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AWARDS

THE EUROPEAN ACADEMY OF REHABILITATION MEDICINE SCIENTIFIC PRIZES 2012 AND 2013

Sponsored by Journal of Rehabilitation Medicine

WINNER 2012: GUNILLA ÖSTLUND

Summary of the thesis: Aspects of fatigue in post-polio. This thesis was awarded with the European Academy of Rehabilitation Medicine prize 2012. Dr Östlund received her prize during the ESPRM congress in Marseille, France, 2014.

Fatigue is a subjectively experienced and complex phenomenon and one of the most common symptoms of post-polio syndrome (PPS), occurring in up to 90% of patients. Experiencing fatigue negatively affects work performance, family life, social relationships, and quality of life (QOL). Fatigue can be central or peripheral in origin and can be experienced in various ways, for example, as general, physical, mental, or muscle fatigue.

The overall aim of the 4 papers was to evaluate and analyze fatigue in PPS patients. The specific aims were as follows: in the first paper, "Cognitive functioning in post-polio patients with and without general fatigue" to determine whether generally fatigued PPS patients display cognitive deficits compared with non-fatigued subjects; In the second paper "Vitality among Swedish patients with post-polio: a physiological phenomenon" to evaluate vitality and fatigue and the relative effects of physiological and psychological parameters on vitality level; in the third paper, "Post-polio syndrome – Fatigued patients a specific subgroup?" to characterize fatigued and non-fatigued PPS patients, and to define subgroups across the fatigue continuum; and finally, in the fourth paper "IVIG treatment in post-polio patients: evaluation of responders" to evaluate the outcome (quality of life Short-form-36 (SF-36), Physical activity for the elderly (PASE) and pain intensity (VAS)) after intravenous immunoglobulin treatment (IVIG) in patients with post-polio syndrome and to evaluate parameters among demographic and medical background data in order to identify responders.

Three samples of PPS patients are examined. The first paper includes 20 PPS patients, with and without general fatigue, recruited from the post-polio out-patient clinic at Huddinge University Hospital, Stockholm. The second and third paper analyze baseline data for 143 PPS patients from a Swedish multicenter study. The fourth paper is based on follow-up data for 113 patients from the post-polio out-patient clinic at Danderyd University Hospital, Stockholm, before and 6 months after IVIG treatment.

In the first paper, no cognitive performance differences could be detected between the fatigued and non-fatigued PPS patients, and systematically varying the test order did not cause significant mental fatigue.

The results in the second paper showed that vitality in PPS patients was mostly dependent on physiological rather than psychological parameters, and mental fatigue was not a prominent predictor.

In the third paper, contrary to expectations, vitality increased while fatigue and pain decreased with increasing age. Fatigued PPS patients were characterized by significantly lower age, more physical problems, and lower QOL than were non-fatigued PPS patients. Furthermore, in the fatigued group, mental fatigue was relatively more important than was physical fatigue.

In the fourth paper, the scores for the SF-36 sub-domains Vitality, Bodily Pain, Social Functioning, Role–emotional, and MCS significantly improved after IVIG treatment at the 6-month follow-up. Vitality and Bodily Pain were identified as possible outcome variables for IVIG treatment.

Age below 65 years of age, paresis in the lower extremities, and lack of concomitant disorders may be main indicators for a future identification of responders.

It is concluded that, in PPS, fatigue is mostly physical in nature – mental fatigue not being a prominent phenomenon – and that general fatigue does not affect cognition. PPS patients, of whom fatigued PPS patients can be considered a subgroup, may respond positively to IVIG treatment.

Gunilla Östlund is working as licensed psychologist at the Department of Rehabilitation Medicine, Danderyd University Hospital, Stockholm, Sweden. Her current research is aimed at evaluating IVIG in post-polio patients in order to identify responders. She is also involved in a project comparing fatigue, background factors and quality of life in patients with post-polio and ME/chronic fatigue syndrome. E-mail: gunilla.ostlund@ki.se

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Gunilla Östlund receiving the European Academy Award on 27 May 2014 in Marseille from Professors Guy Vanderstraeten and Anne M. Chamberlain.

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WINNER 2013: ERIC J.K. BOLDINGH

Summary of the thesis: Pain and disabilities related to hip disorders in adults with severe cerebral palsy. This thesis was awarded with the European Academy of Rehabilitation Medicine prize 2013. Dr Boldingh received his prize during the ESPRM congress in Marseille, France, 2014.

Research considered the question: *Are patients with cerebral palsy (CP) and hip disorders bothered by this disorder, in their youth, adolescence or later? And if so, how can we help these people by preventing or curing this problem?*

First part of the thesis is on the development of an instrument to measure pain in patients with severe cerebral palsy. The pain assessment instrument (PAICP) uses drawings of everyday situations. Patients score pain on a faces pain scale (1).

Secondly, a cross-sectional study was carried out to investigate the relationship between hip X-ray findings (migration, deformity and osteoarthritis) and pain in 160 patients with severe CP (2).

