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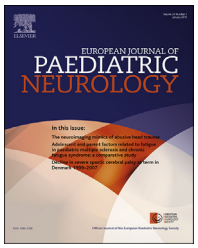

Editorial

Physical activity after mild traumatic brain injury: What are the relationships with fatigue and sleep quality? Is physical activity a key to prevention of post-concussive symptoms?

Acquired brain injury (ABI) in children and youth has been designated as a neglected area in medicine and a 'silent' epidemic.[1] Traumatic brain injury (TBI) is a common injury during childhood and youth and one of the leading causes of death and disability. The estimated yearly incidence in western countries is 225–296 per 100.0000 for the age group 15–25 years.[1,2] The majority of injuries (>95%) are of mild severity and most children recover completely. However, it is now increasingly recognized that mild TBI (mTBI) may lead to persistent problems in up to 21% of children 12–24 months trauma.[3] Post-concussive symptoms may include somatic (e.g., headache, dizziness, nausea, fatigue, sleeping problems) cognitive (e.g., attention and memory problems, reduced processing speed), emotional (e.g., mood liability, depressed) and behavioral (e.g., aggressive behavior) complaints.[3] Fatigue and sleep difficulties are commonly reported symptoms in up to 17% and 23% of patients respectively, 12 months after mTBI.[4] The brain basis of fatigue is poorly understood. However, multiple possible biological causes of fatigue include neuroanatomical, functional, psychological, biochemical, endocrine and sleep-related causes, occurring independently or in combination after TBI.[5] Recent data from other ABI (multiple sclerosis) reported increased fatigue associated with reduced physical activity (PA) and participation. Physical symptoms 6 months postinjury were found to be a strong predictor of 12 months postinjury fatigue, across all domains.[4]

In this issue of EJPN, Van Markus-Doornbosch and colleagues[6] report the results of a cross-sectional survey study on the relationships between PA of adolescents and young people and fatigue and sleep quality, 6–18 months after mTBI As main outcome measures they used the relevant questionnaires, with results dichotomized into meeting or not meeting Dutch Health Enhancing Physical Activity recommendations (D-HEPA).

Study participants were found to be less active than the Dutch reference 51% of their study population having activity levels lower than recommended by the D-HEPA. More importantly, they found significantly higher fatigue scores in the group not meeting D-HEPA recommendations. In contrast, sleep quality was not associated with PA levels.

Engaging in regular PA can have substantial cognitive and academic benefits and is generally promoted for its beneficial effects on physical and mental health and the synergistic effects on cognition and academic performance.[7] Childhood and adolescence are characterized as a period of rapid neuronal and cortical development. TBI during this period has the potential to disrupt the normal development.

After mTBI, PA is not encouraged and patients may at best leave the emergency departments of hospitals with a leaflet that says that physical activities should only be restarted stepwise, depending from the resolution of post-concussive symptoms. Recently, Anderson et al. reported reduction of post-concussive symptoms and faster reaction times on computer-based cognitive tasks in children and adolescents with recent concussion after moderate exercise.[8] Identification of PA as an important factor in relation to fatigue after mTBI is a first step to place PA also in the correct perspective in relationship to prevention and rehabilitation of long term post-concussive symptoms.

There is emerging evidence for the benefit of PA on cognitive outcome after ABI. Two studies have been published and others are in progress evaluating the effect of exercise programs in pediatric brain tumor survivors.[9–11] In a controlled crossover exercise program study in long-term survivors of pediatric brain tumors treated with radiation, there appears to be some evidence of structural brain changes including increased white matter and hippocampal volume and increased cortical thickness in multiple brain regions.[10,11] Additionally, improvements in reaction time were demonstrated.[11]

Each of these primary areas of neurorehabilitation research have yet to be studied in more detail in victims of TBI. However, PA intervention approaches may hold promise for addressing the specific neurocognitive sequelae in children with mTBI and change the advice concerning PA in patients recovering

from mTBI. The findings of Van Markus-Doornbosch et al. may be a first step to identify relevant parameters in such future research.

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