WHOQOL-BREF Questionnaire as a Measure of Quality of Life in Sarcoidosis

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ABSTRACT

The aim of this study was to evaluate the usefulness of a short form of the WHOQOL questionnaire, the WHOQOL-BREF, which consists of 24 questions, in evaluating quality of life (QOL) in sarcoidosis patients. A group of 97 sarcoidosis patients and a matched group of 97 healthy controls took part in the study. Their QOL was examined by means of the WHOQOL-BREF, and the respiratory functions were measured in sarcoidosis patients. The WHOQOL-BREF revealed significantly poorer QOL of sarcoidosis patients in the domains of Physical and Psychological Health in comparison to healthy controls. In contrast, sarcoidosis patients perceived their QOL significantly better than healthy controls in the domains of Social Relations and Environment. Differences between sarcoidosis patients and healthy controls were found in several items from the WHOQOL-BREF and some of them were modified by gender. However, the WHOQOL-BREF did not prove to be a sensitive measure of fatigue, which is the most common symptom in sarcoidosis patients.

***Key words**: sarcoidosis, quality of life, WHOQOL-BREF*

Introduction

Quality of life (QOL) is defined as an individual perception of well-being. Subject expresses his subjective perception of the impact of health on quality of life. It is affected by physical, material, social and emotional well-being, as well as many factors including financial status, the environment we live and work in, people we connect with. The QOL is overall well-being which can be influenced by objective parameters as well as subjective perception.

Several questionnaires are being used in scientific investigations and clinical practice, in order to assess quality of life in patients with respiratory diseases. Asthma quality of life questionnaire (AQLQ) has proven as reliable and specific method in assessing QOL in asthma patients[1]. Moreover, there are several questionnaires for evaluating QOL in patients with COPD[2]. Several studies evaluated QOL of sarcoidosis patients by means of the World Health Organization Quality of Life Questionnaire WHOQOL-100[3,4]. The WHOQOL-100 was developed within a multicentre study to measure perceived QOL in the context of the culture and value system in which a person lives, and in relation to own goals, expectations, standards and concerns. It enables detailed assessment of 24 specific facets of quality of life, as well as one general facet assessing the Overall Quality of Life and General Health. The 24 specific facets are grouped either into 6 broader domains of quality of life (Physical Health, Psychological Health, Level of Independence, Social Relations, Environment and Spirituality) or are condensed into 4 domains in the way that the domain of Physical Health incorporates the Level of Independence and the domain of Psychological Health incorporates Spirituality[5].

Studies that used the WHOQOL-100 in sarcoidosis patients found the WHOQOL-100 to be a useful measure of QOL. Due to the comprehensiveness of WHOQOL-100 (100 questions) it takes between 30 and 90 minutes to be completed. The WHO developed a shorter form of the

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WHOQOL questionnaire, the WHOQOL-BREF, to be less lengthy for participants. The aim of this study was to examine whether the WHOQOL-BREF would be useful for measuring QOL in sarcoidosis patients. Several authors compared QOL of sarcoidosis patients with QOL of patients diagnosed with rheumatoid arthritis[5] and chronic dermatosis[6].

Therefore in this study we compared the estimate of QOL obtained by the WHOQOL-BREF between a group of sarcoidosis patients and a group of healthy controls.

Patients and Methods

Participants

Two groups of participants were included in the study: a group of sarcoidosis patients (n=97), and a control group of participants who stated they were healthy at the time of examination (n=97). The group of sarcoidosis patients was examined at the University Hospital for Lung Diseases »Jordanovac« in Zagreb. The control group was examined at the Institute for Medical Research and Occupational Health in Zagreb. Patients were included in the study on the basis of radiographic, functional and clinical evidences of sarcoidosis. The participants of the healthy control group were selected to match the participants of the sarcoidosis group for age, gender and level of education.

