Comorbidities and the quality of life in hypertensive patients

Monika Zygmuntowicz¹, Aleksander Owczarek², Adam Elibol¹, Jerzy Chudek¹

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 individuals³–⁸ 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.¹³,¹⁴ 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 hypertensive patients.
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/KB1/100/1/10/11), 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, co-existing 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).

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.
Comorbidities and the quality of life in hypertensive patients

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.

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.

Abbreviations: COPD – chronic obstructive pulmonary disease
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 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
Comorbidities and the quality of life in hypertensive patients

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.

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.

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., who used a longer version of the health survey (SF-36). Similarly, a study by Aydemir et al. 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.

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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.\textsuperscript{17} In particular, the presence of hypertension in these patients was associated with worse mental health.\textsuperscript{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.\textsuperscript{4,6} However, diuretics and β-blockers may actually worsen the HRQoL,\textsuperscript{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.\textsuperscript{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 under-reported 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.

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Comorbidities and the quality of life in hypertensive patients


ORIGINAL ARTICLE Comorbidities and the quality of life in hypertensive patients

339
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 miesiące. 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 obstrukcyjnych 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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