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The impact of socioeconomic status on the quality of life in patients with chronic obstructive pulmonary disease

Abstract

Introduction: In addition to the traditional biomedical parameters, quality of life (QoL) evaluation has found its well-deserved place in the overall assessment of patients with chronic obstructive pulmonary disease (COPD). The impact of socioeconomic status (SES) was rarely evaluated in QoL studies in such patients with no such studies having been conducted in Poland. The aim of our study was to compare QoL between COPD patients and the control group and to evaluate the impact of SES, selected demographic characteristics, smoking and bronchial tree obstruction on the QoL in COPD patients.

Material and methods: We enrolled 120 patients with COPD (98 men and 22 women; mean age: 62.3 years) with no comorbidities and 85 healthy individuals (39 men and 46 women; mean age: 56.0 years). All the COPD patients underwent spirometry. QoL was assessed with the SF-36 Health Survey and the St George's Respiratory Questionnaire. To assess SES, demographic variables and smoking we used a questionnaire of our own authorship.

Results: COPD patients showed a significantly lower QoL compared to controls. Univariate analysis demonstrated effects of educational background, income, occupation, employment status and bronchial obstruction on the individual QoL domains. Multivariate regression analysis revealed that the sociodemographic factors significantly affecting the overall QoL included: present occupation, employment status, monthly income, educational background and total exposure to cigarette smoke. No effects of age, sex or smoking status on the QoL in COPD were shown.

Conclusions: The QoL in patients with COPD is affected by many factors. In addition to spirometric abnormalities the significant factors that modify QoL are: educational background, monthly income, present occupation and employment status, while sex, age and smoking status do not significantly affect QoL.

Key words: chronic obstructive pulmonary disease, quality of life, socioeconomic status

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Introduction

The management of COPD patients is not only aimed at relieving the symptoms, preventing exacerbations, reducing mortality, preventing complications and delaying progression of the disease but also improving overall health and mood and preserving, for as long as possible, the patient's psychomotor function and professional activity. Quality of life (QoL) evaluation has therefore become an important element of the overall assessment of patients with chronic obstructive pulmonary disease (COPD) in addition to the traditional biomedical parameters.

Quality of life is defined as an individual's perception of his life position in the cultural context, within the system of values and relative to the individual's tasks, expectations and environmental circumstances [1, 2]. According to the popular understanding, QoL refers to the feeling of satisfaction, the feeling of having done well in life in the context of the real needs and possibilities of a person [3].

Quality of life in clinical evaluation is measured with the use of general and specific questionnaires. While general questionnaires may be used in different disease entities and take into consid-

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ration the patient's well-being and factors related to the experience of the illness, specific questionnaires focus on the phenomena arising from the illness itself and may only be used in a specific group of patients [2].

An optimal QoL assessment in COPD patients involves the use of both general and specific questionnaires [4, 5]. The QoL in COPD is lower than that in the healthy population, although the opinions on its determinants vary. Quality of life is affected by pathophysiological factors, psychological factors and, albeit confirmed by some studies only, socioeconomic factors [6].

Socioeconomic status (SES) refers to the social position of an individual or a group of persons who have achieved a similar level of wealth, power, prestige, education, lead similar lifestyles, spend their free time in similar ways and share a similar occupational status. The commonly used measures of socioeconomic differences include: educational background, income and present occupation [7, 8].

The impact of sociodemographic factors, such as age, sex, marital status, educational background, income, employment has rarely been investigated in QoL studies in COPD patients with no such studies having been conducted in Poland so far. Socioeconomic factors have, however, been proved to affect the QoL in patients with hypertension [9], patients undergoing chronic dialysis [10] and the elderly [11]. Studies conducted outside Poland have demonstrated an influence of socioeconomic factors on the QoL in patients with asthma, patients with a history of stroke, patients with prostate tumours and patients managed for chronic renal failure [10, 12–14]. The few studies evaluating the effect of SES on the QoL in patients with COPD reported contradictory opinions. Some authors confirmed [15–18], while others negated [19, 20] the effects of SES on the QoL in COPD patients.

The aim of our study was to evaluate the impact of socioeconomic status on the QoL in patients with COPD.