Measures

Quality of life was measured by means the World Health Organization Quality of Life Questionnaire (WHOQOL-BREF). The WHOQOL-BREF is a generic quality of life questionnaire which has been used with different patient populations such as those suffering from diabetes, rheumatoid diseases, mental diseases[7], AIDS[8], and diseases of gastrointestinal system, as well as with healthy population[9]. Twenty-four questions are chosen from the original WHOQOL-100 questionnaire, one per each facet, and 2 questions that refer to satisfaction with Overall Quality of Life and General Health. Other questions are divided into four domains of the quality of life: Physical Health (7 items), Psychological Health (6 items), Social Relations (3 items), and Environment (8 items). Participants estimate the quality of their lives during previous two weeks answering each question on a Likert type scale from 1 to 5, 1 being for lowest, and 5 highest agreement with the question. In the WHOQOL-BREF mean estimate for all items in each domain is transformed either to the range 4 to 20 or to the range 0 to 100, so that the results could be compared to the results in WHOQOL-100. Higher score in each domain indicates better QOL. In this study the transformation of the results in each domain was performed for the theoretical range 4 to 20. High internal consistency and test-retest stability were established for the results in the Croatian version of the WHOQOL-BREF in a previous study[10]. Cronbach alpha coefficients were 0.82 for Physical Health, 0.75 for Psychological Health, 0.66 for Social Relations and 0.80 for Environment. Test-retest stability established in a period of two to eight weeks was 0.66 for Physical Health, 0.72 for Psychological Health, 0.76 for Social Relations and 0.87 for Environment.

In patients with sarcoidosis respiratory functions were also measured, which included spirometry and carbon monoxide diffusing capacity (DL_{CO}). The functional tests were performed at the Pulmonary function laboratory of the University Hospital for Lung Diseases »Jordanovac«.

All investigations were conducted in conformity with ethical principles of research, and informed consent was obtained from all participants in the study.

Statistical methods

Statistical analyses included the methods of descriptive statistics, t-test for independent samples, χ^2 test, analyses of variance and correlation analyses. The accepted level of significance was $p<0.05$.

Results

The analyses showed that the group of sarcoidosis patients did not differ in demographic characteristics and smoking status from the group of healthy controls. Within each group differences in number of males and females were not statistically significant. Regarding other demographic characteristics, the majority of participants in both groups was married, had secondary school education and was non-smokers. Demographic characteristics and smoking status are presented in Table 1.

In sarcoidosis patients the mean FVC was 93.6% (S.D.=17.2), FEV_1 was 94.5% (S.D.=16.5), and DLco was 84.3% (S.D.=16.9).

The comparisons of the WHOQOL-BREF results by domains were conducted by means of 2 x 2 ANOVAs. The dependent variable in each analysis was a result in a particular domain of the quality of life, and the sources of the between-subject variability in all analyses were Group (sarcoidosis patients vs. healthy controls) and Gender (males vs. females).

Sarcoidosis patients had lower scores in the domains of Physical and Psychological Health than healthy controls ($F(1/190)=112.33$, $p<0.001$, and $F(1/191)=7.15$, $p<0.01$, respectively). However, in the domains of Social Relations and Environment sarcoidosis patients obtained significantly higher scores than healthy controls ($F(1/191)=9.95$, $p<0.01$, and $F(1/191)=17.31$, $p<0.001$, respectively). Data are summarized in Table 2.

Further comparisons of the results for each item of the WHOQOL-BREF were conducted by means of 2 x 2 ANOVAs with Group (sarcoidosis patients vs. healthy controls) and Gender (male vs. females) as sources of the between-subject variability.

Regarding the general estimate of quality of life (Q1) and general satisfaction with health status (Q2) sarcoidosis patients did not differ statistically significantly from healthy controls. However, the significant main ef-

TABLE 1
DEMOGRAPHIC CHARACTERISTICS AND SMOKING STATUS WITH TESTS FOR WITHIN-GROUP AND BETWEEN-GROUP COMPARISONS

Characteristics	Sarcoidosis patients (n=97)	Healthy controls (n=97)	Comparison between groups
Age M (S.D.)	42.43 (9.92)	42.71 (9.08)	t=0.207, df=193, p=0.837
Gender n(%)			
Males	40 (41.2)	42 (43.3)	χ^2=0.266, df=1, p=0.606
Females	57 (58.8)	55 (56.7)	
	χ^2=1.020, p=0.312	χ^2=2.979, p=0.084	
Level of education n(%)			
Primary school	8 (8.2)	8 (8.2)	
Secondary school	64 (66.0)	64 (66.0)	χ^2=0.054, df=1, p=0.974
Tertiary	25 (25.8)	25 (25.8)	
	χ^2=49.0, p=0.000	χ^2= 49.0, p=0.000	
Marital status n(%)			
Singles	15 (15.5)	16 (16.5)	
Married/Living as married	75 (77.3)	76 (78.3)	χ^2=0.387, df=2, p=0.824
Divorced	7 (7.2)	5 (5.2)	
	χ^2=92.102, p=0.000	χ^2=85.443, p=0.000	
Smoking n(%)			
Non-smokers	69 (71)	61 (62)	χ^2=1.733, df=1, p=0.188
Smokers	28 (29)	36 (38)	
	χ^2=5.878, p=0.015	χ^2=17.330, p=0.000	

