# ORIGINAL PAPER
## ΕΡΕΥΝΗΤΙΚΗ ΕΡΓΑΣΙΑ

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# Quality of sleep and health-related quality of life in community-based patients with multiple sclerosis

OBJECTIVE **To investigate the relationship between sleep quality and health-related quality of life (HRQoL) among community-based Greek patients with multiple sclerosis (MS).** METHOD **A cross-sectional study was conducted with 97 patients with MS, between March and June, 2019. The patients completed a questionnaire covering their demographic and clinical data, and the Greek versions of the Pittsburgh Sleep Quality Index (PSQI) and the Multiple Sclerosis Quality of Life (MSQOL-54) questionnaires. The Expanded Disability Status Scale (EDSS) was retrieved from the hospital records.** RESULTS **The majority of participants were women (68%) and their mean age was 41.8±11 years. Their mean score on the EDSS was 3.4±1.78, and on the MSQOL-54, the Physical Health composite score (PCS) 47.88±17.59 and the Mental Health composite score (MCS) 58.74±22.68. A Global Sleep Quality Score of >5, indicating poor sleep quality, was recorded in 83 (85.6%) of patients. Only the PCS was negatively associated with the Global Sleep Quality Score (p<0.001). Other factors that negatively affected quality of sleep were female gender ($\beta$=-1.562, p=0.013), increasing age ($\beta$=0.056, p=0.045) and unemployment ($\beta$=-1.171, p=0.048). The EDSS score was a prognostic factor for the physical aspect of HRQoL (p<0.001), and the physical and the mental aspects of HRQoL were correlated with each other (p<0>001).** CONCLUSIONS **There is a strong interaction between quality of sleep and the physical and mental dimensions of HRQoL in patients with MS. Frequent assessment of sleep quality in this group of patients will contribute to improvement in this aspect of their lives. Systematic evaluation of the HRQoL and the quality of sleep of community-based patients with MS should be a tertiary prevention priority in community care at all stages of the disease.**

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Ποιότητα ύπνου και ποιότητα ζωής ασθενών με σκλήρυνση κατά πλάκας στην κοινότητα

*Περίληψη στο τέλος του άρθρου*

Multiple sclerosis (MS) is a chronic, degenerative and life-threatening disease that severely impairs the health-related quality of life (HRQoL) of sufferers.[1] According to the Atlas of MS,[2] its global prevalence has increased to 35.9/100,000. There is a large variability between countries in the prevalence of the disease and the age at diagnosis, and females are twice as likely as men to be affected. In Greece, the prevalence increased from 10.1/100,000 in 1984 to 119.61/100,000 in 2006.[3]

The disease diminishes physical functioning, employability, social interaction, leisure activities, independence and the ability to carry out daily living activities, and often there are also cognitive impairment and psychological effects.[1] Every aspect of HRQoL is gradually affected as the disease progresses, creating a vicious circle between worsening symptoms, limitations of daily living and overall decrease in the well-being of the sufferer.

Sleep, which is a natural function, is negatively affected in patients with MS, as a result of several factors.[4] Poor sleep quality is most commonly caused by insomnia, restless legs syndrome and respiratory disorders.[5] Sleep disturbances are more frequent in patients with MS than in the general population[6] and are correlated with poorer HRQoL compared with patients with MS who have no sleep disturbances.[7] A relationship between sleep and fatigue and the evolution of general disability is also documented,[8] and studies indicate

that poor sleep quality has a negative effect on all aspects of HRQoL[9] and could be a critical confounder.[10] One study found that only physical and emotional symptom clusters are found to affect HRQoL and disease intrusiveness.[11] Poor sleep quality is also correlated with a higher score on the Expanded Disability Status Scale (EDSS), and with high comorbidity scores and a lower total score on the physical and mental aspects of HRQoL.[8,12,13] Negative correlation has been found between the EDSS score and the physical and mental dimensions of QoL, while the EDSS and overall sleep scores have been reported as independent prognostic factors for the physical and mental dimensions of HRQoL of patients with MS.[13]

A multidisciplinary team approach is the key for the effective management of MS at any stage and at any situation.[14] Nurses, because of their regular close contact with patients, play a pivotal role in establishing, maintaining and sustaining care aimed at enhancement and maintenance of the well-being of the patient and his(her) family; sleep management being one focus of care.[15]

This study was motivated by the fact that literature in Greece on the contribution of sleep quality to the HRQoL of patients with MS is scarce.

