

The Quality of Life of the Patients with Rheumatoid Arthritis before and after Balneotherapy

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Abstract: Rheumatic diseases are the most common reasons of partial disability and the fourth leading reason of the full disability. The rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by synovium inflammation with subsequent joints harming. The complex RA treatment has several objectives—symptomatic relief, suppression of active inflammation, prevention of tissue damage, improvement of physical function, self-reliance, and improvement of the quality of life. The integral part of the therapeutic approach to patients with chronic musculoskeletal disease is a spa treatment, which is having a long-lasting tradition in their area. Spa treatment has positive impact on the quality of life improvement. The purpose of the present work: The main objective of this work is the assessment of spa therapy effects on patients' quality of life with rheumatoid arthritis. Compare the results in quality of life assessment with men and women before and after the spa treatment. The investigation was created with 40 participants. The female and male ratio was balanced in the group 20: 20. The average age was in their complete investigated group 61.95. The male age variance was from 39 to 78 years of age and with female group the youngest patient was 45 and the oldest 76. Patients completed Jáchymov Spa treatment with 21-day length. The quality of life index in the whole group of patients after completing the spa treatment reached higher values as before the spa treatment. The result index of the quality of life with men before spa treatment was 51.6, and the spa treatment was 63.1. With women was the result index of quality of life before spa treatment 48.7 and after the spa treatment it reached 60.4. Patient's quality of life was higher in their sample due to spa treatment completion compared with results before the spa treatment. Spa treatment positively affects the quality of life of patients with rheumatoid arthritis.

Key words: Rheumatoid arthritis, balneotherapy, quality of life.

1. Introduction

Rheumatic diseases are the most frequent reasons of partial disability and the fourth frequent reason of the full disability. Rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by inflammation of the synovium with follow-up damage to the joints [1, 2]. Complex treatment of RA has several goals—symptomatic relief, suppression of an active inflammation, prevention of tissue damage, improvement of the physical function, self-sufficiency, as well as the improvement of the quality of life [3-6]. A spa therapy is an inseparable part of the therapeutic approach to the patients with chronic musculoskeletal

diseases, with deep tradition in their territory [5, 7-9]. Several authors from different workplaces studied and evaluated the spa therapy effects on the patients' quality of life with chronic musculoskeletal disorders [8-11]. They concluded that the spa therapy positively influences and improves patient's quality of life [8, 12-14].

1.1 Contemporary Situation

1.1.1 Balneology, balneotherapy, rheumatoid arthritis, quality of life

In many countries the spa treatment is an integral part of the complex treatment procedures for patients with various kinds of diseases [4, 10, 15, 16]. Bender among the others states that spa therapy has beneficial effects on the stress removal, relieves pain and reduces consumption of analgesics, which

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positively affects the quality of life [3, 5, 6, 15, 17]. Many authors [3, 7, 8, 13, 14] considered the spa facilities as the excellent places for improvement of the patient's autonomy and self-sufficiency. Appropriate way of provided spa treatment does not only reduce the pain but it also improves musculoskeletal functions and thereby positively affects the quality of life [1, 13, 18-20]. In 2002-2005 a group of authors [11, 13, 21] proved beneficial effects of the spa treatment and the quality of their conditional health on the group of 260 patients with chronic musculoskeletal disabilities. These authors conducted their research in Berta Spa Trebon, where the quality of life was assessed and evaluated through the HRQoL concept—Health Related Quality of Life, with utilization of the SF—36 questionnaire [12, 21]. Within all 8 assessed domains was the quality of life 3 months after the balneotherapy much higher than before the spa treatment [11-13, 21]. Franke further performed an extensive study in Germany and Austria [22]. The research was conducted in the spa facilities, where radon as a natural healing source is being used. Franke's blind randomized study in the set of 681 patients dealt with the radon used in therapy of rheumatic diseases. Franke's results indicated that there were no substantial changes in the quality of life after the therapy, on the other side was recorded significant pain relief of patients with rheumatoid arthritis [22].

