Cerebral palsy research news

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CP Alliance Chair of Cerebral Palsy Research

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Interventions and Management

1. Pertinence of Constraint-Induced Movement Therapy in Neurological Rehabilitation: A Scoping Review

Purva Gulrandhe, Sourya Acharya, Maharshi Patel, Samarth Shukla, Sunil Kumar

Review Cureus. 2023 Sep 13;15(9):e45192. doi: 10.7759/cureus.45192. eCollection 2023 Sep.

Constraint-induced movement therapy (CIMT) is a neurorehabilitation technique that aims to restore motor function in patients with central nervous system injuries. Based on behavioral research conducted, CIMT has been found effective in restoring motor function in various conditions including stroke, cerebral palsy, traumatic brain injury (TBI), and more. The therapy combines neurological and behavioral mechanisms to induce neuroplastic changes and overcome learned nonuse. Modified CIMT (mCIMT) is a variant that focuses on sensorimotor functioning in the affected limb. This review summarizes studies on CIMT and mCIMT, with a focus on stroke, cerebral palsy, and other conditions. Results show that CIMT and mCIMT demonstrate significant improvements in motor function and quality of life. The studies underscore the importance of long-term research, comparative or combined therapies, and exploration of less-studied conditions like multiple sclerosis (MS) and brachial plexus injury. Overall, CIMT and mCIMT hold promise for neurorehabilitation, emphasizing the need for further investigation to enhance their effectiveness and application.

PMID: 37842361

2. Playfulness and New Technologies in Hand Therapy for Children With Cerebral Palsy: Scoping Review

Tamara Veronica Pinos Cisneros, Annette Brons, Ben Kröse, Ben Schouten, Geke Ludden

Review JMIR Serious Games. 2023 Oct 16:11:e44904. doi: 10.2196/44904.

Background: Innovative technologies such as game consoles and smart toys used with games or playful approaches have proven to be successful and attractive in providing effective and motivating hand therapy for children with cerebral palsy (CP). Thus, there is an increased interest in designing and implementing interventions that can improve the well-being of these children. However, to understand how and why these interventions are motivating children, we need a better understanding of the playful elements of technology-supported hand therapy. Objective: This scoping review aims to identify the playful elements and the innovative technologies currently used in hand therapy for children with CP. Methods: We included studies that design or evaluate interventions for children with CP that use innovative technologies with game or play strategies. Data were extracted and analyzed based on the type of technology, description of the system, and playful elements according to the Lenses of Play, a play design toolkit. A total of 31 studies were included in the analysis. Results: Overall, 54 papers were included in the analysis. The results showed high use of consumer technologies in hand therapy for children with CP. Although several studies have used a combination of consumer technologies with therapeutic-specific technologies, only a few studies focused on the exclusive use of therapeutic-specific technologies. To analyze the playfulness of these interventions that make use of innovative technologies, we focused our review on 3 lenses of play: Open-ended Play, where it was found that the characteristics of ludus, such as a structured form of play and defined goals and rules, were the most common, whereas strategies that relate to paidia were less common. The most commonly used Forms of Play were physical or active form and games with rules. Finally, the most popular Playful experiences were control, challenge, and competition.

Conclusions: The inventory and analysis of innovative technology and playful elements provided in this study can be a starting point for new developments of fun and engaging tools to assist hand therapy for children with CP.

PMID: 37843886

3. Reduced Corticospinal Drive to Antagonist Muscles of Upper and Lower Limbs During Hands-and-Knees Crawling in Infants with Cerebral Palsy：Evidence From Intermuscular EMG-EMG Coherence

Qiliang Xiong, Jinliang Wan, Yuan Liu, Xiaoying Wu, Shaofeng Jiang, Nong Xiao, Wensheng Hou

Behav Brain Res. 2023 Oct 17:114718. doi: 10.1016/j.bbr.2023.114718. Online ahead of print.