The aim of the study was to investigate the relationship between sleep quality and HRQoL in Greek community-based patients with MS.

## MATERIAL AND METHOD

### Study design and population

In a cross-sectional study design, a convenience sample was recruited of 97 patients with MS visiting the outpatient neurology departments of two major hospitals in the Athens metropolitan area, for a scheduled check-up between March and June, 2019.

The inclusion criteria were: a diagnosis of MS and follow-up at the outpatient clinics, ability to speak and understand the Greek language, and acceptance to participate in the study. The exclusion criteria were: age <18 years, symptom exacerbation and hospitalization in the previous two weeks (as the acute phase, hospitalization and high-dose corticosteroids may affect sleep quality).

### Data collection

Demographic data, including gender, age, marital status, level of education, were recorded, and clinical data, including the EDSS score, duration of illness and recent relapse, were retrieved from the hospital records. The EDSS score ranks disease severity on a range of 0 to 10.[16]

The Pittsburgh Sleep Quality Index (PSQI) assesses sleep quality, according to seven parameters (subjective sleep quality, sleep latency, duration, efficiency, sleep disturbances, use of sleep medication and daytime dysfunction).[17] The global score is based on the sum of the seven subscores, with a range of 0–21. A global PSQI score ≥5 indicates significant sleep disturbance. The Greek version[18] of the PSQI has been administered to patients with cancer, and Cronbach's alpha was found to be 0.76.

The HRQoL of the participants was evaluated by the Greek version of the Multiple Sclerosis Quality of Life-54 (MSQOL-54) questionnaire.[19,20] This questionnaire has 54 questions, in subscales creating two composite scores: the Physical Health Composite Score (PCS), which consists of the subscales: physical function, health perceptions, energy/fatigue, role limitations due to physical problems, pain, sexual function, social function and health distress; and the Mental Health Composite Score (MCS), which consists of the subscales of overall quality of life, emotional well-being, role limitations due to emotional problems and cognitive function. Higher scores on PCS and MCS indicate better HRQoL.

### Ethical issues

The study protocol was approved by the ethics committees of the two hospitals (ref no: 60/7.2.2019, ref no: 84/28.2.2019). Participants were informed about the purpose of the study, voluntary participation, and the ability to exit the study at any time. Written informed consent was obtained prior to questionnaire completion. The questionnaires were anonymous and collected by the primary researcher. Permission was obtained to use both research tools.

### Statistical analysis

Categorical data are reported as absolute frequencies (n) and (%) percentages. Numerical data are presented as mean and standard deviation (mean±SD) or as median and interquartile range (IR). To test the normality of the distribution of the continuous variables Kolmogorov-Smirnov test and figures were used. Bivariate analysis was performed and Student's t-test was applied for continuous variables. Pearson's correlation coefficient was used to test correlation between continuous variables which followed normal distribution, and Spearman's correlation coefficient was used to test correlation between ordinal and continuous variables. Multivariate linear regression analysis was conducted when the dependent variable was continuous and >2 independent variables were significantly different ($p<0.2$) in the bivariate analysis, then variables were entered into backward stepwise linear regression. The beta coefficients, the respective 95% confidence intervals and the p values are presented. The Cronbach's alpha internal consistency index was 0.80 for the global PSQI score and 0.78 for the PCS and the MCS, respectively. The level of statistical significance was set at 0.05. Data analysis was performed using the Statistical Package for Social Sciences (IBM SPSS), version 20.0.

## RESULTS

The study sample consisted of 97 community-based patients with MS, with a mean age of 41.8±11.0 years, the majority (68%) of whom were women; 49.5% were married and 46.4% were unemployed. The median time interval from disease onset was 9.5 years, from definitive disease diagnosis 7.5 years and from the latest relapse 1.5 years. Their mean global PSQI score was 7.6±3.2, and 85.6% had a score higher than 5. The median EDSS score was 3 (IR 2.5), and 58 patients (59.79%) had a score of 0.0–3.0, indicating mild disability, 27 (27.83%) scored 3.5–5.5, indicating moderate disability and 12 (12.37%) had a score ≥6.0, indicating severe disability. The detailed characteristics of the study patients are shown in table 1.

