Poor sleep quality in MS patients

M Vitkova[1,2], J Rosenberger[2], I Nagyova[2,5], M Chylova[2,3], P Mikula[2,5], J Szilasiova[1], Z Gdovinova[1], JW Groothoff[4] and JP van Dijk[2,4]

[1]Department of Neurology, Faculty of Medicine, Safarik University, Kosice, Slovakia
[2]Graduate School Kosice Institute for Society and Health, Safarik University, Kosice, Slovakia
[3]1st Department of Psychiatry, Faculty of Medicine, Safarik University, Kosice, Slovakia
[4]Department of Social Medicine, University Medical Center Groningen, University of Groningen, The Netherlands
[5]Institute of Public Health – Department of Social Medicine, Faculty of Medicine, Safarik University, Kosice, Slovakia

INTRODUCTION

Sleep disturbances are common in patients with multiple sclerosis (MS) and they can be associated with lower quality of life (QoL). The aim of study was to explore **the association of poor sleep with QoL in MS patients and define the clinical and** psychosocial factors related to poor sleep quality.

METHODS

The study comprised 121 MS patients (78.5% women, mean age 40.2 ± 9.7 years, mean EDSS 3.3 ± 1.5) from Eastern Slovakia. The most of the patients-79% had relapse-remitting course of disease, 13% had secondary progressive course and 8% had clinically isolated syndrome. Sleep disturbances were measured by Pittsburgh Sleep **Quality Index (PSQI), fatigue by Multidimensional Fatigue Inventory 20 (MFI-20), anxiety** and depression by Hospital Anxiety and Depression Scale (HADS) and quality of life by **Short Form 36 (SF-36). Functional disability was assessed using Expanded Disability** Status Scale (EDSS). Multiple linear regression analyses were performed.

RESULTS

The frequency of poor sleep was 48.9% (PSQI score > 5). Patients with poorer sleep had worse score on PCS. The model **consisting of physical fatigue (β=-0.50; p<0.001), EDSS (β=-0.33; p=0.001) and poor sleep quality (β=-0.20; p=0.03) explained 60%** of variance in PCS (Tab 1). The variable explaining the most **variance in MCS was depression (β=-0.55; p<0.001). Sleep disturbances were not found to be significantly associated** with MCS (Tab 2).

To define the clinical and psychosocial factors related to poor sleep quality another multiple linear regression were performed. Independent predictors of poorer sleep quality were **depression (β= 0.36; p=0.007) and general fatigue (β= 0.30; p=0.02) even after controlling for relevant sociodeo-graphic (age, gender)** and clinical variables (EDSS, anxiety and **the dimensions of fatigue-physical fatigue,** reduced activity, reduced motivation, mental fatigue). This model explained 35% of variance of PSQI (Tab 3).

TABLE 1 **LINEAR REGRESSION MODEL: ASSOCIATIONS OF FATIGUE AND POOR SLEEP WITH PHYSICAL QUALITY OF LIFE (SF36)**

Model 1	
Physical fatigue	-.71
R2 / Adjusted R2	.51/.50
Model 2	
Physical fatigue	-.58
EDSS	-.31
R2 / Adjusted R2	.58/.57
Model 3	
Physical fatigue	-.49
EDSS	-.33
Poor sleep quality	-.20
R2 / Adjusted R2	.62/.60

Dependent Variable: PCS – Physical Component Summary of SF-36.

Adjusted beta coefficients are displayed

Model was controlled for sociodemo-graphic (age, gender) and clinical variables (EDSS,depression, anxiety and the dimensions of fatigue – general fatigue, reduced activity, reduced motivation, mental fatigue).

TABLE 2 **LINEAR REGRESSION MODEL: ASSOCIATIONS OF FATIGUE AND POOR SLEEP WITH MENTAL QUALITY OF LIFE (SF36)**

Model 1	
Depression	-.77
R2 / Adjusted R2	.60/.59
Model 2	
Depression	-.55
Anxiety	-.30
R2 / Adjusted R2	.63/.62

Dependent Variable: MCS– Mental Component Summary of SF-36.

Adjusted beta coefficients are displayed

Model was controlled for sociodemographic (age, gender) and clinical variables (EDSS and five dimensions of fatigue – general fatigue, physical fatigue, reduced activity, reduced motivation, mental fatigue).

TABLE 3 **LINEAR REGRESSION MODEL: INDEPENDENT PREDICTORS OF POOR SLEEP QUALITY (PSQI)**

Model 1	
Depression	-.57
R2 / Adjusted R2	.32/.31
Model 2	
Depression	-.36
General fatigue	-.30
R2 / Adjusted R2	.37/.35

Dependent Variable: poor sleep quality measured by PSQI.

Adjusted beta coefficients are displayed

Model was controlled for sociodemographic (age, gender) and clinical variables (EDSS, anxiety and the dimensions of fatigue – physical fatigue, reduced activity, reduced motivation, mental fatigue).

