

# Improvement of the Quality of Life of persons with degenerative joint disease in the process of a comprehensive rehabilitation program enhanced by Tai Chi: The perspective of increasing therapeutic and rehabilitative effects through the applying of eastern techniques combining health-enhancing exercises and martial arts

## Authors' Contribution:

- A** Study Design
- B** Data Collection
- C** Statistical Analysis
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- E** Funds Collection

Wiesław Tomaszewski<sup>1ABCD</sup>, Grzegorz Mańko<sup>2ABCD</sup>, Maria Pachalska<sup>3ABCD</sup>,  
Marzena Chantsoulis<sup>4ABCD</sup>, Jacek Perliński<sup>5ABCE</sup>, Beata Łukaszewska<sup>6ABD</sup>,  
Magdalena Pawłowska<sup>3BD</sup>, Jarosław Jaszczur-Nowicki<sup>7ABCD</sup>

<sup>1</sup> College of Physiotherapy, Wrocław, Poland

<sup>2</sup> Department of Ergonomics and Physiology, Institute of Physiotherapy, Faculty of Health Sciences, Collegium Medicum at the Jagiellonian University in Cracow, Cracow, Poland

<sup>3</sup> Department of Neuropsychology, Andrzej Frycz-Modrzewski Krakow University, Cracow, Poland

<sup>4</sup> Faculty of Physiotherapy, Academy of Physical Education, Wrocław, Poland

<sup>5</sup> Faculty of Health Sciences, Department of Physiotherapy, The Elbląg Institute of the Humanities and Economics, Elbląg, Poland

<sup>6</sup> Institute of Psychology, University of Gdansk, Gdansk, Poland

<sup>7</sup> Department of Individual Sports, Academy of Physical Education and Sport in Gdansk, Gdansk, Poland

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## Abstract

### Background and Study Aim:

The main problem for patients with degenerative joint disease is the chronic pain associated with a lowered quality of life. The aim of the research was improvement of the quality of life of these patients undergoing a comprehensive rehabilitation programme employing strategic approaches, with the inclusion of Tai Chi, dictated by the programme's goal.

### Material/Methods:

The research covered a group of 40 patients suffering from degenerative joint diseases, undergoing a comprehensive rehabilitation programme at the Rehabilitation Centre in Krzeszowice, Poland. The research group comprised 30 women and 10 men. The mean age for the group was  $63.5 \pm 8.0$  years. A Polish adaptation of the Arthritis Impact Measurement Scale-2 (AIMS-2) was used to evaluate quality of life. The patients were examined twice: before and after 3 weeks of the rehabilitation.

### Results:

Before rehabilitation there occurs a lowered quality of life brought about chiefly by acute joint pain, which directly makes physical functioning difficult and indirectly influences those areas of quality of life linked to psychic and social functioning. As a result of implementing a comprehensive rehabilitation program there occurred an improvement in the quality of life. The results obtained were dependent on age, duration of the disease as well as the degree of joint degeneration.

### Conclusions:

The applying of a comprehensive rehabilitation program improved the quality of life of the patients with degenerative joint disease. Selected Tai Chi exercises constitute a novel supplementation to a comprehensive rehabilitation programme, influencing its effectiveness.

**Key words:** motor skills • chronic pain • osteochondritis • osteotomy • health behaviour • therapeutic behaviour • preventative (rehabilitative) behaviour • aging

**Author's address:** Grzegorz Mańko, Department of Ergonomics and Physiology, Institute of Physiotherapy, Faculty of Health Sciences, Collegium Medicum at the Jagiellonian University in Cracow, Grzegorzeczka 20 St., 31-531 Cracow, Poland; e-mail: manko@fizjoterapia.pl

## BACKGROUND

Degenerative joint disease (osteoarthritis, OA) is associated with the process of the destruction of the articular cartilage subjected to overburdening in daily life conditions and secondary changes within the epiphyses, with an inflammatory reaction of the synovial membrane and the stabilising structures of the joints, as a consequence of which there results damage to the anatomical joint, impairment to **motor skills** – chiefly in movement and the appearance of symptoms of **chronic pain** [1–3].