Background: There is growing interest in understanding the central control of hands-and-knees crawling, especially as a significant motor developmental milestone for early assessment of motor dysfunction in infants with cerebral palsy (CP) who have not yet acquired walking ability. In particular, CP is known to be associated with walking dysfunctions caused by early damage and incomplete maturation of the corticospinal tract. However, the extent of damage to the corticospinal connections during crawling in infants with CP has not been fully clarified. Therefore, this study aimed to investigate the disparities in intermuscular EMG-EMG coherence, which serve as indicators of corticospinal drives to antagonist muscles in the upper and lower limbs during crawling, between infants with and without CP. Methods: This study involved 15 infants diagnosed with CP and 20 typically developing (TD) infants. Surface EMG recordings were obtained from two pairs of antagonist muscles in the upper limbs (triceps brachii (TB) and biceps brachii (BB)) and lower limbs (quadriceps femoris (QF) and hamstrings (HS)), while the infants performed hands-and-knees crawling at their self-selected velocity. Intermuscular EMG-EMG coherence was computed in two frequency bands, the beta band (15-30Hz) and gamma band (30-60Hz), which indicate corticospinal drive. Additionally, spatiotemporal parameters, including crawling velocity, cadence, duration, and the percentage of stance phase time, were calculated for comparison. Spearman rank correlations were conducted to assess the relationship between EMG-EMG coherence and crawling spatiotemporal parameters. Results: Infants with CP exhibited significantly reduced crawling velocity, decreased cadence, longer cycle duration, and a higher percentage of stance phase time compared to TD infants. Furthermore, CP infants demonstrated decreased coherence in the beta and gamma frequency bands (indicators of corticospinal drive) in both upper and lower limb muscles. Regarding limb-related differences in the beta and gamma coherence, significant disparities were found between upper and lower limb muscles in TD infants ($p<0.05$), but not in infants with CP ($p>0.05$). Additionally, significant correlations between coherence metrics and crawling spatiotemporal parameters were identified in the TD group ($p<0.05$), while such correlations were not evident in the CP group. Conclusions: Our findings suggest that the corticospinal drive may functionally influence the central control of antagonist muscles in the limbs during typical infant crawling. This functional role could be impaired by neurological conditions such as cerebral palsy. The neurophysiological markers of corticospinal drive, specifically intermuscular EMG-EMG coherence during crawling in infants with cerebral palsy, could potentially serve as a tool to assess developmental response to therapy.

PMID: 37858871

4. Comparison of different methods used in balance evaluation in children with diparetic cerebral palsy

Ayşegül Göktürk Usta, Kadriye Armutlu

Neurol Res. 2023 Oct 18:1-5. doi: 10.1080/01616412.2023.2257451. Online ahead of print.

Purpose: In this study, we aimed to investigate the validity and reliability of Single Leg Stance (SLS), Tandem Stance (TS) and Pediatric Reach Tests (PRT) in children with Cerebral Palsy (CP). Methods: Fifty-three children (31 boys, 22 girls, age:3-15 years, Gross Motor Function Classification System (GMFCS) Level I- II with diparetic CP were included the study. SLS, TS, PRT test used for balance evaluations. SLS test was made by standing on dominant (D) and non-dominant (ND) extremity both eyes opened (EO) and closed (EC). Results: The mean age of childrens were 7.88±3.43 years. The Cronbach's - coefficients of all tests used to evaluate the internal consistency were found to excellent to acceptable level. SLS-D with EO/ EC, SLS-ND with EO/ EC and TS with EO had strong correlation, TS with EC and PRT-Forward moderate correlation, PRT-Right and eft low correlation with GMFCS. All tests except PRT-Right and PRT-Left were discriminate balance ability between GMFCS level I and level II (AUC>0.800). Conclusion: In this study, we used SLS, TS, PRT for balance evaluations and we investigated reliability and validity (construct and predictive) of each balance tests in childeren with diparetic CP. All tests were sensitive in distinguishing between GMFCS levels I and II, except PRT-Right and PRT-Left. As a result of the study, it was determined that the tests were valid and reliable, suggesting that physiotherapists will provide clinical advantage in order to quickly learn about the balance of children with CP.

PMID: 37850443

5. Common modelling assumptions affect the joint moments measured during passive joint mobilizations

Axel Koussou, Raphaël Dumas, Eric Desailly

Sci Rep. 2023 Oct 18;13(1):17782. doi: 10.1038/s41598-023-44576-8.

Joint resistance to passive mobilization has already been estimated in-vivo in several studies by measuring the applied forces and moments while manipulating the joint. Nevertheless, in most of the studies, simplified modelling approaches are used to calculate this joint resistance. The impact of these simplifications is still unknown. We propose a protocol that enables a reference 3D inverse dynamics approach to be implemented and compared to common simplified approaches. Eight typically developed children and eight children with cerebral palsy were recruited and underwent a passive testing protocol, while applied forces and moments were measured through a 3D handheld dynamometer, simultaneously to its 3D kinematics and the 3D kinematics of the different segments. Then, passive joint resistance was estimated using the reference 3D inverse dynamics approach and according to 5 simplified approaches found in the literature, i.e. ignoring either the dynamometer kinematics, the measured moments alone or together with the measured tangential forces, the gravity and the inertia of the different segments, or the distal segments kinematics. These simplifications lead to non-negligible differences with respect to the reference 3D inverse dynamics, from 3 to 32% for the ankle, 4 to 34% for the knee and 1 to 58% for the hip depending of the different simplifications. Finally, we recommend a complete 3D kinematics and dynamics modelling to estimate the joint resistance to passive mobilization.

