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ORIGINAL ARTICLE

SELECTED PSYCHOLOGICAL FACTORS AS PREDICTORS OF QUALITY OF LIFE IN PATIENTS WITH CHRONIC DISEASES OF THE MUSCULOSKELETAL SYSTEM DURING REHABILITATION

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Introduction: Quality of life is an important variable that has remained a very popular measure in medical and psychological research since it was first described in 1960s. Measurement of quality of life is mostly used for the assessment of improvement in patients with chronic diseases. Quality of life measures add a subjective aspect, expressed by the patient, to the objective assessments performed by physicians. Osteoarthritis is a group of chronic conditions in which biological and mechanical factors lead to progressive degeneration of the articular cartilage and the underlying bone tissue.

Methods: The aim of the study was to assess the influence of selected independent variables on the quality of life in patients with chronic musculoskeletal disorders undergoing rehabilitation.We used the following tools: A self-made survey - basic sociodemographic data; SF-36 Questionnaire, AIS - Acceptance of Illness Scale by B.J. Felton, T.A. Revenson, and G.A. Hinrichsenin as adapted by Z. Juczynski, MHLC - Multidimensional Health Locus of Control by K.A. Wallston, B.S. Wallston, R. DeVellis as adapted by Z. Juczynski, BPCQ - Beliefs About Pain Control Questionnaire as adapted by Z. Juczynski, WOMAC - Western Ontario and McMaster Universities Osteoarthritis Index, and CISS - Coping Inventory for Stressful Situations by N.S. Endler and J.D.A. Parker.

Results: The predictors of quality of life in the studied patients were determined. Statistically significant variables were: styles of coping with stress in stressful situations - task-oriented style, emotion-oriented style and avoidance-oriented style; internal locus of health control, disease acceptance and everyday functioning.

Figure: 1 • **Tables:** 3 • **References:** 39 • **Full-text PDF:** http://www.pjamp.com • **Copyright** © 2015 Polish Aviation Medicine Society, ul. Krasińskiego 54/56, 01-755 Warsaw, license WIML • **Indexation:** Index Copernicus, Polish Ministry of Science and Higher Education

Discussion: Our results are, to some extent in line with previous research which confirmed that osteoarthritis decreased quality of life, primarily due to pain, stiffness and limitations of physical function.

Conclusions: The multiple regression models showed that significant predictors of quality of life in patients with osteoarthritis were disease acceptance, coping strategies in difficult situations, internal locus of health control and everyday functioning.

Keywords: osteoarthritis, predictors of quality of life, quality of life

INTRODUCTION

Quality of life is an important variable that has remained a very popular measure in medical and psychological research since it was first described in 1960s. As pointed out by Wrzesniewski, there is not a single established theory of quality of life or even a widely accepted definition of it [14]. Juczynski wrote" (…) people have always wanted to achieve the way of life which is good for them. This is reflected by their desire to achieve happiness, which is perceived as something very important. It is the role of science to reveal what factors are responsible for achieving, if not happiness, then at least well-being, and what factors interfere with it" [15,24]. There are numerous definitions of quality of life. Among notions similar to quality of life there are happiness, self-fulfillment, life satisfaction, well-being or wellness [2,3,7,33], although they are all subjective in nature. With respect to the definition of quality of life, the following categories can be considered: lack of difficulties and burdens, lack of unpleasant symptoms, emotional balance, need of fulfillment, richness of experience, positive attitude towards life, high level of satisfaction with life, and life situation [1]. In medical research, quality of life is perceived as health status in its physical, mental and social dimensions. Recently, there have been attempts to consider the influence of spiritual factors on health status. It is difficult to compare different quality of life studies because of a multitude of definitions, models as well as measurement tools.

Measurement of the quality of life and its changes is feasible particularly in patients with chronic diseases. Quality of life measures add a subjective aspect, expressed by the patient, to the objective assessments performed by physicians, and can therefore help in the treatment process.

