

# Evaluation of quality of life in chronic, progressing rheumatic diseases based on the example of osteoarthritis and rheumatoid arthritis

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**Background:** Rheumatic diseases, irrespective of etiology and clinical course, influence different areas of a patient's life. Adapting to disability and limitations caused by an illness is very difficult for many patients. The main goal of a therapeutic procedure should be improvement of health-related quality of life (QoL).

**Objective:** Evaluation of the factors that influence the QoL that are conditioned by the state of health of patients with osteoarthritis (OA) and rheumatoid arthritis (RA).

**Methods:** The study group consisted of 198 patients diagnosed with OA, according to the American College of Rheumatology criteria (1988), and 100 patients diagnosed with RA, according to the American College of Rheumatology criteria (2010). A diagnostic survey using visual analog scale of pain, health assessment questionnaire disability index, and 36-item short form health survey were used in this study.

**Results:** The average age of patients with OA was 59.16 ( $\pm 15.87$ ) years and patients with RA was 55.22 ( $\pm 14.87$ ) years. The average duration of illness examined for OA was 5.5 ( $\pm 4.32$ ) years, whereas for RA, it was slightly more at 6.8 ( $\pm 5.21$ ) years. Overall the QoL in both study groups was of medium level. Among patients with OA and RA, lower evaluation of QoL was mainly affected by age (OA – physical sphere [PCS]  $r_s = -0.177$ ,  $P < 0.012$ ; MCS  $r_s = -0.185$ ,  $P = 0.008$ ; RA – PCS  $r_s = -0.234$ ,  $P = 0.019$ ; MCS  $r_s = -0.208$ ,  $P = 0.038$ ), the level of physical disability (OA – PCS  $r_p = -0.532$ ,  $P < 0.001$ ; MCS  $r_s = -0.467$ ,  $P < 0.001$ ; RA – PCS  $r_p = -0.326$ ,  $P < 0.001$ ; MCS  $r_s = -0.229$ ,  $P < 0.001$ ), and pain (OA – PCS  $r_p = -0.425$ ,  $P < 0.001$ ; mental sphere/mental functioning (MCS)  $r_s = -0.359$ ,  $P < 0.001$ ; RA – PCS  $r_p = -0.313$ ,  $P < 0.001$ ; MCS  $r_p = -0.128$ ,  $P < 0.001$ ).

**Conclusion:** Patients with OA, despite their average older age, had a higher evaluated QoL than patients with RA. Overall QoL in terms of mental functioning in both rheumatic diseases was assessed at a higher level than in the area of physical functioning.

**Keywords:** quality of life, physical functioning, mental functioning, pain, malfunction

## Introduction

According to the World Health Organization (WHO), quality of life (QoL) is defined as "a way of perception of the individual's life position in cultural context, value system in which he/she lives and in relation to tasks, expectations and standards effective in her/his environment". QoL indicators are: ability of adaptation, ability to perform life roles, mental well-being, and normal social functioning.<sup>1,2</sup>

In studies of sociology and social policy, QoL reflects the way and degree of satisfaction of various human needs, including the perception of achieved life standard. QoL is, therefore, a function of evaluation of the way of life or lifestyle, wherein the reference points are consumption aspirations of individuals and groups. It reflects

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individual feelings and one's assessments. It is understood as welfare, referring both to health and illness.<sup>3,4</sup>

Experience of illness, especially of a chronic nature, most often causes major changes in the way a person functions and has an influence on all aspects, private and professional, of his/her life. It precludes persons from fulfilling basic life roles and makes them dependent on others. Illness and suffering constitute an existential experience that changes the hierarchy of values, instills a different perspective on the surrounding reality, provokes changes in life plans, and affects the feeling of solitude and social isolation. Chronic disease is also a challenge for the patient's close environment, family, and friends. The QoL with the disease is determined by factors such as clinical condition and physical functioning, mental condition, social situation, and somatic responses. It is described as health-related quality of life (HRQoL).<sup>1,2</sup> The socio-demographic factors, such as age, sex, work (life roles), and social support also should be taken into consideration.