1.2 History of Spa Treatment

Since the Ancient times people were using natural healing resources to treat diseases as well as to enhance their health. Waters, differing in appearance, taste or temperature from the usual water sources, attracted the attention of people living closely with nature. The earliest descriptions of hydrotherapy forms come from the Chinese literature around 3700 BC, then in Egypt around 2500 BC. The Indian Vedas clearly set the number and length of bathing together with precise description for procedures implementation. Except for India, development of predominantly cleansing baths

and therapeutic spas were recorded in Japan around 1800 BC [4, 9, 20, 23].

Huge development of spas in Europe was seen in the Ancient times. The Greek physician Hippocrates watched the effects of hot water on human organism. He, as the first one, described basic rules of hygiene and categorized mineral waters based on the salt content. At that time the spas were built in Thermopylae, Oete, Hypote and other places. More flourishing spas occurred later in the Ancient Rome, for example Caracalla, Tito, Diocletian and Constantine baths. It was typical for the Romans to set up spas in the colonized territories. Some of them recently belong to the most well-known spas such as Aque Mutiacenses (now Wiesbaden), Aque Aureliae (Baden-Baden), Aque Domitianae (Aix-les-Bains), Herkulaneum spa in Romania and so on [4, 9, 10, 23, 24].

In the Middle Ages spas did not record any boom, but, on the contrary it was a period of spas failure. Moving away from the Hippocratic principles of hygiene, the period brought epidemics of plague and leprosy, which had a disastrous effect on spas across Europe. Modernity brought a renewal to almost all spa locations bound with an intensive use of mineral waters. The 20th century events, two world wars combined with great political power shifts of the forces were for the spas generally unfavourable [9, 20].

Spas in the Czech Republic, Slovakia and Hungary have rich tradition what is related to abundant occurrence of natural medicinal resources in the both territories [2, 4, 9, 13, 14, 20].

1.3 Balneology and Balneotherapy

Many authors have defined the terms balneology and balneotherapy [3, 17, 18, 24, 25]. Jandová defines balneology as a science on treatment with natural and specific mineral resources and their effects on the human body. The same source gives also other definition of balneotherapy: "Balneotherapy is the treatment with natural mineral resources, i.e. natural mineral water, gas, peloids and climate, it is a summary

of specific therapeutic procedures provided at the sites with healing sources under the medical guidance aimed at healing and optimum restitution of the body functions” [9].

1.4 Spa Treatment from Medicine Viewpoints

Zvonár stated that a spa treatment is one of the oldest therapeutic methods, which is coming out of the experienced therapeutic effects of some water sources, mud or climate environment. The essential part of modern spa treatments is utilization of objectified therapeutic effects of natural medicinal resources, physical medicine, rehabilitation, nutrition, psychotherapy and pharmacotherapy in needful measures, implemented as a complex spa treatment [20].

The course of the spa treatment depends on:

a) patient's disease and its stage (in particular it is a chronic disease characterized by continuous progression and the risk of possible disability as a consequence of the disease); b) incidence of other diseases which can affect the course of the fundamental disease or the progress of the spa treatment; c) some physiological factors (menstruation); d) patient's approach to the spa treatment, which may be positive and amplifies the potential effect of the spa treatment, or negative, resulting in the non-compliance with the prescribed regime of the spa treatment); e) length of spa stay - some diseases require longer time, others shorter. The length of stay should not be determined administratively, but particularly with regard to the disease) [19, 20, 24, 26, 27].

1.5 Spa Treatment Phases

Progress of the spa treatment can be divided into several phases:

(1) *Spa entry phase*—this is the first period of diagnostic stage aimed at setting the adequate balneo-rehabilitation programme.

(2) *Acclimatization phase*—the patient adapts to the new environment, the impact of different stimuli of the

undergone procedures within the balneo-rehabilitation programme.

(3) *Effective spa phase*—represents interaction of the patient's organism and prescribed balneo-rehabilitation program, the resulting response of the individual functions for the spa treatments.

(4) *Spa reaction*—characterizes own effects of the spa treatment.