Osteoarthritis is one of the most frequent chronic diseases. It is the most common cause of musculoskeletal pain in people in the developed countries [17]. The World Health Organization sees osteoarthritis as one of the most serious threats to modern civilizations. Osteoarthritis, usually of the hip and knee, affects mostly people in the old age - it is found in 13% or 15% of people in Europe and the United States, respectively [9,11]. In Western Europe, osteoarthritis of the hip affects 3-11% of people over 35 years of age and up to 85% of the elderly [13]. In approximately 20% of patients, idiopathic degenerative changes are seen in both hips. Prevalence of osteoarthritis of the hip is slightly higher in women (8%) than in men (6.7%), and increases with age [12,13].

Osteoarthritis is a group of chronic conditions in which biological and mechanical factors lead to progressive degeneration of the articular cartilage and the underlying bone tissue. Osteoarthritis has an insidious onset and is characterized by progressive symptoms leading to a decreased joint function and chronic pain [17,19,21]. Osteoarthritis is also a social condition as it affects the ability to participate in family, occupational, and social life.

In principle, the treatment of osteoarthritis should be tailored to each patient individually, taking into account other co-morbidities [17,19,21]. Factors such as pain intensity, location and degree of joint destruction, and patients' expectations should be taken into account [38]. Oftentimes, the aim of conservative and surgical treatment is pain reduction. The mainstay of treatment for osteoarthritis should be conservative therapy consisting of patient and family education, regular physical exercises, prostheses and devices enabling independent life. Rehabilitation comprises physical therapy. It is important to explain to the patient the importance of lifestyle changes, such body weight reduction in obese patients [24].

From a psychological standpoint, knowledge of the disease, disease acceptance and internal health control locus are very important for the improvement of quality of life. Oftentimes, the above-mentioned factors influence health behaviors.

METHODS

We attempted to assess the influence of selected independent variables on the quality of life in patients with chronic musculoskeletal disorders undergoing rehabilitation. The independent variables included: disease acceptance, ability to control health and pain, evaluation of everyday functioning, coping strategies.

Therefore, the aim of the study was to determine prognostic factors for the subjective quality of life based on the above-mentioned independent variables in patients undergoing rehabilitation.

Based on the reasoning described above, we hypothesized that the quality of life in patients with musculoskeletal disorders undergoing rehabilitation will be determined by pain intensity, everyday functioning, somatic symptoms, ability to control pain and health, and coping strategies.

Study group characteristics

We invited 105 patients (76 women, 29 men) with a mean age of 62.22 years (+/- 9.76) (women 62.68 years (SD 9.96), men 61 years (SD 9.26)). The age range for women and men with osteoarthritis of the hip and knee undergoing rehabilitation in an outpatient clinic in Lodz was 35-84 years and 40-78 years for women and men, respectively. The rehabilitation process lasted for approximately 2 weeks (10 visits).

The inclusion criteria were:

- chronic musculoskeletal pain irrespective of etiology;
- qualification for rehabilitation made by an orthopedic surgeon or a physician specializing in medical rehabilitation;
- lack of contraindications for rehabilitation;
- written informed consent.

Tools

We used the following tools:

