ORIGINAL ARTICLE – STUDENT AWARD WINNER 2012*

Comorbidities and the quality of life in hypertensive patients

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KEY WORDS

arterial hypertension, comorbidities, quality of life

ABSTRACT

INTRODUCTION An important factor influencing the perception of health-related quality of life (HRQoL) is the presence of chronic diseases, especially polymorbidity. However, little is known about how concurrent chronic diseases influence the HRQoL of hypertensive patients.

OBJECTIVES The primary aim of the study was to assess the relationship between comorbidities and different aspects of HRQoL in a large unselected cohort of patients undergoing treatment for hypertension.

PATIENTS AND METHODS A questionnaire-based study was conducted by 832 primary care physicians in a group of 12,525 unselected patients treated for hypertension for at least 3 months. HRQoL was evaluated using the Medical Outcomes Study 12-item Short-Form Health Survey (SF-12).

RESULTS Coexisting diseases were reported in 7986 patients (63.8%). Significantly lower HRQoL values were associated with coexisting diseases, especially obstructive respiratory disease, degenerative disc disease, radiculopathy, coronary artery disease, heart failure, stroke, diabetes, epilepsy, neurotic disorders, and mood disorders. The HRQoL of hypertensive patients decreased significantly with age and duration of antihypertensive therapy (>2 years). HRQoL values were higher for men and participants with higher education and lower for participants who were obese or had visceral obesity. Antihypertensive therapy was effective in 25.4% of the participants.

CONCLUSIONS Chronic diseases concomitant with arterial hypertension negatively affect all dimensions of the HRQoL.

INTRODUCTION Hypertension is a chronic, often asymptomatic disease that affects nearly 30% of adults in Poland.[1] The primary goal in hypertension treatment is to reduce long-term cardiovascular risk. However, recent studies have focused on the health-related quality of life (HRQoL) in hypertensive patients to improve daily functioning, minimize physical and psychological suffering, and enable full participation in family and social life.[2] The HRQoL of hypertensive patients is worse than that of healthy individuals[3-8] and is dependent on blood pressure, organ damage, comorbidities (including obesity), and treatment (both pharmacological and nonpharmacological).[9] As in the general population, lower HRQoL values in hypertensive patients are associated with older age, female sex, low socioeconomic status, and lower educational level.[10]

Comorbidities in hypertensive patients have been observed to reduce the effect of therapy and to decrease the HRQoL.[11] These concurrent diseases can be divided into 3 groups: conditions causally related to hypertension (overweight and obesity, diabetes, hyperthyroidism, chronic glomerulopathies), complications of hypertension (atherosclerosis, ischemic heart disease, myocardial infarction, heart failure, stroke), and conditions unrelated to hypertension (degenerative disc disease, neurotic disorders, chronic obstructive pulmonary disease [COPD] and asthma, peptic ulcer disease).[12] A number of studies have suggested that the presence of complications and comorbidities influences the HRQoL in hypertensive patients more than hypertension itself.[4,6] Although the effect of comorbidities on the HRQoL in hypertensive patients is becoming apparent, few studies have investigated this relationship in detail.

Therefore, the primary aim of this study was to determine the association between comorbidities and the HRQoL in a large unselected cohort of

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Received: March 30, 2012.
Accepted: April 2, 2012.
Conflict of interest: none declared.
Pol Arch Med Wewn. 2012; 122 (7-8): 333-340

* The authors won the third award of the Editor-in-Chief for the best student paper submitted to Pol Arch Med Wewn in 2012. Details on 2012 student investigator awards can be found at www.pamw.pl.

TABLE 1 Characteristics of hypertensive patients (n = 12,525)