PMID: 37853085

6. Hip displacements and correctable scoliosis were prevalent in children with cerebral palsy registered in a Danish follow-up programme from 2010 to 2020

Laerke Hartvig Krarup, Pia Kjaer Kristensen, Martin Baekgaard Stisen, Kirsten Nordbye-Nielsen, Inger Mechlenburg

Acta Paediatr. 2023 Oct 20. doi: 10.1111/apa.17013. Online ahead of print.

Aim: We need a better understanding of non-surgical interventions for hip dislocations and scoliosis. This study estimated the cumulative incidence of problems among children with cerebral palsy and described the type and frequency of therapist-led interventions. Methods: The study comprised 1482 children (58% male) aged 0-15 years, with a mean age of 3.6 years, who were registered in the Danish Cerebral Palsy Follow-up Programme from 2010 to 2020. We used the Kaplan-Meier estimator to examine the cumulative incidence of hip displacement, hip dislocation, correctable scoliosis and non-correctable scoliosis. The type and frequency of therapist-led interventions are reported descriptively. Results: The cumulative incidence of hip displacement and hip dislocation were 15.8% and 3.5%, respectively, and 39.0% and 13.9% for correctable and non-correctable scoliosis. The most frequently reported type of therapist-led intervention was a joint range of motion exercise. We found that 60.5% with hip displacements and 43.8% with correctable scoliosis used a standing aid. A further 5.4% used a spinal orthosis to prevent deformity and 8.1% for stabilisation. Conclusion: Hip displacement and correctable scoliosis were prevalent in children with cerebral palsy, whereas the occurrence of hip dislocations and non-correctable scoliosis was low. The use of assistive aids was low.

PMID: 37861180

7. Walking outcomes in cerebral palsy: What is the GOAL?

Unni Narayanan

Dev Med Child Neurol. 2023 Oct 20. doi: 10.1111/dmcn.15783. Online ahead of print.

No abstract available

PMID: 37861286

8. [Hippotherapy versus hippotherapy simulators as a treatment option in children with cerebral palsy: A systematic review] [Article in Spanish]

A García-Arandilla, T Gonzàlez-Gàzquez, A Morgado-Pérez, V Davalos Yerovi, M Tejero-Sánchez, D Meza-Valderrama

Review Rehabilitacion (Madr). 2023 Oct 18;58(1):100816. doi: 10.1016/j.rh.2023.100816. Online ahead of print.

Introduction and objective: Hippotherapy (HPOT) and hippotherapy simulators (SHPOT) are used in children with cerebral palsy to achieve their maximum functionality and independence. The aim is to find out if HPOT and SHPOT produce the same effects on balance, gross motor function, and postural control in children under 18 years old with cerebral palsy. Materials and methods: The keywords used were: hippotherapy, equine-assisted therapy and cerebral palsy. The databases used were PeDro, Scopus, LILACS, ScienceDirect, Cochrane Library, Web of Science and CINAHL Complete (Ebsco). Studies were included if they were randomized clinical trials that studied the effect of HPOT and/or SHPOT on the variables mentioned in these patients. Results: Four studies assessed balance, 4 studied gross motor function, and 2 investigated postural control. Both

HPOT and SHPOT produced benefits in all of them. Conclusions: According to the studied variables both interventions produce similar improvements. Although, they increase with HPOT possibly due to greater sensory stimulation.

PMID: 37862777

9. Chronic pain assessment for young people with cerebral palsy: Moving beyond pain intensity

Nadine Smith

Dev Med Child Neurol. 2023 Oct 15. doi: 10.1111/dmcn.15771. Online ahead of print.

No abstract available

PMID: 37840336

10. Barriers in maintaining oral health among the children with cerebral palsy - Parent/caregiver's perspective

Diana Constance, Rohini Subbiah, Aparna Sukumaran, Parangimalai Diwakar Madankumar

J Indian Soc Pedod Prev Dent. 2023 Jul-Sep;41(3):234-238. doi: 10.4103/jisppd.jisppd_360_23.

Background: Cerebral palsy (CP) is primarily a neuromotor disorder that affects the development of movement, muscle tone, and posture. Objective: This qualitative study explores the underlying barriers in maintaining oral health from the perspective of the caregivers or parents. Materials and methods: Focus group discussion was conducted with the parents or caregivers in the National Institute for Empowerment of Persons with Multiple Disabilities (NIEPMD), Muttukadu, Chennai. Data were collected from seven participants. Thematic analysis identified key themes using NVivo software. Results: The discussion on barriers to maintain oral health faced by parents of children with CP identified a collation of three key themes: behavioral challenges, inhibited social and communication skills, and parental dependence. Conclusion: Oral health professionals should aim to raise awareness among health-care professionals to work toward reducing the barriers to oral health care that these populations currently experience.

