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List of Abbreviations

AChEI : acetylcholine esterase inhibitors

AChR : acetylcholines receptor

ADEM : acute disseminated encephalomyelitis

AHI : apnea hypopnea index

ASF : apnea symptoms frequency

BAD : Becks depression inventory

BAI : Beck anxiety index

BDZ : benzodiazepines

BMI : body mass index

CASI : cognitive abilities screening instrument

CBT : core body temperature

CFS : chronic fatigue syndrome

CI : confidence interval

CIDP : chronic inflammatory demyelinating polyneuropathy

CNS : central nervous system

CPAP : continuous positive airway pressure

CRP : C-reactive protein

CSF : cerebrospinal fluid

DA : dopamine

DAS28 : Disease Activity Score 28 for RA

DM : dermatomyositis

DRN : dorsal raphe nucleus

Dspz : dorsal subparaventricular zone

EEG : electroencephalogram

EMG : electromyogram

EOG : electro-oculogram

ESS : Epworth sleepiness scale

FQSQ :functional outcomes of sleep questionnaire

GABA : γ-aminobutyric acid

GBS : Guillain Barre syndrome

HLA : human leukocyte antigen

HLA : human leukocyte antigen

ICU : intensive care unit

IFN-B : interferon beta

IL-6 : interleukin 6

JIA : juvenile idiopathic arthritis

LE : limbic encephalitis

MACTAR : The McMaster Toronto Arthritis patient preference questionnaire

MG :myasthenia gravis

MGUSP : monoclonal gammopathy of undetermined significance

mHAQ : Modified Health Assessment Questionnaire

MMSE : minimental status examination

MRSA : methicillin resistant Staphylococcus aureus

MS : multiple sclerosis

MSLT : multiple sleep latency test

MWT : maintenance of wakefulness test

NAID : neurologic autoimmune disorders

NE : norepinephrine

NIPPV : noninvasive intermittent positive pressure ventilation

NK : natural killers

NREM : non rapid eye movement

ODI : oxygen desaturation index

OR : odds ratio

OSA : obstructive sleep apnea

PAP : positive airway pressure

PGO : ponto-geniculo-occipital

PLM : periodic leg movement

PM : polymyositis

PRL : prolactin

PSD : partial sleep deprivation

PSG : polysomnography

PSQI : Pittsburgh sleep quality index

PW : paradoxical weakness

QMGS : quantitative myasthenia gravis score

QOL : quality of life

RA : rheumatoid arthritis

RADAI : Rheumatoid Arthritis Disease Activity Index

RBD : REM sleep behavior disorder

REM : rapid eye movement

RLS : restless leg syndrome

Scale (CESD): The Center for Epidemiologic Studies Depression

SDB : sleep disordered breathing

sIBM : sporadic inflammatory body myositis

SNc : substantia nigra pars compacta

SOL : sleep onset latency

SSc : systemic sclerosis

SSS : Stanford sleepiness scale

SWS : slow wave sleep

TNF : tumor necrosis factor

TSH :thyroid stimulating hormone

VGKC : voltage gated potassium channel

VPAG : vental periaqueductal grey matter

VTA : ventral tegmental area

W : waking

WASO : wake after sleep onset

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Introduction

A correlation between sleep loss and development of different pathologies has recently been revealed by numerous studies. The potential magnitude of this problem is highlighted in the 2013 International Bedroom Poll, where more than half of the population in industrialized countries report insufficient sleep on a regular basis ***(Christfersson et al., 2014)***.