(5) *Re-acclimatization phase*—represents the post-spa treatment period, after which the patient returns to domestic environment and comes *the phase of de-adaptation* [1, 4, 8, 19, 20].

The phases of the spa treatment described above only represent a frame division, but practically can be encountered with every spa treatment. They refer to the organism time adjustment and individual reactions to the spa treatment factors. The final form of spa reactions are in addition to the objective factors (the impact of individual balneo-rehabilitation treatments) influenced by the subjective factors characterized by patient's own processing of experience during the spa treatment. This interaction can be considered as a starting point and prognosis of the spa treatment effects. Often tends to be discussed the issue of the spa response, that is characteristic of all forms of the spa treatments and expresses the subjective and objective deterioration of the patient's state during the spa stay or after its completion [2, 10, 17, 20, 24]. Response to the spa treatment can persist within varying periods of time, but usually disappears after 1-7 days [20]. Substantially it develops with all the patients, but cannot occur in the same range, it depends on the spectrum of medical services (spa response is more massive with applied peloids and mud, hyperthermia treatments, etc.), as well as the spa treatment reaction is affected by the activity of basic pathologic processes during the spa treatment. The rheumatic diseases with massive activity have more substantial spa reaction compared with the other diseases [4, 6, 20].

Table 1 General spa treatment effects.

Normalization of the disturbed functions of the individual systems, as a result of homeostasis.
Improvement of regulation activity of the individual organs.
Normalization of individual functional systems.
Increased coordination of rhythmic functions—chronic-biologic homeostasis.
Renewal of chronic-biologic balance.
Well-being fitting—subjective feeling of health.
Change of resistance and immunity—protection against intercurrent infections.

Processed according to [20, 22, 25].

The spa treatment also represents an irreplaceable part in preventive care.

1.6 Rheumatoid Arthritis

1.6.1 Definition

The rheumatoid arthritis have been defined by several authors [1, 2, 6, 7].

Pavelka [1] defines rheumatoid arthritis (RA) as a chronic inflammatory disease where the main symptoms are within synovial lining of the joints, tendons and gravimetric follicles. The basic manifestation is infiltration of the joint environment by the inflammatory cells, synovial tissue hyperplasia and progressive destruction of cartilage and adjacent bone. Clinically, the most common manifestation is via symptoms of chronic symmetric polyarthritis with consequent joint destructions and deformities formation [1].

1.6.2 Epidemiology

Rheumatoid arthritis has almost worldwide occurrence. The disease incidence per 100.000 population is between 10 and 50, the higher rates are valid for Northern Europe and North America, and lower rates are for example in the southern Europe. The prevalence is on average at the level about 0.8% with a range from 0.3 to 2.1%. The RA prevalence can rarely be found among some Indian tribes in the United States (Cippewa or Pima Indians), with recorded 7.1% and 5.3%. On the other hand, in some rural areas of South Africa were not reported any RA cases. In general the authors can state that RA is not tied to the cold climate, the disease occurs within all the

continents and climates and it affects all the races. More frequently, the disease affects women where is the ratio 3: 1 compared to men. The disease usually starts during the fourth and fifth life decade, but up to 80% of RA patients start between 35 and 50 years of age. For women over 60 years of age is the disease presence 6 times higher compared with the age from 18 and 29 [1, 2, 26].

The disease has more frequent family history with relatives in the first level, predominantly with women, often among mother and daughter or the female siblings. Up to 10% of patients with seropositive RA has a disabled relative [1, 2].

Despite significant advances in RA research, the cause of RA is still unknown. Chronic joint inflammation develops after the initial activation of the immune system of the genetically predisposed individual by recently still unidentified antigen. The cytokine TNF- α (the tumour necrotizing factor), plays the key role in development of local and systemic inflammatory changes. Rheumatoid arthritis is a chronic progressive polyarthritis where the spectrum of clinical manifestation can vary [1, 2].