TABLE 2
ESTIMATED MARGINAL MEANS AND STANDARD ERRORS OF TWO GROUPS IN FOUR DOMAINS OF THE WHOQOL-BREF

	Sarcoidosis patients (n=97)		Healthy controls (n=97)	
	M	S.E.	M	S.E.
Physical Health	13.69	0.18	16.36	0.18
Psychological Health	14.96	0.17	15.61	0.17
Social Relations	16.69	0.24	15.64	0.24
Environment	15.52	0.18	14.46	0.18

fects of Group were found for Q3 (F(1/188)=292.88, p<0.001) and Q4 (F(1/188)=175.02, p<0.001) within the domain of Physical Health. In comparison to healthy controls sarcoidosis patients perceived more limitations in activities due to pain (Q3) and were more in need of medical treatment (Q4). Significant interaction of Group and Gender found for Q3 (F(1/188)=11.48, p=0.001) and Q4 (F(1/188)=5.65, p<0.05) indicated that in perception of limitations due to pain (Q3) and need of medical treatment the effects of sarcoidosis were somewhat more pronounced in males than in females. Significant interaction of Group and Gender was also found for Q16 (F(1/188)= 6.27, p<0.05), indicating that in females satisfaction with sleep was lower in patients than in healthy controls, while in males there were no differences in satisfaction with sleep between the patients and healthy controls.

Within the domain of Psychological Health significant main effects of Group were found for Q5 (F(1/188)=4.82, p<0.05) and Q26 (F(1/188)=163.82, p<0.001). Sarcoidosis patients estimated their enjoyment in life (Q5) higher than healthy controls. At the same time they reported negative feelings (Q26) more often than healthy individuals. Significant interaction of Group and Gender for Q26 (F(1/188)=4.10, p<0.05) indicated that male sarcoidosis patients reported negative feelings more often than female, in comparison to healthy controls of the same gender. Within the domain of Psychological Health we observed also a significant main effect of Gender for Q19 (F(1/188)=5.78, p<0.05), indicating that men were generally more satisfied with themselves (M=4.125, S.D.= 0.682) than women (M=3.898, S.D.=0.610).

Within the domain of Social Relations a significant main effect of Group was found for Q21 (F(1,188)=7.99, p<0.01). Sarcoidosis patients rated their satisfaction with sex life higher than did healthy controls. The ANOVA yielded a significant main effect of Group for Q22 (F(1,188)= 19.91, p<0.001), as well as a significant interaction between Group and Gender (F(1,188)=7.78, p<0.01). The main effect of Group needs to be interpreted in light of the significant interaction since higher satisfaction with support from friends was found in sarcoidosis patients in comparison to healthy controls only for males, but not for females.

Within the domain of Environment significant differences between sarcoidosis patients and healthy individuals were found in Q9 (F(1,188)=11.13, p=0.001), Q12 (F(1,188)=24.12, p<0.001), Q23 (F(1,188)=4.27; p<0.05), Q24 (F(1,188)=29.31, p<0.001) and Q25 (F(1,188)=7.36; p<0.01). They showed that in comparison to healthy con-

