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Interventions and Management

1. Disabil Rehabil. 2014 Oct 20:1-8. [Epub ahead of print]

Sit-to-stand movement changes in preschool-aged children with spastic diplegia following one neurodevelopmental treatment session - a pilot

Yonetsu R1, Iwata A, Surya J, Unase K, Shimizu J.

Purpose: This study was designed to provide a better understanding of how a single neurodevelopmental treatment (NDT) session affects sit-to-stand (STS) movements in children with cerebral palsy (CP). **Methods:** Eight children with spastic diplegia and five typically developing children, aged 4-6 years, participated in this study. The CP participants performed STS movements immediately before and after a 40-min NDT session. Using a three-dimensional, four-camera analysis system, angular movements involving the hip, knee and ankle joints of the participants were obtained. **Results:** During forward tilt of the trunk, the maximum and final angles after the NDT session significantly decreased compared with those before the session ($p < 0.05$, $p < 0.01$). Moreover, the final hip flexion after the session also significantly decreased compared with that before the session ($p < 0.01$). On the other hand, the initial, maximum and final ankle dorsiflexion angles after the session were significantly greater ($p < 0.05$, $p < 0.01$ and $p < 0.05$, respectively) than before the session. **Conclusions:** These findings suggest that a single NDT session enables children with CP to stand from a seated position without using some atypical movement patterns. **Implications for Rehabilitation** Preschool-aged children with spastic diplegia, with limited ability to independently transfer from a sitting position, and dependent on a wheelchair for mobility experience obstacles to enhanced activities of daily life and social participation. A single neurodevelopmental treatment session would enable children with spastic diplegia to perform sit-to-stand movements more efficiently, with selective muscle control. Understanding how a single neurodevelopmental treatment session affects sit-to-stand movements in children with spastic diplegia is invaluable for therapists planning more efficient therapeutic programs and may enable children with spastic diplegia to develop improved mobility.

PMID: [25327772](https://pubmed.ncbi.nlm.nih.gov/25327772/) [PubMed - as supplied by publisher]

2. J Pediatr Orthop. 2014 Oct 20. [Epub ahead of print]

A Descriptive Study of Lower Limb Torsional Kinematic Profiles in Children With Spastic Diplegia.

Simon AL1, Ilharreborde B, Megrot F, Mallet C, Azarpira R, Mazda K, Presedo A, Penneçot GF.

BACKGROUND: Lower limb rotational anomalies in spastic diplegic children with cerebral palsy (CP) are common

and difficult to identify through physical examination alone. The identification and treatment of the overall rotational disorders must be considered to restore physiological lever-arms lengths and lever-arms orientation. The aims of the study were to assess the prevalence of lower limb rotational malalignment and to describe the distribution of the different kinematic torsional profiles in children with spastic diplegia. **METHODS:** Instrumented gait analysis data from 188 children with spastic diplegia were retrospectively reviewed. None of the patients had undergone surgery previously or received botulinum toxin treatment within 6 months before the review. Kinematic data, collected at the midstance phase, included: pelvic, hip, and ankle rotation and foot progression angle. **RESULTS:** The prevalence of kinematic rotational deviations was 98.4%. Sixty-one percent of the children walked with an internal foot progression angle and 21% exhibited external alignment. The pelvis was internally rotated in 41% of the cases and externally in another 27%. Hip rotation was internal in 29% and external in 27% of the cases. Ankle rotation was internal in 55% and external in 16% of the cases. Lower limb rotational anomalies involved more than one level in 77% of the limbs. A kinematic compensatory deviation was identified in at least one level in 48% of the limbs. **CONCLUSIONS:** Kinematic rotational anomalies were identified in nearly all the 188 children in the study. The multilevel involvement of lower limb malalignment was not systematically associated with compensatory mechanisms between the levels. Ankle rotational anomalies were the most frequent cause of lower limb torsional deviations followed by pelvic malalignment.

LEVEL OF EVIDENCE: Level IV.

[PMID: 25333905](#) [PubMed - as supplied by publisher]

3. J Am Acad Orthop Surg. 2014 Nov;22(11):691-698.

Applications of Musculoskeletal Ultrasonography in Pediatric Patients.

Vanderhave KL, Brighton B, Casey V, Montijo H, Scannell B.

Ultrasonography is an excellent adjunct to other musculoskeletal imaging tools utilized in the pediatric population and in some instances offers advantages over CT and MRI. It permits dynamic examination of anatomic structures and assists in guiding minimally invasive procedures. In the lower extremity, ultrasonography assists in screening for such disorders as developmental dysplasia of the hip and in detecting slipped capital femoral epiphysis and femoral acetabular impingement. In the neonatal spine, ultrasonography can identify unossified vertebral arches. Among other applications in the upper extremity, ultrasonography may be used in the evaluation and examination of peripheral nerve injuries and is a preferred modality for imaging the shoulder in infants with neonatal brachial plexus palsy. It is also considered an optimal adjunct for administration of botulinum toxin-A in children with cerebral palsy. The portability, relative low cost, lack of radiation, and absence of known contraindications enhances the utility of ultrasonography in pediatric orthopaedics.

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4. Physiol Meas. 2014 Oct 23;35(11):2307-2318. [Epub ahead of print]

Validity of an activity monitor in young people with cerebral palsy gross motor function classification system level I.

O' Donoghue D1, Kennedy N.