PMID: 37861638

11. From monkeys to humans: observation-based EMG brain-computer interface decoders for humans with paralysis

Fabio Rizzoglio, Ege Altan, Xuan Ma, Kevin L Bodkin, Brian M Dekleva, Sara A Solla, Ann Kennedy, Lee E Miller

J Neural Eng. 2023 Oct 16. doi: 10.1088/1741-2552/ad038e. Online ahead of print.

Intracortical brain-computer interfaces (iBCIs) aim to enable individuals with paralysis to control the movement of virtual limbs and robotic arms. Because patients' paralysis prevents training a direct neural activity to limb movement decoder, most iBCIs rely on "observation-based" decoding in which the patient watches a moving cursor while mentally envisioning making the movement. However, this reliance on observed target motion for decoder development precludes its application to the prediction of unobservable motor output like muscle activity. Here, we ask whether recordings of muscle activity from a surrogate individual performing the same movement as the iBCI patient can be used as target for an iBCI decoder. We test two possible approaches, each using data from a human iBCI user and a monkey, both performing similar motor actions. In one approach, we trained a decoder to predict the electromyographic (EMG) activity of a monkey from neural signals recorded from a human. We then contrast this to a second approach, based on the hypothesis that the low-dimensional "latent" neural representations of motor behavior, known to be preserved across time for a given behavior, might also be preserved across individuals. We "transferred" an EMG decoder trained solely on monkey data to the human iBCI user after using Canonical Correlation Analysis to align the human latent signals to those of the monkey. We found that both direct and transfer decoding approaches allowed accurate EMG predictions between two monkeys and from a monkey to a human. Our findings suggest that these latent representations of behavior are consistent across animals and even primate species. These methods are an important initial step in the development of iBCI decoders that generate EMG predictions that could serve as signals for a biomimetic decoder controlling motion and impedance of a prosthetic arm, or even muscle force directly through Functional Electrical Stimulation.

PMID: 37844567

12. Virtual Reality and Active Video Game Integration within an Intensive Bimanual Therapy Program for Children with Hemiplegia

Audrey Ferron, Maxime T Robert, William Fortin, Odette Bau, Marie-Claude Cardinal, Julie Desgagné, Geoffroy Saussez, Yannick Bleyenheuft, Danielle Levac

Phys Occup Ther Pediatr. 2023 Oct 16:1-17. doi: 10.1080/01942638.2023.2259462. Online ahead of print.

Aims: To describe the nature of custom and non-custom virtual reality and active video game (VR/AVG) implementation within a Hand-Arm Bimanual Intensive Therapy Including Lower Extremities (HABIT-ILE) intervention program for children with hemiplegia. Methods: Six children aged 8-11 years participated in a 10-day HABIT-ILE intervention (65 h; 6.5 planned VR/AVG hours). VR/AVG implementation details were recorded daily and summarized with descriptive statistics; active motor engagement was quantified as minutes of active game participation. Post-intervention interviews with interventionists were analyzed with qualitative content analysis. Results: On average, participants received 79% of the planned VR/AVG dosage (314/400 planned minutes, range 214-400 min), of which the per-session active motor engagement average was 68% (27 min, SD 12 min). Participation involved equivalent amounts of custom (49%) and non-custom (51%) VR/AVG system use. Material and verbal adaptations facilitated alignment with HABIT-ILE principles. Interventionists identified type of task (gross versus fine motor), children's perceived motivation, and VR/AVG attributes as factors influencing active motor engagement and alignment with HABIT-ILE principles. Conclusions: Describing individual and technological challenges of VR/AVG integration within HABIT-ILE can advance knowledge about VR/AVG use in intensive interventions and identify directions for subsequent research.

PMID: 37846035

13. Letter to the Editor: "Translation and validation of Cerebral Palsy Quality of Life Questionnaire-Teen in Hong Kong Chinese population [CP QoL-Teen (HK)]"

Fatih Özden

Comment Eur J Pediatr. 2023 Oct 14. doi: 10.1007/s00431-023-05260-1. Online ahead of print.

No abstract available

PMID: 37837463

14. Prevalence of cerebral palsy comorbidities in China: a systematic review and meta-analysis

Chao Gong, Xiaopei Liu, Liya Fang, Annan Liu, Beibei Lian, Xunzhong Qi, Shuyue Chen, Huiqing Li, Ming Zhao, Jin Guo, Shaobo Zhou

Front Neurol. 2023 Sep 28:14:1233700. doi: 10.3389/fneur.2023.1233700. eCollection 2023.