Material and methods

We enrolled 120 patients with COPD, 22 women and 98 men, 44 to 82 years old (mean age: 62.3 years) managed at the Outpatient Clinic of Lung Diseases and Tuberculosis in Zabrze, Poland, between 2001 and 2003, with a diagnosis of COPD established in accordance with the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines of 2001 (updated version of 2003) and the guidelines of the Polish Society of Tuberculosis and Pneumonology (PSTP) of 2002. All the pa-

Table 1. General characteristics of treated and control group

	Treated group	Control group
Patients:	120	85
women	22	46
men	98	39
Age	62.35 (44–82)	56 (39–80)
Marital status:		
single	4	3
married	99	64
widowed	12	10
divorced	5	8
Education:		
university	8	16
middle school	24	35
skilled	45	18
primary	43	16
Monthly incom:		
> 1000 PLN	40	33
500–1000 PLN	58	36
< 500 PLN	22	16
Profession:		
white-collar	20	24
blue-collar	100	61
Occupation:		
employed	18	51
retired	66	27
pensioner	29	7
unemployed	7	1
FEV ₁ (l)	1.61 ± 0.73 SD	
FEV ₁ % nal. mean	54.15 ± 21.07 SD	
FVC (l)	2.48 ± 0.84 SD	
FVC% nal. mean	67.14 ± 18.27 SD	
Smoking behaviour:		
non-smokers	15	26
smokers	36	30
ex-smokers	69	29
Pack-year	28.8 ± 18.0 SD	28.8 ± 18.0 SD

SD — standard deviation

tients underwent spirometry (MicroLab 3300), which revealed an airway obstruction (defined as FEV₁/FVC < 70%) following administration of a bronchodilator (salbutamol 400 µg). A total of 13 patients were diagnosed with mild COPD (FEV₁ ≥ 80% predicted), 54 with moderate COPD (50% < FEV₁ < 80% predicted), 42 with severe COPD (30% < FEV₁ < 50% predicted) and 11 with very severe COPD (FEV₁ < 30% predicted). The patients were stable showing no exacerbations in the previous 3 months and were being managed in accordance with the GOLD and PSTP guidelines [21,22] according to the severity of the disease (Table 1). We enrolled patients without significant co-morbidities who were not being managed at any specialist outpatient facility other than the Outpatient Clinic of Lung Diseases for COPD and were not taking

any other medication than medication for COPD. Exclusion criteria were as follows:

- lack of consent to participate in the study;
- presence of medical conditions preventing the patient from completing the questionnaire and socioeconomic status survey: major CNS disorders, motor disability, significant visual impairment;
- presence of other respiratory disorders: asthma, bronchiectasis, tuberculosis, pneumoconiosis, lung cancer;
- presence of other co-morbidities: cardiovascular disease, psychiatric diseases, metabolic diseases (e.g. diabetes mellitus), bone and joint diseases (e.g. degenerative diseases of the spine, rheumatic diseases), ophthalmic diseases (e.g. glaucoma, cataracts), cancer.

A total of 85 healthy individuals (47 women and 38 men) aged 39 to 80 years (mean age: 56 years) without any chronic co-morbidities were enrolled in the control group. In the previous 6 months these subjects underwent screening assessments which included spirometry and chest X-ray, which showed no abnormalities (Table 1).

Quality of life was assessed using the Polish version of the SF-36 Health Survey and the Polish version of St George's Respiratory Questionnaire (SGRQ). The SF-36, an example of a general questionnaire, is one of the subjective measures of health used in population studies. The questionnaire was used with the approval of its author, J.E. Ware. The questionnaire contained 36 questions concerning 8 spheres of life: physical functioning (PF, Physical Functioning), social functioning (SF, Social Functioning), limitation of activity due to lack of physical health (RP, Role Physical), bodily pain (BP, Bodily Pain), limitation of activity due to emotional problems (RE, Role Emotional), mental health (MH, Mental Health), vitality (VT, Vitality), general health (GH, General Health) and two subscales summarising functioning in the physical dimension (Physical Component Summary [PCS]) and the mental dimension. Each of the above domains was rated from 0 to 100 after an appropriate conversion formula was applied. The lower the score, the lower the QoL. In Poland, Marcinowicz and Sienkiewicz [23] demonstrated a high validity and reliability of the Polish version of the SF-36 Health Survey [24, 25]. St George's Respiratory Questionnaire (SGRQ) is a specific questionnaire evaluating QoL in respiratory diseases. The questionnaire was used with the approval of its author, P. Jones. The SGRQ contained 50 questions grouped into three subscales: Symptoms (S), Activity (A) and Impacts (I).