age, y	57 ±12
sex, male/female, n (%)	5801 (46.3)/6724 (53.7)
place of residence, n (%)	
rural areas	2301 (18.4)
cities	10,224 (81.6)
education, n (%)	
primary school	1425 (11.4)
vocational school	2834 (22.6)
secondary school	4843 (38.7)
higher	3423 (27.3)
BMI, kg/m^2	28.6 ±4.5
overweight, n (%)	5739 (45.8)
obesity, n (%)	4236 (33.8)
waist circumference, cm	
men	97.2 ±11.1
women	89.5 ±12.4
visceral obesity, n (%)	8522 (68.0)
systolic blood pressure, mmHg	143.9 ±14.7
<140, n (%)	3916 (31.3)
140–160, n (%)	6178 (49.3)
>160, n (%)	2431 (19.4)
diastolic blood pressure, mmHg	87.8 ±9.8
duration of antihypertensive therapy, mo	77 ±68
monotherapy, n (%)	2635 (21.0)
polytherapy, n (%)	9890 (79.0)
number of drugs	2.8 ±0.9
nonpharmacological methods, n (%)	11,164 (89.2)
body weight reduction[a]	7150 (71.7)
increased physical activity[a]	7319 (73.4)
diet modification	9301 (74.3)
smoking cessation	4368 (34.9)
quality of life (SF-12)	
physical functioning	62.88 ±32.28
role physical	59.15 ±25.86
bodily pain	68.87 ±27.14
vitality	51.50 ±25.24
social functioning	65.42 ±26.32
role emotional	65.63 ±24.70
mental health	62.85 ±20.89
general health	44.39 ±20.53

Data are presented as mean ± standard deviation.

a overweight or obese patients

Abbreviations: BMI – body mass index, SF-12 – Medical Outcomes Study 12-item Short-Form Health Survey

hypertensive patients, using the Medical Outcomes Study 12-item Short-Form Health Survey (SF-12).

Patients and methods A total of 832 primary health care physicians throughout Poland participated in the study, recruiting 12,525 adult patients who had undergone hypertension treatment for at least 3 months and were able to complete the survey on their own. There were no exclusion criteria. The study protocol was approved by the bioethics committee of the Medical University of Silesia, Katowice, Poland (KNW/0022/KB1/100/I/10/11), and all participants provided informed consent.

The study questionnaire consisted of 2 parts. The first part was completed by a physician and included questions about demographics (sex, age, place of residence, education level), anthropometric measurements (body weight, height, waist circumference), blood pressure measurements, duration of hypertension, smoking status, coexisting diseases (according to the International Classification of Diseases, tenth revision), use of antihypertensive drugs (class of drug and active ingredient), and nonpharmacological (lifestyle) approaches such as increased physical activity, diet modification, smoking cessation, and weight loss. The second part of the survey, consisting of the questions from SF-12, was completed by a participant to protect patient privacy (license no. CT119 837/OP003 368, Quality Metric Inc.). The SF-12 form is an abbreviated version of the SF-36 form that assesses 8 dimensions of health: physical functioning, role physical, bodily pain, vitality, social functioning, role emotional, mental health, and general health. Raw scores were converted to percentages using the following formula: (value obtained – the lowest value in the population) × 100 / (the highest value in the population – the lowest value in the population).

Overweight and obesity were diagnosed according to the World Health Organization criteria, and visceral obesity was determined according to the 2005 International Diabetes Foundation criteria for Caucasians (waist circumference ≥80 cm for women and ≥94 cm for men).

Blood pressure control was scored on the basis of office blood pressure measurements in accordance with the 2009 European Society of Hypertension guidelines on hypertension management (<140/90 mmHg).[13]

Statistical analysis was performed using the STATISTICA 8.0 PL and STATA softwares. The nominal and ordinal data were expressed as percentages, and interval data as mean values with standard deviations. Quantitative variables were compared using the analysis of variance followed by the Tukey's post-hoc test. Distribution of variables was evaluated by the Shapiro-Wilk test, and homogeneity of variances was assessed by the Levene test.

Backward stepwise multivariate analyses were performed to evaluate variables representing different aspects of the HRQoL. Multivariate linear regression models were used for mixed variables, with an independent covariance structure for the random effects of age and sex, to obtain constrained maximum likelihood estimates (restricted maximum likelihood). Statistical significance was set at a P value less than 0.05.

TABLE 2 Coexisting diseases in hypertensive patients (n = 12,525)

Diseases		n (%)
cardiovascular diseases	coronary artery disease	2703 (21.6)
	atrial fibrillation	279 (2.2)
	heart failure	464 (3.7)
	peripheral artery disease	360 (2.8)
	chronic venous disease	186 (1.5)
	past stroke	232 (1.9)
metabolic disorders	diabetes	2669 (21.3)
	lipid disorders	1935 (15.4)
gastrointestinal diseases	gallstones	51 (0.4)
	irritable bowel syndrome	48 (0.4)
	peptic ulcer disease	262 (2.1)
urinary tract diseases	chronic kidney disease	68 (0.5)
	kidney stones	69 (0.6)
	benign prostate hyperplasia[a]	324 (5.6)
respiratory diseases	COPD/asthma	557 (4.4)
endocrine diseases	hypothyroidism	296 (2.4)
	hyperthyroidism	74 (0.6)
	goiter	133 (1.1)
bone and joint disorders	degenerative disc disease	1494 (11.9)
	radiculopathy	294 (2.3)
	osteoarthritis	990 (7.9)
	osteoporosis	48 (0.4)
neurological and psychiatric disorders	mood disorder	156 (1.2)
	neurosis	162 (1.3)
	epilepsy	24 (0.2)
cancer		42 (0.3)
other		426 (3.4)