Of significance from the clinical point of view is the division of degenerative disease in relation to the localisation of these changes. For the medical and rehabilitation approaches differ according to the location of the pathological changes. The most important localisations from the clinical point of view are the hip joint (coxarthrosis), the knee joint (gonarthrosis) and the spine (spondyloarthrosis) [4].

The main problem experienced by patients with degenerative joint disease is the chronic acute pain noted in the joints making physical functioning difficult for the patients, usually caused by **osteochondritis**, as well as the gradual decrease in motor activity. An individual afflicted with this disease gradually loses the ability to independently carry out everyday activities [1,2] and becomes socially dependent. These factors mean that the quality of life connected with the condition of health undergoes a dramatic fall.

Chronic disease is a negative phenomenon handicapping biological functions and one which leads to permanent psychosomatic changes. At the same time the role of the patient in family and professional life changes. In this context health becomes the most important and is simultaneously viewed as the most important component of life quality [3,4].

In the current work quality of life will be understood in accordance with the guidelines of the World Health Organisation (WHO) [5,6]. WHO formulate quality of life as the perceiving of the individual as well as their life position equally within a cultural context as within the value system that surrounds them in relation to their aims, expectations and standards. Cohort studies [5] conducted on individuals with degenerative disease

showed that the most important aims that have an influence on the quality of life are: work satisfaction, a happy marriage, life optimism, the ability to experience joy, satisfaction in one's personal life (equally one's sex life), financial stability.

The basic aim in the treatment of these patients is: a minimising of the loss of physical skills, maintaining the ability to undertake independently daily activities, protecting these individuals from a deterioration in quality of life. In connection with this many tests have been conducted with the aim of the optimization of the rehabilitation process through a shortening of its duration and reducing the costs of the procedures carried out. However, this is no easy task, as degenerative joint disease is chronically progressive in character and often does not respond to treatment in a way that matches the expectations of both therapists and patients [7,8].

A promising programme of treatment introduced into clinical practice at the beginning of the 21st century is a comprehensive programme of rehabilitation utilising a strategic goal-orientated approach, whose effectiveness has been confirmed on numerous occasions in the clinical treatment of chronically ill individuals, with particular consideration being given to those with brain damage [9,10].

The traditional approach and the programmes and methods of rehabilitation developed in this approach are characterised by fragmentariness, reactivity (we wait for the appearance of problems), rigidity in exercise modification and patient objectivity.

The strategic approach is one connected with the planning of aim-orientated rehabilitation; strategic programmes are characterised by comprehensiveness, directed towards the future (we attempt to foresee the problems that may occur with the illness and the exercises carried out, heuristic methods taking into consideration the subjectivity of the patient as well as the rehabilitation goals voiced by the patient).

The methodology in the strategic approach was adopted and adapted from Management by Objectives (MBO). On the basis of an interview and observations we establish at the beginning of rehabilitation and subsequently verify periodically four parameters connected with the

**Motor skills** – performance of complex motor acts.

**Chronic pain** – aching sensation that persists for more than a few months.

**Osteochondritis** – inflammation of a bone and its overlaying cartilage.

patient's state of health as well as with the therapeutic strategies employed.

Here belong four factors (1) strengths, (2) weaknesses, (3) opportunities, (4) threats.

The primary goals in rehabilitation are (1) improvement in quality of life, (2) enabling as much as possible independent functioning for a patient, (3) returning life meaning to the patient.

The secondary goals are the regaining or substitution (by means of compensation) of individual functions considered important in light of the primary aims [11].

This programme was introduced for the first time to the Rehabilitation Centre in Krzeszowice, Poland in 2006 and was suitably modified for the needs of individuals with degenerative joint disease. Modification involved the introduction of, beside standard procedures such as balneotherapy, physiotherapy, and kinesiotherapy, a strategic approach taking into consideration an individually agreed on – with every degenerative joint disease patient – list of goals enhanced by analgesic treatment with the use of non-steroid analgesic and anti-inflammatory drugs as well as Tai Chi exercises.