Each question is scored and the individual scores are added to calculate the outcome of QoL assessment. The total score (T) obtained with the use of the SGRQ and the results for the individual scales may range from 0 (lowest QoL impairment) to 100 (highest QoL impairment) [26, 27]. In Poland, the questionnaire has been validated in patients with asthma showing a high efficacy, reliability and test-retest reliability [28]. The subjects self-administered the questionnaires, which took them 15–20 minutes.

We designed our own questionnaire to evaluate socioeconomic status factors based on other authors' studies [15, 18, 19]. In the questionnaire, we included basic demographics, such as age and sex, and basic socioeconomic status indicators, such as educational background, employment and monthly income per family member expressed in the Polish zloty. We also included questions about the smoking status (never-smoker, ex-smoker, smoker), the number of cigarettes smoked a day and the number of years of smoking. We calculated the total exposure to tobacco smoke expressed in pack years (1 pack year = 20 cigarettes per day per year). The patients completed the questionnaires voluntarily, as a supplement to the medical interview. The study had been approved by the Bioethics Committee of the Silesian Chamber of Physicians and Dentists, Poland.

The statistical significance of the differences between the study groups was assessed using univariate analysis of variance confirmed by the Kruskal-Wallis test and the non-parametric U Mann-Whitney test. In order to determine the significance of the differences between the group means in the analysis of variance we used Tukey's HSD post hoc test. The interrelationship of the variables was also assessed using Spearman's rank correlation coefficient. We also used multivariate regression analysis. We adopted a P value of < 0.05 to be statistically significant.

Results

Patients with COPD showed a significantly lower QoL compared to controls. Lower QoL was found in all the SGRQ domains (Fig. 1) and in six domains of the SF-36, namely: General Health (GH), Physical Functioning (PF), Role Physical (RP), Role Emotional (RE), Vitality (V) and Physical Component Summary (PCS). We did not observe any significant differences in the Mental Health (MH), Social Functioning (SF), Bodily Pain (BP) or Mental Component Summary (MCS) domains (Fig. 2).

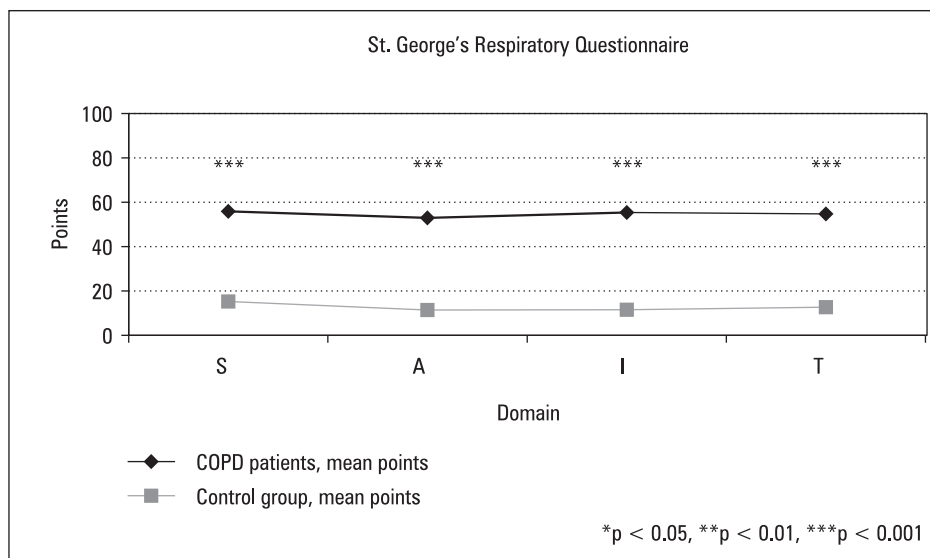


Figure 1. General quality of life in treated and controls using St. George's Respiratory Questionnaire