a in men

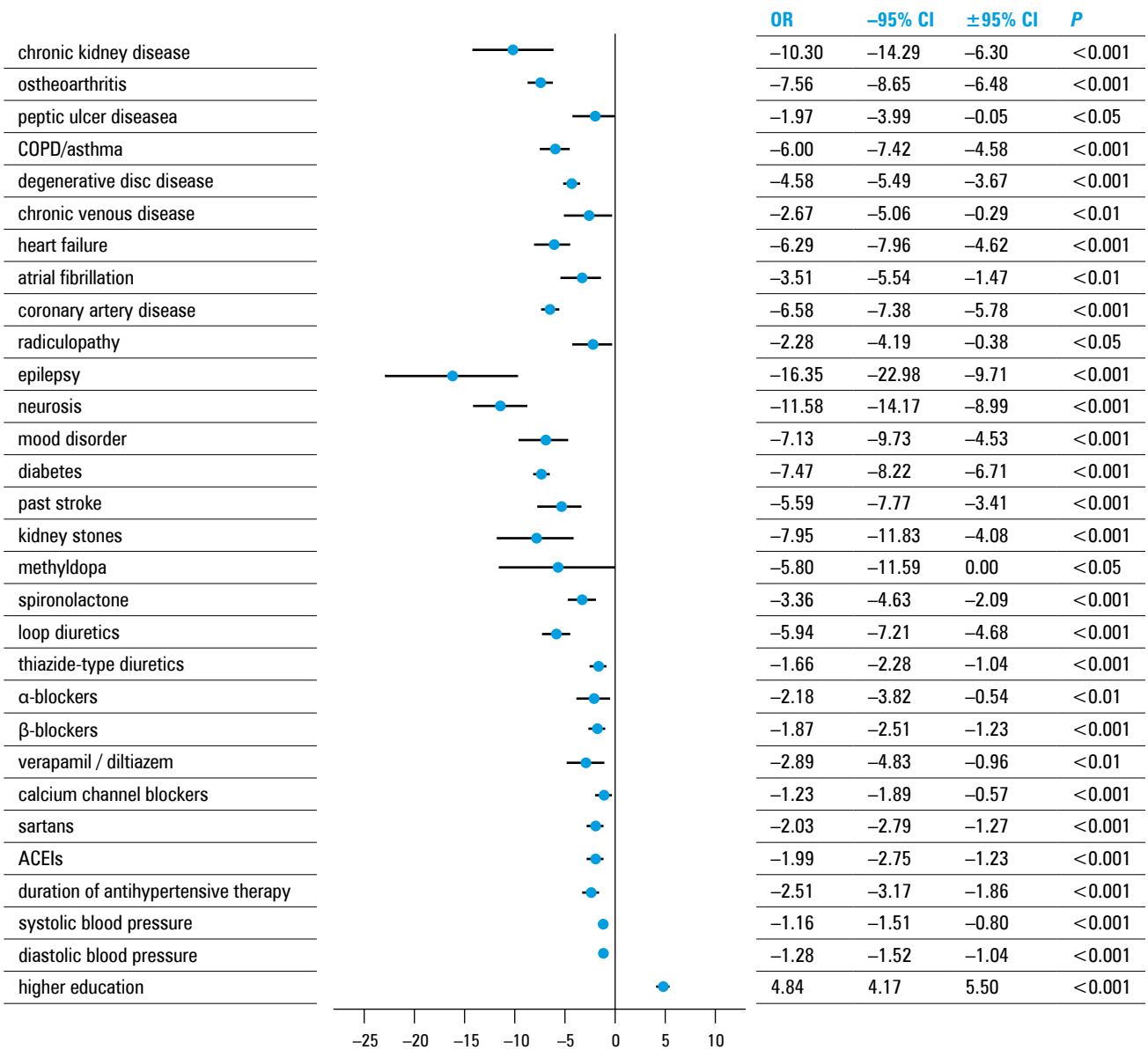
Abbreviations: COPD – chronic obstructive pulmonary disease

RESULTS **Study group characteristics** The study group consisted of 5801 men (46.3%) and 6724 women (53.7%) (TABLE 1). The urban population (81.6%) was overrepresented according to the data obtained from the Polish Central Statistical Office (Główny Urząd Statystyczny). We found that 33.8% of the participants were obese and 68.0% had visceral obesity.