TABLE 3
MEAN ESTIMATES AND STANDARD DEVIATIONS FOR EACH WHOQOL-BREF ITEM

	Sarcoidosis patients			Healthy controls		
	Male n=40 M (S.D.)	Female n=57 M (S.D.)	All n=97 M (S.D.)	Male n=42 M (S.D.)	Female n=55 M (S.D.)	All n=97 M (S.D.)
Q1 Overall Quality of Life	4.000 (0.506)	3.947 (0.789)	3.969 (0.684)	3.775 (0.660)	3.843 (0.579)	3.813 (0.613)
Q2 General Health	3.700 (0.608)	3.544 (0.657)	3.608 (0.638)	3.825 (0.636)	3.765 (0.885)	3.791 (0.782)
Physical Health						
Q3 Pain	**1.875 (0.822)**	**2.439 (0.907)**	**2.206 (0.912)**	**4.500 (0.751)**	**4.196 (0.938)**	**4.330 (0.870)**
Q4 Dependence on medical treatment	**2.075 (0.829)**	**2.298 (0.801)**	**2.206 (0.816)**	**4.325 (0.797)**	**3.863 (1.327)**	**4.066 (1.143)**
Q10 Energy	4.075 (0.829)	3.790 (0.818)	3.907 (0.830)	4.075 (0.730)	3.980 (0.735)	4.022 (0.730)
Q15 Mobility	4.250 (0.707)	3.965 (0.706)	4.082 (0.717)	4.150 (0.921)	4.235 (0.971)	4.198 (0.945)
Q16 Sleep	**3.875 (0.686)**	**3.649 (0.612)**	3.742 (0.650)	**3.650 (0.949)**	**4.020 (0.948)**	3.857 (0.961)
Q17 Activities of daily living	3.950 (0.678)	3.825 (0.630)	3.876 (0.650)	3.950 (0.714)	4.020 (0.707)	3.989 (0.707)
Q18 Working capacity	4.050 (0.846)	3.790 (0.773)	3.897 (0.810)	4.100 (0.709)	4.078 (0.717)	4.088 (0.709)
Psychological Health						
Q5 Positive feelings	3.800 (0.464)	3.719 (0.675)	**3.753** (0.596)	3.525 (0.816)	3.529 (0.833)	**3.528** (0.821)
Q6 Meaningfulness of life	4.375 (0.705)	4.263 (0.669)	4.309 (0.682)	4.275 (0.679)	4.275 (0.826)	4.275 (0.761)
Q7 Concentration	3.725 (0.640)	3.807 (0.718)	3.773 (0.685)	3.800 (0.608)	3.882 (0.816)	3.846 (0.729)
Q11 Body appearance	4.225 (0.862)	4.088 (0.786)	4.144 (0.816)	4.325 (0.829)	4.137(1.020)	4.220 (0.940)
Q19 Satisfaction with oneself	4.225 (0.660)	3.912 (0.576)	4.041 (0.628	4.025 (0.698)	3.882 (0.653)	3.945 (0.673)
Q26 Negative feelings	**2.300 (0.564)**	**2.456 (0.629)**	**2.392 (0.605)**	**3.750 (0.670)**	**3.510 (0.758)**	**3.615 (0.727)**
Social Relations						
Q20 Personal relations	4.075 (0.997)	4.193 (0.611)	4.144 (0.790)	4.150 (0.662)	4.000 (0.916)	4.066 (0.814)
Q21 Sex life	4.225 (0.577)	3.877 (0.781)	**4.021** (0.721)	3.675 (0.764)	3.726 (1.097)	**3.703** (0.960)
Q22 Support from friends	**4.425 (0.636)**	**4.246 (0.606)**	**4.320 (0.622)**	**3.700 (0.687)**	**4.078 (0.770)**	**3.912 (0.755)**
Environment						
Q8 Physical safety	3.650 (0.622)	3.684 (0.631)	3.670 (0.624)	3.850 (0.834)	3.863 (0.693)	3.857 (0.754)
Q9 Healthy physical environment	3.625 (0.586)	3.596 (0.623)	**3.608** (0.605)	3.275 (0.816)	3.255 (0.770)	**3.264** (0.786)
Q12 Financial resources	3.600 (0.810)	3.895 (0.900)	**3.773** (0.872)	3.050 (0.932)	3.118 (0.993)	**3.088** (0.962)
Q13 Availability of information	3.850 (0.736)	4.210 (0.590)	4.062 (0.674)	3.950 (0.750)	3.961 (0.871)	3.956 (0.815)
Q14 Opportunities for leisure activities	3.375 (0.668)	3.246 (0.662)	3.299 (0.664)	3.550 (0.904)	3.000 (1.249)	3.242 (1.139)
Q23 Home environment	4.100 (0.871)	4.158 (0.882)	**4.134** (0.874)	3.550 (1.108)	4.137 (0.895)	**3.879** (1.031)
Q24 Access to health services	**4.450 (0.597)**	**4.140 (0.666)**	**4.268 (0.654)**	**3.575 (0.958)**	**3.745 (0.913)**	**3.670 (0.932)**
Q25 Transport	4.300 (0.758)	4.193 (0.693)	**4.237** (0.718)	3.850 (0.949	3.941 (1.066)	**3.901** (1.012)