Objectives: This systematic review aimed to comprehensively understand the comorbidity of cerebral palsy (CP) in China. Methods: We searched through databases in both Chinese and English until December 2022 to gather cross-sectional studies on the comorbidity of CP in China. After two reviewers independently screened the articles, collected the data, and assessed the bias risk, a meta-analysis was conducted using the Stata 17.0 software. Results: A total of 73 articles were included. Of these, 16 articles reported total comorbidity, with a prevalence of 79.7% (95% CI: 73.8-85.7%); 56 articles reported epilepsy, with a prevalence of 17.9% (95% CI: 15.4-20.4%); 48 articles reported intellectual disability, with a prevalence of 58.0% (95% CI: 51.8-64.3%); 32 articles reported speech disorders, with a prevalence of 48.0% (95% CI: 41.6-54.4%); 41 articles reported hearing disorders, with a prevalence of 17.2% (95% CI: 13.0-21.4%); and 35 articles reported vision disorders, with a prevalence of 23.1% (95% CI: 16.3-29.8%). The topographical type of CP was the primary source of heterogeneity in the prevalence of epilepsy. Diagnostic criteria for CP, clinical type of CP, GMFCS, publishing time, and topographical type of CP were the primary sources of heterogeneity in the prevalence of intellectual disability. Clinical type of CP and topographical type were the primary sources of heterogeneity in the prevalence of speech disorders. Finally, the region was the primary source of heterogeneity in the prevalence of hearing disorders. Conclusion: The prevalence of comorbidities in CP is high in China. Comorbidities are related to the characteristics, severity, and risk factors of brain insult and have a particular relationship with regional economic development and medical and health levels.

PMID: 37840931

15. Transition from child to adult services for young people with cerebral palsy in Ireland: Influencing factors at multiple ecological levels

Jennifer Fortune, Jennifer M Ryan, Aisling Walsh, Michael Walsh, Claire Kerr, Thilo Kroll, Grace Lavelle, Mary Owens, Owen Hensey, Meriel Norris

Dev Med Child Neurol. 2023 Oct 17. doi: 10.1111/dmcn.15778. Online ahead of print.

Aim: To explore the factors that influence the process of transitioning from child to adult services in Ireland among young people with cerebral palsy, their parents, and service providers. Method: This study followed a qualitative descriptive approach. Semi-structured interviews were conducted with 54 participants, including young people with cerebral palsy aged 16 to 22

years (n = 13), their parents (n = 14), and service providers (n = 27). Data were analysed using the Framework Method. Findings were categorized using an ecological model across four levels: individual, microsystem, mesosystem, and exosystem. Results: Limited awareness, preparation, and access to information hindered successful transition. Microsystem factors such as family knowledge, readiness, resilience, and health professional expertise influenced transition experience. Mesosystem factors encompassed provider-family interaction, interprofessional partnerships, and interagency collaboration between child and adult services. Exosystem factors included inadequate availability and distribution of adult services, limited referral options, coordination challenges, absence of transition policies, staffing issues, and funding allocation challenges. Interpretation: Transition is influenced by diverse factors at multiple ecological levels, including interactions within families, between health professionals, and larger systemic factors. Given the complexity of transition, a comprehensive multi-level response is required, taking into account the interactions among individuals, services, and systems.

PMID: 37849380

16. Prevalence, Clinical Features, Neuroimaging, and Genetic Findings in Children With Ataxic Cerebral Palsy in Europe

Veronka Horber, Guro L Andersen, Catherine Arnaud, Javier De La Cruz, Ivana Dakovic, Andra Greitane, Owen Hensey, Kate Himmelmann, Katalin Hollody, Karen Horridge, Christoph T Künzle, Marco Marcelli, Els Ortibus, Antigone Papavasiliou, Oliver Perra, Mary J Platt, Gija Rackauskaite, Solveig Sigurdardottir, Anja Troha Gergeli, Daniel Virella, Ingeborg Krägeloh-Mann, Elodie Sellier

Neurology. 2023 Oct 19:10.1212/WNL.0000000000207851. doi: 10.1212/WNL.0000000000207851. Online ahead of print.

Objective: To report on prevalence, associated impairments, severity and neuroimaging findings in children with ataxic cerebral palsy (CP). Methods: In children coded as having ataxic CP in the Central database of JRC-SCPE (Joint Research Center-Surveillance of Cerebral Palsy in Europe) and born 1980-2010, birth characteristics, severity profiles including associated impairments, neuroimaging patterns and the presence of syndromes were analyzed. Definitions were according to validated SCPE guidelines. Prevalence over time was estimated using Poisson regression. Results: In total, 679 children with ataxic CP were identified in 20 European CP registers. The proportion with ataxic CP was 3.8% and varied from 0% to 12.9%. Prevalence over time showed no significant trend. 70% of children with ataxic CP were able to walk, 40% had severe intellectual impairment and a high impairment index. Children with ataxic CP were mostly born at term (79%) and with normal birth weight (77%). Neuroimaging patterns revealed normal findings in 29%, brain maldevelopments in 28.5% and miscellaneous findings in 23.5% and brain injuries in 19%, according to the SCPE classification. Genetic syndromes were described in 9%. Conclusions: This register-based multicentre study on children with ataxic CP provides a large sample size for the analysis of prevalence, severity and origin of this rare CP subtype. Even with strict inclusion and classification criteria, there is variation between registers on how to deal with this subtype and diagnosis of ataxic CP remains a challenge. Ataxic cerebral palsy differs from other CP subtypes: children with ataxic CP have a disability profile that is more pronounced with respect to cognitive than gross motor dysfunction. They are mostly term born and the origin rarely suggests acquired injuries. In addition to neuroimaging, a comprehensive genetic work-up is particularly recommended for children with this CP type.