The mean duration of hypertension treatment was 77 months; 21.0% of the participants received monotherapy and 79.0% combination therapy. Recommended blood pressure levels were achieved in 31.3% (systolic) and 44.9% (diastolic) of the participants. Antihypertensive therapy was effective in 25.4% of the participants. The most commonly used drugs were angiotensin II receptor type 1 antagonists (sartans; 53.0%), angiotensin-converting enzyme inhibitors (ACEIs; 52.2%), diuretics (50.9%), β-adrenergic receptor antagonists (β-blockers; 35.2%), and calcium channel blockers (29.5%). Nonpharmacological treatment of hypertension had been recommended for the majority of patients (89.3%).

As shown in TABLE 2, comorbidities were reported for 7986 participants (63.8%), including coronary artery disease (CAD; 21.6%), diabetes (21.3%), symptomatic osteoarthritis or degenerative disc disease (13.8%), and COPD or asthma (4.4%). Benign prostatic hyperplasia was diagnosed in 5.6% of men.

Factors associated with health-related quality of life Women reported lower HRQoL in all dimensions assessed by the SF-12 form. In addition, HRQoL decreased with age. From the fifth decade of life, both men and women reported that general health deteriorated, while only women reported a decline in physical health. From the sixth decade of life, both men and women reported lower HRQoL in all dimensions except vitality, which was maintained a decade longer in women. Patients taking more medications reported lower values in all HRQoL dimensions. In addition, the HRQoL (especially physical health) deteriorated with increasing duration of antihypertensive therapy, even after only 2 years of treatment. In contrast, higher education levels were associated with higher HRQoL.



	OR	–95% CI	±95% CI	*P*
chronic kidney disease	–10.30	–14.29	–6.30	<0.001
ostheoarthritis	–7.56	–8.65	–6.48	<0.001
peptic ulcer diseasea	–1.97	–3.99	–0.05	<0.05
COPD/asthma	–6.00	–7.42	–4.58	<0.001
degenerative disc disease	–4.58	–5.49	–3.67	<0.001
chronic venous disease	–2.67	–5.06	–0.29	<0.01
heart failure	–6.29	–7.96	–4.62	<0.001
atrial fibrillation	–3.51	–5.54	–1.47	<0.01
coronary artery disease	–6.58	–7.38	–5.78	<0.001
radiculopathy	–2.28	–4.19	–0.38	<0.05
epilepsy	–16.35	–22.98	–9.71	<0.001
neurosis	–11.58	–14.17	–8.99	<0.001
mood disorder	–7.13	–9.73	–4.53	<0.001
diabetes	–7.47	–8.22	–6.71	<0.001
past stroke	–5.59	–7.77	–3.41	<0.001
kidney stones	–7.95	–11.83	–4.08	<0.001
methyldopa	–5.80	–11.59	0.00	<0.05
spironolactone	–3.36	–4.63	–2.09	<0.001
loop diuretics	–5.94	–7.21	–4.68	<0.001
thiazide-type diuretics	–1.66	–2.28	–1.04	<0.001
α-blockers	–2.18	–3.82	–0.54	<0.01
β-blockers	–1.87	–2.51	–1.23	<0.001
verapamil / diltiazem	–2.89	–4.83	–0.96	<0.01
calcium channel blockers	–1.23	–1.89	–0.57	<0.001
sartans	–2.03	–2.79	–1.27	<0.001
ACEIs	–1.99	–2.75	–1.23	<0.001
duration of antihypertensive therapy	–2.51	–3.17	–1.86	<0.001
systolic blood pressure	–1.16	–1.51	–0.80	<0.001
diastolic blood pressure	–1.28	–1.52	–1.04	<0.001
higher education	4.84	4.17	5.50	<0.001

FIGURE 1 Relationship between general health and education, blood pressure, duration of treatment, medication, and comorbidities, as assessed by SF-12; constant factor: 84.7 (95% CI, 77.5–91.8); log REML = –52,594; χ^2 = 3665; *P* <0.001
Abbreviations: ACEIs – angiotensin-converting enzyme inhibitors, CI – confidence interval, OR – odds ratio, REML – restricted maximum likelihood, others – see TABLES 1 and 2

Relationship between comorbidities and health-related quality of life Lower HRQoL values were associated with obesity, including visceral obesity, in both men and women. However, being overweight was associated with lower HRQoL values only for women. Other coexisting conditions associated with lower HRQoL included diabetes, CAD, left ventricular heart failure, chronic respiratory diseases (e.g., COPD and asthma), urolithiasis, affective disorders, epilepsy, neurotic disorders, degenerative disc disease, and osteoarthritis.