Studies of QoL connected with medical condition enable an assessment of how the disease and its related limitations affect patients' functioning in the physical and mental area, as well as their social relations.<sup>3,4</sup>

Diseases of osteoarticular system affect a significant percentage of people in Poland, many of whom suffer from adjudicated level of disability. Osteoarthritis (OA) affects ~8 million people, whereas inflammatory joint disease, ie, rheumatoid arthritis (RA) affects ~4 million.<sup>5</sup>

According to the WHO, OA is the fourth leading cause of physical disability and one of the most serious hazards of civilization. Pathological changes caused by the disease are irreversible; they are the reason for physical disability and very often require highly specialized, invasive therapeutic intervention. The disease considerably decreases the QoL of people suffering from it compared with the healthy population, as OA, in its progressive, chronic course, hinders, and sometimes even hampers, fulfilling basic roles in the society, including functioning in the family or at work,<sup>6,7</sup> which also leads to isolation and deepens depression. Another factor that determines the worsening of the QoL in patients with OA is older age. OA is the third most common disease in the elderly and is a cause of disability in people aged >65 years. These limitations lead to loss of mobility and worsening of performance, as well as to poorer QoL.

RA is another rheumatic disease that differs in etiopathogenetic terms and clinical treatment; it is a heterogenic, inflammatory joint disease, characterized by a chronic progressing inflammatory process of the synovial membrane, leading to distraction of articular and circumarticular tissues.

In spite of treatment, the disease is chronic, with relapses, which causes progressive destruction and deformation of joints, and disability. As a result of articular changes, about one-third of patients manifest permanent disability. The disease affects mainly young people aged between 30 and 50 years. Women are affected four times more often than men.<sup>8</sup>

RA is classified as a disease of connective tissue, which has a significant impact on the deteriorating of HRQoL, along with the duration of the disease.<sup>9,10</sup>

Taking into account functional consequences of rheumatic diseases and the risk of affecting other organs and systems, it is advisable to understand the patient's problems during therapeutic treatment in a multidimensional manner. Thus, nowadays, in the treatment of chronically ill patients, evaluation of their QoL is also taken into account, taking notice of factors that are dependent (age, sex, education, professional status, family situation, individual capabilities of the patient, the potential to adapt, and the degree of the obtained social support) and independent from the medical condition (feeling of pain, chronic fatigue syndrome, side effects of drugs, organ complications, and the level of physical fitness).<sup>1,3,5,7</sup>

The authors of this study present the following research thesis to study the influence of socio-demographic factors, as well as the process in which functional condition and pain, typical for rheumatic diseases, affect the QoL and hinder medical condition:

1. Whether progressing physical disability and persistent pain significantly influence mental and physical condition, and functioning in social roles of patients with certain rheumatic diseases?
2. What areas of patients' functioning are disturbed the most as a consequence of chronic and progressive course of rheumatic diseases?
3. Taking into consideration etiopathogenetic distinctiveness and clinical course of OA and RA, how do the selected patients evaluate their QoL depending on variables of age, sex, and duration of an illness?
4. To what aspects of care and health education during planning therapeutic process of patients with rheumatic disease should be focused on?

Researchers hypothesize that rheumatic diseases involve significant consequences in terms of physical, mental, and social functioning. Pain and disability that progress together with duration of the illness and patients' age, significantly determine their attitudes toward the illness, how they cope with emotions (female sex) and how they function in social roles.

It can be presumed that educating patients and providing support for coping with the disease, especially in reducing pain and improving physical performance, can greatly improve the QoL of the patients with chronic rheumatic disease.

## Patients and methods

The study group consisted of 198 patients diagnosed with OA of the hip, knee, and spine. The inclusion criteria were age  $\geq 40$  years, diagnosis of OA according to American College of Rheumatology (ACR) criteria (1988), and written informed consent of the patient to take part in the study. The group with RA was diagnosed according to ACR guidelines (2010) and consisted of 100 patients. In the study, the adopted inclusion criteria of patients with RA was low or medium disease activity (disease activity score [DAS 28]  $\leq 5$ ). The criterion for exclusion from the study was the existence of other overlapping diseases of bone and joint, including inflammatory joint diseases.

The study was conducted at the Department of Rheumatology, University Clinical Hospital in Białystok and Unit of Rheumatology in the hospital in Augustów (SP Zespół Opieki Zdrowotnej w Augustowie). The research was approved by the Bioethics Committee of the Medical University of Białystok (R-I- 002/572/2011). Patients filled in the questionnaire on their own, with opportunity provided to seek an explanation for any incomprehensible questions.

A diagnostic survey using visual analog scale of pain (Pain VAS), health assessment questionnaire disability index (HAQ-DI), scale of QoL evaluation (36-item short form health survey [SF-36]) was used in this study.