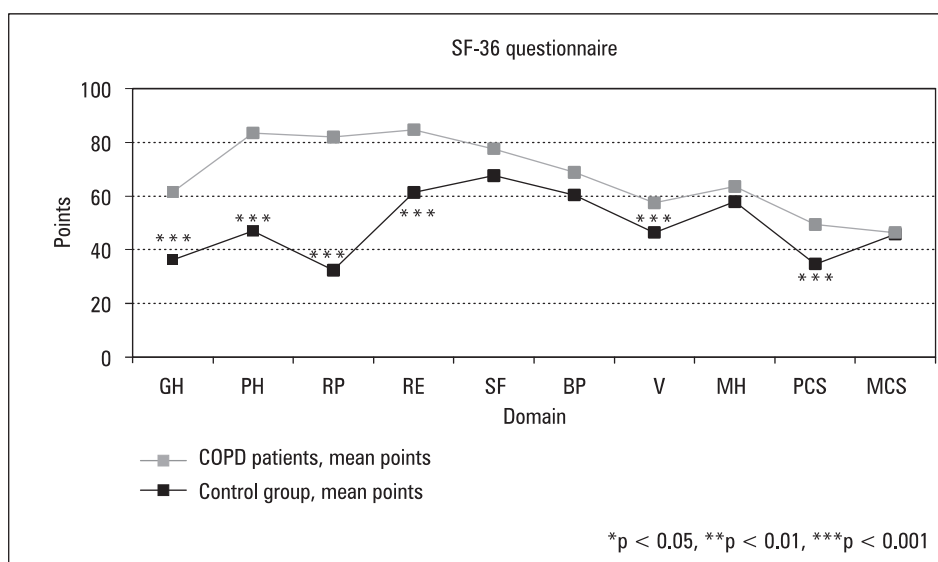


Figure 2. General quality of life in COPD patients and controls using SF-36 questionnaire

Subjects with higher education showed a significantly higher QoL compared to subjects with secondary, vocational or primary education. The higher QoL was demonstrated in three domains of the SF-36: Physical Functioning (PF), Role Physical (RP) and Physical Component Summary (PCS) (Table 2), and in the Activity (A), Impacts (I) and Total score (T) of the SGRQ (Table 3).

When we analysed the effects of the monthly income on the QoL we observed significant differences between subjects with the highest and those with the lowest monthly income. The differences were only observed in the Social Functioning (SF), mental health (MH) and Mental Component Sum-

mary (MCS) domains of the SF-36 (Table 2) and in the Activity (A) domain of the SGRQ (Table 3).

White-collar workers had significantly higher scores compared to blue-collar workers in the general health (GH), physical functioning (PF), Role Physical (RP), Social Functioning (SF), Vitality (V) and Physical Component Summary (PCS) domains of the SF-36 (Table 2). This trend was observed in all the domains of the SGRQ (Table 3).

When we considered the impact of employment status on the QoL we found that pensioners and subjects on disability allowance reported a significantly lower QoL compared to subjects in current employment. These differences were evident in the

Table 2. Socio-demographic factors affecting in univariate analysis the general quality of life in Sf-36 questionnaire

