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Investigation of factors influencing health-related quality of life in patients with rheumatoid arthritis

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OBJECTIVE **To investigate health-related quality of life (HRQoL) in individuals with rheumatoid arthritis (RA) and identify the factors that influence it.** METHOD **A cross-sectional study was conducted at the "Asklepieion" General Hospital of Voula from December 2021 to December 2022. The study comprised 110 patients diagnosed with RA. Data collection was conducted using the short version of the SF-12 questionnaire. Data were collected using a convenience sampling approach. Data analysis was performed using the Statistical Package for Social Sciences (SPSS) software, version 26.0.** RESULTS **The mean score for the "physical health" subscale was 54.8±23.5, while the mean score for the "mental health" subscale was 53.7±24.2. These scores indicated a moderate quality of life. A statistically significant correlation was found between the "physical health" and "mental health" subscales, with the highest values observed in younger participants and those with a shorter disease duration, a higher level of education, and those who were married and or partnered. No significant statistical correlation was observed between the HRQoL subscales and patients' gender. The coefficient of determination of the model (Radj^2) was 0.952, with the independent variables "Rheumatoid arthritis duration (years)", "Age" and "Education" explaining 95.2% of the variation in the dependent variable "SF-12 – physical health". Also, the Radj^2 was 0.953, with the independent variables "Rheumatoid arthritis duration (years)", "Age" and "Education" explaining 95.3% of variation in the dependent variable "SF-12 – mental health".** CONCLUSIONS **The present study highlighted the importance of socio-demographic characteristics to the HRQoL of individuals with RA. Healthcare providers should consider these characteristics, in conjunction with the overall impact of the disease, to enhance the quality of life of people suffering from RA.**

Διερεύνηση παραγόντων που επηρεάζουν τη σχετιζόμενη με την υγεία ποιότητα ζωής ασθενών με ρευματοειδή αρθρίτιδα

Περίληψη στο τέλος του άρθρου

Key words

Health-related quality of life
Rheumatoid arthritis

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Rheumatoid arthritis (RA) is a chronic autoimmune disease that mainly affects the joints, causing alteration of the synovial fluid and leading to a painful inflammatory process which can result in chronic systemic inflammation over time.[1] The disease affects 0.8–1% of all populations and is considered the second most common rheumatic disease after osteoarthritis, with women being two to three times more likely to be affected than men.[2] It usually affects people aged between 35 and 55, although it may also occur in younger people and even children.

Research over the last 30 years has shown that RA is a global disease that affects all people regardless of gender, ethnicity, age or nationality.[3] RA is characterized by progressive disability over time and associated with an increased risk of mortality compared to the general population.[4] As RA is an idiopathic inflammatory disorder, most patients have an inherited predisposition to the disease although the cause remains unknown. However, there is evidence that it is associated with environmental toxins, food sensitivities, allergies, stress, trauma, infections, bacterial overgrowth (dysbiosis), leaky gut syndrome and hormonal imbalances.[5] The main symptoms of RA include pain, stiffness, swelling and redness surrounding the joints, primarily in the hands, shoulders, elbows, hips and knees. Occasionally, there may be acute pain at the back of the head, while the cervical spine may also be affected.[5]

Modern treatment approaches aim to achieve remission of the disease.[6] Therapeutic intervention involves eliminat-

ing the symptoms of the disease, treating the pain and other symptoms that affect the individual's functionality in everyday activities, limiting the spread of the damage and intervening to ensure that the patient enjoys as good a quality of life (QoL) as possible.