Tai Chi is a system, developed in China in the 11<sup>th</sup> century, of harmonious slow movements positively influencing the recovery and maintaining of physical and psychic health. It is derived from ancient martial arts and was created centuries ago for this aim. It turns out, however, that regular Tai Chi may bring with it also measurable health benefits. Tai Chi is exercise for the whole body, 'meditation in movement', which positively influences the functioning of the whole organism – both its psyche and soma. It is known that the coordination of the workings of various parts of the body while carrying out exercises allows for, thanks to the full involvement of consciousness, the achievement of a state of physical and psychic relaxation [12–14].

On the basis of numerous – particularly of late – reports based on many years of observations, as equally research works in accordance with the principles of Evidence Based Medicine (EBM) [15–21], one may state that there exist documented pieces of evidence on the positive influence of Tai-Chi on the health of those who practice it. There has been shown an improvement in the functioning of the cardio-vascular system, a positive change in the lipid profile, improvement in the immune system, effectiveness in osteoporosis, degenerative joint disease and rheumatoid diseases.

There has equally been proven the impact of Tai Chi on improvements in the daily functioning of individuals

with Parkinson's disease, multiple sclerosis, as well as the showing of Tai Chi as one of only a few forms of exercise suitable for people regardless of their limitations – 'who may exercise in a chair and in bed' [12,13].

Research into determining the best method for improving balance in individuals older than 65 has proved that Tai Chi is also considered to be an unusually effective system of exercises counteracting falls at an advanced age, which would lessen the risk of variously called falls that often result in serious body injury [22,23].

Attention is also drawn to the fact that the benefits of Tai Chi go far beyond simply an improvement in physical health. The concentration and memory needed to master a run of 108 movements creating a so-called 'sequence' and also the additional benefit resulting from contact with other people set on the self-same goal – improvement in health and desiring to realise this through the practicing of a pleasant form of exercise, favourably influences also the psychophysical aspects of quality of life.

The aim of the work was improvement of the quality of life of patients with degenerative joint disease undergoing a comprehensive rehabilitation programme using a strategic approach directed towards a goal and with the addition of Tai Chi exercises.

## MATERIAL AND METHODS

The tests covered a group of 40 individuals suffering from a degenerative disease of the joints of the upper and lower limbs as well as the spine, undergoing rehabilitation at the Rehabilitation Centre in Krzeszowice. Patients were qualified for testing on the basis of a medical diagnosis. Those selected for testing constituted 2nd and 3rd degree of degeneration according to Seyfried [24]. The research group comprised 30 women and 10 men aged 46 to 80. The mean age for the research group was  $63.5 \pm 8.0$ ; 40% of those tested lived in the country, with 60% were living in urban areas; 12.5% of those tested had a degree or higher education qualification, 15% secondary education, 40% a vocational secondary education, with 32.5% of the testees having only completed primary education; 50% were married with the rest of the group declaring themselves unattached/single (including those who were widowed). For 75% the main source of income was a pension or disability pension, while 22.5% work. Only one individual (2.5%) was classified as unemployed.

The questionnaire research was conducted during the patients stay at the Rehabilitation Centre in Krzeszowice. All questionnaires were completed by one and the same person, in similar local conditions, at the same time of

day. The patients were tested twice, before the rehabilitation programme commencement as well as on the last day at the Centre.

A Polish adaptation of the Arthritis Impact Measurement Scale-2 (AIMS-2) was applied in the evaluation of quality of life to ascertain the functional state of individuals with osteoarthritis [25,26]. The adapted AIMS -2 is comprised of two parts: the first part contains 57 questions which evaluate the quality of life in the 12 subgroups: physical activeness (mobility), moving and bending, hand and finger functions, upper arm/shoulder functions, daily care, household activities, social activeness, family support, pains in joints, work, level of emotional tension, mood.

In the second part of the modified AIMS-2 are to be found answers to questions on the level of patient satisfaction in the above listed areas, the influence of disease/illness on the above areas as well as in which of the mentioned fields the patients themselves most expected improvement. The final part of the survey contained questions on current and future perceptions of health as well as socio-demographic information. The whole questionnaire contained 78 questions.

All of the above mentioned subgroups contain answers composing 5 possibilities: from (always) to (never) or (every day) to (never). The patient could obtain a minimum of 0 and a maximum of 10 points, whereby 0 represented a high quality of life, while 10 – a low quality of life.