The structure of the SF-36 questionnaire enabled the collective results to be calculated separately, so-called physical functioning (SF-36 PCS) and mental functioning (SF-36 MCS). The questionnaire also included eight subscales (physical functioning [PF], social functioning [SF], deficiency in fulfilling social roles for physical reasons [RP], pain [BP], general health [GH], vitality [VT], mental health [MH], and deficiency in fulfilling social roles for psychical reasons [RE]), in which rating system was between 0 and 100 points; higher scores equal better functioning.<sup>4</sup>

The HAQ-DI is a validated generic measure of physical functioning combining eight domains (dressing and grooming, arising, eating, walking, hygiene, reach, grip, and other activities). Responses to each item ranged from 0 (no difficulty) to 3 (unable to do). The total score ranged from 0 to 3: 0–1 – little degree of dysfunction in any field of daily life; >1–2 – serious limitations or need for help in daily

activities; and >2–3 – total inability to do daily activities without help.<sup>11,12</sup>

Intensity of pain (Pain VAS 0–100) was interpreted in three ranges: 0–35 – low level; 36–65 – average; and 66–100 – high level of pain sensation.<sup>13</sup>

## Data analysis

All data were analyzed using PQStat v.1.4.2 software. The null hypothesis was tested of no correlation between QoL and patient pain problem and disability. Pearson ( $r_p$ ) and Spearman ( $r_s$ ) correlation coefficient was reported and  $P$ -value  $\leq 0.05$  was considered significant, with  $r$  of 0.10, 0.20, and 0.50 representing small, medium, and large effects, respectively. The effects of sex, age, disease duration, and educational background were tested across all measures. Students'  $t$ -test was used to assess sex differences and one-way analysis of variance for differences across age groups, disease duration, and educational background (to examine the differences between the averages of the individual groups post-hoc test [Tukey test] was used).

## Results

### Overall characteristics of patients with OA and RA

Most patients diagnosed with OA were females ( $n=110$ , 56.6%; Table 1). Taking age into account, patients were

**Table 1** General list of socio-demographic variables and evaluation of quality of life among patients with OA and RA

Variables studied (score range)	Rheumatic disease	
	OA	RA
Age (years)	59.16 $\pm$ 15.87	55.22 $\pm$ 14.87
Duration of illness (years)	5.5 $\pm$ 4.32	6.8 $\pm$ 5.21
Gender – number of females (%)	110 (55.6)	70 (70.0)
Educational background		
Basic/professional – number (%)	100 (50.5)	48 (46.4)
Secondary – number (%)	61 (30.8)	34 (30.1)
Higher – number (%)	37 (18.7)	18 (23.5)
Place of residence		
City – number (%)	122 (61.6)	63 (60.8)
Village – number (%)	76 (38.4)	37 (36.5)
Occupational status		
Annuity/pension – number (%)	138 (70.1)	59 (56.9)
Working – number (%)	55 (27.9)	25 (43.1)
Family status		
Married – number (%)	147 (74.2)	54.4 (53.1)
Widowed – number (%)	43 (21.7)	32.8 (31.8)
Single – number (%)	8 (4.0)	12.8 (15.1)
HAQ-DI (0–3)	1.10 $\pm$ 0.92	1.44 $\pm$ 0.96
Pain VAS (0–100)	59.2 $\pm$ 19.0	50.07 $\pm$ 15.4

**Note:** Data presented as mean  $\pm$  standard deviation unless stated otherwise.

**Abbreviations:** HAQ-DI, health assessment questionnaire disability index; OA, osteoarthritis; pain VAS, visual analog scale of pain; RA, rheumatoid arthritis; SD, standard deviation.

divided into three groups: 40–60 years (43.4%); 61–76 years (36.9%); and  $\geq 77$  years (19.7%). Average age (standard deviation [SD]) was 59.16 ( $\pm 15.87$ ) years. As shown in Table 1, majority of patients (61.6%) lived in the city. Majority of patients (74.2%) were married. Analyzing the level of education, 50.5% of patients declared having elementary/vocational education, 30.8% secondary education, and 18.7% higher education. The vast majority (70.1%) were pensioners/old age pensioners. The average duration of illness was 5.5 ( $\pm 4.32$ ) years (Table 1). More than half of the patients (56.1%) were ill for  $>10$  years.

As shown in Table 1, females with RA accounted for 70% of all the patients ( $n=70$ ). Average age (SD) was 55.22 ( $\pm 14.87$ ) years. With respect to age, majority were patients up to 60 years of age (comparable to OA group). Similarly, majority (63%) of patients with OA lived in the city. More than half of the patients (53.1%) were married. The education levels of the study group was commensurate to that of the OA group. The majority (56.9%) were pensioners/old-age pensioners. The average duration of disease was higher than that of the OA group and amounted to 6.8 ( $\pm 5.21$ ) years, to compare, over half of the patients (51%) were ill for  $>10$  years.