In recent years, measuring health-related quality of life (HRQoL) has been gaining ground as a way of assessing treatment outcome.[7,8] HRQoL refers to psychosocial, emotional and physical treatment effectiveness as perceived by the patients themselves.[7–9] Patients' perception of their health is therefore a very important measure of treatment effectiveness.[7,8] In RA sufferers, HRQoL is determined by the disease itself, by the existence of conditions reducing the patient's functionality, and by possible adverse effects of the medications they take. Limited functional ability is associated with depression and a reduced ability to cope with it even when the disease is in its early stages.[10] RA has a significant impact on patients' HRQoL, mainly due to limited functionality, affecting both the physical and the mental dimension of health with negative effects on patients' professional and social activity,[6] as it is usually accompanied by pain, lack of autonomy and limitations in daily life and is often experienced as a loss of independence.[11,12] This sense of loss causes strong fear in patients, as immobility has been associated with feelings of helplessness and dysfunction.[13] Another key factor associated with quality of health in people with RA is (a sense of) fatigue, which can affect work performance, increase the risk of injuries, reduce the ability to participate in rehabilitation programmes, and strain relationships with others.

The aim of the present study was to investigate the level of HRQoL in patients with RA and to explore possible correlations with specific socio-demographic characteristics (age, years of disease duration, gender, marital status, educational level) of the patients participating in the study. The importance of this study lied in the fact that nowadays quality of life is more frequently becoming an issue of everyday medical practice and is the subject of epidemiological research into the health needs of populations. The results of the present study could provide yet another useful tool for assessing the everyday activities and functionality associated with QoL in RA patients.

MATERIAL AND METHOD

Study designs and patients

A cross-sectional study was performed using convenience sampling due to the epidemiological situation, the COVID-19 outbreak and the use of a questionnaire. Data collection was performed using the 12-item Short Form Survey (SF-12) questionnaire. Data collection took place between December 2021 and December 2022. The sample consisted of 110 patients with RA who were either hospitalized in the Rheumatology Clinic or attending regular outpatient clinics at the "Asklepieion" General Hospital of Voula.

The SF-12 questionnaire is a self-reported outcome measure assessing the impact of health on an individual's daily life. The SF-12 is a shortened version of the SF-36 questionnaire, which evolved from the Medical Outcomes Study.[15] The SF-12 was created to be applied in clinical research and patient care, taking patients require approximately five minutes to complete. It has been established internationally as the most reliable HRQoL measurement tool. The SF-12 consists of 12 questions that explore the patient's health status in eight different domains: general health perception, physical health, limited role-physical function, physical pain, vitality, mental health, limited role-emotional function, and social function. In terms of "physical health", the degree of limitation in everyday activities, including self-care, as well as the intensity of physical pain and the resulting limitations in performing activities are assessed. Similarly, for "mental health", the degree of limitation in everyday activities due to psychoemotional health issues, as well as mental health and well-being is assessed. For each of the main subscales of (a) "physical health" and (b) "mental health", the responses of the survey participants are recorded from 0 to 100, with a score of less than 50 indicating that the patients' QoL concerning their health is poor and a score greater than 50 indicating that it is better than average.

The present study was approved by the hospital management and carried out in full compliance with the new General Data Protection Regulation (GDPR) on sensitive personal data. Approval was also obtained from the Research Ethics Committee of the University of West Attica (UNIWA). Before the completion of the questionnaires, detailed information was provided to the patients participating in the study on the purpose and objectives of the study, making them aware that participation was voluntary and assuring them of the confidentiality and anonymity of their data. If they agreed to participate in the study, they completed an informed consent form. The data collected were anonymous and used solely for the purposes of the study, while they were accessible to the principal investigator.

The criteria for inclusion in the study were: (a) Men and women, (b) age 18 years and over, (c) fluency in spoken and written Greek. Patients who did not wish to participate were excluded from the study.

Statistical analysis

For the descriptive statistical analysis, continuous variables were expressed as mean±standard deviation (mean±SD) and categorical variables were expressed as absolute numbers (n) and percentages (n%). The internal consistency coefficient was studied to measure reliability. For clinical applications, Cronbach's alpha ($\alpha>0.8$) is desirable. In the present study, Cronbach's alpha was 0.85 and 0.83 for the "physical health" and "mental health"

subscales, respectively. The Pearson correlation coefficient (r) was used to measure the relationship between two continuous variables, while Spearman's rank correlation coefficient (Rs) was used to measure the relationship between a continuous and a regular variable. To investigate the existence of a relationship between a quantitative and a dichotomous variable, the t-test was applied. Multiple linear regression was used to investigate the factors that can predict a continuous variable. Data analysis was conducted using the Statistical Package for Social Sciences (SPSS) (IBM SPSS Statistics), version 26.0. The two-tailed statistical significance level was set at 0.05.