1.7 Quality of Life

1.7.1 Definition of the concept - quality of life (HRQOL, SF-36)

It is difficult to grasp the concept of quality of life which is in the theoretical concepts dealt by many authors from different areas of science [21, 22, 27]. Professionals who deal with the quality of life issues agree that the definition of quality of life is more difficult than definition of the length of life—that means the quantity [19, 26]. The cause can be sought in the fact that the quality of life is highly subjective matter and for each individual it can represent something different. Quality of life may include characteristics of the natural and social environment of a person, his physical and mental state, questions of sense and usefulness of life, the subjective assessment of life in the terms of personal comfort and

satisfaction. It also denotes the parts of individual and social life, which cannot be captured by quantitative characteristics, and not to measure them as it is possible with living standards. Based on WHO definition of the quality of life “it is the individual perception of the position in life in the context of culture and value systems in which they live related to their goals, expectations, standards and concerns” [12, 18, 21, 27]. Except for the person’s physical health, the quality of life comprises also the psychological state, level of independence, social relations, personal beliefs and relation to salient features of the environment. It is only a subjective evaluation inserted in the cultural, social and environmental context. The health state, life style, life satisfaction, mental health or subjective well-being represent are only the individual features of the multi-dimensional assessment [12].

WHO conception of quality of life comprises 6 domains, each with different amount of indicators:

(1) *Physical health* (energy and fatigue, pain and discomfort, ability to sleep and rest).

(2) *Psychological domain* (negative and positive emotions, self-esteem, thinking, learning, memory and concentration).

(3) *Level of independence* (mobility, everyday activities, addiction on medical substances and medical aids, work capacity).

(4) *Social relations* (personal relations, social support, sexual activity).

(5) *Environment* (financial resources, freedom, physical safety and security, social care, domestic environment, possibilities for gaining new information and skills, physical environment, transport).

(6) *Spirituality and personal beliefs* (religious, spiritual, personal) [12].

In medicine, the emphasis lies on HRQoL—Health Related Quality of Life, which evaluates the effect on quality of life with the current health of the individual and involves physical aspects (elimination of symptoms, especially the pain), psychological (mental wellbeing of the patient), importance and life

satisfaction (existential and spiritual aspects) [12].

The other authors describe HRQoL as follows:

(1) *Physical condition*—symptoms of the disease, side effects of treatment.

(2) *Functional fitness*—performance status (Karnofsky), employment integration, family life, ability to communicate with family and community.

(3) *Psychical condition*—prevailing mood, attitude to life and illness, ability to cope with illness, personal characteristics.

(4) *Satisfaction with treatment*—complex assessment of the environment in which the patient is being treated, technical skills of the personnel and the ability to communicate, including administration of the objective health information.

(5) *Social condition*—relations of the patient with relatives and closest people, the role of the person in social groups [12, 21].

The purpose of the present study was to evaluate the efficacy of the balneotherapy on patient’s quality of life with the rheumatoid arthritis. The authors followed two questions:

1. Using Questionnaire SF-36 (HRQOL) the authors study the changes of the quality of life of patients with RA who underwent the spa therapy.

2. To compare the results of the quality of life both sexes before and after completing the balneotherapy.

2. Material and Methods

The research sample was created by 40 participants. The sample was very balanced, amount of male and female representatives was in the ratio 20: 20 (Table 2). The average age of the research participants was 61.95. Average age for the men sample was 62.4 years and with women 61.5 years of age. The research sample was created only with RA diagnosed patients in different stages and development and functional abilities. The age scale of the male sample was from 39 to 78 years of age and in the female sample was the youngest woman 45 and the oldest one 76 years old. The research includes only patients diagnosed with the

Table 2 Age characteristics of respondents.

Sample unit characteristic	Average age
Complete unit (n = 40)	61.95
Male unit (n = 20)	62.4
Female unit (n = 20)	61.5

rheumatoid arthritis in the different stage of illness and with varying functional fitness. The RA patients passed 21-day spa therapy at their workplace Léčebné lázně Jáchymov a.s.

The survey was realized from September 2013 till January 2014 at the sample of 40 respondents. The authors used the interrogating research method in the form of a questionnaire HRQOL (SF-36).