In the group with OA, as seen in Table 1, average HAQ DI (SD) was evaluated at level 1.10 ( $\pm 0.92$ ), whereas among people diagnosed with RA, it was slightly worse at 1.44 ( $\pm 0.96$ ). The value HAQ  $>1$  may indicate in both groups moderate limitations and the need for help while performing daily life activities.

Average level of pain in the OA group was 59.2 ( $\pm 19.0$ ), whereas in RA it was 50.07 ( $\pm 15.40$ ), which shows average level of pain sensation (Table 1).

## Analysis of QoL and its components (SF-36 scale) among patients with OA and RA

The results of QoL survey in Table 2 show that the average value of physical functioning (PCS) among patients with OA was  $42.39 \pm 18.73$ , whereas average of mental functioning (MCS) was  $47.65 \pm 21.44$ . In the group with RA, the average value of PCS was  $37.36 \pm 14.57$ , whereas that of MCS was  $44.30 \pm 20.81$ , which also proves better functioning of patients with RA in the mental sphere, compared to physical functioning. The analysis also shows that patients with RA evaluate their QoL worse than patients with OA.

Linear correlation between PCS and MCS enabled observation of a positive linear dependence in the group with OA ( $r_p=0.643$ ,  $P<0.001$ ) and among patients with RA ( $r_p=0.534$ ,  $P<0.001$ ), it shows that together with better QoL value in a physical sphere grows QoL value in a mental sphere, in both groups of the study (Table 2).

Analysis of individual components of QoL according to SF-36 shows that each patient, as shown in Table 2, assessed the lowest limitations in social roles for RP. Generally, patients with RA evaluated their QoL as lower in comparison to patients with OA, excluding domains of VT and SF.

## Effect of sex, age, and duration of disease on QoL of patients with OA and RA

In both the study groups, it was possible to observe statistically important relationship between mental functioning (MCS) and sex: OA ( $P=0.007$ ), RA ( $P=0.028$ ), which is shown in Table 3. Sphere of mental functioning among

**Table 2** Analysis of a general quality of life (SF-36 PCS, SF-36 MCS) and its subscales (PF, RP, BP, GH, VT, SF, RE, MH) among patients with OA and RA

SF-36 (0–100)	Rheumatic disease			
	OA, mean $\pm$ SD	$*r_p$ /P-value	RA, mean $\pm$ SD	$*r_p$ /P-value
PCS (0–100)	42.39 $\pm$ 18.73	$*r_p=0.643$ $P<0.001$	37.36 $\pm$ 14.57	$*r_p=0.534$ $P<0.001$
MCS (0–100)	47.65 $\pm$ 21.44		44.30 $\pm$ 20.81	
<b>Subscales SF-36 (0–100)</b>				
PF	47.55 $\pm$ 28.63		42.90 $\pm$ 22.69	
Limitations in social roles for RP	24.11 $\pm$ 41.03		16.00 $\pm$ 32.47	
BP	57.27 $\pm$ 9.84		56.65 $\pm$ 8.65	
GH	42.16 $\pm$ 17.21		34.00 $\pm$ 17.21	
VT	43.41 $\pm$ 18.32		45.32 $\pm$ 19.41	
SF	38.86 $\pm$ 24.22		41.10 $\pm$ 23.34	
Deficiency in fulfilling social roles for RE	51.51 $\pm$ 47.68		38.70 $\pm$ 45.84	
MH	56.44 $\pm$ 17.60		52.51 $\pm$ 16.90	

**Note:**  $*r_p$ , Pearson's correlation coefficient, where 0.10, 0.20, and 0.50 represent small, medium, and large effects, respectively.

**Abbreviations:** HAQ DI, health assessment questionnaire disability index; SF-36, item short form health survey; MCS, mental sphere; PCS, physical sphere; PF, physical functioning; RP, physical reasons; BP, pain; GH, general health; VT, vitality; SF, social functioning; RE, psychical reasons; MH, mental health; OA, osteoarthritis; RA, rheumatoid arthritis; SD, standard deviation.