RESULTS

Of the 110 patients with RA, 68.2% were male and 31.8% female with a mean age of 63.1±12.9 years (tab. 1). The mean duration of RA disease was 9.8±7.4 years. Most patients (84.5%) were residents of Attica. Regarding their educational background, 49.1% of the patients had received education up to the secondary level, 36.4% had completed post-secondary education and only 14.5% had completed higher education. Regarding their marital status, 66.4% were single, divorced or widowed and 33.6% were married or partnered. 57.3% were in employment and 42.7% were not in employment.

The mean score of the "physical health" subscale was 54.8±23.5 and that of the "mental health" subscale was 3.7±24.2, values indicating moderate QoL (tab. 2). Statistically significant correlations were found between the two subscales ("physical health" and "mental health") and the socio-demographic characteristics of the participants (tab. 3, figures 1–3). The results showed that high scores in the "physical health" and "mental health" subscales were significantly correlated with younger age (p<0.001), marital

Table 1. Characteristics of study participants.

	n (110)	n (%)
Gender		
Female	75	68.2
Male	35	31.8
Age (mean±standard deviation)	63.1±12.9	
Rheumatoid arthritis duration (years) (mean±standard deviation)	9.8±7.4	
Place of residence		
Attica	93	84.5
Provinces	17	15.5
Education		
Up to secondary education	54	49.1
Post-secondary education	40	36.4
Higher education	16	14.5
Marital status		
Married and or partnered	37	33.6
Unmarried or divorced or widowed	73	66.4
Employment status		
In employment	63	57.3
Not in employment	47	42.7

Table 2. Basic statistical indices of "physical health" and "mental health" subscales of the SF-12 questionnaire.

	Mean	Standard deviation
SF-12 – physical health	54.8	23.5
SF-12 – mental health	53.7	24.2

Table 3. Correlations between SF-12 questionnaire subscales and factors examined.

	Physical health	Mental health
Age	r(110)=-0.963, p<0.001	r(110)=-0.764, p<0.001
Gender	t(108)=1.437, p=0.153	t(108)=0.302, p=0.170
Marital status	t(108)=3.350, p=0.001	t(108)=3.507, p=0.001
Disease duration (years)	r(110)=-0.912, p<0.001	r(110)=-0.913, p<0.001
Education	p(110)=0.735, p<0.001	p(110)=0.612, p<0.001
Place of residence	t(108)=0.768, p=0.444	t(108)=0.810, p=0.420

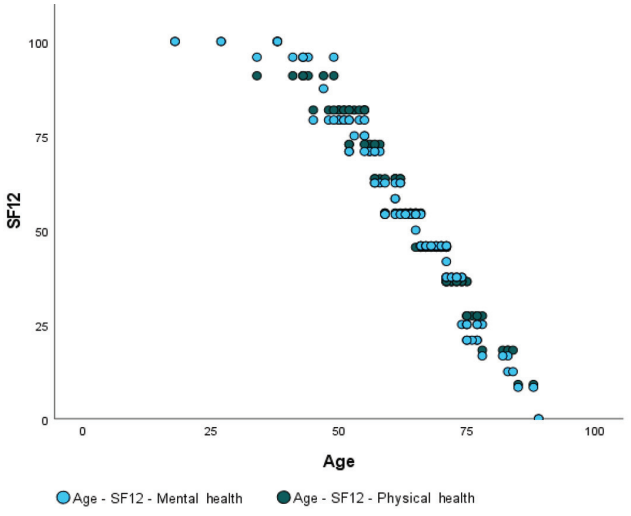

Figure 1. Scatter plot of age and SF-12 subscales.