Socioeconomic factors	Domain									
	GH	PF	RP	RE	SF	BP	V	MH	PCS	MCS
University education	35.5 (22.1)	87.5** (10.0)	81.2** (37.2)	81.2 (35.3)	82.8 (26.7)	73.4 (23.1)	73.4 (21.0)	66.5 (18.0)	46.3** (9.2)	48.0 (12.8)
Middle schoole ducation	40.7 (19.9)	55.2 (27.8)	38.5 (44.8)	38.5 (48.2)	66.1 (32.9)	60.7 (30.9)	60.7 (22.3)	57.6 (23.0)	37.8 (9.1)	43.2 (12.7)
Skilled education	38.7 (19.3)	43.1 (22.5)	25.5 (34.3)	25.5 (43.1)	70 (31.1)	60.5 (30.4)	60.5 (21.8)	61.2 (26.0)	32.5 (9.0)	48.5 (12.4)
Primary education	31.5 (16.1)	38.8 (25.9)	26.7 (39.5)	26.7 (44.3)	63.4 (28.8)	57.3 (28.3)	57.3 (24.5)	53.1 (19.0)	32.8 (9.8)	44.1 (12.5)
Incom > 1000 PLN	38.8 (19.9)	50.6 (27.8)	40 (41.1)	70.0 (41.2)	76.2* (32.1)	64.4 (30.6)	64.4 (24.2)	64* (23.1)	35.7 (10.5)	49.3* (12.2)
Incom 500–1000 PLN	36.5 (18.7)	46.5 (26.0)	28.4 (41.7)	60.3 (44.8)	67.2 (28.6)	61.6 (27.0)	61.6 (21.8)	58.6* (21.4)	34.4 (9.9)	45.7 (12.1)
Incom < 500 PLN	31.9 (15.5)	41.6 (25.4)	28.4 (36.4)	48.5 (46.8)	53.4 (29.2)	49.2 (31.0)	49.2 (22.5)	45.2 (21.1)	33.2 (9.2)	39.7 (12.7)
White-collar	45.4* (19.0)	74.7* (21.8)	67.5*** (44.5)	76.7* (42.0)	84.4 (21.8)	67.4 (29.6)	58.7* (15.5)	67.0 (18.9)	43.6* (9.0)	49.1 (9.2)
Blue-collar	34.4 (18.2)	41.4 (23.7)	25.2 (36.1)	58.3 (44.3)	64.4 (31.2)	58.8 (29.1)	43.9 (23.9)	56.1 (23.0)	32.8 (9.1)	45.2 (13.1)
Employed	42.2 (16.3)	66.1*** (21.1)	58.3* (40.2)	68.5 (43.5)	72.2 (23.3)	70.3 (23.2)	55* (19.8)	63.5 (17.7)	41.9* (8.2)	46.5 (11.2)
Retired	38.2 (18.23)	48.5 (25.2)	30.7 (41.5)	62.6 (43.9)	70.4 (28.6)	65.5 (27.6)	48.7 (22.2)	60.4 (21.7)	34.7 (9.8)	47.2 (12.2)
Pensioner	28.4 (18.2)	32.4 (25.5)	19.8 (33.7)	55.1 (46.5)	59.9 (37.5)	57.7 (36.6)	35.2 (22.5)	52.1 (27.7)	30.2 (9.9)	43.1 (14.9)
Unemployed	36.4 (12.1)	43.6 (23.0)	32.1 (37.4)	57.1 (46.9)	62.5 (34.6)	42.6 (37.1)	47.1 (22.7)	44.6 (11.9)	33.0 (5.0)	42.8 (12.4)
FEV ₁ > 80%	38 (23.3)	67.7** (28.2)	58.3 (22.1)	66.6 (43)	63.5 (33.2)	55.1 (28.6)	47.3 (22.2)	53.8 (21)	40.7 (11.4)	42.4 (12.4)
FEV ₁ 79–50%	35 (15.7)	45.3 (24.7)	29.2 (39)	59.2 (43.7)	70.6 (29.4)	59.8 (25.3)	44.8 (21.8)	55.5 (21.5)	34.1 (9.3)	45.4 (11.4)
FEV ₁ 49–30%	37.6 (19.3)	46.3 (26.8)	30.9 (40.5)	61.9 (46.9)	66.4 (32.5)	60.6 (34.4)	48.8 (23.1)	60.1 (24.1)	34.2 (10.0)	46.8 (13.7)
FEV ₁ < 30%	33.4 (25.2)	33.2 (20.8)	20.4 (40.0)	63.6 (43)	63.6 (29.3)	67.2 (29.0)	44.1 (28.3)	66.9 (25.0)	31.2 (9.4)	48.1 (14.7)

*p < 0.05, **p < 0.01, ***p < 0.001

Physical Functioning (PF), Role Physical (RP), Vitality (V) and Physical Component Summary (PCS) domains of the SF-36 (Table 2). The SGRQ showed effects of employment on the QoL in the Activity (A) and Impacts (I) domains and in the Total score (T). In the Activity (A) domain and the Total score (T) subjects on disability allowance reported a lower QoL compared to pensioners and subjects in current employment. In the Impacts (I) domain, on the other hand, subjects in current employment reported a higher QoL compared to pensioners, subjects on disability allo-

wance and unemployed subjects, while pensioners had a higher QoL compared to subjects on disability allowance (Table 3).