Multivariate regression analysis Multivariate regression models that included pharmacotherapy, demographic, and clinical variables explained 22.1% to 45.6% of the variation in the HRQoL. The results of the models for general, physical, and mental health combining the other analyzed aspects of the HRQoL are shown in FIGURES 1–3. A decline in physical functioning and vitality was associated with coexisting diseases in particular. Of interest, epilepsy was a disorder most strongly associated with bodily pain. All dimensions of the HRQoL were lower for patients with COPD/asthma, degenerative disc disease, radiculopathy, CAD, heart failure, previous stroke, diabetes, epilepsy, neurotic disorders, and affective disorders. Lower values for the dimensions of social functioning, role emotional, and vitality were strongly associated with epilepsy, neurotic disorders, and affective disorders. Worsening physical health was associated with urolithiasis, epilepsy and COPD/asthma, while worsening general health was associated with epilepsy, affective disorders, and chronic kidney disease. Cardiovascular disease was associated with worsening physical and mental health, while cholelithiasis was associated only with bodily pain.

Of the coexisting conditions evaluated, hypothyroidism had the smallest association with declining HRQoL, specifically in terms of physical functioning, role emotional, and social functioning.

Diuretics and β-blockers were the drugs associated with the greatest deterioration in the HRQoL. ACEIs and sartans were associated only