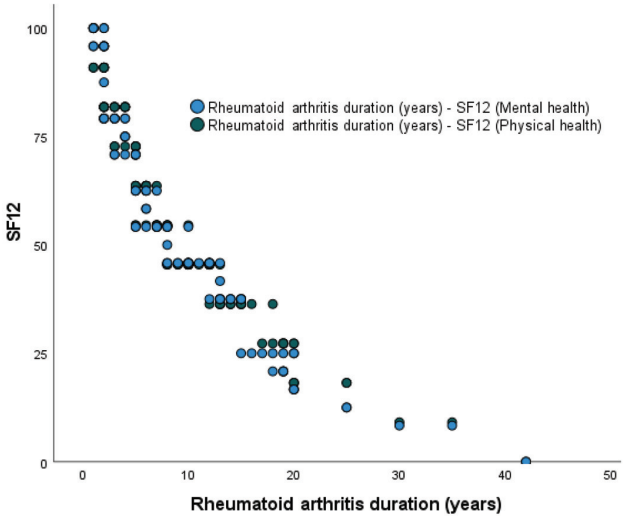

Figure 2. Scatter plot of disease duration (years) and SF-12 subscales.

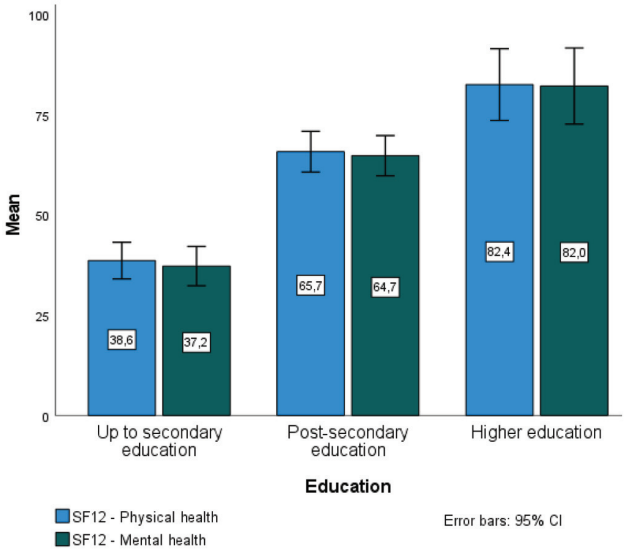

Figure 3. Bar graphs of education and SF-12 subscales. 95% CI: 95% confidence interval.

status (married or partnered) ($p<0.001$), fewer years of disease duration, and higher educational level ($p<0.001$ for both subscales). Finally, no statistically significant correlation was found between the subscales of the SF-12 questionnaire and gender.

In the multiple linear regression analysis, the coefficient of determination of the model ($Radj^2$) was 0.952, with the independent variables "Rheumatoid arthritis duration (years)", "Age" and "Education" explaining 95.2% of the variation in the dependent variable "SF-12 – physical health" (tab. 4). In the multiple linear regression analysis, the coefficient of determination of the model ($Radj^2$) was 0.953, with the independent variables "Rheumatoid arthritis duration (years)", "Age" and "Education" explaining 95.3% of the variation in the dependent variable "SF-12 – mental health" (tab. 5).

DISCUSSION

The present study aimed to investigate the level of HRQoL in patients with RA. The sub-objective of the study was to investigate possible correlations between HRQoL in patients with RA and gender, age, marital status, years of disease duration, educational level and place of residence.

The results showed moderate QoL in both "physical health" and "mental health" in patients with RA who participated in the study, with lower mean values recorded for "mental health". More specifically, in terms of "physical health", the lowest score on this scale is interpreted as a severe limitation in performing all everyday physical activities, including self-care, due to physical health problems. In terms of "mental health", a lower score indicates constant feelings of nervousness and depression, while a higher score is interpreted as the absence of issues at work or in other everyday activities due to psycho-emotional problems. These findings could be explained by depression and anxiety, which often coexist in patients with RA for several reasons, including a biological mechanism associated with cytokines, the mental burden caused by the chronicity of the disease and the management of disease complications,[16] and fatigue that causes a significant change for the worse in patients' mood.[17] Similarly, the results of a cross-sectional study conducted in the Outpatient Clinic of the Rheumatology Clinic of the University General Hospital of Heraklion, Crete in a sample of 465 patients with RA, using the SF-36 questionnaire, observed that the mean values for "physical health" and "mental health" quality were close to the centre of the scale, indicating moderate QoL. However, contrary to the results of the present study, a higher mean value was recorded in "mental health" and a lower mean value in "physical health".[18]