The global PSQI score was negatively correlated with the scores on 10 of the 12 dimensions of the MSQOL-54 questionnaire, and with the PCS and MCS. The mean PCS and MCS were 47.88±17.59 and 58.74±22.68, respectively. The highest mean score was for cognitive function, 68.4±28.08, and the lowest was for physical health, 14.82±1.07 (tab. 2).

Bivariate analysis showed that age was positively correlated with the global PSQI score ($r_P$=0.265, p=0.009) and negatively correlated with PCS ($r_P$=-0.308, p=0.002). The EDSS score was correlated positively with the global PSQI score ($r_S$=0.269, p=0.008) and negatively with the PCS and MCS ($r_S$=-0.656, p<0.001 and $r_S$=-0.519, p<0.001, respectively). The global PSQI score was associated negatively with the PCS ($r_P$=-0.412, p<0.001) and MCS ($r_P$=-0.270, p=0.008); thus, an increase in the global PSQI score (i.e., poor sleep quality) exerted a negatively effect on both the physical and mental dimensions of QoL. The PCS was correlated negatively with the global PSQI score ($r_P$=-0.412, p<0.001) and positively with the MCS ($r_P$=0.778, p<0.001). The MCS was correlated negatively with the global PSQI score ($r_P$=-0.270, p=0.008) and positively with the PCS ($r_P$=0.778, p<0.001) (tab. 3).

Multivariate linear regression analysis revealed that men had a lower mean sleep quality score than women (p=0.013). Increased age was related to higher sleep quality scores (p=0.045), and working patients had lower scores of sleep quality than unemployed patients (p=0.048). A high PCS was related to lower sleep quality scores (p<0.001), and a high MCS was related to a high PCS (p<0.001). A high EDSS score and a longer period from disease diagnosis were related to a low PCS (p<0.001 and p=0.005, respectively), and a high PCS was related to a high MCS (β=0,593, p<0.001) (tab. 4).

**Table 1.** Characteristics of study patients with multiple sclerosis (n=97).

| Characteristics | n (%) |
|---|---|
| *Gender* | |
| Female | 66 (68.0) |
| Male | 31 (32.0) |
| *Age** | 41.8 (11.0) |
| *Educational level* | |
| Primary and secondary school | 13 (13.4) |
| High school (Lyceum) | 37 (38.1) |
| College or university | 36 (37.1) |
| Postgraduate studies | 11 (11.3) |
| *Occupation* | |
| Employed | 41 (42.3) |
| Unemployed | 56 (57.7) |
| *Family status* | |
| Unmarried | 30 (30.9) |
| Married | 48 (49.5) |
| Other | 19 (19.6) |
| *Number of children* | |
| 0 | 40 (41.2) |
| 1 | 20 (20.6) |
| 2 | 33 (34.0) |
| ≥3 | 4 (4.1) |
| *Time interval from the disease onset*** | 9.5 (10.5) |
| *Time from the definitive disease diagnosis*** | 7.5 (10.5) |
| *Time from the latest relapse*** | 1.5 (3.5) |
| *EDSS score (patient record file)*** | 3 (2.5) |
| Mild disability (0,0–3,0) | 58 (59.79) |
| Moderate disability (3,5–5,5) | 27 (27.83) |
| Severe disability (≥6,0) | 12 (12.37) |
| *PSQI*** | 7.6 (3.2) |
| Poor sleeper >5 | 83 (85.6) |
| Good sleeper ≤5 | 14 (14.4) |

* Mean (standard deviation, SD),  ** Median (interquartile range, IR)
EDSS: Expanded Disability Status Scale, PSQI: Pittsburgh Sleep Quality Index

## DISCUSSION

This cross-sectional study investigated the relationship between sleep quality and HRQoL in Greek community-based patients with MS, and demonstrated strong negative correlation between sleep quality and both the physical and mental dimensions of HRQoL.