Note: Higher score in all items indicate better quality of life. Mean values are presented in bold for the statistically significant main effect of Group, and interaction of Group and Gender

trols sarcoidosis patients rated their environment healthier (Q9), and perceived higher satisfaction with their financial resources (Q12), conditions of living place (Q23), access to health services (Q24) and transport (Q25). Significant interaction between Group and Gender for Q24 ($F(1,188)=4.18$, $p<0.05$) indicated that satisfaction with access to health services increased more in male sarcoidosis patients than in female, in comparison to healthy controls of the same gender. Within the domain of Environment we observed also the significant main effect of Gender for Q14 ($F(1,188)=6.42$, $p<0.05$) indicating that men were generally more satisfied with opportunities for recreation ($M=3.462$, $S.D.=0.795$) in comparison to women ($M=3.130$, $S.D.=0.987$). We observed the significant main effect of Gender also for Q23 ($F(1,188)=5.45$, $p<0.05$), indicating that men we generally more satisfied with conditions of their living place ($M=3.462$, $S.D.=0.795$) than women ($M=3.130$, $S.D.=0.987$). Data are presented in Table 3.

The correlations between age and results on four domains of the WHOQOL – BREF were not statistically significant neither in the group of sarcoidosis patients ($r=-0.03$ for Physical Health, $r=-0.14$ for Psychological Health, $r=0.10$ for Social Relations, $r=0.00$ for Environ-

TABLE 4
PEARSON CORRELATIONS OF PULMONARY FUNCTION PARAMETERS WITH RESULTS IN FOUR DOMAINS OF THE WHOQOL-BREF IN SARCOIDOSIS PATIENTS (n=97)

	Physical Health	Psychological Health	Social Relations	Environment
FVC	0.429**	0.390**	0.249*	0.190
FEV_1	0.399**	0.341**	0.274**	0.196
DLco	0.362**	0.304**	0.116	0.190

** p<0.01, * p<0.05

ment) nor in the group of healthy controls (r=–0.06 for Physical Health, r=–0.16 for Psychological Health, r=–0.15 for Social Relations, r=0.01 for Environment). In the group of sarcoidosis patients moderate correlations were found between the pulmonary function parameters and quality of life in the domains of Physical Health and Psychological Health. Correlations between pulmonary functions parameters and quality of life in the domains of Social Relations and Environment were small or were not statistically significant, as presented in Table 4.

Discussion

The results of our study suggest that there is a difference in QOL between groups that were investigated. A group of 97 sarcoidosis patients and a matched group of 97 healthy individuals were included in this study. According to the Cummins program, a balanced model of quality of life should be unchangeable during life[11]. However, our study has shown that there is a difference in quality of life when comparing persons affected by the disease and healthy individuals.

There was no significant difference between sarcoidosis patients and healthy controls with respect to age, gender, smoking habits and marital status. The average age of sarcoidosis patients was 42.4 years of age, and of healthy individuals 42.7. According to the literature, the incidence and prevalence of sarcoidosis is at peek between 20 and 40 years of age. The average age of sarcoidosis patients in USA is around 40 years of age[12], and 41.5 in Denmark[13]. It is well documented that sarcoidosis affects more women than men, as seen in our group. In Japan, Spain and according to researches in Croatia sarcoidosis can more often be seen in females[14]. According to numerous studies sarcoidosis affects mostly non-smokers, which has been proven in sarcoidosis patients in Croatia as well.

There was no significant difference between sarcoidosis patients and healthy individuals when comparing estimates of Overall Quality of Life and General Health. However, our results showed differences in the domain of Physical Health. Questions regarding Physical Health were connected to daily activities, working capacity, energy, mobility, pain and sleeping. Sarcoidosis patients were more limited due to pain and needed greater medical assistance. These difficulties were greater in men. Comparing to healthy controls women were less satisfied with sleeping than men. Moreover, within the domain of Psychological Health there was significant difference between sarcoidosis patients and healthy controls. Questions related to this domain included positive and negative feelings, memory and concentration. Although sarcoidosis patients more often expressed more enjoyment in life, they also more often expressed negative feelings. These negative feelings and reduction of concentration usually reflect a depressive syndrome. According to the literature, temporary depression in sarcoidosis patients which manifests itself as nervousness, anger and anxiety, can be seen more often in women[15]. In our group of sarcoidosis patients, in contrast to the literature, men complained more often of pain and negative feelings. On the other hand, men also gave the opinions to the contrary, and were more satisfied with themselves, their sex life, medical treatment, environment and support from friends.