Regarding the correlation of the two subscales ("physical health" and "mental health") with the socio-demographic characteristics of the participants, in the present study, a statistically significant correlation was found, with high scores in the "physical health" and "mental health" subscales being significantly correlated with younger age and fewer years of disease duration. These results are explained by the progression of the disease and the existence of co-morbidity with increasing age, resulting in a deterioration in patients'

Table 4. Multiple linear regression analysis – physical health.

Coefficients*								
Model		**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**	**95% confidence interval for B**	
		B	**Std. error**	**Beta**			**Lower bound**	**Upper bound**
1	(Constant)	133.565	5.544		24.091	0.000	122.570	144.561
	Gender	0.413	1.069	0.008	0.387	0.700	-1.706	2.533
	Age	-1.200	0.084	-0.657	-14.343	0.000	-1.366	-1.034
	Rheumatoid arthritis duration (years)	-0.874	0.138	-0.276	-6.337	0.000	-1.147	-0.600
	Place of residence	-1.092	1.368	-0.017	-0.798	0.427	-3.805	1.621
	Education	3.402	0.930	0.105	3.656	0.000	1.557	5.247
	Marital status	0.611	1.106	0.012	0.553	0.582	-1.582	2.805

* Dependent variable: SF-12 – physical health: The coefficient of determination of the model (Radj^2) was 0.952 (variables "Rheumatoid arthritis duration (years)", "Age", and "Education" explain 95.2% of variation in physical health)

Table 5. Multiple linear regression analysis – mental health.

Coefficients*								
Model		**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**	**95% confidence interval for B**	
		B	**Std. error**	**Beta**			**Lower bound**	**Upper bound**
1	(Constant)	137.605	5.686		24.199	0.000	126.328	148.883
	Gender	-0.140	1.096	-0.003	-0.128	0.899	-2.314	2.034
	Age	-1.249	0.086	-0.664	-14.550	0.000	-1.419	-1.078
	Rheumatoid arthritis duration (years)	-0.907	0.141	-0.278	-6.411	0.000	-1.187	-0.626
	Place of residence	-0.783	1.403	-0.012	-0.558	0.578	-3.566	2.000
	Education	2.978	0.954	0.089	3.121	0.002	1.085	4.871
	Marital status	-0.120	1.134	-0.002	-0.106	0.916	-2.370	2.130

* Dependent variable: SF-12 – mental health: The coefficient of determination of the model (Radj^2) was 0.953 (variables "Rheumatoid arthritis duration (years)", "Age" and "Education" explain 95.3% of variation in mental health).

physical and mental health, directly leading to worse QoL. These results were confirmed by the study conducted in the Outpatient Clinic of the Rheumatology Clinic of the University General Hospital of Heraklion, Crete, where older age is correlated with significantly lower scores in QoL related to "physical health".[18] Similar results were obtained in a study[19] conducted in a rheumatology clinic of a hospital in Vienna, Austria, on 120 patients with RA using the SF-36 questionnaire. Older age was correlated with lower physical health quality but higher mental HRQoL. One possible interpretation could be that chronic disease, such as RA, has a stronger impact on younger patients, as it is more difficult for them to accept the limitations caused by the disease such as loss of work. The study also showed that patients who had completed secondary education had a better HRQoL than patients with a lower educational level. These results suggest a better understanding of the impact of the disease on the QoL of patients with RA. In a study[20] conducted in a rheumatology clinic in Turkey in 52 RA patients aged 65 and over (group 1) and 84 RA patients aged 65 and under (group 2), RA patients aged 65 and over had higher levels of pain and depression with increased fatigue and lower sleep quality compared to their counterparts under 65 years of age. Similar results concerning mental health were found by a meta-analysis[21] of 31 studies on HRQoL in 22,335 patients with RA using the SF-36 survey, where the higher mean age was correlated with improved mental health quality in patients. As argued in the literature,[22] chronic conditions affect various aspects of life, including employment, self-esteem, plans for the

future, and developing and maintaining relationships. It can be more exhausting to experience these life impacts as a younger adult than as an elderly patient.