CONCLUSION

Poor sleep is associated with a reduction in QoL in MS patients. Depression and general fatigue were the main variables related to poor sleep. Thus, effective treatment of these conditions could be assumed to improve quality of sleep and to increase a patient's QoL.

ACKNOWLEDGEMENT

This work was supported by the Slovak Research and Development Agency under contract No. APVV-20-038305 (20%) and APVV-0220-10 (60%). Furthermore, this work was partially supported by the Agency of the Slovak Ministry of the Education, Science, Research and Sport of the Slovak Republic for the Structural Funds of the EU under project No. ITMS: 26220120058 (20%).

Poster Session 2, Monday 10 September

Ageing and dementia 2

P2001

High-dose 13.3mg/24h rivastigmine transdermal patch demonstrates efficacy on instrumental activities of daily living: analysis of autonomy and higher-level function subscales

G. Alva[1], J. Cummings[2,3], B. Winblad[4], G. Grossberg[5], L. Frölich[6], T. Krahnke[7], P. Downs[8], C. Strohmaier[7]
[1]ATP Clinical Research, Costa Mesa, CA, [2]Cleveland Clinic Lou Ruvo Center for Brain Health, Las Vegas, NV, [3]Cleveland Clinic Lou Ruvo Center for Brain Health, Cleveland, OH, USA, [4]Karolinska Institutet Alzheimer Disease Research Center, Huddinge, Sweden, [5]St. Louis University School of Medicine, St Louis, MO, USA, [6]Department of Geriatric Psychiatry, Central Institute of Mental Health, Medical Faculty Mannheim, University of Heidelberg, Mannheim, Germany, [7]Novartis Pharma AG, Basel, Switzerland, [8]Novartis Pharmaceuticals Corporation, East Hanover, NJ, USA

Background: There is a need for improved therapeutic options for patients with Alzheimer's disease (AD) to address decline in ability to perform instrumental activities of daily living (IADL). The objective of this analysis was to assess efficacy of a higher dose of rivastigmine transdermal patch (13.3mg/24h) on the IADL domain of the ADCS-ADL scale, focusing on autonomy and higher level function (HLF), in patients with mild-to-moderate AD.
Methods: Patients with AD meeting pre-specified decline criteria during initial open-label (IOL) treatment with 9.5mg/24h patch, entered a 48-week, randomised, double-blind (DB) phase (13.3 versus 9.5mg/24h). Change from DB-baseline to Week 48 on the ADCS-IADL (co-primary outcome) and autonomy and HLF subscales, was calculated and compared between treatment groups.
Results: Of 1584 patients enrolled into the IOL phase, 567 entered the DB phase (13.3mg/24h, n=280; 9.5mg/24h, n=287). Overall, the between-group difference in change from baseline on the ADCS-IADL was statistically superior with 13.3mg/24h patch from Week 16 onwards ($p<0.05$). The 13.3mg/24h patch showed statistical superiority over the 9.5mg/24h patch on the autonomy subscale at Weeks 24 ($p=0.025$), 32 ($p=0.009$) and 48 ($p=0.041$), and on the HLF subscale at Weeks 32 ($p=0.006$) and 48 ($p<0.001$).
Conclusions: The 13.3mg/24h rivastigmine patch significantly reduced deterioration on IADL compared with the 9.5mg/24h patch, with greater efficacy demonstrated on both autonomy and HLF. These results indicate that the higher-dose patch offers clinically meaningful benefits on IADL.

P2002

Abnormalities of functional connectivity in patients with frontotemporal dementia: a network analysis using resting state fMRI and graph theory

M. Filippi[1], S. Sala[2,3], P. Valsasina[2], F. Agosta[2], G. Magnani[4], S.F. Cappa[5], E. Scola[6], A. Falini[6], G. Comi[4]
[1]Neuroimaging Research Unit and Department of Neurology, [2]Neuroimaging Research Unit, Vita-Salute San Raffaele University and San Raffaele Scientific Institute, [3]Department of Statistic, University of Milano-Bicocca, [4]Department of Neurology, [5]Department of Clinical Neurosciences, [6]Department of Neuroradiology and CERMAC, Vita-Salute San Raffaele University and San Raffaele Scientific Institute, Milan, Italy