1. A self-made survey - basic sociodemographic data.
2. SF-36 questionnaire - assessment of quality of life in patients; consisting of global score, health score, physical score, change in health status over the last year, and social score.
3. Acceptance of Illness Scale, AIS (B.J. Felton, T.A. Revenson, G.A. Hinrichsen) as adapted by Z. Juczynski - measurement of disease acceptance.
4. Multidimensional Health Locus of Control, MHLC (K.A. Wallston, B.S. Wallston, R. DeVellis) as adapted by Z. Juczynski. It is a self-descriptive tool for general health expectations comprising the influence of the patient, other people and chance [16].
5. The Beliefs About Pain Control Questionnaire (Skevington S.) as adapted by Z. Juczynski. It is a self-descriptive tool for adults who suffer from pain. It has 13 items grouped into 3 factors measuring the strength of belief in the ability to control pain:
   - personally (internal factors);
   - by physician (influence of other people);
   - chance [16].
6. Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) version LK 3.0 administered before and after rehabilitation. It measures a subjective view of the patient on the degree of progression of osteoarthritis of the hip and knee. This tool is designed specifically for the assessment of symptoms and daily functioning in people with osteoarthritis of the hip or knee. WOMAC evaluates three dimensions of the functional status - pain, joint stiffness, and physical function [5,8,23]. On each of these dimensions, a score from 0 to 5 is given:
   - Pain (0 - no pain, 1 - mild pain, 2 - moderate pain, 3 - severe pain, 4 - very severe pain);
   - Stiffness (0 - no stiffness, 1 - mild stiffness, 2 - moderate stiffness, 3 - severe stiffness, 4- very severe stiffness);
   - Physical Function - (0 - very high, 1 - high, 2 - moderate, 3 - low, 4 - very low).
7. Coping Inventory for Stressful Situations, CISS (N.S. Endler and J.D.A. Parker). This tool describes different behaviors that can be performed in stressful situations. N.S. Endler and J.D.A. Parker differentiated three styles:
   - Task-oriented coping (TOC) - behaviors that aim at resolving a given problem under stressful circumstances through cognitive reappraisal or attempts to change the situation;
   - Emotion-oriented coping (EOC) - concentration on one's own emotions, feelings such as anger, tension, guilt. People with this style of coping tend to fantasize and think wishfully under stressful circumstances in order to reduce stress-related emotional tension;
   - Avoidance-oriented coping (AOC) - attempts to redirect attention from a stressful situation or negative feelings that might be associated with it.

RESULTS

The studied patients had diseases of both the knee and/or hip joints but 64% had osteoarthritis of the knee (F-64%, M-62%), 23% osteoarthritis of the hip (F-22%, M-28%), and 12% osteoarthritis of both joints (F-13%, M-10%). This trend was seen also when gender was taken into account. The relationship between gender and osteoarthritis type was not statistically significant ($\chi 2=0.926$ df=2 p - non-significant).

Distributions of the studied variables were not significantly different from the normal distribution (Shapiro-Wil test) and there were no statistically significant differences between genders. Therefore, we decided to carry out the analyzes on pooled data.

Tab. 1. presents the basic results of statistical tests. The mean score on the quality of life scale in the studied population was approximately 89, which is comparatively low. However, it is higher than the scores in patients with diabetes (ca. 60) or osteoporosis (ca. 50) [20]. In turn, the mean scores on the MHLC scale in our group were similar to those from previous studies performed in patients with chronic diseases (in American studies they were I=25.78, O=22.54, C=17.64) [36]).

We verified our hypotheses with multiple regression after ensuring a linear relationship between predictors and the independent variable (general score on the quality of life) with the use of scatter plots and Pearson's correlation coefficients (shown in Tab. 2.).

As seen in Tab. 2., some independent variables were significantly correlated with the independent variable.

Multiple regression was performed in a stepwise-forward way. The results of multiple regression analysis are presented in Tab. 3.

We determined the following statistically significant predictors of the quality of life - task-oriented, emotion-oriented, and avoidance-oriented coping, internal locus of health control, disease acceptance and everyday functioning. Other vari-

Tab. 1. Basic statistics of variables.

Name of variable	mean	median	SD
Womac			
Pain (P)	50.81	50	16.13
Stiffness (S)	46.03	50	18.71
Physical function (PF)	49.92	49	16.93
Quality of Life SF-36			
SF36_GS	88.63	86	13.32
SF36_GH	14.55	15	2.29
SF36_F	5.90	6	1.76
SF36_HC	2.25	2	0.84
SF36_OAS	6.39	6	2.02
CISS			
Task-oriented coping (TOC)	55.82	56	9.02
Emotion-oriented coping (EOC)	42.39	45	9.13
Avoidance-oriented coping (AOC)	42.29	42	8.18
Distraction	19.13	19	4.46
Social diversion	15.19	15	3.82
AIS			
AIS - score	28.06	29	7.98
BPCQ			
Chance control	15.33	15	4.50
Physician control	15.58	16	3.84
Internal control	14.15	14	3.79
MHLC			
Internal (I)	24.33	25	6.43
Influence of others (O)	23.50	23	5.37
Chance (C)	20.39	20	6.25

SF36_OG - Quality of life General Score SF36_F- Physical Function
SF36_GH- General Health SF36_HC- Health Change over the last year
SF36_SA - Social Activity

ables included in the regression model, such as believes in internal or physician control of pain, influence of others on health, and age, were statistically insignificant.