A significantly higher QoL was observed in subjects with mild COPD compared to the other groups. This significant effect of bronchial obstruction on the QoL was demonstrated in the Impacts (I) and Total score (T) domains of the SGRQ (Table 3) and in the Physical Functioning (PF) domain of the SF-36 (Table 2).

We observed no differences in the QoL with respect to sex, age, smoking status or total exposu-

Table 3. Socio-demographic factors affecting in univariate analysis the general quality of life in St. George's Respiratory Questionnaire

Socioeconomic factors	Domain			Total
	S	A	I	
University education	40.1 (26.6)	29.1*** (17.0)	29.2*** (14.5)	33.3*** (18.8)
Middle school education	49.7 (18.9)	52.5 (17.3)	52.4 (19.3)	50.5 (15.2)
Skilled education	58.3 (21.8)	52.5 (19.3)	56.6 (17.7)	56.2 (16.7)
Primary education	59.8 (22.2)	58.3 (20.7)	60.6 (18.0)	59.8 (17.6)
Incom >1000 PLN	50.7 (20.8)	49.6* (22.4)	54.1 (21.4)	52.3 (19.6)
Incom 500–1000 PLN	56.9 (24.4)	51.5 (18.7)	54.4 (18.7)	54.3 (17.8)
Incom < 500 PLN	62.8 (15.8)	63.0 (17.9)	59.0 (17.0)	60.8 (14.2)
White-collar	43.2* (21.3)	36.9*** (16.7)	39.6*** (19.7)	39.3*** (15.8)
Blue-collar	58.5 (21.5)	56.2 (19.5)	58.5 (17.7)	57.9 (16.8)
Employed	52.7** (19.7)	44.4** (17.2)	39.4 (15.9)	44.7*** (14.6)
Retired	52.7 (23.4)	48.7 (19.7)	53.9 (19.3)	52.0 (18.2)
Pensioner	64.2 (18.8)	65.2 (16.5)	66.0 (14.6)	65.5 (14.1)
Unemployed	62 (22.7)	63.5 (22.2)	66.0 (12.8)	63.3 (15.5)
FEV ₁ > 80%	43.9 (26.0)	44.4 (23.5)	38.7*** (22.8)	42.0** (21.7)
FEV ₁ 79–50%	56.3 (20.0)	53.7 (21.2)	55.8 (19.5)	54.9 (16.9)
FEV ₁ 49–30%	55.8 (22.9)	53.3 (19.0)	56.6 (16.2)	55.5 (17.2)
FEV ₁ < 30%	68.7 (19.8)	58.5 (16.3)	68.3 (12.6)	66.4 (13.4)

*p < 0.05, **p < 0.01, ***p < 0.001

re to cigarette smoke in either questionnaire (SF-36 and SGRQ).

Multivariate regression analysis showed that factors significantly increasing the QoL in COPD patients include: current occupation — office employment (domains: PF, RP, SF, V, PCS, S, A, I, T), current employment (PF, MH, PSC, V, BP, A, I, T), higher monthly income per family member (SF, MH, BP, S), mild bronchial obstruction (PF, S, I, T) and the number of pack years (PCS, RP) (Tables 4 and 5).

Cronbach's alpha reliability coefficient for both tests exceeded 0.80.

Discussion

We showed a reduced QoL in patients with COPD compared to healthy individuals, which is consistent with other studies [18]. The SGRQ showed a significantly reduced QoL in all the domains and the SF-36 demonstrated a significantly lower QoL mainly in the Physical Functioning domain. The COPD patients did not differ significantly from the control group as far as mental functioning was concerned.

The causes of reduced QoL in COPD patients are complex, and the opinions on the impact of

individual factors vary. The QoL in COPD patients does not only deteriorate with increasing airflow limitation, as other factors have been confirmed to adversely affect the QoL in these patients, such as: reduced diffusion capacity of the lungs, reduced exercise performance, reduced oxygen partial pressure and increased dyspnoea [15, 18, 29, 30]. Quality of life may also be affected by mental status, depression and anxiety [31]. The absence of differences between the study group and the control group in the mental dimension may have been caused by excluding patients with co-morbidities, including psychiatric disorders, and by the acceptance of being chronically ill be the patients. Similar findings have been reported in patients on chronic dialysis, where the reduced QoL is mainly seen in the physical functioning domain, while no differences compared to healthy individuals are observed in the mental status [10].