Our study demonstrated that sarcoidosis patients have better results than healthy individuals within the domain of Social Relations and Environment. We couldn't find explanation for better patients' results in the domain of Social Relations and Environment neither in our results nor in literature. Questions related to this domain included physical safety, energy, mobility, access to health services, financial resources, home environment, as well as questions concerning satisfaction with oneself, support from friends, personal relations, sex life and healthy physical environment.

In two studies conducted in the Netherlands QOL of sarcoidosis patients was compared to those of healthy individuals, and the results were similar to ours. They demonstrated that sarcoidosis patients with current symptoms estimated their quality of life to be lower in comparison to healthy controls in the domain of Physical Health and Level of Independence, as well as in the facet of Overall Quality of Life and General Health. Patients currently reporting symptoms did differ from healthy individuals in the facet of negative feelings within the domain of Psychological Health, while there was no significant difference in the domain scores for Social Relations and Environment. All sarcoidosis patients taken together, irrespective whether they were currently reporting symptoms or not, rated their Overall Quality of Life, General Health, and the QOL in the domain of Physical Health lower than healthy individuals. However, sarcoidosis patients that were currently not affected by active disease evaluated their QOL better than healthy individuals in the domain of Social Relations and Environment[16]. Similar results were documented in our study. Some psychologists offer an explanation for this illogicality. They believe that the reduction of QOL in one domain is compensated by an augmentation in another domain. Due to illness, imbalance of quality of life occurs and patients strive to retrieve the balance[17].

We documented the reduction of QOL of sarcoidosis patients in the domain of Physical and Psychological

Health by using WHOQOL-BREF questionnaire. Based on this questionnaire we did not obtain any information regarding fatigue, which is the most significant symptom of sarcoidosis. According to the literature, fatigue is one of the main causes of reduced QOL in sarcoidosis patients. Recent studies show that 60% of sarcoidosis patients in Croatia[18] and 73% in Netherlands[19] report persistent fatigue. Our results show correlation of age and QOL. Moderate correlation between pulmonary functions parameters and QOL in the domains of Physical and Psychological Health, and small correlation with Social Relations were documented.

Our results show that measuring pulmonary functions parameters is insufficient for evaluating QOL. Questionnaires for evaluating QOL should be used because they give more precise and complete assessment of overall health status. The WHOQOL-BREF questionnaire, as opposed to expert opinion[20] of other specialists is not sufficient for the evaluation of QOL in sarcoidosis patients, thus additional scale for assessing fatigue should be used for obtaining better QOL evaluation.

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WHOQOL-BREF UPITNIK KAO MJERA KVALITETE ŽIVOTA KOD BOLESNIKA SA SARKOIDOZOM

SAŽETAK

Cilj ovog istraživanja je bio procijeniti korisnost kratkog oblika WHOQOL upitnika, WHOQOL-BREF, koji se sastoji od 24 pitanja, u procjeni kvalitete života bolesnika sa sarkoidozom. U istraživanje je bilo uključeno 97 bolesnika sa sarkoidozom i kontrolna skupina od 97 zdravih ispitanika. Njihova kvaliteta života je ispitivana WHOQOL-BREF upitnikom, a bolesnicima sa sarkoidozom su učinjeni i funkcijski testovi. WHOQOL-BREF upitnik je pokazao značajnije manju kvalitetu života bolesnika u području fizičkog i psihičkog zdravlja u usporedbi s kontrolnom skupinom. Nasuprot tome bolesnici sa sarkoidozom su pokazali bolju kvalitetu života u području socijalnih odnosa i okoline. Razlike između bolesnika sa sarkoidozom i kontrolne skupine u pojedinim područjima bile su u interakciji sa spolom. WHOQOL-BREF upitnik nije se pokazao kao dobra mjera u procjeni umora koji je jedan od najčešćih simptoma bolesnika sa sarkoidozom.