**Table 2.** Association between scores on the MSQoL-54 subscales and the global PSQI score of patients with multiple sclerosis (n=97).

| Items/sub items | Score mean (SD) | Global PSQI score | |
|---|---|---|---|
| | | Spearman's correlation coefficient | p value |
| *Physical Health Composite Score (MSQoL-54 sub items)* | 47.88 (17.59) | -0.44 | <0.001 |
| Physical health | 14.82 (11.07) | 0.11 | 0.29 |
| Role limitations due to physical problems | 40.29 (43.96) | -0.31 | <0.001 |
| Health distress | 50.37 (23.31) | -0.33 | <0.001 |
| Pain | 36.24 (25.98) | -0.35 | <0.001 |
| Energy | 40.11 (23.44) | -0.33 | <0.001 |
| Sexual function | 53.80 (29.77) | -0.32 | <0.001 |
| Health perceptions | 45.21 (28.47) | -0.34 | <0.001 |
| Social function | 46.67 (22.27) | -0.31 | <0.001 |
| *Mental Health Composite Score (MSQoL-54 sub items)* | 58.74 (22.68) | -0.30 | <0.001 |
| Role limitations due to emotional problems | 53.61 (44.50) | -0.30 | <0.001 |
| Cognitive function | 68.40 (28.08) | -0.24 | 0.02 |
| Emotional well-being | 54.71 (20.68) | -0.17 | 0.10 |
| Overall quality of life | 63.80 (19.76) | -0.25 | 0.01 |

MSQoL-54: Multiple Sclerosis Quality of Life, PSQI: Pittsburgh Sleep Quality Index, SD: Standard deviation

**Table 3.** Bivariate correlations between demographic and clinical data and the global PSQI score, and the PCS and the MCS, in patients with multiple sclerosis (n=97).

| Independent variables | Global PSQI score | | PCS | | MCS | |
|---|---|---|---|---|---|---|
| | Mean (SD) | p value | Mean (SD) | p value | Mean (SD) | p value |
| *Gender* | | 0.174* | | 0.659* | | 0.7* |
| Female | 9.5 (3.2) | | 47.3 (17.5) | | 58.2 (23.5) | |
| Male | 8.6 (2.6) | | 49.0 (18.1) | | 59.8 (21.2) | |
| *Age** | 0.265 | *0.009* | -0.308 | *0.002* | -0.072 | 0.482 |
| *Educational level*** | -0.217 | *0.033* | 0.173 | 0.090 | 0.156 | 0.127 |
| *Number of children*** | 0.210 | *0.039* | -0.202 | *0.047* | 0.004 | 0.971 |
| *Employment* | | 0.171* | | 0.507* | | 0.328* |
| No | 9.6 (3.4) | | 46.9 (17.4) | | 56.8 (22.2) | |
| Yes | 8.8 (2.4) | | 49.3 (18.0) | | 61.4 (23.4) | |
| *Time interval from disease onset*** | 0.128 | 0.210 | -0.164 | 0.108 | -0.121 | 0.239 |
| *Time interval from definitive disease diagnosis*** | 0.157 | 0.125 | -0.159 | 0.121 | -0.103 | 0.316 |
| *EDSS score*** | 0.269 | *0.008* | -0.656 | *<0.001* | -0.519 | *<0.001* |
| *Time interval from latest relapse*** | 0.149 | 0.145 | 0.017 | 0.870 | -0.032 | 0.759 |
| *Global PSQI Score** | – | – | -0.412 | *<0.001* | -0.270 | *0.008* |
| *Physical Health Composite Score** | -0.412 | *<0.001* | – | – | 0.778 | *<0.001* |
| *Mental Health Composite Score** | -0.270 | *0.008* | 0.778 | *<0.001* | – | – |

* t-test,  ** Pearson's correlation coefficient,  *** Spearman's correlation coefficient

PSQI: Pittsburgh Sleep Quality Index, PCS: Physical Health Composite Score, MCS: Mental Health Composite Score, SD: Standard deviation

**Table 4.** Multivariate linear regression analysis results.

| Dependent variable | Coefficient b | 95% CI for b | p value |
|---|---|---|---|
| *Global PSQI Score* | | | |
| Gender | -1.562 | -2.782 to -0.341 | 0.013 |
| Age | 0.056 | 0.001 to 0.111 | 0.045 |
| Employment | -1.171 | -2.332 to -0.010 | 0.048 |
| PCS | -0.066 | -0.100 to -0.032 | <0.001 |
| *Physical Health Composite Score* | | | |
| Interval from disease manifestation | -1.106 | -1.721 to -0.492 | 0.001 |
| EDSS score | -3.1 | -4.341 to -1.858 | <0.001 |
| MCS | 0.439 | 0.340 to 0.538 | <0.001 |
| *Mental Health Composite Score* | | | |
| PCS | 1.003 | 0.837 to 1.168 | <0.001 |