Low socioeconomic status is a significant risk factor for COPD and may sometimes impair QoL to a greater degree than the pathophysiological factors [17]. Our findings are consistent with other authors' opinions [15, 16, 18] on the impact of education on the QoL. Low education was associated with reduced QoL mainly in the physical functioning domain [18]. Similar findings have

Table 4. Socio-demographics factors. degree of airflow obturation. the number of packyears affecting the general quality of life in multiple regression analysis

PF	Factor β	Standard error	R²	p
Z	-0.358	0.088	0.201656	< 0.001
SZ	-0.246	0.088	0.248491	0.006
FEV ₁ ,% nal.	0.206	0.084	0.290694	0.02
RP	Factor β	Standard error	R²	p
Z	-0.374	0.0889	0.115010	< 0.001
P	-0.310	0.0889	0.210209	< 0.001
SF	Factor β	Standard error	R²	p
DM	-0.290	0.093	0.095191	0.002
Z	-0.195	0.093	0.133039	0.038
BP	Factor β	Standard error	R²	p
DM	-0.278	0.090	0.076923	0.002
SZ	-0.219	0.090	0.176724	0.017
V	Factor β	Standard error	R²	p
Z	-0.364	0.122	0.056922	0.003
W	0.301	0.126	0.086528	0.02
SZ	-0.226	0.101	0.129421	0.03
MH	Factor β	Standard error	R²	p
DM	-0.309	0.089	0.092855	< 0.001
SZ	-0.290	0.089	0.172406	0.001
PCS	Factor β	Standard error	R²	p
Z	-0.403	0.090	0.164691	< 0.001
P	-0.225	0.085	0.219584	0.009
SZ	-0.185	0.088	0.291786	0.030

Z — occupation, SZ — employment, P — smoking pack-years, DM — monthly incom, W — education

been reported in patients undergoing chronic dialysis [10] and patients with hypertension [9]. A study of the population of Cracow, Poland, showed that a higher level of education and a better professional standing in the elderly positively affected the QoL [11].

Our study showed that white collar workers had a significantly higher quality of life compared to blue collar workers, while subjects on disability allowance and pensioners had a lower QoL compared to subjects in current employment. In multivariate regression analysis, current occupation and employment status were the only factors affecting the QoL in most domains. Orbon et al. [32] demonstrated that COPD patients who were unable to work were characterised by a reduced QoL

compared to patients in current employment, although other authors [19, 33] did not confirm the relationship between QoL and employment status or current occupation.

We also showed an impact of the monthly income on the QoL in COPD patients. In multivariate regression analysis, income was one of the significant factors affecting the QoL in the Mental Health (MH), Social Functioning (SF), Bodily Pain (BP) domains of the SF-36 and the Symptoms (S) subscale of the SGRQ, which is consistent with other authors' opinions [15, 34]. Sufficient material means allow these patients not only to satisfy their basic living needs but also to actively spend their free time, keep social contacts and enjoy their lives more. In patients with asthma the number

Table 5. Socio-demographics factors. degree of airflow obturation. the number of packyears affecting the general quality of life in multiple regression analysis

S	Factor β	Standard error	R²	p
FEV ₁ % nal.	-0.264	0.093	0.073285	0.005
Z	0.187	0.093	0.114664	0.047
DM	0.168	0.093	0.142804	0.073
A	Factor β	Standard error	R²	p
SZ	0.268	0.093	0.122376	0.005
Z	0.265	0.094	0.17355	0.006
I	Factor β	Standard error	R²	p
SZ	0.383	0.087	0.180386	p < 0.001
FEV ₁ % nal.	-0.299	0.083	0.281558	p < 0.001
Z	0.197	0.087	0.31644	0.026
T	Factor β	Standard error	R²	p
SZ	0.312	0.089	0.136705	p < 0.001
FEV ₁ % nal.	-0.272	0.085	0.224187	0.001
Z	0.242	0.089	0.277045	0.008

Z — occupation, SZ — employment, DM — monthly income

of failures in life strictly related to lower QoL was significantly higher in low-income patients compared to high-income patients [13]. The QoL was also reduced in prostate cancer patients with a lower economic status [14]. The inclusion of monthly income per family member as an indicator of socioeconomic status has certain limitations, as it ignores other material resources, such as cars or homes. Some patients may also purposefully overstate or understate their incomes when completing the questionnaires or fail to take into consideration economic status changes over the past several years or decades and their socioeconomic status in childhood.