The final R2 multiple coefficient of determination was 0.53, i.e. the model predicted 53% of the independent variable (quality of life) variance. Below, we present a graphical relation between variables within a 95% confidence interval.

Tab. 2. Pearson's correlations coefficients between independent variables and the general score in the quality of life.

Variable	Correlations N=105
	SF36_GS
Age	-0.14
BPCQ	
BPCQ - Chance control	0.07
BPCQ - Physician control	-0.12
BPCQ - Internal control	0.02
AIS	0.27**
MHLC	
MHLC - Internal	0.30**
MHLC - Influence of others	0.05
MHLC - Chance	-0.08
Womac	
Pain	0.32**
Stiffness	0.26**
Physical function	0.41***
CISS	
Task-oriented coping (TOC)	0.21*
Emotion-oriented coping (EOC)	-0.47***
Avoidance-oriented coping (AOC)	0.11

*- p < 0.05 **-p < 0.01 ***-p < 0.001

DISCUSSION

Our study demonstrated a relationship between the quality of life and disease acceptance, internal locus of health control, and coping strategies in patients with chronic musculoskeletal diseases undergoing rehabilitation. Because the studied variables were subjective in nature, they depend on many psychosocial factors. Disability, frequently co-existing with many diseases, results in a need for institutional help from qualified personnel. It does not mean however, that disease acceptance or knowledge of one's own disease is not important. We found that disease acceptance (and therefore knowledge of it) and internal control of health co-determine the quality of life.

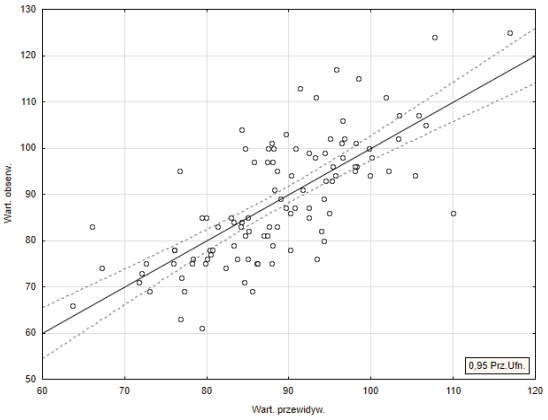

Fig. 1. Predicted vs. observed values of the dependent variable (general scores in quality of life).
[wart. Obser.] - observed values
[Wart. Przewidywane] - predicted value
[prz. Ufn] - confidence interval

Tab. 3. Multiple regression results.

	Summary of multiple regression general score in quality of life R= 0.73 R2= 0.53 F(9.95)=12.085 p =0.000					
	Beta	SE Beta	B	SE B	t	p
Free score			60.39	12.20	4.954	0.000003
Emotion-oriented coping (EOC)	-0.48	0.07	-0.69	0.11	-6.607	0.000000
Everyday activities	0.29	0.07	0.23	0.06	3.849	0.0002
MHLC internal locus of health control	0.22	0.09	0.46	0.19	2.422	0.012
Task-oriented coping (TOC)	0.28	0.07	0.41	0.11	3.781	0.0003
BPCQ - chance	-0.11	0.09	-0.33	0.26	-1.277	0.203
Avoidance-oriented coping (AOC)	0.15	0.07	0.25	0.12	2.033	0.045
Disease acceptance	0.15	0.08	0.25	0.13	1.991	0.049
MHLC - influence of others	0.12	0.08	0.31	0.19	1.615	0.109
Age	-0.09	0.08	-0.12	0.10	-1.133	0.259

Beta and B - raw and unstandardized regression coefficient
SE Beta and SE B - standard error of regression coefficient

To some extent, our results are in line with previous research [18,22,30]. They confirm that osteoarthritis decreases quality of life, primarily due to pain, stiffness and limitations of physical function.