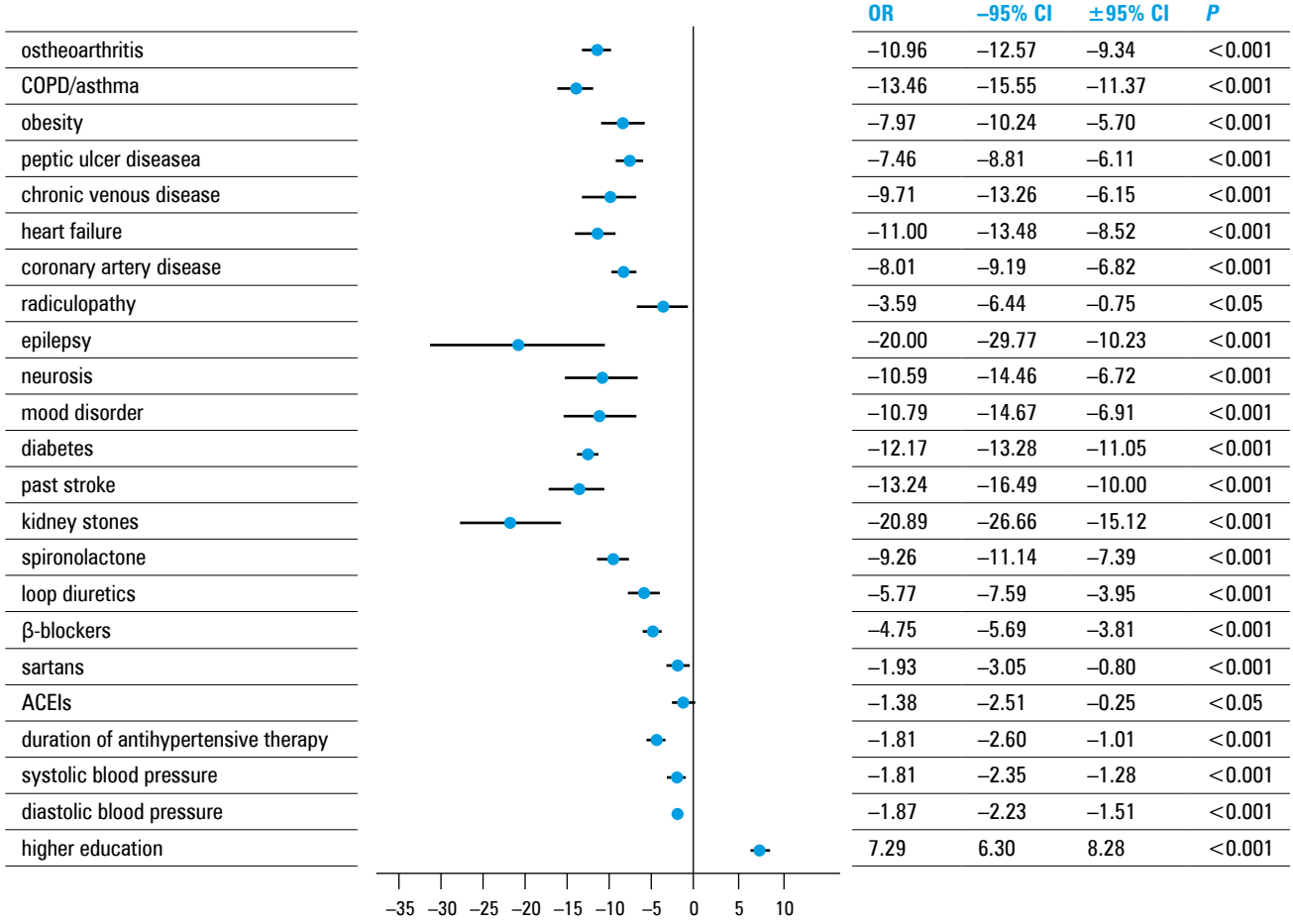


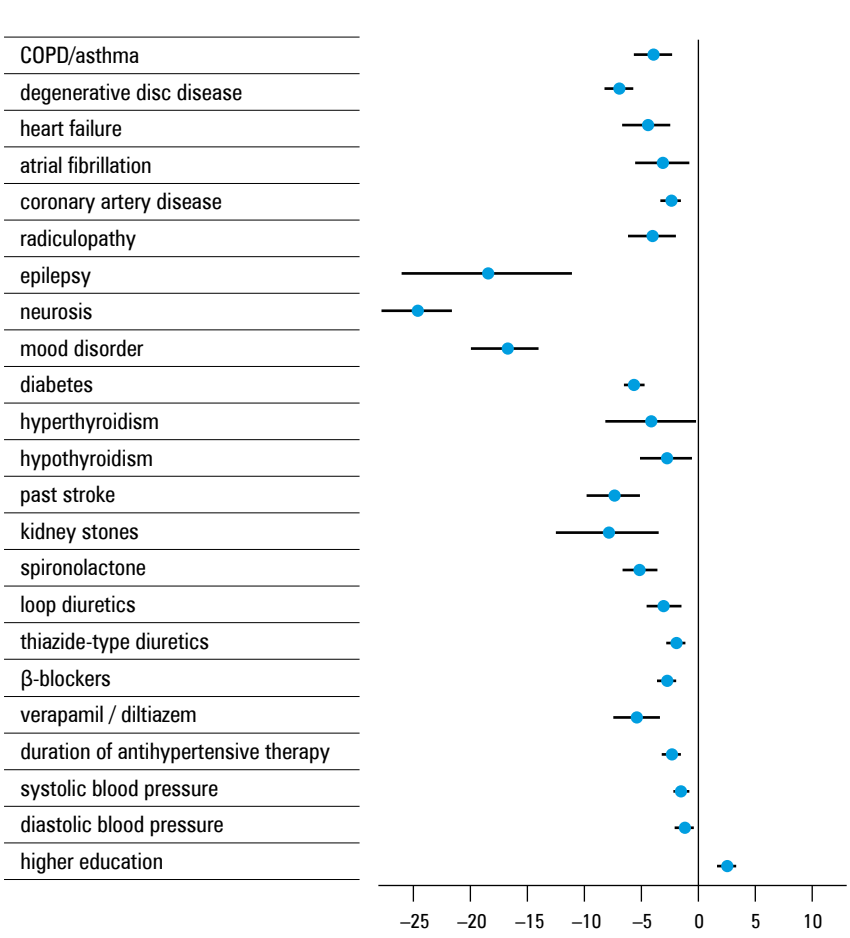
FIGURE 2 Relationship between physical health and education, blood pressure, duration of treatment, medication and comorbidities, as assessed by SF-12; constant factor: 118.0 (95% CI, 104.3–131.7); log REML = –57,588; $\chi^2 = 3822$; $P < 0.001$
Abbreviations: see **TABLES 1**, **2**, and **FIGURE 1**

with declining general health (**FIGURE 1**), while verapamil and diltiazem were associated with worse mental health (**FIGURE 3**). Calcium channel blockers (dihydropyridine derivatives) were associated with worsening general health, bodily pain, vitality, and social functioning.