In terms of marital status, this study found that married or partnered RA patients who participated in the study recorded higher scores on the "physical health" and "mental health" subscales. Similar results in patients with RA using the European Quality of Life-5 Dimensions (EQ-5D) questionnaire were found by a study,[23] with married or partnered patients reporting higher HRQoL scores than patients living alone.

The educational level of patients in the present study appeared to play an important role in patients' "physical health" and "mental health", with higher educational level being significantly correlated with better physical and mental health. Similar results were found in a study[18] of Greek RA patients, where the higher educational level was correlated with significantly higher QoL scores related to physical and mental health.

Finally, no statistically significant correlation was found between the subscales of the SF-12 questionnaire and the gender of RA patients. However, a different study[18] found a statistically significant difference in HRQoL concerning gender, with female patients recording lower scores in physical and mental health than male patients. Contrary to the findings of the present study were the results of a meta-analysis,[21] in which female gender of RA patients was correlated with higher "physical health" but lower "mental health" quality scores. Our result is inconsistent with related studies on the effect of gender on RA.[24,25] Gender also influences the occurrence of comorbidities in these patients, which is to be expected given the differences in the frequency distribution of these conditions in the general population as a function of gender.[26] This result may be due to the small proportion of men in the sample of the present study, so this finding should be treated with the appropriate caution, considering that statistical significance does not always reflect practical significance and that context matters when interpreting study findings. In a cross-sectional study of 154 patients with RA, conducted in a University Hospital in Portugal using the SF-36 questionnaire, the results showed that patients with RA not only had reduced physical function and increased mental health disturbance, but also had a lower QoL compared to the general population.[25] Regarding possible determinants of these results, it was confirmed that female gender and older age were correlated with higher disability scores. These data confirm previous results. One possible interpretation is that physical function decreases with age, and it is well known that women have a lower pain threshold and men have greater physical strength than women.[27] Similar results were found in a study of 298 hospitalized RA patients from four medical centres in northeast China. The results showed lower QoL in both physical and mental health in RA patients compared to the general population, with lower QoL in physical health.[28] Similarly, in a study of 103 RA patients and 73 members of the general population as a control group in outpatient care centres in Colombia, RA patients reported significantly higher depressive symptoms and lower HRQoL than healthy controls.[29]

Concerning age, contrasting results to the present study were found in a study[28] of hospitalized RA patients from four medical centres in northeast China, where age was positively correlated with mental health. A possible interpretation could be that younger patients were more likely to be anxious and this may have affected their mental health, as they have higher QoL standards and focus more on the symptomatology of the disease affecting their QoL than older patients.

In conclusion, the findings of the present study confirmed the impact of RA on patients' QoL. These findings contributed to a deeper and more complete understanding of HRQoL in RA patients. RA is a condition whose prevalence increases with age. Statistical analysis of the data showed that disease progression is not independent of socio-demographic factors. Therefore, clinicians could evaluate these factors, as well as the subjective experience of the disease to improve the QoL of patients with RA. Although these results are not expected to provide a generalized conclusion for patients in Greece but rather to explore the trend of possible correlation of the factors examined, they consist a useful tool for the study of QoL in patients with rheumatic diseases.

Future research is needed, developing the combined use of quantitative and qualitative methodologies. The findings of these studies could contribute to a deeper understanding of the influence of the demographic and social factors of RA patients identified in the present study that are correlated with the quality of "physical health" and "mental health". Future evidence-based interventions focused on understanding the QoL of RA patients are also necessary. Health professionals, in collaboration with patients, should be encouraged to engage in proactive discussions about the expectations and goals of current treatments, to enable effective decision-making and the design of personalized treatment strategies that will provide optimal disease management, as well as the best QoL for the patient.