In all patients taking part in the comprehensive rehabilitation programme the same procedure algorithm was applied:

#### 1. Balneotherapy:

- Sulphur baths (daily for 20 minutes, the first treatment lasts 7 minutes, the next 14 and subsequent ones 20 minutes each).
- Mud compresses (the compresses were applied for 20 minutes every day for the whole duration of the rehabilitation programme).

#### 2. Physiotherapy:

- Healing currents (everyday iontotherapy with the application of non-steroid anti-inflammatory and analgesic drugs, 15 minutes, TENS for 10 minutes).
- Underwater vibratory massage of the upper and lower limbs (for 15 minutes the lower or upper limbs depending on the location of the degenerative changes).
- Ultrasound (daily depending on localisation from 6 to 10 minutes).
- Magnetotherapy (daily for 20 minutes).

#### 3. Kinesiotherapy:

- Active exercises in burdening (by means of suspended weights/ pulley systems, riding a cycloergometer without loading).
- Free exercises (strengthening the postural muscles: stomach, gluteal and dorsal).
- Individual exercises (using neurophysiological methods individually adapted for functional deficiency).

The exercises were done daily for a one hour period.

1. Occupational therapy with health education (a daily meeting for around an hour).

2. Psychotherapy (once a week).

The entirety of the basic programme applied in algorithm was supplemented, in accordance with the strategic approach individually agreed upon with each of the patients, by a list of aims as well as being enhanced by analgesic and anti-inflammatory treatment (Diclofenac sodium) [11]. The programme duration was four weeks, which coincides with the refunding available within the National Health Fund (Narodowy Fundusz Zdrowia).

3. Tai Chi (twice a week).

Tai Chi exercise sessions maybe classified to sensorimotor exercises. These were performed willingly by patients, who gladly participated in the classes which have for several years now become a stable element of the rehabilitation programme

Individuals who had undergone operation treatment as a result of degenerative joint disease were excluded from the tests, as were those in a severe clinical state, with neurological defects, with depression and dementia.

Statistical analysis was made with the use of the Anova Estimation and Spearman Rank correlation.

The experiment was approved by the Local Ethical Committee.

## RESULTS

There was not found to be any significant statistical variations between the results obtained by women and those by men, therefore further statistical analysis will be conducted without recourse to the sex of participants.

Evaluation of degenerative joint disease patient quality of life by means of the AIMS-2 scale. The results on quality of life (according to the AIMS-2 scale) obtained in Test 1 (prior to rehabilitation) and Test 2 (after rehabilitation) in such areas as level of mobility, movement and bending, the functions of hand and fingers,

the function of the forearm, daily care, household activities, social activity, pain, tension level as well as mood are presented below.

There was a statistically significant ( $p < 0.05$ ) fall in the range of level of mobility, which points to an improvement in quality of life in the area in question. The mean value before rehabilitation was 4.57, while after rehabilitation 3.11.

Within the scope of mean values for the movement and bending obtained in Test 1 (prior to rehabilitation) and in Test 2 (after rehabilitation) there was shown a statistically significant difference ( $p < 0.05$ ). The average result in this area was for the first test 5.88, while in Test 2 – 4.06.

The average values for the hand and finger functions obtained in Test 1 (prior to rehabilitation) and in Test 2 (after rehabilitation) were for pre rehabilitation 1.52, while after rehabilitation not much less at 1.12, however this difference was statistically significant ( $p < 0.05$ ).

For the scope of mean values for the parameter upper arm/shoulder functions gained in Test 1 (before rehabilitation) as well as in Test 2 (after rehabilitation), there was observed a statistically significant ( $p < 0.05$ ) change. The mean value prior to rehabilitation was 1.08, while afterwards 0.67.

In studying the average value for the daily care parameter obtained in both Test 1 (before rehabilitation) and in Test 2 (after rehabilitation) one may note that prior to rehabilitation the value was 0.74, while after the period of rehabilitation 0.54, yet this change was statistically significant ( $p < 0.05$ ).