**Table 3** Evaluation of quality of life in physical sphere (SF-36 PCS) and mental sphere (SF-36 MCA), and sex, age, and duration of disease in OA and RA

Variables studied	SF-36		Quality of life in PCS (0–100)				Quality of life in MCS (0–100)			
			OA, mean ± SD		RA, mean ± SD		OA, mean ± SD		RA, mean ± SD	
	Mean ± SD	F-statistic <sup>#</sup> /P-value <i>r<sub>s</sub></i> <sup>§</sup> /P-value	Mean ± SD	F-statistic <sup>#</sup> /P-value <i>r<sub>s</sub></i> <sup>§</sup> /P-value	Mean ± SD	F-statistic <sup>#</sup> /P-value <i>r<sub>s</sub></i> <sup>§</sup> /P-value	Mean ± SD	F-statistic <sup>#</sup> /P-value <i>r<sub>s</sub></i> <sup>§</sup> /P-value	Mean ± SD	F-statistic <sup>#</sup> /P-value <i>r<sub>s</sub></i> <sup>§</sup> /P-value
<b>Sex</b>										
F	38.70±16.50	#10.01 (0.001)	35.51±12.58	#3.863 (0.052)	41.67±17.90		44.00±21.32	#7.396 (0.007)	41.34±17.85	#4.932 (0.028)
M	47.00±20.36						52.51±20.82		51.23±17.85	
<b>Age (years)</b>										
40–60	46.88±20.91	#4.558 (0.011) <sup>§</sup> –0.177 (0.012)	40.40±18.82	#2.195 (0.116) <sup>§</sup> –0.234 (0.019)	37.94±14.60		52.16±21.97	#3.726 (0.025) <sup>§</sup> –0.185 (0.008)	49.31±20.45	#1.720 (0.184) <sup>§</sup> –0.208 (0.038)
61–76	39.25±15.92		37.94±14.60				45.28±19.66		43.68±20.39	
≥77	38.36±16.71		32.33±13.41				42.16±21.98		39.01±21.43	
<b>Duration of diseases (years)</b>										
0–5	51.15±21.12	#8.760 (<0.001)	41.80±19.46	#3.170 (0.025)	41.08±13.39		55.37±20.21	#7.585 (<0.001)	49.08±24.09	#0.486 (0.692)
6–10	43.89±19.87		41.08±13.39				52.50±22.18		43.86±18.03	
>10	38.14±15.81		33.52±11.39				42.63±20.46		41.03±21.38	

Note: <sup>#</sup>The univariate ANOVA for independent groups, F-statistic, <sup>§</sup>Spearman correlation coefficient *r<sub>s</sub>*.

Abbreviations: ANOVA, analysis of variance; F, female; M, male; MCS, mental sphere; PCS, physical sphere; SF-36, 36-item short form health survey; OA, osteoarthritis; RA, rheumatoid arthritis; SD, standard deviation.

males with rheumatic disease was higher than females. Males with OA also performed better in physical sphere (PCS) ( $P=0.001$ ).

Detailed analysis also proved better SF in a group of males with OA ( $P=0.043$ ) and RA ( $P=0.022$ ).

Table 3 also shows minus linear correlation between age and physical functioning ( $r_s=-0.177$ ,  $P=0.012$ ), and mental functioning ( $r_s=-0.185$ ,  $P=0.008$ ) of patients with OA.

In the group with RA, minus linear correlation between age and mobility ( $r_s=-0.234$ ,  $P=0.019$ ), and mental functioning ( $r_s=-0.208$ ,  $P=0.038$ ) was also noticed. This shows that, together with age, QoL worsened in each sphere in both RA and OA.

QoL in both the study groups was assessed the highest among patients aged 40–60 years (Table 3).

Analyzing the data in Table 3, it was observed that among patients diagnosed with OA ( $P<0.001$ ) and RA ( $P=0.025$ ), there was a statistically important relationship between QoL in the sphere of physical functioning (PCS) and duration of illness. The analysis also showed that physical functioning was assessed higher among patients with OA ( $51.15\pm21.12$ ), when the illness lasted 0–5 years, than in a comparative RA group ( $41.80\pm19.46$ ).

Duration of the disease had a great impact also on the QoL in the mental sphere (MCS) in a group of patients with OA ( $P<0.001$ ) (Table 3).

Detailed analysis of SF-36 proved the relationship between PF and duration of the disease among patients with OA ( $P=0.002$ ) and RA ( $P<0.001$ ). Among patients with OA ( $P=0.022$ ) and RA ( $P=0.005$ ), there was also a relationship between pain (BP) and the disease duration.

## Effect of pain and progressive physical disability on QoL of patients with OA and RA

Research proved, as shown in Table 4, that with greater difficulty in daily functioning comes lower QoL ( $P\leq0.05$ ).

Pearson's correlation coefficient showed minus linear relationship between level of disability and QoL in the physical ( $r_p=-0.532$ ,  $P<0.001$ ) and mental ( $r_p=-0.467$ ,  $P<0.001$ ) spheres in the OA group (data in Table 5). Among patients with RA, it was also observed that, together with an increase of disability level, evaluation of QoL in mental ( $r_p=-0.229$ ,  $P<0.001$ ) and physical spheres ( $r_p=-0.326$ ,  $P<0.001$ ) also worsened.