We noted no impact of age on QoL. The impact of age on QoL is sometimes completely negated, as it is continually shown that elderly patients adapt to the limitations imposed by their illness and treat them as a natural consequence of the ageing process [19], while according to other authors, advanced age is a significant factor reducing the QoL in COPD [17, 19, 20, 29].

We observed a significant effect of spirometric abnormalities on QoL only in the Physical Functioning domain of the SF-36. Subjects with mild COPD showed a significantly higher QoL compared to subjects with severe COPD. In the SGRQ, on the other hand, low FEV₁ values corresponded with QoL reduction in the Impacts (I) domain and in the Total score (T). We also sho-

wed correlations between the individual scores obtained in the SGRQ and FEV₁ in the majority of domains, which confirms the fact that the specific questionnaire is a much more sensitive tool in detecting QoL changes in COPD patients than the SF-36. In multivariate regression analysis, FEV₁ was one of the factors affecting the QoL in the Physical Functioning (PF) domain and in the majority of SGRQ domains. Ferrer et al. [35] found that even in patients with moderate COPD the QoL was significantly reduced. Stahl et al. [20] demonstrated a relationship between the QoL and bronchial obstruction in the Physical Functioning domain of the SF-36 and in the Total score of the SGRQ, while no such relationship was observed in the Mental Component Summary (MCS) of the SF-36. Similarly to our study, other authors [15, 18, 29] observed a higher impact of bronchial obstruction on the Physical Component Summary (PCS) compared to the Mental Component Summary (MCS). On the other hand, Katelaars et al. [19] showed a weak relationship between FEV₁ and the QoL, emphasising that the QoL correlates more with reduced physical performance and the degree of autonomy than with the severity of bronchial obstruction. Schlecht et al. [36] not only emphasise stronger correlation of dyspnoea with the QoL compared to spirometric parameters, but also the absence of any effects of the latter on mental health domains.

Our findings do not suggest any sex-related differences in the QoL, which is consistent with other studies [21, 37], although some [38, 40] have shown lower QoL in women with COPD compared to men. Opinions on the effects of smoking on the QoL also differ [18, 20]. While some studies have shown ex-smokers enjoy a higher QoL compared to current smokers [33, 34], other studies have not demonstrated any significant differences [39]. In our study, in multivariate regression analysis, the total exposure to cigarette smoke expressed as pack years was a significant factor affecting the QoL in the Role Physical (RP) and Physical Component Summary (PCS) domains of the SF-36. Tsukino et al. [29] showed that the total exposure to cigarette smoke expressed as pack years was one of the four independent factors affecting the QoL, the other ones being: bronchial obstruction, diffusion capacity and age. Heijdra et al. not only evaluated the negative impact of smoking status on the QoL, which proved higher in current smokers, but also the effects of total exposure to cigarette smoke expressed as pack years, and showed that in ex-smokers and current smokers the QoL deteriorated with the number of pack-years [39].

We also assessed socioeconomic conditions in the control group. The impact of monthly income was evident in the physical health domains (PF, RP, PCS) of the SF-36, while in the population of COPD patients the mental functioning domain was the domain that was predominantly impaired.

The impact of current occupation (white collar workers) was evident in only two physical health domains (PF, PCS) and in the COPD subjects the QoL was reduced in most domains. Employment status affected the QoL in the General Health (GH), Physical Functioning (PF) and Physical Component Summary (PCS) domains. Subjects in active employment and pensioners showed a higher QoL.

We did not observe any effects of educational background, smoking status, number of pack years, age or sex on the QoL in the control group. No QoL reduction in the SGRQ was demonstrated.

Conclusions

The QoL in patients with COPD is affected by many factors. In addition to spirometric abnormalities the significant factors that modify QoL are: educational background, monthly income, present occupation and employment status, while sex, age and smoking status do not significantly affect QoL.

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