PMID: 37857495

17. Oral health of individuals with cerebral palsy in Saudi Arabia: A systematic review

Faris Yahya I Asiri, Marc Tennant, Estie Kruger

Review Community Dent Oral Epidemiol. 2023 Oct 19. doi: 10.1111/cdoe.12923. Online ahead of print.

Objective: This systematic review aimed to comprehensively summarize and critically assess studies conducted on oral health outcomes among individuals with cerebral palsy (CP) in Saudi Arabia. Methods: This study followed the Participants, Exposure, Control and Outcomes (PECO) framework to formulate a focused research question. We conducted an extensive literature search across multiple databases, including PubMed, Medline, Scopus and Embase, in addition to clinical trial registers. Inclusion criteria encompassed clinical studies conducted in either English or Arabic, focusing on CP as defined by the International Classification of Diseases 10 (ICD10), and examining various oral health conditions and parameters. Nonclinical studies, commentaries, other systematic reviews and letters to the editor were excluded. Data extraction included comprehensive information about the study characteristics, oral health outcomes (dental, oral or periodontal disease; changes in standardized indices; dental trauma and other types of oral diseases) and an assessment of the risk of bias using the Appraisal Tool for Cross-Sectional Studies (AXIS). Results: The initial search yielded a total of 879 articles, ultimately resulting seven studies that met our stringent inclusion criteria. All of these studies were conducted as cross-sectional investigations in different cities within Saudi Arabia. The sample sizes ranged from 46 to 400 participants, all falling within the age range of 2-18 years. Notably, the prevalence of dental caries among individuals with CP in these studies varied significantly, with rates ranging from 52.9% to as high as 98.6%. Additionally, a substantial portion of CP patients exhibited poor oral hygiene, with figures ranging between 34.6% and 66.2%, and dental trauma was reported in 47.5% of the cases. Moreover, these studies underscored the influence of motor function and intellectual disabilities on the oral health status of CP individuals. Furthermore, various secondary outcomes, including periodontal parameters and oral health-related quality of life, were also assessed. However, it is

essential to acknowledge that several sources of bias were identified within these studies, raising questions about the generalisability of their findings. Conclusion: In conclusion, the systematic review revealed a concerning pattern of high dental caries prevalence and other oral health issues among individuals with CP in Saudi Arabia. Nevertheless, the need for comparative studies between CP patients and those without CP is evident to establish a definitive understanding of the oral health status of CP individuals. Initiating early interventions such as oral hygiene education, preventive dentistry programs, and orthodontic interventions could potentially contribute to improved oral health outcomes for individuals with CP in Saudi Arabia.

PMID: 37855080

18. Long-term motor development after hypothermia-treated hypoxic-ischaemic encephalopathy

Mimmi Eriksson Westblad, Kristina Löwing, Katarina Robertsson Grossmann, Mats Blennow, Katarina Lindström

Eur J Paediatr Neurol. 2023 Oct 16:47:110-117. doi: 10.1016/j.ejpn.2023.10.003. Online ahead of print.

Aims: To describe longitudinal motor development in children treated with therapeutic- hypothermia (TH) due to neonatal hypoxic-ischaemic encephalopathy (HIE) and to explore motor functioning in early adolescence. Material and methods: Children treated with TH due to HIE during 2007-2009, in Stockholm, participated in a prospective follow-up study. Motor development was assessed on four occasions, reported as percentiles and at mean ages. Alberta Infant Motor Scale was used at 0.35 years of age, Bayley Scales of Infant and Toddler Development-III at 2.1 years and Movement Assessment Battery for Children (MABC-2) at 7.3 and 11.1 years of age. MABC-2 Checklist was completed by parents at 7.3 and 11.1 years of age. General cognition was assessed using Wechsler Intelligence Scales for Children Fifth Edition (WISC-V). Results: Thirty-one percent (14/45) of the children had a motor score ≤ 15th percentile, indicating risk of motor difficulties at 11.1 years of age, and simultaneously the scores from parents of 52% (23/44), indicating risk of motor difficulties in the everyday context. These children had significantly lower motor percentile at 2.1 years of age, but within the normal range. Longitudinal motor development displayed a weak association with WISC-V Full Scale IQ (rs0.38, p = 0.013). Conclusion: Among survivors of hypothermia-treated HIE free of moderate/severe cerebral palsy, a third had MABC-2 scores indicating risk of motor difficulties at 11.1 years of age. As motor difficulties became more apparent over time, we suggest that children treated with TH due to neonatal HIE should be followed into at least middle school age.