Together with intensification of pain, as shown in Table 4, comes lowering of QoL conditioned by medical condition, however, in mental spheres (MCS), with reference to pain

**Table 4** Evaluation of quality of life in mental (SF-36 MCS) and physical (SF-36 PCS) spheres, and pain (pain VAS) and disability (HAQ DI)

Variables studied	SF-36		Quality of life in PCS (0–100)				Quality of life in MCS (0–100)			
	OA		RA		OA		RA			
	Mean ± SD	F-statistic <sup>#</sup> /P-value	Mean ± SD	F-statistic <sup>#</sup> /P-value	Mean ± SD	F-statistic <sup>#</sup> /P-value	Mean ± SD	F-statistic <sup>#</sup> /P-value		
Pain VAS (0–100)										
0–35	61.83±18.92	21.01 (<0.001)	56.46±17.50	10.22 (<0.001)	63.89±18.88	11.79 (<0.001)	55.85±19.39	2.195 (0.116)		
36–66	42.97±18.44		36.33±12.75		49.50±19.55		45.30±20.17			
67–100	37.11±15.50		34.37±13.14		42.24±21.25		40.44±21.28			
HAQ DI (0–3)										
0–1	51.44±18.87	42.78 (<0.001)	44.92±15.81	9.732 (<0.001)	56.69±19.17	29.69 (<0.001)	50.61±20.53	2.905 (0.05)		
>1–2	32.53±10.51		34.38±12.61		37.86 ±17.88		41.75±20.10			
>2–3	24.54±9.56		26.47±5.03		29.53±21.05		35.45±21.89			

Note: <sup>#</sup>The univariate ANOVA for independent groups, F-statistic.

Abbreviations: ANOVA, analysis of variance; HAQ DI, health assessment questionnaire disability index; MCS, mental sphere; PCS, physical sphere; SF-36, 36-item short form health survey; pain VAS, visual analog scale of pain; OA, osteoarthritis; RA, rheumatoid arthritis; SD, standard deviation.

(Pain VAS), QoL has better results in a group of patients with OA ( $P<0.001$ ) than with RA ( $P=0.116$ ).

In both the study groups, it was possible to observe (Table 5) minus linear correlation between QoL in the sphere of physical functioning (PCS) and pain sensation (Pain VAS) (OA:  $r_p=-0.425$ ,  $P<0.001$ ; RA:  $r_p=-0.313$ ,  $P<0.001$ ). In groups with RA ( $r_p=-0.128$ ,  $P<0.001$ ) and OA ( $r_p=-0.359$ ,  $P<0.001$ ), minus linear correlation between QoL and sphere of mental functioning (MCS) was also observed.

Our studies have shown the impact of pain and progressive disability on specific spheres of QoL ( $P<0.05$ ) (Table 6).

The detailed analysis of individual coefficients SF-36, as shown in Table 5, points to linear relationship between PF and pain sensation (Pain VAS) in a group with OA ( $r_p=-0.393$ ,  $P<0.001$ ) and RA ( $r_p=-0.279$ ,  $P=0.001$ ). Minus linear correlation between evaluation of SF among patients with OA ( $r_p=-0.519$ ,  $P<0.001$ ) and RA ( $r_p=-0.124$ ,  $P<0.001$ ), and pain (Pain VAS) was also noticed.

Research proved, what we can see in Table 5, at minus linear correlation between the degree of physical disability (HAQ DI) and PF, in groups of patients both with OA ( $r_p=-0.612$ ,  $P<0.001$ ) and in group of patients with RA ( $r_p=-0.416$ ,  $P<0.001$ ). The analysis also pointed at minus linear correlation between growing degree of physical disability (HAQ DI) and SF – OA  $r_p=-0.385$ ,  $P<0.001$ ; RA  $r_p=-0.209$ ,  $P<0.001$ .

## Discussion

Diseases of the osteoarticular system pose serious clinical, social, and economic problems. They affect a great percentage of people, majority of whom had an adjudicated level of disability.

Chronicity of both OA and RA, especially chronic pain, progressing deformation of joints leading to reduction of functional capacity, cause difficulties in self-care and, as a consequence, patient's dependence on those around them. Disability, apart from clinical effects, entails a number of other consequences, both social and economic, and contributes to decrease in the QoL.<sup>7–9</sup>

Cuperus et al<sup>14</sup> in the assessment of QoL, also indicated that in patients with OA there is a lower evaluation of QoL in the physical sphere compared with the mental sphere. This has been confirmed by Ambriz Murillo et al,<sup>15</sup> with reference to patients diagnosed with OA and RA.