In studying the mean value of the parameter household activities obtained for Test 1 (before rehabilitation) and in Test 2 (after rehabilitation) it was shown that the average result prior to rehabilitation was 4.23, while after rehabilitation this reduced to 3.58. The difference between the state prior to rehabilitation and afterwards was statistically significant ( $p < 0.05$ ).

The average value of the parameter social activeness obtained in Test 1 (before rehabilitation) as well as in Test 2 (after rehabilitation) was 4.86 in Test 1, while after rehabilitation it fell to 3.75, while the change was statistically significant ( $p < 0.05$ ).

The average value of the parameter pain obtained in Test 1 (before rehabilitation) and in Test 2 (after rehabilitation) was 6.2, while after rehabilitation this fell to 3.68. The difference was statistically significant ( $p < 0.05$ ).

In studying the mean value of the level of tension parameter obtained in Test 1 (before rehabilitation) and

in Test 2 (after rehabilitation) it was ascertained that the difference obtained in the level of tension was statistically significant ( $p < 0.05$ ), while the mean value, which at the beginning of the tests had been 4.17, was, after rehabilitation, reduced to 3.03.

The last of the areas discussed was mood. The mean value obtained for this parameter in Test 1 (before rehabilitation) and in Test 2 (after rehabilitation) was subject to a statistically significant ( $p < 0.05$ ) improvement as a result of the rehabilitation conducted. At the beginning the average value was 2.5, while after rehabilitation it had fallen to 2.08.

The correlation of age, degree of degeneration and length of illness in relation to the areas of quality of life on the AIMS-2 scale are presented in Table 1.

There was observed the existence of a statistically significant correlation between patient age, the duration of the illness as well as the degree of degeneration and all the areas of the AIMS-2 scale. Of note is the fact that the older patients with a higher degree of degradation as well as those who were ill for longer, evaluated the quality of life in the particular areas as worse.

Here is located the correlation for three areas of quality of life selected by patients, in which they most wanted to see improvement:

- Position: mobility, movement and bending, arthritic pain 21 of the 40 patients.
- Position: mobility, arthritic pain, social activity 3 of the 40 patients.
- Position: mobility, emotional tension, mood 2 of the 40 patients.
- Position: mobility, arthritic pain, household activities 9 of the 40 patients.
- Position: mobility, movement and bending, hand functions 5 of the 40 patients.

## DISCUSSION

It was shown in the work that the application (presented in detail above) of a comprehensive rehabilitation programme utilising a strategic goal-orientated approach with the use of Tai Chi exercises significantly improved the quality of life for patients – with a varied intensity, however, in the particular areas.

Numerous publications [5,27–34] dealing with the subject of functional improvement in patients with degenerative illnesses following the completion of rehabilitation allow one to state that it has a positive impact on improvements in quality of life.

**Table 1.** The correlation of age, degree of degradation and the time of illness in relation to the areas of quality of life on the AIMS-2 scale in patients with degenerative joint disease (n=40).

Pair of variables	Age	Degree of degradation	Length of illness
Social activity before	.350*	.284	.280
Social activity after	.366*	.338*	.314*
Pain before	.390*	.576*	.470*
Pain after	.530*	.638*	.494*
Household activities before	.526*	.789*	.597*
Household activities after	.525*	.777*	.586*
Hand and finger function before	.490*	.454*	.371*
Hand and finger function after	.501*	.423*	.344*
Level of mobility before	.427*	.622*	.420*
Level of mobility after	.382*	.598*	.402*
Level of tension before	.254	.391*	.352*
Level of tension after	.169	.355*	.259
Mood before	.488*	.431*	.596*
Mood after	.397*	.362*	.483*
Daily care before	.403*	.507*	.282*
Daily care after	.413*	.507*	.279*
Movement and bending before	.243	.452*	.184
Movement and bending after	.354*	.451*	.304*
Forearm function before	.642*	.556*	.427*
Forearm function after	.552*	.507*	.421*

r – Spearman correlation coefficient; \* p<0.05.