Each of the addressed patients signed the informed consent. During the entrance procedure, each patient received a SF-36 questionnaire for filling in. The full wording of SF-36 Questionnaire was published [12, 21]. Three months after completing the spa therapy the patients filled in the questionnaire again. For the statistic evaluation were used all the collected data from the patients before and after the spa therapy.

SF-36 Questionnaire is a 36-question generic questionnaire created for assessment of the health state condition and the quality of life bound with it. It comprises physical, social and mental parts not only of positive but also the negative health aspects. The multicomponent scale evaluates 8 health domains. It consists of: PF—Physical Functioning; RP—Role Physical; BP—Bodily Pain; GH—General Health; VT—Vitality; SF—Social Functioning; RE—Role Emotional; MH—Mental Health. All the questions were evaluated in the scale from 0 to 100, where the highest the score the better functioning results were. The numerical values of the individual responses are given in the questionnaire. The resulting score of the questions which are related together form one of the 8 domains and then the arithmetic average was calculated for each of domain which represent the final score.

Question number 2 does not belong to any of the dimensions nor to any resulting score. It represents

the individual part which identifies how the patient himself perceives own health change for the past year (HT—reported as Health Transition).

On the basis of possible difficult interpretation of eight domains were developed two summary scores—scores of the overall physical health (PCS) and overall mental health (MCS). To work with the overall quality of life can be expected the index of overall quality of life (SF-36), which gathers all the mental and physical circuits, again calculated as an arithmetic average. In this case, the arithmetic average has the eight domains.

Summary score of SF-36 Questionnaire:

Total physical health (PCS = Physical Component Summary)

It brings together the topics affecting the physical health:

- Physical activity (PF),
- Limitation of physical activity (RP),
- Bodily Pain (BP),
- General Health Assessment (GH).

It is calculated as simple arithmetic average of the given dimensions. The value of total physical health varies in the interval from 0 up to 100, where the higher the value the better physical health.

Total psychic health (MCS = Mental Component Summary).

Aggregates circuits influencing psychical health:

- Vitality (VT),
- Social activity (SF),
- Limitation of emotional problems (RE),
- Mental health (MH)

It is calculated as the simple arithmetic average of the dimensions. The value of total psychic health dimension varies in the interval from 0 to 100, where the higher value means better physical health.

Index of total quality of life (SF-36) groups all mental and physical circuits. Through the simple arithmetic average of individual domains it calculates the total health, where the result is the index of the total quality of life. The value of resulting index of the

quality of life SF-36 can vary from 0 to 100, where the higher value means higher total health, better quality of life [27].

3. Results and Discussion

After assessment of all collected questionnaires before and after the spa therapy, with three month interval, was the whole set of data collected and processed statistically and reported in the Table 3.

Table legend: The questionnaire SF-36 is a 36-question generic questionnaire developed for assessing the health and related quality of life. It includes physical, social and mental components not only with positive but also with the negative health aspects. It consists of a multi-component evaluation scale comprising 8 health domains: PF—Physical Functioning; RP—Role-Physical; BP—Bodily Pain; GH—General Health; VT—Vitality; SF—Social-Functioning; RE—Role-Emotional; MH—Mental Health.

Rheumatoid arthritis is a chronic, extremely serious disease that ultimately results in patient's disability. Their group of respondents are equivalent in the age structure, as well as in the volume of participants. All the gained data both before and after the balneotherapy, the respondents' data were significantly lower compared with the Oxford data [27] and the data collected from the sample of healthy population, represented by the police workers of the Czech Republic in the Central Region of the Czech Republic [21]. In some cases were the domain values highly significantly lower $P < 0.001$ (for RP, BP, GH,

VT with men and women). The spa therapy influenced beneficially and the significantly lower values were positively modified. Better results were gained with men in all the searched parameters compared to women, except for BP and VT. Based on the collected data and further statistical processing of SF-36 Questionnaires in their research set, can be stated that the authors managed to meet their goal, and the stated hypotheses were confirmed. The authors found out that the spa therapy positively influences the assessment of quality of life with RA patients. The results show that the index of quality of life in the whole searched set of patients after completed spa therapy achieved higher values than before the spa therapy. The positive effect of the spa therapy on the quality of life of patients with chronic musculoskeletal disabilities were showed in the work of the authors [11, 13], from Berta Spa Trebon, where with the set of 260 patients through the SF-36 questionnaire came to the conclusion that the spa therapy positively affects the quality of life.

