and stressful events on the perception of quality of life, especially among patients with a lower socioeconomic status. Thus, the results obtained by Ferreira *et al.* [16], which showed that the amount of the average monthly net income determines the self-assessment of quality of life, will not be surprising. According to the author, higher income resulted in better perception of quality of life. Bandiera *et al.* [47], in a cross-sectional study conducted in 2004 in the United States, highlight the relationship between asthma, low income, minorities (racial and ethnic) and mental health. Similar studies were conducted by Wisnivesky *et al.* [48], assessing quality of life of patients with asthma from poor neighborhoods of New York. Sex and a low socioeconomic status were regarded as most important risk factors associated with the exacerbations of the disease and mortality rate. This is also confirmed by other authors [29].

In our research, a significantly higher level of perceived quality of life was observed in patients who better rated their financial situation (controlled asthma $p < 0.0001$, partially controlled asthma $p < 0.0002$, uncontrolled asthma $p < 0.009$, entire population $p < 0.0001$).

The literature mentions the impact of the socioeconomic factor which is the marital status on quality of life.

In the research by Wang *et al.* [35], carried out in Taiwan by means of the questionnaire St. George's Respiratory Questionnaire (SGRQ) in the Chinese version, marital status had an impact on the perception of quality of life. Married patients received lower scores concerning quality of life. In the study by Ferreira *et al.* [16], single people and marriages presented higher quality of life than those who had got divorced and widowed people.

In our study, in all cases, the average levels of quality of life of single people were higher than those of married patients. A significant difference was only present in the entire population (p = 0.0025).

Conclusions

Chronic diseases lower well-being and cause negative emotions. Asthma is a condition that significantly affects quality of life, reducing in various ways activity levels in patients, physically, emotionally, and socially.

Quality of life in patients with asthma depends on many factors. In the conducted study, age, education, professional activity, marital status and financial condition can be included as the elements modifying QOL. There was no relationship between sex, place of residence and quality of life.

The degree of asthma control has important social and economic implications. Based on the conducted research, significant differences were noticed in the quality of life in patients with bronchial asthma according to the degree of the disease control. Adherence to GINA guidelines will reduce the severity of symptoms or exacerbations and will help patients avoid unnecessary hospitalizations.

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