Multiple regression analysis revealed significant predictors of the quality of life. Based on the statistically significant predictors of quality of life, it can be said that quality of life determines a certain standard of life. Contrary to our expectations, pain intensity was not a statistically significant predictor of quality of life, and one of the BPCQ subscales - pain control, was statistically insignificant. We expected quality of life to be associated with pain, but the significant predictors were everyday functioning, disease acceptance, styles of coping, and internal locus of health control. In our opinion, this can be related to the fact that patients get used to pain and other symptoms, but their quality of life is determined to a greater extent by difficulties and limitations in everyday life. Because pain is a sensory and emotional experience, it can be modified by the process of learning and then memorized in the central nervous system. Past experience with pain can change the perception of it by either increasing or decreasing this sensation. Other factors influencing the perception of pain are attitude towards disease, pain and suffering [29,31]. The relationship between quality of life and age, physical disability, patient's perception of disease, participation in social life has been studied before with congruent results [17,27,32].

Similarly to pain, stiffness was also an insignificant predictor of quality of life in the multiple regression model, although it is an important characteristic of osteoarthritis. This can be explained by the chronicity of the condition, age, and the belief that osteoarthritis is not a completely curable disease. It is tolerated by patients, and therefore disease acceptance is of importance.

The relationship between somatic diseases and stressful events has been studied before [6,10,27]. Our results are in line with previous research. Stress is associated with experiencing emotions. The type and intensity of emotions experienced by patients is dependent on the knowledge of the disease and its perceived importance.

In our opinion, coping strategies (e.g. with disease), both rational and irrational, are used in order to improve quality of life and everyday functioning. Coping is important for adapting to difficult situations and plays two roles - it changes a given situation through an instrumental function concentrated on the problem, and regulates stress-related emotions (regulative function). This view is also represented by Wons [35].

Knowledge of emotions and strategies of coping with disease allows for a better adaptation to chronic conditions. Acceptance of disease, i.e. getting used to the limitations caused by it, is associated with a reduction of negative emotions and reactions related to the disease and therapy. The greater the acceptance, the lower is the experience of negative emotions [4,27,28,37]. The way in which the patient sees and interprets the disease determines his reactions towards it, and has an impact on emotions associated with the disease. Moreover, it determines behaviors associated with coping with disease.

A good cognitive adaptation to the disease requires an acquisition of new skills by learning about the disease and methods of treatment. This should result in a cognitive reappraisal of life in such a way that enables satisfaction with life in spite of the disease. Emotional adaptation to disease is, for instance, a constructive and controlled expression of anger.

The internal health control, one of the MHLC subscales that was included in the regression model, corresponds to the desire to improve quality of life. In turn, the chance subscale of pain control tells us that patients cannot control their pain completely and can only tolerate it or reduce it by taking medication or undergoing surgical procedures. It is postulated that the internal locus of health control is favorable as it promotes health behaviors and independence of patients. It is usually associated with a desire to improve one's own health status [16].

In conclusion, it is worth mentioning that among patients with osteoarthritis of the hip and/or knee (as well as among other patients) there is a conviction that the disease in not curable. Oftentimes, patients expect only a reduction in pain, which results in a better everyday psychosocial functioning and a higher quality of life.

CONCLUSION

Multiple regression model determined the following significant predictors of quality of life in patients with osteoarthritis - disease acceptance, coping strategies, internal locus of health control, and everyday functioning.

In the studied group, patients with chronic diseases of the musculoskeletal system undergoing rehabilitation did not see pain as one of the most significant aspects of the disease.

AUTHORS' DECLARATION:

Study Design: Marian Macander, Katarzyna Denys, Krzysztof Zbolarski, Paweł Denys; **Data Collection:** Marian Macander, Katarzyna Denys, Krzysztof Zbolarski, Paweł Denys; **Statistical Analysis**: Marian Macander, Katarzyna Denys, Krzysztof Zbolarski, Paweł Denys; **Manuscript Preparation:** Marian Macander, Katarzyna Denys, Krzysztof Zbolarski, Paweł Denys; **Funds Collection:** Marian Macander, Katarzyna Denys, Krzysztof Zbolarski, Paweł Denys. The Authors declare that there is no conflict of interest.

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