DISCUSSION Our study shows that comorbidities and the number of medications are the primary factors associated with lower HRQoL in hypertensive patients. This finding is consistent with that of Wang et al.,[6] who used a longer version of the health survey (SF-36).[6] Similarly, a study by Aydemir et al.[14] suggested that heart failure, previous stroke, CAD, myocardial infarction, and peripheral artery disease influenced the HRQoL in hypertensive patients. In addition, we found that lower HRQoL in hypertensive patients was associated with diabetes, chronic respiratory diseases (e.g., COPD and asthma), kidney stones, mental illness (mainly mood and neurotic disorders), epilepsy, radiculopathy, and osteoarthritis. This discrepancy could be due to the smaller study population in the Turkish study (n = 938) compared with our study (n = 12,525). In the present study, patients with coexisting chronic diseases mentioned above reported lower HRQoL scores in all dimensions: physical functioning, role physical, bodily pain, vitality, social functioning, role emotional, mental health, and general health. Multivariate regression analysis confirmed the association of lower HRQoL with CAD, heart failure, cerebrovascular episodes, chronic kidney disease, diabetes, COPD/asthma, degenerative disc disease, osteoarthritis, and neurotic disorders.

The early stages of hypertension are rarely accompanied by physical pain. However, we observed that physical pain was worse in patients with insufficiently controlled blood pressure and with longer duration of hypertension therapy. The intensity of physical pain was also associated with the coexistence of other chronic diseases, which is consistent with the previous reports.[3,6,14,15] Polymorbidity, which is common in elderly patients, is an important factor in HRQoL deterioration associated with aging.

It should be stressed that comorbidity can affect different aspects of the HRQoL to varying degrees. For example, previous studies suggest that congestive heart failure, cerebrovascular disease, angina pectoris, and obesity are important factors in declining physical health in hypertensive patients. Transient ischemic attacks and myocardial infarctions are associated primarily with poor mental health, while peripheral artery disease is associated with worse perceptions of overall health.[16]



	OR	–95% CI	±95% CI	*P*
COPD/asthma	–4.04	–5.65	–2.44	<0.001
degenerative disc disease	–7.10	–8.12	–6.08	<0.001
heart failure	–4.55	–6.44	–2.65	<0.001
atrial fibrillation	–3.13	–5.43	–0.83	<0.01
coronary artery disease	–2.36	–3.26	–1.46	<0.001
radiculopathy	–4.13	–6.29	–1.97	<0.001
epilepsy	–18.60	–26.03	–11.17	<0.001
neurosis	–24.81	–27.74	–21.87	<0.001
mood disorder	–16.96	–19.94	–13.98	<0.001
diabetes	–5.70	–6.54	–4.85	<0.001
hyperthyroidism	–4.18	–8.42	0.06	<0.05
hypothyroidism	–2.88	–5.04	–0.71	<0.01
past stroke	–7.48	–9.94	–5.02	<0.001
kidney stones	–7.99	–12.39	–3.59	<0.001
spironolactone	–5.33	–6.76	–3.89	<0.001
loop diuretics	–3.17	–4.58	–1.75	<0.001
thiazide-type diuretics	–2.01	–2.71	–1.31	<0.001
β-blockers	–2.83	–3.55	–2.12	<0.001
verapamil / diltiazem	–5.48	–7.65	–3.32	<0.001
duration of antihypertensive therapy	–2.41	–3.15	–1.67	<0.001
systolic blood pressure	–1.68	–2.08	–1.28	<0.001
diastolic blood pressure	–1.14	–1.42	–0.87	<0.001
higher education	2.45	1.70	3.21	<0.001

FIGURE 3 Relationship between mental health and education, blood pressure, duration of treatment, medication, and comorbidities, as assessed by SF-12; constant factor: 101.8 (95% CI, 96.5–107.2); log REML = –54 152; $\chi^2 = 2314$; $P < 0.001$
Abbreviations: see **TABLES 1**, **2**, and **FIGURE 1**

Conversely, hypertension worsens the HRQoL in other chronic diseases. For example, in patients who underwent primary total knee arthroplasty, the coexistence of hypertension lowered HRQoL scores for physical pain, physical health, vitality, social functioning, and mental health, as assessed by SF-36.[17] In particular, the presence of hypertension in these patients was associated with worse mental health.[17]