Sleepiness, fatigue and sleep fragmentation are among the most frequent symptoms of acute and chronic inflammatory neurologic autoimmune disorders (NAID) .While current knowledge supports a strong involvement of both the neuroendocrine and the immune systems .Processes underlying homeostatic and circadian sleep regulation have an influence on functions of the immune system ***(Khatami et al., 2008)*.**

In one study, many patients with chronic inflammatory demyelinating polyneuropathy (CIDP) reported sleep difficulties. It may be hypothesized that paresthesias and pain interfere with the sleep of these patients. However, a more in-depth evaluation is necessary .Improved sleep may favor quality of life for patients with CIDP ***(Santos et al., 2014).***

In a study the prevalence of restless leg syndrome (RLS) in patients with CIDP was significantly higher than controls. Screening for RLS in CIDP patients may be appropriate, particularly in those with weakness, disability, and motor axonal loss in the lower limbs ***(Rajabally and Rauhl, 2010)*.**

Another study confirms a high prevalence of RLS in inflammatory neuropathies as CIDP as well ***(Luigetti et al., 2013)*.**

Disease severity maybe considered to be a Myasthenia Gravis-specific risk factor for patient-reported sleep disturbance. An increased incidence of sleep disorders, especially sleep disordered breathing and obstructive sleep apnea (OSA) has been noted in Myasthenia Gravis (MG) patients. An association between corticosteroid use and risk of sleep disorders has been reported, but the influence of disease severity on sleep quality is not clear ***(Lapiscina et al., 2011)*.**

A prospective study demonstrates a benefit of napping on weakness in a neuromuscular disorder and suggests that napping could be considered as a simple intervention to help mitigate weakness in patients with MG ***(Kassardjian et al., 2013)*.**

It is clear that sleep disturbances are prevalent in Multiple Sclerosis (MS), and associated with significant consequences for patients ***(Kaminska et al., 2011)*.**

In a study it was found that yawning and napping provide symptom relief among patients with MS. Not getting a good night's sleep made MS symptoms worse for many patients ***(Gallup et al., 2010)*.**

The exact mechanism of sleep disturbances in Guillain-Barre syndrome (GBS) is speculative. These patients experience sensory disturbances including pain, have recent onset motor disability, require prolonged hospital stay and exhibit anxiety and may be expected to have sleep disturbances.

The CSF hypocretin-1 (a hypothalamic neuropeptide deficient in narcolepsy) levels, measured in a group of patients in a study, were lower in patients of GBS with hallucinations than in those without them. The authors proposed involvement of lateral hypothalamus in GB syndrome that governs the sleep architecture.

Treatment of underlying causes like pain, anxiety; early institution of specific treatment for GB syndrome like plasma exchange or intravenous immunoglobulins and reassurance might be some of the steps in alleviating the sleep disturbances ***(Karkare et al., 2013)*.**

Sleep complaints are an important part of the symptomatology of rheumatologic disorders. Nocturnal sleep disruption is a common finding and it is expressed in the analysis of the sleep EEG ***(Abad et al., 2008).***

It was found in a study that sleep disturbance and fatigue are prevalent among children with juvenile idiopathic arthritis (JIA) and Juvenile Dermatomyositis (JDM). Sleep disturbance and fatigue are strongly related to increases in pain ***(Avie et al., 2008).***

While in another study it was found that a high frequency of obstructive sleep apnea in patients with inflammatory myopathies (dermatomyositis, polymyositis, and sporadic inclusion body myositis). Weakness of the oropharyngeal muscles could explain this finding and the possibility that these alterations play a role in the persistence of fatigue ***(Callaghan et al., 2009).***

Rapid-eye-movement sleep behavior disorder frequently occurs in the setting of neurological conditions involving the brain stem, including demyelinating lesions like acute aseptic limbic encephalitis ***(Lin et al., 2009).***

A number of patients have prominent and early sleep-wake disturbance, insomnia, restless legs syndrome and obstructive sleep apnea as a feature of autoimmune mediated limbic encephalitis. Hypersomnia with

fragmented night sleep has been described in patients with anti-Ma encephalitis as well ***(Anderson et al., 2012).***

A study suggest that sleep disruption, and in particular sleep disordered breathing might be highly prevalent in sporadic inclusion body myositis. An association with the severity of muscular impairment, and in particular with dysphagia, can be hypothesized ***(Marca et al., 2013).***

Aim of the Work

To highlight the recent updates regarding the interrelation between sleep, sleep-related disorders and some autoimmune neurologic diseases and the impact of this relation on disease outcome and quality of life of patients with these diseases.