PMID: 37862884

19. Is there early ageing in cerebral palsy?

Bernard Dan

Editorial Dev Med Child Neurol. 2023 Oct 20. doi: 10.1111/dmcn.15793. Online ahead of print.

No abstract available

PMID: 37861275

20. Development of social functioning in children with cerebral palsy: A longitudinal study

No authors listed

Dev Med Child Neurol. 2023 Oct 20. doi: 10.1111/dmcn.15792. Online ahead of print.

No abstract available

PMID: 37861273

21. Cerebral palsy in children born after assisted reproductive technology; is there a true association?

Jayapriya Jayakumaran, Mark Trolice, Lucy Chen, Laurel Stadtmauer

Acta Obstet Gynecol Scand. 2023 Oct 18. doi: 10.1111/aogs.14699. Online ahead of print.

No abstract available

PMID: 37853602

22. Vocal Characteristics of Infants at Risk for Speech Motor Involvement: A Scoping Review

Helen L Long, Leslie Christensen, Sydney Hayes, Katherine C Hustad

J Speech Lang Hear Res. 2023 Oct 18:1-29. doi: 10.1044/2023_JSLHR-23-00336. Online ahead of print.

Purpose: The purpose of this scoping review was to (a) summarize methodological characteristics of studies examining vocal characteristics of infants at high risk for neurological speech motor involvement and (b) report the state of the high-quality evidence on vocal characteristic trends of infants diagnosed or at high risk for cerebral palsy (CP). Method: The PRISMA (Preferred Reporting Items of Systematic Reviews and Meta-Analyses) extension for scoping reviews was followed for reporting our review. Studies measured prelinguistic vocal characteristics of infants under 24 months with birth risk or genetic conditions known to commonly present with speech motor involvement. Fifty-five studies met criteria for Part 1. Eleven studies met criteria for synthesis in Part 2. Results: A smaller percentage of studies examined infants with or at risk for CP compared to studies examining genetic conditions such as Down syndrome. The median year of publication was 1999, with a median sample size of nine participants. Most studies were conducted in laboratory settings and used human coding of vocalizations produced during caregiver-child interactions. Substantial methodological differences were noted across all studies. A small number of high-quality studies of infants with or at risk for CP revealed high rates of marginal babbling, low rates of canonical babbling, and limited consonant diversity under 24 months. Mixed findings were noted across studies of general birth risk factors. Conclusions: There is limited evidence available to support the early detection of speech motor involvement. Large methodological differences currently impact the ability to synthesize findings across studies. There is a critical need to conduct longitudinal research with larger sample sizes and advanced, modern technologies to detect vocal precursors of speech impairment to support the accurate diagnosis and prognosis of speech development in infants with CP and other clinical populations.

PMID: 37850852

23. Positional Change Used to Manage Postextubation Respiratory Failure in a Child With Cerebral Palsy

Jun Hirokawa, Kouichi Hidaka, Mitsuyo Kanemaru, Takashi Hitosugi, Yu Oshima, Takeshi Yokoyama

Case Reports Anesth Prog. 2023 Sep 1;70(3):124-127. doi: 10.2344/anpr-70-02-08.

Dental treatment for patients with cerebral palsy (CP) is often performed under general anesthesia due to involuntary movements that can render dental treatment difficult. Since CP is often accompanied by spasticity, care must be taken when positioning patients during general anesthesia. We report the management of a 14-year-old girl with CP and epilepsy undergoing general anesthesia for dental treatment who experienced respiratory failure due to acute thoracoabdominal muscle hypertonia after extubation. She had a history of cardiac arrest due to respiratory failure caused by acute muscle hypertonia and successful resuscitation. General anesthesia was induced after careful positioning of the patient to prevent spastic muscle stretching, and the dental treatment was completed without complications. However, upon awakening after extubation, the patient developed respiratory failure due to acute muscle hypertonia. The patient was resedated and repositioned from a supine to a sitting position, and her symptoms improved. There was no recurrence of muscle hypertonia, and she recovered fully without complications. In this case, respiratory failure associated with acute muscle hypertonia was successfully managed by position change after initial treatment with positive-pressure ventilation and propofol. It is important to be prepared for the possibility of respiratory failure associated with acute muscle hypertonia and its countermeasures when providing general anesthesia for patients with CP.