The current study showed that even though patients with OA were older than patients with RA with most OA patients being pensioners/retired, patients with OA showed

**Table 5** Correlation between pain problems and disability and quality of life in mental (SF-36 MCS) and physical (SF-36 PCS) spheres and in subscales SF-36 (physical PF and social SF functioning) of OA and RA patients

Variables studied (score range)	Rheumatic disease	SF-36		SF-36 subscales	
		PCS	MCS	PF	SF
		$r_p$ *P-value	$r_p$ *P-value	$r_p$ *P-value	$r_p$ *P-value
Pain VAS	OA	-0.425 (<0.001)	-0.359 (<0.001)	-0.393 (<0.001)	-0.519 (<0.001)
	RA	-0.313 (<0.001)	-0.128 (<0.001)	-0.279 (<0.001)	-0.124 (<0.001)
HAQ DI	OA	-0.532 (<0.001)	-0.467 (<0.001)	-0.612 (<0.001)	-0.385 (<0.001)
	RA	-0.326 (<0.001)	-0.229 (<0.001)	-0.416 (<0.001)	-0.209 (<0.001)

**Note:** \* $r_p$ , Pearson's correlation coefficient, where 0.10, 0.20, and 0.50 represent small, medium, and large effects, respectively.

**Abbreviations:** HAQ DI, health assessment questionnaire disability index; MCS, mental functioning subscales SF-36; PCS, physical sphere; PF, physical functioning; SF-36, 36-item short form health survey; SF, social functioning; OA, osteoarthritis; RA, rheumatoid arthritis.

a higher QoL than those with RA. This demonstrates the progression of inflammation in the course of RA-associated symptoms (pain, swelling, morning stiffness of the joints) and progressive deformity of the joints, leading to disability.<sup>10</sup>

Rheumatic diseases are a group of illnesses that affect females more than males. Studies show that sex is a very important factor that influences patients' QoL. Females with OA and RA declare lower QoL than males.<sup>7,16-19</sup>

The results of our research led us to the conclusion that there is an important interdependence between mental functioning and sex. Males, with both OA and RA, rated mental sphere higher than females. In the group of males with OA, at the same time, a higher evaluation of QoL in their physical sphere was observed compared to females.

Age is also a crucial predicator in rheumatic diseases. Diagnosis of OA is made more often in the older age group, mainly between 55–65 years of age, whereas RA is diagnosed at an younger age (40–50 years).<sup>5,7,10</sup>

Taking the factor of age into consideration, patients with both OA and RA aged >77 years demonstrated lower QoL in the spheres of physical and mental functioning than the other two age groups.

Other reports, comparable to the results of our research, have also indicated the impact of age on the QoL and general social functioning among people with OA and RA.<sup>17,19,20</sup>

Rheumatic diseases tend to be recurrent and chronic; therefore, duration of illness is a crucial factor influencing QoL of patients with OA and RA.

The research concerning variable duration of OA showed that the lowest assessment of QoL, in physical and mental spheres, was present in the group where the illness lasted >10 years. Progressing duration of illness had a significant impact on such domains of life as pain, social

functioning, and limitations in social roles for physical and mental reasons. Among patients with RA, duration of illness significantly affected the deteriorating QoL in the physical sphere.

The analysis of literature enabled observing how significant duration of illness affects the evaluation of QoL among patients diagnosed with OA and RA. The factor that to a large degree determines QoL of the patients with RA is state of mobility expressed with a negative clinical assessment of osteoarticular system.<sup>15,18,21,22</sup>

The primary clinical problem in the OA is joint pain that aggravates during lifting heavy objects or movement, which can also occur with no physical activity or at night. In the case of very advanced changes, the pain is severe even when there is lack of activity and at night (insomnia problem).<sup>6,7,19</sup> Also in RA, the most common ailment perceived by the patients is joint pain. The pain is usually most severe in the morning, and often occurs at night. It is accompanied by a feeling of morning stiffness of joints that lasts a few minutes, and in the active disease might last a few hours.<sup>10,19,20</sup>

The pain accompanying rheumatic diseases contributes to patients becoming anxious, irritated, and exhausted, which, in turn, causes discomfort in their daily life functioning. Intensification of pain often leads patients into isolation and loneliness. The symptoms also affect the effectiveness of self-care and rehabilitation; therefore, pain control methods are a very important part of coping with the disease.<sup>8,9,21</sup>

The research concerning patients with OA showed that, together with intensification of pain comes lowering of QoL in both major spheres of QoL (physical and mental). Escalating level of pain significantly affects such domains as social functioning and limitations in social roles for physical reasons. Among patients with RA, level of pain affected physical sphere remarkably.