Measuring the QoL of patients with RA is particularly

important because this assessment provides important information for evaluating the course of the disease, assessing the effectiveness of medical treatments and holistic health interventions and planning future treatments.

ΠΕΡΙΛΗΨΗ

Διερεύνηση παραγόντων που επηρεάζουν τη σχετιζόμενη με την υγεία ποιότητα ζωής ασθενών με ρευματοειδή αρθρίτιδα

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ΣΚΟΠΟΣ Η διερεύνηση του βαθμού της σχετιζόμενης με την υγεία ποιότητας ζωής σε ασθενείς με ρευματοειδή αρθρίτιδα, καθώς και των παραγόντων που επιδρούν σε αυτή. **ΥΛΙΚΟ-ΜΕΘΟΔΟΣ** Διεξήχθη μια συγχρονική μελέτη, από τον Δεκέμβριο του 2021 έως τον Δεκέμβριο του 2022, σε 110 ασθενείς με ρευματοειδή αρθρίτιδα στο Γενικό Νοσοκομείο «Ασκληπιείο» Βούλας. Η συλλογή των δεδομένων πραγματοποιήθηκε με τη σύντομη μορφή του ερωτηματολογίου SF-12. Για τη συλλογή των δεδομένων χρησιμοποιήθηκε η μέθοδος της δειγματοληψίας ευκολίας. Η ανάλυση των δεδομένων διενεργήθηκε με το λογισμικό πρόγραμμα Statistical Package for Social Sciences (SPSS), έκδοση 26.0. **ΑΠΟΤΕΛΕΣΜΑΤΑ** Η μέση βαθμολογία της υποκλίμακας της «σωματικής υγείας» βρέθηκε 54,8±23,5 και της «ψυχικής υγείας» 53,7±24,2, τιμές που δηλώνουν ένα μέτριο επίπεδο ποιότητας ζωής. Διαπιστώθηκε στατιστικά σημαντική συσχέτιση μεταξύ των υποκλιμάκων σωματικής και ψυχικής υγείας, με τις υψηλότερες τιμές να καταγράφονται στους ασθενείς μικρότερης ηλικίας, με λιγότερα έτη νόσησης, υψηλότερο εκπαιδευτικό επίπεδο και σε αυτούς που ήταν έγγαμοι και σε συμβίωση. Δεν βρέθηκε στατιστικά σημαντική συσχέτιση μεταξύ των υποκλιμάκων του ερωτηματολογίου SF-12 και του φύλου των συμμετεχόντων ασθενών. Ο συντελεστής προσδιορισμού του μοντέλου (Radj^2) υπολογίστηκε ίσος με 0,952, όπου οι ανεξάρτητες μεταβλητές «Έτη νόσησης από ρευματοειδή αρθρίτιδα», «Ηλικία» και «Εκπαίδευση» ερμηνεύουν το 95,2% της μεταβλητότητας της εξαρτημένης μεταβλητής «SF12 – σωματική υγεία». Επίσης, ο συντελεστής προσδιορισμού του μοντέλου (Radj^2) υπολογίστηκε ίσος με 0,953, όπου οι ανεξάρτητες μεταβλητές «Έτη νόσησης από ρευματοειδή αρθρίτιδα», «Ηλικία» και «Εκπαίδευση» ερμηνεύουν το 95,3% της μεταβλητότητας της εξαρτημένης μεταβλητής «SF12 – ψυχική υγεία». **ΣΥΜΠΕΡΑΣΜΑΤΑ** Η παρούσα μελέτη ανέδειξε τη σημασία των κοινωνικο-δημογραφικών παραγόντων στη σχετιζόμενη με την υγεία ποιότητα ζωής των ασθενών με ρευματοειδή αρθρίτιδα. Οι λειτουργοί υγείας οφείλουν να αξιολογούν τους εν λόγω παράγοντες, καθώς και τη συνολική επίδραση της νόσου, για να βελτιώσουν την ποιότητα ζωής των ασθενών με ρευματοειδή αρθρίτιδα.

Λέξεις ευρετηρίου: Ρευματοειδής αρθρίτιδα, Σχετιζόμενη με την υγεία ποιότητα ζωής

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