The purpose of their study was to assess the effect of the spa therapy on the quality of life of the patients with rheumatoid arthritis. The quality of life was investigated via standardized SF-36 questionnaire and the expressed total quality of life represented the value 50.1 for the whole set before the spa therapy. After completing the spa therapy with 3 months apart, were measured the values of the index of quality of life was 61.8 for the entire set. From the results the authors concluded that the spa therapy in their survey set had a positive effect on the quality of life of patients with rheumatoid arthritis, whereas the authors found higher

Table 3 Comparison of respondent results—men and women before and after the spa therapy with data gained in Oxford and the Czech Republic.

Sets	Domain and their values										
	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS	SF36
Oxford	88.40	85.62	82.93	88.01	81.49	73.77	61.13	73.52	86.24	72.48	79.36
Czech Republic	94.86	67.52	76.74	69.08	89.25	70.98	77.70	70.18	77.05	77.03	77.04
Men before	66	35	39.5	37	50.3	61.3	63.3	60.2	44.4	58.8	51.6
Men after	74.3	51.3	54.9	44.3	60.8	70.6	80.7	70	56.3	69.9	63.1
Women before	62.3	35	40	42.8	50.3	53.1	50	56	44.6	52.4	48.7
Women after	68.3	52.5	53.5	49.3	60	63.1	71.7	64.8	55.9	64.9	60.4

values of the resulting index of the quality of life after completing the spa therapy. Men compared with women gained better results in the assessment of the quality of life both before as well as after the spa therapy. The resulting index of quality of life with men before the spa therapy was 51.6 and after the spa therapy it represented 63.1. Women accounted the resulting index of quality of life in the value of 48.7 before the spa therapy, and after the spa therapy it reached the value 60.4.

The BP (pain) domain of the SF-36 questionnaire, which is from therapeutic point of view very important were the average values before the spa treatment with men 39.5 and after the spa treatment 54.9, what means that the patients reported reduction in pain. The same occurred the female sample survey where before the spa treatment were measured average values for dimension BP (pain) 40 and after its completion 53.5. For the total BP dimension before spa treatment was the average value of 39.8 and after its completion 54.5. From the showed results came out, that the spa treatment had an effect on reduction of pain the surveyed set and their results for the pain within the SF-36 questionnaire are the same as those described by Franke's study on a sample of 681 patients [22]. Their assumption, that the influence of spa therapy improves the quality of life of patients with rheumatoid arthritis was correct and their hypothesis was confirmed. After completing the spa therapy were measured higher values of total index of quality of life.

4. Conclusions

It was found, that the evaluation of quality of life with men and women is different, both before as well as after the spa treatment. In both cases women evaluated the quality of life as poorer one. However, the positive effect of the spa therapy on quality of life with men and women was the same. Spa treatments are aimed at completing the process of recovery following the inpatient or outpatient care with variety of different diseases of the locomotive, or the other apparatuses. It

is not only related to physical recovery but also to the complete health. It focuses on the complete personality of the patient, and utilizes the whole scale of methods such as baths, wraps, kinesiotherapy, physical therapy, etc. The complex care has a demonstrable effect on the quality of life of patients undergoing the spa therapy. Every disease, especially with chronic progressive character, brings deterioration of quality of life, which is reflected in the physical, psychological and social area. Patient's quality of life was in their survey sample higher after completing the spa treatment than before the spa treatment. In the sample of 40 patients, the authors tried to prove positives of the spa treatment in the set of patients with rheumatoid arthritis, what was achieved. The positive effects were similar in the female and male sample. Their survey showed that the value of the resulting index of quality of life after completing the spa therapy was higher and therefore it is possible to conclude that the spa treatment positively affects the quality of life of patients with rheumatoid arthritis.

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