**Table 6** Detailed analysis of quality of life coefficients (SF-36 subscales) in a sphere of PF, SF and pain (pain VAS) and disability (HAQ DI)

Variables studied	SF-36 subscales					
	PF (0–100)			SF (0–100)		
	OA		RA	OA		RA
	Mean ± SD	F-statistic <sup>#</sup> /P-value	Mean ± SD	Mean ± SD	F-statistic <sup>#</sup> /P-value	Mean ± SD
<b>Pain VAS (0–100)</b>						
0–35	72.4±20.47	14.44 (<0.001)	54.44±25.05	63.5±25.23	25.66 (<0.001)	58.33±20.72
36–66	48.97±28.89		46.5±20.46	44.45±20.54		43.25±21.90
67–100	40.3±26.69		36.62±23.18	30.6±21.51		34.62±23.97
<b>HAQ DI (0–3)</b>						
0–1	63.45±23.72	72.56 (<0.001)	60.71±15.95	50.34±22.23	33.17 (<0.001)	46.78±20.63
>1–2	31.66±20.29		35.45±20.02	29.09±19.65		40.18±24.53
>2–3	9.68±11.47		22.77±15.02	16.25±18.14		25.0±20.72

**Note:** <sup>#</sup>The univariate ANOVA for independent groups, F-statistic.

**Abbreviations:** ANOVA, analysis of variance; HAQ DI, health assessment questionnaire disability index; SF-36, 36-item short form health survey; OA, osteoarthritis; pain VAS, visual analog scale of pain; RA, rheumatoid arthritis; PF, physical functioning; SF, social functioning; SD, standard deviation.

Reports of other researchers prove that a significant problem of patients with OA and RA having an effect on QoL conditioned by medical condition, is the level of pain. The authors argue that the more patients suffer from pain, the lower is their QoL.<sup>15,18,22,23</sup>

Research shows that the primary standard and the objective of procedure in rheumatic diseases should be eliminating chronic, nagging pain that affects both physical and mental spheres; it should also be taken into consideration that sensory and emotional sensations associated with pain influence each other.<sup>24,25</sup>

The progressive nature of the disease makes daily life functioning worse. HAQ DI enables assessing one's functioning in daily life individually.<sup>11,12</sup>

Analysis of our research results has shown that patients with OA declared a slightly better performance in activities of daily living (HAQ DI) than patients with RA. However, with progressive physical disability and the need for help from others in performing basic tasks, the overall QoL in patients with OA decreases. In this group, progressing level of disability also significantly affected domains of QoL, ie, pain and deteriorating social functioning. Among patients with RA, there has been an increase in the malfunction concerning the performing basic activities of daily life (HAQ DI), which had an effect on the low evaluation of QoL in the sphere of physical functioning.

The results of other researchers also point to the influence of disability on deterioration of evaluation of QoL among patients diagnosed with OA and RA.<sup>17,20,22,24</sup>

Research has shown the need for taking special care of the elderly people, with an emphasis on the improvement of their functionality and, through that, their independence. It should be taken into consideration that, very often for the ill or disabled person, the possibility of an active, independent life is the most important aspect that should be maintained (or regained). The measure of success for the therapeutic team is maintaining or restoring the patient's possibility of independent living.<sup>25,26</sup>

## Limitations

The study on patients with OA and RA has its limitations due to the applied research tool questionnaire, based on assessment of their own health, which prevents an independent verification of data. There was also slightly different representativeness of patients' age. OA patients were in the age group ≥40–70 years, while RA group in ≤40–61 years, which confirms epidemiological data concerning the prevalence of both diseases.

## Conclusion

Overall QoL evaluated by the patients with OA and RA was of average level. QoL in terms of mental functioning in studied rheumatic diseases was at a higher level than the sphere of physical functioning. In spite of old age, patients with OA evaluated their QoL higher in comparison with patients with RA. With age, QoL decreased significantly in all studied population. Duration of chronic rheumatic disease influenced the low evaluation of QoL in terms of physical functioning in the whole studied population, more than the mental state among patients with OA. Chronic pain and progressing disability are crucial determinants of physical, mental, and social functioning of patients with OA and RA. When planning therapeutic and educational action concerning patients with rheumatic diseases, the prime concerns should be: improvement of functions of osseous-muscular-articular system, chronic pain management, psychological support, help with performing family/professional roles, and positive social relationships.

## Author contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

## Disclosure

The authors report no conflicts of interest in this work.

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