We conclude that there is a high prevalence of hip pain after unsuccessful femoral bone surgery in patients with severe CP. Migration and deformity of the femoral head are closely inter-related, and are associated with pain (2). Patients frequently need a special molded chair and suffer from adduction contractures of the hip (3).

Third part is a systematic review of the literature about preventive, curative and palliative surgery in hip disorders in patients with severe cerebral palsy (4, 5).

Last part is the design of a decision tree for the surveillance and intervention of hip disorders in spastic CP. The algorithm is based on our research and on the literature assessed in our reviews.

Dr Eric Boldingh (1951) is working as a physiatrist for multiple impaired children in the Hague, the Netherlands. His current research is aimed at establishing a CP registration system in the Netherlands. E-mail: e.boldingh@casema.nl

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Dr Eric Boldingh receiving the European Academy Award on 27 May 2014 in Marseille from Professors Guy Vanderstraeten and Anne M. Chamberlain.

The following theses were also considered to be of very high level and deserve to be shown even though they did not manage to reach the level of getting the award

Thesis: Health issues and participation in adults with cerebral palsy. *Wilma van der Slot*

The permanent and complex nature of cerebral palsy (CP) and the risk of developing secondary conditions imply that persons with CP will face health issues and participation restrictions throughout life.

The main aim of this thesis was to improve our insight into health issues and participation amongst adults with spastic CP, and to identify targets for prevention and treatment of both health problems and participation restrictions.

In two cross-sectional studies we studied 72 adults with spastic unilateral and bilateral CP (aged 25–45 years) without severe cognitive impairment. Health issues, e.g., chronic pain, fatigue and depressive symptoms, were assessed. Furthermore, aerobic fitness (progressive maximal exercise test), physical activity level (activity monitor) and cardiovascular disease (CVD) risk factors (e.g., non-fasting blood sample, blood pressure, body fat, and smoking) and clustered 10-year CVD risk (Systematic Coronary Risk Evaluation) were measured. In addition, participation and health-related quality of life (HRQoL) were assessed.

Compared to Dutch healthy reference samples, adults with bilateral CP had a significantly higher prevalence of chronic pain (75% vs 39%) and depressive symptoms (25% vs 12%) ($p < 0.005$), higher severity of fatigue (4.4 vs 2.9; $p < 0.0001$) (1), and reduced aerobic fitness and physical activity (mean 77% and 85% of ref. values, respectively).

The 10-year fatal CVD clustered risk was low ($\leq 1\%$). However, several single CVD risk factors were present, e.g. higher blood pressure levels. A high risk waist circumference was found in about one-fifth of the study sample. Lipid profile, smoking and alcohol

consumption were more favourable amongst adults with bilateral CP than in a reference sample (2).

Regarding participation, at least 60% of adults with bilateral CP had difficulty in mobility, recreation and housing, and 44% in personal care and employment. Adults with bilateral CP perceived a low HRQoL for physical functions, but not for mental functions (3).

In adults with unilateral CP, physical activity levels were normal and they had in most life areas a comparable level of participation as healthy age and gender matched persons. However, they spent more time on non-intensive leisure activities (4).

In conclusion, this study on relatively young adults with spastic CP without severe cognitive impairment, showed that persons with bilateral CP were severely affected by secondary conditions, in addition to their spastic paresis. A substantial number of them experienced participation restrictions. Relevant modifiable factors in bilateral CP seem aerobic fitness, body fat and self-efficacy. Adults with unilateral CP functioned relatively well, but were less extensively studied. These findings underscore the necessity for future research to disentangle underlying mechanisms of health issues and to refine targets for both prevention and treatment of adults with CP.

Wilma van der Slot works as a rehabilitation physician and researcher at the Department of Neurorehabilitation of Rijndam rehabilitation institute and within the research themes 'Transition and Lifespan Research' and 'MoveFit' of the Department of Rehabilitation Medicine, Erasmus MC, Rotterdam, The Netherlands. Her works involves neurorehabilitation, specialised rehabilitation care during the transition into adulthood and lifespan care for persons with a disabling condition since childhood. E-mail: w.vanderslot@erasmusmc.nl

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Thesis: A roundtrip between the rehabilitation department and the gait lab: Interest of the tibial nerve neurotomy and of the long-range autocorrelations analysis. *Benjamin Bollens*

The Physical and Rehabilitation Medicine department and the gait lab are complementary. Evidence-based rehabilitation requires the development of reliable assessment tools and efficient rehabilitative procedures, whereas clinical practice contextualizes the observations made in the gait lab. Hence, the efficacy of the tibial nerve neurotomy and the interest of the long-range autocorrelations analysis were studied in a complementary way throughout the same PhD thesis.