The activPAL™ activity monitor has potential for use in youth with Cerebral Palsy (CP) as it has demonstrated acceptable validity for the assessment of sedentary and physical activity in other populations. This study determined the validity of the activPAL™ activity monitor for the measurement of sitting, standing, walking time, transitions and step count for both legs in young people with hemiplegic and asymmetric diplegic CP. Seventeen participants with CP Gross Motor Function Classification System level I completed two video recorded test protocols that involved wearing an activPAL™ activity monitor on alternate legs. Agreement between observed video recorded data and activPAL™ activity monitor data was assessed using the Bland and Altman (BA) method and intraclass correlation coefficients (ICC 3,1). There was perfect agreement for transitions and high agreement for sitting (BA mean differences (MD): -1.8 and -1.8 s; ICCs: 0.49 and 0.95) standing (MD: 0.8 and 0.1 s; ICCs: 0.59

and 0.98) walking (MD: 1 and 1.1 s; ICCs: 0.99 and 0.94) timings and low agreement for step count (MD: 4.1 and 2.8 steps; ICCs: 0.96 and 0.95) for both legs. This study found clinically acceptable agreement with direct observation for all activPAL™ activity monitor functions, except for step count measurement with respect to the range of measurement values obtained for both legs in this study population.

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5. J Child Health Care. 2014 Oct 21. pii: 1367493514551312. [Epub ahead of print]

Family-centred practices in the provision of interventions and services in primary health care: A survey of parents of preschool children with cerebral palsy.

Myrhaug HT1, Jahnsen R2, Ostensjø S3.

The aims of this study were to explore how parents of preschoolers with cerebral palsy (CP) experienced the level of family-centred services using the Measure of Processes of Care (MPOC-20) within primary health care in Norway and to examine the relationships between these experiences and the provided everyday skills interventions and services. A survey was sent to 360 parents of preschool children with CP. The response rate was 34%. Of the MPOC scales respectful and supportive care and coordinated and comprehensive care received the highest ratings, and providing general information received the lowest. Our findings indicate lower levels of family centredness in primary health-care contexts than that reported in specialist health care. Significant positive associations were found between all the five MPOC-20 scales and the parents' satisfaction with the amount of service coordination ($p = .000-.004$). The high scores for respectful and supportive care and the low scores for general information indicate that the families experienced relational help giving practices to a larger extent and participatory practices to a lesser extent. To increase the participatory aspects of family-centred practice, further research needs to address facilitators and barriers of information sharing and ways of giving this information both in specialist and primary health care.

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6. Phys Ther. 2014 Sep;94(9):1211-9. doi: 10.2522/ptj.20130392. Epub 2014 May 1.

Early intervention post-hospital discharge for infants born preterm.

Hilderman CG1, Harris SR2.

[PMID: 24786939](#) [PubMed - indexed for MEDLINE]

Prevention and Cure

7. *Dev Med Child Neurol.* 2014 Oct 21. doi: 10.1111/dmcn.12599. [Epub ahead of print]

Neurological outcomes of animal models of uterine artery ligation and relevance to human intrauterine growth restriction: a systematic review.

Basilious A1, Yager J, Fehlings MG.

AIM: This review explores the molecular, neurological, and behavioural outcomes in animal models of uterine artery ligation. We analyse the relevance of this type of model to the pathological and functional phenotypes that are consistent with cerebral palsy and its developmental comorbidities in humans. **METHOD:** A literature search of the PubMed database was conducted for research using the uterine artery ligation model published between 1990 and 2013. From the studies included, any relevant neuroanatomical and behavioural deficits were then summarized from each document and used for further analysis. **RESULTS:** There were 25 papers that met the criteria included for review, and several outcomes were summarized from the results of these papers. Fetuses with growth restriction demonstrated a gradient of reduced body weight with a relative sparing of brain mass. There was a significant reduction in the size of the somatosensory cortex, hippocampus, and corpus callosum. The motor cortex appeared to be spared of identifiable deficits. Apoptotic proteins were upregulated, while those important to neuronal survival, growth, and differentiation were downregulated. Neuronal apoptosis and astrogliosis occurred diffusely throughout the brain regions. White matter injury involved oligodendrocyte precursor maturation arrest, hypomyelination, and an aberrant organization of existing myelin. Animals with growth restriction demonstrated deficits in gait, memory, object recognition, and spatial processing. **INTERPRETATION:** This review concludes that neuronal death, white matter injury, motor abnormalities, and cognitive deficits are important outcomes of uterine artery ligation in animal models. Therefore, this is a clinically relevant type of model, as these findings resemble deficits in human cerebral palsy.

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8. *J Biol Chem.* 2014 Oct 22. pii: jbc.M114.576397. [Epub ahead of print]

Histone deacetylase-3 is necessary for proper brain development.

Norwood J1, Franklin JM1, Sharma D1, D'Mello SR2.

The functional role of histone deacetylase-3 (HDAC3) in the developing brain has yet to be elucidated. We show mice lacking HDAC3 in neurons and glia of the central nervous system, Nes-Cre/HDAC3 cKO mice, show major abnormalities in the cytoarchitecture of the neocortex and cerebellum and die within 24 hours of birth. Later born neurons do not localize properly in the cortex. Similar mislocalization is observed with cerebellar Purkinje neurons. While the proportion of astrocytes is higher than normal, the numbers of oligodendrocytes are reduced. In contrast, conditional knockout of HDAC3 in neurons of the forebrain and certain other brain regions, using Thy1-Cre and CaMKII-Cre for ablation, show no overt abnormalities in the organization of cells within the cortex or of cerebellar Purkinje neurons at birth. But both lines of conditional knockout mice suffer from progressive hind-limb paralysis, ataxia, and die around 6 weeks of birth. The mice display elevated overall numbers of cells, increased numbers of astrocytes, and Purkinje neuron degeneration. Taken together, our results demonstrate that HDAC3 plays an essential role in regulating brain development with effects on both neurons and glia in different brain regions.

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