Objective: To investigate the functional organization of large-scale brain networks in patients with the behavioural variant of frontotemporal dementia (bvFTD) using resting state functional MRI (RS fMRI) and graph theory.
Methods: 18 bvFTD patients (mean age=61.9 years, SD=8.4, MMSE: 22+6), and 50 sex-matched healthy controls (mean age=61.1 years, SD=9.1) underwent RS fMRI examination. Whole-brain networks were assessed using graph theory. First, the correlation matrix between the 90 cortical regions of the automated anatomical labelling (AAL) atlas, representing functional connectivity inside the brain, was computed for each subject. This matrix was subsequently binarized at different thresholds. The overall topology of functional connectivity was examined at each threshold by computing the commonest graph theoretical metrics, comprising the degree, the clustering coefficient, the characteristic path length and the global efficiency. Between-group differences of network connectivity were investigated with a two-sample t-test.
Results: Most of graph theoretical metrics were significantly altered in bvFTD patients vs. healthy controls. In particular, the average degree and global network efficiency were significantly decreased in bvFTD patients vs. controls at all considered correlation thresholds (p ranging from 0.015 to 0.045). On the contrary, the average path length was significantly increased (p ranging from 0.015 to 0.03). The average clustering coefficient was significantly lower in bvFTD patients than in healthy controls at most of the examined correlation thresholds (p ranging from 0.02 to 0.09).
Conclusions: The large-scale functional network organization is significantly altered in bvFTD patients vs. control subjects, suggesting a loss of efficiency in information exchange between brain areas.

P2721

Imaging comparison study of multiple sclerosis (MS) and neuromyelitis optica (NMO)

J.-G. Liu[1], X.-K. Qi[2], K.-H. Zheng[3], H.-L. Zhang[2]
[1]Neurology, [2]Navy General Hospital, [3]Iconography, Navy General Hospital, Beijing, China

Objective: To compare imaging characteristics of MS and NMO for differential diagnosis.
Methods: The imaging characteristics of 60 MS and 48 NMO cases were retrospectively studied.
Results: The three top predilection sites of the brain in head MRI of MS were para-lateral ventricles (34/60), subcortex white matter (27/60), brain stem (23/60), and it also involved the cortex (9/60). By contrast, brain lesions were observed in 59.4% of NMO, and the three top predilection site of brain lesions in NMO were brain stem (13/32), circum-lateral ventricles(12/32), subcortex white matter (7/32), furthermore, the lesions surrounded the third ventricle (6/32) and the tegmentum of brain stem near peri-aqueduct (8/32) of NMO were not found in MS. The lesions of spinal cord shown in MRI of MS were typically oval, peripheral, and asymmetric, but in NMO longitudinally extensive and central conversely. The mean number of involved vertebral segments in NMO was significantly higher than that in MS ($p<0.001$). Furthermore, the number of spinal cord lesions in MS was remarkably higher than that in NMO ones ($p<0.001$).
Conclusions: Several distinct imaging characteristics between NMO and MS as follows: like MS, most patients with NMO may have brain lesions, but its distributions may be different from MS's, such as the lesions surrounding the third ventricle and the tegmentum of brain stem near peri-aqueduct of NMO. Compared with MS, the cortical lesions may be more rarely observed for NMO. The mean number of involved vertebral segments in NMO is higher than 3, and in MS less than 3.

P2722

Poor sleep is associated with low health related quality of life in multiple sclerosis patients

M. Vitkova[1,2], J. Rosenberger[2], I. Nagyova[2], M. Chylova[2,3], P. Mikula[2], J. Szilasiova[1], Z. Gdovinova[1], J.P. van Dijk[2,4], J.W. Groothoff[4]
[1]Department of Neurology, P.J.Safarik University Kosice, Faculty of Medicine, [2]Graduate School Kosice Institute for Society and Health, P.J.Safarik University Kosice, [3]1st Department of Psychiatry, Faculty of Medicine, Safarik University, Košice, Slovak Republic, [4]Department of Community & Occupational Health, University Medical Center Groningen, Groningen, The Netherlands

Introduction: Sleep disturbances in patients with multiple sclerosis (MS) can be associated with lower health related quality of life (HRQoL). The aim of study was to explore the association of poor sleep with HRQoL in MS patients and to explore the clinical and psychosocial factors related to poor sleep quality.
Methods: The study comprised 121 patients (78.5% women, mean age 40.2±9.7 years, mean EDSS 3.3±1.5). Sleep disturbances were measured by the Pittsburgh Sleep Quality Index (PSQI), fatigue by the Multidimensional Fatigue Inventory (MFI-20), anxiety and depression by the Hospital Anxiety and Depression Scale (HADS) and HRQoL by the Short Form 36 (SF-36). Functional disability was assessed using Expanded Disability Status Scale (EDSS). Multiple linear regression analyses were performed.
Results: The frequency of poor sleep was 48,9%. Patients with poorer sleep had worse score on Physical Component Summary (PCS). The model consisting of physical fatigue ($p=0.001$), EDSS ($p=0.001$) and poor sleep ($p=0.03$) explained 60% of variance in PCS. Sleep disturbances were not found to be associated with Mental Component Summary. Independent predictors of poorer sleep were depression ($p=0.007$) and general fatigue ($p=0.02$). This model explained 35% of the variance of the PSQI.
Conclusion: Poor sleep is associated with low physical HRQoL in MS patients. Depression and general fatigue were the main variables related to poor sleep. Thus, effective treatment of these conditions could improve quality of sleep and to increase a patient's HRQoL.