Here it is important to emphasise the role that has been played since 2006 by selected Tai Chi exercises in the comprehensive programme of rehabilitation employed at the Rehabilitation Centre in Krzeszowice in the treatment of patients suffering from degenerative joint disease. The decision to introduce this form of rehabilitation was taken after a detailed analysis of both the potential attainable effects as well as the maximum restriction of potential side effects resulting from this form of therapy. We were convinced as to this by the numerous reports from world literature on the subject including the most recent reports of the last two years, where the results of published academic works unequivocally confirmed the validity of such a course.

Hall et al. [15] in randomised tests conducted in 2011 on a group of 160 people with chronic low back pain syndrome of varied aetiology, obtained a statistically characteristic improvement in the area of pain reduction, as well as – in the opinion of patients – an improvement in the quality of life after a 10-week period

of employing Tai Chi exercises when compared to the control group where rehabilitation did not include Tai Chi. It was shown that the employed programme of exercises, which comprised 18 40-minute sessions completed during the course of 10 weeks, is effective and safe for patients. Weaknesses and limitations in result interpretation were seen in the short-term effect of pain reduction (conclusion – tests need to be continued), as well as the lack of direct comparison of therapy using Tai Chi with other forms of guided therapy [35,36].

Uhlig et al. [16] have conducted research into a group of 15 patients suffering from rheumatoid inflammatory arthritis (RS) of the joints, the standard treatment for whom was supplemented by a 12-week programme of rehabilitation conducted twice a week. The results, evaluated directly after the end of the rehabilitation cycle and after 12 weeks from the moment of completion, displayed a statistically significant improvement in the pain reduction, the strength of selected muscle groups, physical condition, endurance and sense of balance.

Field [17], in research conducted in 2010 obtained results confirming the impact of Tai Chi exercises on such psycho-physical parameters as pain reduction, strength improvement and muscle tension, reduction in symptoms of osteoporosis and the number of falls, as well as improvement in concentration, the quality of sleep, a fall in cholesterol levels, reduced blood pressure, diabetes parameters and HIV. The tests were conducted in a group of patients suffering from degenerative joint disease, rheumatoid (inflammatory) arthritis, fibromyalgia, osteoporosis, diabetes and others. A most important conclusion of this work is drawing attention to the numerous methodological imperfections in the tests that appear in both the quoted article as equally others, the lack of uniform test groups, the frequency and intensity of exercise programmes (from less than one hour a week for a month period to one hour of Tai Chi daily for a year), which makes it difficult and even impossible to conduct a reliable and convincing comparative study of results.

Chyu et al. [18] in a review article published in 2011 presented multi-centre research conducted in the United States of America from 2000 to 2010 on groups of patients with degenerative joint disease. In patients treated in accordance with the principles in force for therapy broadly understood, there were employed, among others, Tai Chi exercises (also forms of Qigong and Yoga). The positive influence of this type of therapy, expanded by 'extrastandard' elements, was shown when compared to the results of tests on control groups employing in treatment 'traditional' methods and means. Both the work herein cited as equally other works employing Tai Chi exercises [19–21] within rehabilitation programmes, emphasise, besides the illustrated effectiveness of this form of treatment for degenerative joint diseases with regard to improvement in such parameters as pain reduction and muscle stiffness, increased muscle strength and physical condition and an increased sense of balance and minimised fear of falling [22,23], an enhanced sense of one's own effectiveness in daily life and improvement in the quality of life, the necessity for further randomised clinical tests to be run upon a more numerous test sample, defining the currently valid clinical test programmes within the scope of quality, intensity and frequency of exercises, longer observation periods, unification of instruments and test methods – which would enable for a reliable interpretation of the results and a minimising in the obtainment of results that are falsely positive.

In our own research it was noticed that the worst evaluations of quality of life are represented by areas connected with joint pain and the physical sphere. One may presume that it is indeed the increasing pain that

is the direct cause of deteriorating patient quality of life in such areas as mobility or movement and bending, which results in discomfort in the performance of daily activities and through this indirectly influences the area connected with the psyche and social functioning, which obtain somewhat better evaluations.

Both our own results as those findings of other authors [1,5,28,29,37,38] show that after rehabilitation the greatest improvement, although with varied intensity, occurs particularly in the area of arthritic pain and physical fitness.