The spastic equinovarus foot (SEF) is a common impairment that interferes with ambulation, limits achievement of daily activities and negatively affects participation and quality of life in hemiparetic patients. Selective neurotomy is an option of treatment when SEF results from overactivity of the calf muscles. This surgery consists of a partial and selective section of the motor nerve branches innervating the spastic muscles. Only several non-randomized, uncontrolled case-series studies had suggested that tibial nerve neurotomy was a safe and long-lasting treatment of SEF (1). Based on the International Classification of Functioning, Disability and Health, we performed a randomized, assessor-blinded, controlled trial comparing the tibial nerve neurotomy with botulinum toxin injections in the calf muscles (2). This study validated with a higher level of evidence the use of the tibial nerve neurotomy as a treatment of choice for chronic stroke patients presenting with SEF.

In the 2nd part of the project, we explored the long-range autocorrelations characterizing the stride duration variability in the normal human gait, using complex mathematical methods (3). Long-range autocorrelations are used to characterize the long-term dynamics of gait variability and are described as a marker of gait balance and fall risk. Their persistence and reproducibility while walking on a treadmill are a reality, which further validates the treadmill as a useful tool for assessing gait fluctuation dynamics (4). The hypothesis that they would be efficient for comparing subjects presenting with different spontaneous speed is supported by their invariance over a large range of gait speeds in different age groups (5). Finally, it was shown that their properties were not affected by biomechanical constraints or cognitive interferences as imposed through backward walking and dual-tasking (6). As a result, these findings suggest that the long-range autocorrelations observed in walking variability are robust and intrinsic to the locomotor system.

The duality between both parts of the thesis is merely theoretical. In reality, neuroscience improves the knowledge of the nervous system functioning, which is the basis for rational approaches to rehabilitation. In parallel, rehabilitation contextualizes the scientific progress and gives meaning to neuroscience. The common presentation of both projects in the same PhD thesis illustrates the interest of an integrated approach combining clinical and scientific activities. Hence, my professional occupation is presently focused on the clinical management of patients, but always with a scientific vision and in close collaboration with the gait lab.

Benjamin Bollens works as a rehabilitation physician and invited lecturer at the Université Catholique de Louvain, Institute of Neuroscience, Avenue Mounier and Université Catholique de Louvain, Cliniques universitaires Saint-Luc, Physical Medicine and Rehabilitation Department, Avenue Hippocrate, Brussels, Belgium. E-mail: benjamin.bollens@uclouvain.be

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Thesis: Life satisfaction and wheelchair exercise capacity in the first years after spinal cord injury. *Casper Floris van Koppenhagen*

In this thesis findings of the Umbrella study (from start of active rehabilitation up to one year after discharge) and SPIQUE study (5 years after discharge), are presented. This thesis focuses on the impact of wheelchair exercise capacity, life satisfaction and their mutual relationships over time from the start of active rehabilitation up to 5 years after discharge of inpatient rehabilitation.

We found a marked decrease in life satisfaction of persons with spinal cord injury at one year after discharge from inpatient rehabilitation, compared to the general population and to their own life satisfaction before spinal cord injury.

Decrease of life satisfaction was strongest for the domains Sexual life, Self care and Vocational situation. Partner relations, Family life and Contacts with friends and acquaintances appeared the least affected life domains. Age, gender and education had little influence on life satisfaction after spinal cord injury or change of life satisfaction. High level of lesion, suffering from pain and from secondary impairments were associated with a decrease of life satisfaction and with low life satisfaction one year after discharge.

Life satisfaction improved during inpatient rehabilitation, especially during the first 3 months of active rehabilitation and remained stable during the first year after discharge. Having few pain sensations and a low number of other secondary impairments and having a better functional status were predictors of a more favourable course of life satisfaction early after spinal cord injury.

No significant changes in mean wheelchair exercise capacity were found between discharge and 5 years later. No significant determinants for the course of wheelchair exercise capacity in the 1–5 year interval were detected. Again age, gender, level and completeness of lesion were determinants for peak oxygen uptake and level of lesion and gender for peak power output, a confirmation of other international studies. The loss to follow-up group was older of age and included more persons with tetraplegia, probably leading to a slight overestimation of the model outcome for wheelchair exercise capacity.

We confirmed that different wheelchair exercise capacity trajectories exist after spinal cord injury. We found 4 different trajectories in the course of peak power output: 1) high progressive scores; 2) deteriorating scores: progressive scores during inpatient rehabilitation with deteriorating figures after discharge; 3) low progressive scores: low scores at start of rehabilitation with relative strong progressive scores after discharge; and 4) low inpatient scores with very strong progressive scores after discharge. Logistic regression of factors that might be distinctive between the trajectories with high progressive scores and low progressive scores, revealed that older age, female gender, tetraplegic lesion and low functional status were associated with the class with low progressive scores.

We examined that wheelchair exercise capacity and life satisfaction in spinal cord injury population are longitudinally associated up to 5 years after discharge of inpatient rehabilitation. Further analyses revealed that the relationship between exercise capacity and life satisfaction was mainly based on the within-subject variance, suggesting that improvement of physical fitness might lead to improvement of life satisfaction.

Casper Floris van Koppenhagen works as a Physical Medicine and Rehabilitation Specialist at a Spinal Cord Injury Unit, Rehabilitation Centre De Hoogstraat, Utrecht, The Netherlands. E-mail: casper.koppenhagen@planet.nl

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