PMID: 37850673

24. Effectiveness of behavioral activation therapy and acceptance and commitment therapy on depression and rumination as a tool for health promotion on mothers with cerebral palsy children

Mostafa Alirahmi, Sehat Aibod, Akbar Azizifar, Sattar Kikhavani

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Background: Since in most families, mothers are more responsible for taking care of children and they have more responsibility than fathers for monitoring the child; taking care of a disabled child can have a more negative effect on the psychological state of mothers. The purpose of the present study is to investigate the effectiveness of behavioral activation therapy (BAT) and acceptance and commitment therapy (ACT) on depression and rumination on mothers with children with cerebral palsy in the city of Ilam. Materials and methods: The design of this research was pretest and post-test quasi-experimental with a control group. The research sample was 60 mothers who referred to occupational therapy centers in the city of Ilam in 2022, who were randomly divided into two experimental groups (N = 40 for each) and a control group (N = 20). One of the experimental groups, received behavioral activation group therapy method; and the other received the group therapy method based on acceptance and commitment for eight sessions lasted for 90 minutes in week. Data were collected using the Beck depression questionnaire (BDI-II) and the rumination questionnaire in two stages before the intervention and after the intervention. In this

research, covariance analysis was used for data analysis. Results: The results of covariance analysis showed that behavioral activation therapy and acceptance and commitment-based therapy reduced depression ($P < 0.01$) and rumination ($P < 0.01$), and the two experimental groups were compared with the control group in the post-test phase. Conclusion: It seems that behavioral activation therapy and acceptance and commitment therapy are effective in reducing depression and rumination in the subjects of the present study. Therefore, these treatments are suggested as complementary treatments along with drug treatments to improve psychological symptoms.

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25. Chronic traumatic encephalopathy-neuropathologic change in a routine neuropathology service: 7-year follow-up

Marc R Del Bigio, Sherry Krawitz, Namita Sinha

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To follow our 2016 study of chronic traumatic encephalopathy neuropathologic change (CTE-NC) in our forensic autopsy service, we prospectively screened all cases with clinical histories of multiple concussions, persistent post-head injury symptoms, or ≥3 hospital investigations for head injuries from 2016 to 2022 inclusive using hyperphosphorylated tau (p-tau) immunostaining. The cases had routine brain sampling plus 4-6 additional lateral hemisphere samples. When "pathognomonic" CTE-NC lesions were identified, additional p-tau immunostaining was done for CTE-NC staging. Of ~1100 adult brains aged 18-65 years examined, 85 were screened, and 16 were positive for CTE-NC (2 women, 14 men, ages 35-61 years, median 47 years). Alcohol abuse was documented in 14 of 16 (8 in combination with other substances); 5 had developmental brain anomalies (2 presumed genetic, 3 from acquired perinatal insults). Widespread p-tau deposits (high CTE-NC) were found in 7 of 16. Old brain contusions were present in 9 of 16, but CTE-NC did not colocalize. Of particular interest were (1) a man with FGFR3 mutation/hypochondroplasia and life-long head banging, (2) a woman with cerebral palsy and life-long head banging, and (3) a man with bilateral peri-Sylvian polymicrogyria, alcohol abuse, and multiple head injuries. Thus, CTE-NC occurs in association with repeated head trauma outside contact sports. Substance abuse is a common determinant of risk behavior. The utility of diagnosing mild-/low-stage CTE-NC in this population remains to be determined.

PMID: 37846159

26. Neonatal outcomes of early preterm births according to the delivery indications

Hyojeong Kim, Yu Mi Shin, Kyong-No Lee, Hyeon Ji Kim, Young Hwa Jung, Jee Yoon Park, Kyung Joon Oh, Chang Won Choi

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Objective: To compare the neonatal outcomes of early preterm births according to delivery indications and determine the obstetric risk factors associated with adverse outcomes. Methods: We retrospectively studied pregnancies delivered between 22 + 0 and 26 + 6 weeks at the tertiary center between April 2013 and April 2022. Stillbirths, elective termination of pregnancy, and multifetal pregnancies were excluded. Patients were classified into two groups according to delivery indications: spontaneous preterm birth (sPTB) due to premature rupture of membranes (PROM), preterm labor, or acute cervical insufficiency; and indicated preterm birth (iPTB). Obstetric and neonatal outcomes were compared between the groups. Results: Of the 121 neonates, 73 % (88/121) underwent sPTB. The overall survival rates were 73 % and 49 % in the sPTB and iPTB groups, respectively ($p = 0.017$). Multivariate logistic regression analysis was performed with adjustment for gestational age at delivery, fetal growth restriction, cesarean section, histological chorioamnionitis, and funisitis. Moreover, in the 1-year follow-up, the proportion of body mass below the third percentile was significantly higher in the iPTB-group than in the sPTB-group (53 % vs. 20 %, $p = 0.019$). Furthermore, diagnoses of developmental delay and cerebral palsy were slightly higher in the iPTB-group (33 % and 20 %, respectively) than in the sPTB-group (27 % and 9 %, respectively); however, this difference was not statistically significant. Conclusions: In early preterm births, iPTB was associated with a higher neonatal mortality than sPTB.

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