Besides, Weigl et al. [5] showed in their own research conducted on a group of 128 patients by means of the WOMAC and SF-36 questionnaires that the effect of levelling pain, although moderately beneficial, maintains itself even up to 2 years after the rehabilitation conducted. They also noticed that, something which in our own tests as a result of the 4-week period could not be unequivocally confirmed, improvement in physical fitness gives small or moderate effects, but they return to a state approaching the starting point after a period of twelve months. Important although lesser effects [5] occur in the third of the four subscales of the SF-36 scale, which measure psychic health, and more precisely in the vitality, social functioning and psychic health, which remains in accordance with the results of our own tests. However, the SF-36 scale did not show any changes in the emotions.

In addition, Kawasaki et al. [39] conducted an interesting observation confirming the above mentioned considerations on the levelling out of pain and improvement to the quality of life in individual areas. They compared the effects of rehabilitation following hip replacement as well as the acetabulum rotatory **osteotomy** in individuals with degenerative disease of the hip joint. They observed that, by means of the NHP scale, in the period up to the first year following the procedures the best results in the area of arthritis and vitality were displayed by patients who were subjected to physiotherapy. On the basis of our own research as well as the reports of other authors [5,27,38,40–42] one may suppose that reduction in pain is an exceptionally important matter in the improvement in quality of life for patients with degenerative disease, as it directly or indirectly influences the areas of life quality.

In our own research there was also observed the influence of **aging**, degree of degeneration as well as the duration of the illness on the quality of patients' lives.

Analysis of the evaluation of quality of life before and after rehabilitation in relation to age showed a statistical

**Osteotomy** – the surgical cutting of a bone.

**Aging** – the gradual irreversible changes in structure and function of an organism that occur as a result of the passage of time.

dependency ( $p < 0.05$ ) between the majority of the areas of the AIMS-2 scale and patients' ages. Equally the influence of age on the quality of life was confirmed by Cushnaghan and Dieppe [28], who, in tests conducted on a group of 500 people, came to the conclusion that the older patients more negatively evaluated their quality of life.

This would confirm the results obtained in our own tests where prior to rehabilitation age correlated with social activity, pain, the level of mobility, household activities, the function of hand and fingers as well as mood. Following treatment the link with social activity underwent a weakening, there also fell slightly the link between age and the level of mobility. Strengthened, however, were the remaining correlations, which might prove that rehabilitation in these areas is more difficult in older individuals. These results indicate that the older the patient was the worse were the results in the various areas of quality of life [43].

Similar observations were noted in our own research in relation to the dependency of the degree of degeneration and the time of disease duration in relation to the **health behaviour**, especially **therapeutic behaviour**, and **preventative (rehabilitative) behaviour** as well as to the various areas of quality of life [44]. Prior to rehabilitation the time a disease had lasted significantly correlated with social activity, pain, household activities, the function of hand and fingers, the level of mobility, the level of tension, the antebrachium

function and mood. The longer the disease had lasted the worse was the patient state in the above mentioned areas. The strongest correlation was observed between the time of duration and social activity. Following rehabilitation the link between the time of duration and social activity, the function of hand and fingers, the level of tension, mood the antebrachium function underwent a weakening. This means that in these areas improvement was clearest in patients with a long term exposure to the disease. There increased, however, the correlation between the duration time and the level of household activities done, arthritic pain and the level of mobility, which may prove that in these areas improvement was more visible in patients with a shorter term exposure to disease.

## CONCLUSIONS

The applying of a CRP program improved the quality of life of the patients with degenerative joint disease. Selected Tai Chi exercises constitute a novel supplementation to a comprehensive rehabilitation programme influencing its effectiveness.

Furthermore the research confirmed that the Polish adaptation of the Arthritis Impact Measurement Scale-2 (AIMS-2), one adapted for the needs of evaluating the functional state, may be successfully used in research of the patients with osteoarthritis.

**Health behaviour** – is every consciously undertaken act on the part of man, regardless of his actual or perceived state of health, with the aim of promoting, protecting and preserving health, without recourse to its effectiveness or lack.

**Therapeutic behaviour** – undertaken in sickness.

**Preventative (rehabilitative) behaviour** – limiting the effects of disease.

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