PSQI: Pittsburgh Sleep Quality Index, EDSS: Expanded Disability Status Scale, PCS: Physical Health Composite Score, MCS: Mental Health Composite Score, 95% CI: 95% confidence interval

The mean age of the study sample and the EDSS scores are similar to those in previous studies.[8,12,21] In the present study 83 patients (85.6%) experienced poor sleep (PSQI score >5), confirming the poor quality of sleep documented elsewhere in patients with MS.[6,8,9]

Regarding the HRQoL of the patients, the mean PCS was 47.88±17.59, and the mean MCS was 58.74±22.68, similar to findings of other studies.[22,23] Another study[20] with Greek patients reported a mean PCS of 69.26 and 58.55 for employed and unemployed, respectively, and a much higher mean MCS, of 70.48 and 64.1, for the employed and unemployed, respectively. This difference may be related to the stricter sample selection criteria in that study. We found a correlation between the global PSQI score and most subscales of the MSQOL-54, similar to that reported in another study.[13]

In the present study, PCS, MCS and EDSS scores were negatively correlated, showing that disease severity was associated with lower scores on the physical and mental scales of HRQoL, in agreement with previous studies.[13,22]

It was also found that the EDSS score is a prognostic factor only for PCS, as reported in another study.[24] One other study[23] reported a negative correlation between the EDSS score and PCS (r=-0.61) and MCS (r=-0.57) only for the subgroup of patients with EDSS scores of 0–4; while another study[25] on two age groups of patients with MS (<45 years and >45 years) showed that the EDSS score was negatively associated with the PCS in both age groups and

with the MCS only in the younger age group (<45 years). Other studies report a non-linear relationship between the EDSS score and HRQoL in patients with MS.[19,26] The EDSS score, therefore, appears to be an inappropriate tool for assessing QoL, because it does not adequately reflect the patients' own perceptions of the effects of the disease on their overall health status and QoL.[27]

In the present study, men reported better quality of sleep than women, as reported elsewhere[6] and other authors[4] state that various different factors may contribute to poor sleep quality in women, but further research is needed.[28] We also found that older individuals had poorer sleep than younger subjects, in agreement with a cohort study showing that sleep quality is negatively affected by age.[29] Age-related sleep quality differences are multifactorial and multifaceted, however, and age is not in itself a determinant of poor sleep quality, but is related with other factors, such as comorbidity, stress level and a greater burden on the general state of health due to MS symptoms.[30] Employed patients had better sleep quality than unemployed patients; similar findings have been reported,[31] and a possible interpretation may be related to the general benefits of work, which promotes feelings of functionality and creativity, but causes physical fatigue and therefore enhances sleep, but further research is needed to investigate this relationship. In addition, the disease duration negatively affected the physical component of QoL, in agreement with another recent study.[32]

Finally, it was found that patients who scored high on PCS also reported better sleep. Some relevant studies showed that better sleep quality was correlated only with MCS[6,33] while others reported that sleep quality affects both PCS and MCS dimensions of HRQoL.[9,11–13] In the bivariate analysis, sleep quality, PCS and MCS were negatively correlated, but in the multivariate linear regression, only correlation of the global PSQI score with MCS was found. PCS and MCS, on the one hand, were related to each other, as in a similar study[8] and on the other, to the global PSQI score. It can therefore be argued that for people with MS, good sleep is associated with good physical and mental health, and *vice versa*. Along with the other factors that affect the HRQoL of patients with MS, assessment of sleep quality should be prioritized, as it appears to be an important indicator of the quality of their physical and mental health.

These findings indicate that health professionals need to be more aware of the frequency of sleep problems in patients with MS, as their early detection and evaluation is the first step in treating sleep disorders and thus improv-

ing the overall HRQoL. The identification, evaluation and management of sleep disorders and other factors affecting the quality of sleep constitute an interprofessional issue. Nursing interventions, in all settings, are directed towards the improvement of QoL through a holistic approach; nurses are in a position to detect possible sleep disorders in a timely and effective manner. Appropriately trained nurses[34] can educate patients on sleep quality enhancement practices, such as changing daily habits, sleep hygiene, relaxation training and complementary therapies, and can collaborate on the management of disease symptoms, referring the patients to other members of the interdisciplinary team for better therapeutic results, and coordinating team interventions to improve the sleep quality management of patients with MS.