These findings suggest that prevention, early diagnosis, and effective treatment of chronic diseases may be important to preserve the HRQoL in patients with hypertension. In fact, previous studies have reported that appropriate treatment of hypertension and comorbidities appears to prevent further HRQoL deterioration.[4,6] However, diuretics and β-blockers may actually worsen the HRQoL,[9,18,19] which is consistent with our results. Surprisingly, we found that the use of ACEIs and sartans also worsens the HRQoL. This finding is in contrast to previous studies that analyzed selected aspects of the HRQoL such as cognitive function and physical performance.[20,21] It is possible that a weak association of ACEIs and sartans with the HRQoL was not detectable because of the smaller study population. Of the drugs evaluated in our study, calcium channel blockers appeared to have the smallest effect on the HRQoL and were associated only with a decline in general health.

Our study has a number of limitations. The lower than expected prevalence of common diseases (e.g., lipid disorders, peripheral artery disease, chronic kidney disease, chronic venous insufficiency) suggest that polymorbidity was underreported by physicians. Moreover, the requirement that the survey be completed without assistance prevented the inclusion of patients with impaired vision or dementia.

In conclusion, coexisting chronic diseases significantly deteriorate all aspects of the HRQoL in patients with hypertension.

Acknowledgements This study was carried out as a research project of Europharma M. Rachtan Sp. z o.o. and was supported by a grant from EGIS Polska Sp. z o.o. (granted to J.Ch.).

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ARTYKUŁ ORYGINALNY – KONKURS STUDENCKI 2012*

Jakość życia pacjentów z nadciśnieniem tętniczym a choroby współistniejące

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SŁOWA KLUCZOWE

choroby współistniejące, jakość życia, nadciśnienie tętnicze

STRESZCZENIE

WPROWADZENIE Ważnym czynnikiem wpływającym na postrzeganie jakości życia związanej ze zdrowiem (*health-related quality of life* – HRQoL) jest występowanie chorób przewlekłych, a zwłaszcza wielu chorób. Jednak wpływ innych chorób przewlekłych i wielu chorób współistniejących na jakość życia chorych na nadciśnienie tętnicze jest mało poznany.

CELE Celem pracy była ocena wpływu chorób współistniejących na różne aspekty HRQoL w dużej niewyselekcjonowanej kohorcie pacjentów leczonych z powodu nadciśnienia tętniczego.

PACJENCI I METODY Badanie o charakterze ankietowym zostało przeprowadzone przez 832 lekarzy pierwszego kontaktu na grupie 12 525 niewyselekcjonowanych chorych, leczonych z powodu nadciśnienia tętniczego przynajmniej przez 3 miesięce. Oceny HRQoL dokonano za pomocą formularza SF-12 (Medical Outcomes Study 12-item Short-Form Health Survey).

WYNIKI Choroby współistniejące stwierdzono u 7986 chorych (63,8%). Znacząco niższe wartości HRQoL wiązały się z występowaniem chorób współistniejących, w szczególności obturacyjnych chorób układu oddechowego, zmian zwyrodnieniowych kręgosłupa, zespołów korzeniowych, choroby wieńcowej, niewydolności serca, udaru mózgu, cukrzycy, padaczki, zaburzeń nerwicowych i chorób afektywnych. HRQoL chorych na nadciśnienie tętnicze obniżała się istotnie wraz z wiekiem i czasem trwania choroby (>2 lata). Wyższy poziom HRQoL stwierdzono u mężczyzn oraz osób z wyższym wykształceniem, niższy zaś – u pacjentów otyłych oraz tych z otyłością trzewną. Zalecane wyrównanie ciśnienia tętniczego uzyskano u 25,4% badanych.

WNIOSKI Choroby przewlekłe współistniejące z nadciśnieniem tętniczym negatywnie wpływają na wszystkie aspekty HRQoL.

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Praca wpłynęła: 30.03.2012.
Przyjęta do druku: 02.04.2012.
Nie zgłoszono sprzeczności interesów.
Pol Arch Med Wewn. 2012;
122 (7-8): 333-340

* Autorzy pracy otrzymali III nagrodę Redaktor Naczelnej w konkursie na najlepszą studencką pracę oryginalną zgłoszoną do Pol Arch Med Wewn w 2012 r. Regulamin konkursu jest dostępny na stronie www.pamw.pl.