The limitations of the study should be mentioned. The study sample was a convenience sample, it was relatively small, and it came from only two hospitals. There are reservations, therefore, about a causal relationship between the quality of sleep and HRQoL of patients with MS. Additionally, as the sample consisted of community-based patients with mild or moderate disability, according to the EDSS score, the findings of this study cannot not be generalized to all patients with MS.

Future studies should focus on investigating and promoting evidence-based methods for the management of sleep disorders in these patients.

In conclusion, the results of this study provide evidence of a strong interaction between the quality of sleep and the physical and mental dimensions of HRQoL in patients with MS. Every change in one parameter may affect the others, towards the same direction, improvement or deterioration, while other factors, such as disease severity, female gender, increasing age and unemployment, were shown to exert a negative effect on the quality of sleep. The frequent assessment of sleep quality and HRQoL in community-based patients with MS should be a tertiary prevention priority at all disease stages in community care.

## ACKNOWLEDGMENTS

## ΠΕΡΙΛΗΨΗ

**Ποιότητα ύπνου και ποιότητα ζωής ασθενών με σκλήρυνση κατά πλάκας στην κοινότητα**

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**ΣΚΟΠΟΣ** Η διερεύνηση της σχέσης μεταξύ της ποιότητας του ύπνου και της σχετιζόμενης με την υγεία ποιότητας ζωής ασθενών με σκλήρυνση κατά πλάκας που διαμένουν στην κοινότητα. **ΥΛΙΚΟ-ΜΕΘΟΔΟΣ** Το δείγμα ευκολίας της παρούσας συγχρονικής μελέτης περιλάμβανε 97 εξωτερικούς ασθενείς με σκλήρυνση κατά πλάκας. Οι συμμετέχοντες συμπλήρωσαν το ερωτηματολόγιο με τα δημογραφικά και τα κλινικά στοιχεία, το ερωτηματολόγιο Pittsburgh Sleep Quality Index για την αξιολόγηση της ποιότητας του ύπνου και το Multiple Sclerosis Quality of Life Questionnaire για την εκτίμηση της ποιότητας ζωής. **ΑΠΟΤΕΛΕΣΜΑΤΑ** Η πλειοψηφία των συμμετεχόντων ήταν γυναίκες (68%), μέσης (ΤΑ) ηλικίας 41,8 (11,0) ετών. Η μέση τιμή (ΤΑ) της βαρύτητας της νόσου, Expanded Disability Status Scale (EDSS), ήταν 3,4 (1,78), της σύνθετης κλίμακας σωματικής υγείας της ποιότητας ζωής ήταν 47,88 (17,59) και της σύνθετης κλίμακας ψυχικής υγείας 58,74 (22,68). Το 85,6% των ασθενών είχαν συνολική βαθμολογία ποιότητας ύπνου >5, υποδηλώνοντας κακή ποιότητα ύπνου. Μόνο η σύνθετη κλίμακα σωματικής υγείας συσχετίστηκε αρνητικά με τη συνολική βαθμολογία ποιότητας ύπνου (p<0,001). Άλλοι παράγοντες που επηρέασαν αρνητικά την ποιότητα του ύπνου ήταν το γυναικείο φύλο (β=-1,562, p=0,013), η μεγαλύτερη ηλικία (β=0,056, p=0,045) και η απουσία εργασίας (β=-1,171, p=0,048). Η βαρύτητα της νόσου, βάσει της βαθμολογίας EDSS, βρέθηκε να αποτελεί προγνωστικό παράγοντα για τη σύνθετη κλίμακα σωματικής υγείας (p<0,001), ενώ η σύνθετη κλίμακα σωματικής υγείας και η σύνθετη κλίμακα

ψυχικής υγείας της ποιότητας ζωής συσχετίστηκαν στατιστικώς σημαντικά μεταξύ τους (p<0,001). **ΣΥΜΠΕΡΑΣΜΑ-ΤΑ** Η ποιότητα ύπνου, καθώς και η σωματική και ψυχική διάσταση της ποιότητας ζωής των ασθενών με σκλήρυνση κατά πλάκας συσχετίζονται μεταξύ τους ισχυρά. Η αξιολόγηση του ύπνου σε αυτούς τους ασθενείς είναι εξαιρετικής σημασίας για την ολιστική προσέγγισή τους στην κοινότητα.

**Λέξεις ευρετηρίου:** Έλληνες ασθενείς, Ποιότητα ζωής, Σκλήρυνση κατά πλάκας, Ύπνος

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