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Interventions and Management

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1. Upper Limb Therapy for Infants and Young Children with Unilateral Cerebral Palsy: A Clinical Framework

Susan Greaves, Brian Hoare 1

Review J Clin Med . 2024 Nov 15;13(22):6873. doi: 10.3390/jcm13226873.

Abstract

Early detection and rehabilitation interventions are essential to optimise motor function in infants and young children with unilateral cerebral palsy. In this paper we report a clinical framework aimed at enhancing upper limb therapy for infants and young children with unilateral cerebral palsy during a sensitive period of brain development. We describe two major therapeutic approaches based on motor learning principles and evidence: constraint-induced movement therapy and bimanual therapy. These two therapies have demonstrated efficacy in older children and emerging evidence is available for their application to infants younger than 2 years of age. To provide clinicians with guidance as to when to implement these therapies, we discuss the key consideration when undertaking upper limb therapy programs. In addition, we describe the factors to consider when choosing which approach may be suitable for an individual child and family. Detailed strategies for implementing these therapies in infants and young children of different ability levels are given.

PMID: [39598017](#)

2. Safety and efficacy of non-invasive brain stimulation for the upper extremities in children with cerebral palsy: A systematic review

No authors listed

Dev Med Child Neurol . 2024 Nov 28. doi: 10.1111/dmcn.16194. Online ahead of print.

No abstract available

PMID: [39607852](#)

3. The effect of the combined application of repetitive transcranial magnetic stimulation and local injection of botulinum neurotoxin versus their individual use in children with spastic diplegic cerebral palsy

Karim Sami Elsharty, Ahmed Fekry Salman, Islam H Fayed, Rawda S Ahmed, Rana Nabil Hussien

Physiother Theory Pract . 2024 Nov 26;1-10. doi: 10.1080/09593985.2024.2433596. Online ahead of print.

Background: Botulinum neurotoxin (BoNT) is frequently utilized for localized spasticity in patients with spastic diplegic cerebral palsy (CP), while repetitive transcranial magnetic stimulation (rTMS) offers a potential therapeutic option. **Objective:** To assess and compare BoNT and rTMS effects among children with spastic diplegic CP on spasticity and motor function. Additionally, investigate the potential advantages of combining these therapeutic modalities. **Methods:** Seventy five children (aged 4-8 years) with moderate spastic diplegia, were allocated to one of three groups (25 children in each group): the rTMS group (received 10 hz rTMS, 1500 pulses, two sessions per week for 3 months), the BoNT group (received single BoNT injection), and the combined BoNT-rTMS group. All groups underwent a 3-month physical therapy program. Baseline and post-3-month assessments included the motor function by using Gross Motor Function Classification System (GMFCS), and spasticity by using Modified Ashworth Scale (MAS), and electromyography (i.e. the ratio between the amplitude of both Hoffman response to muscle response (H/M ratio)). **Results:** There were a statistically significant difference between groups regarding H/M ratio and GMFCS where p values were (<0.001 and 0.009) respectively. Multivariate regression analysis favored combination therapy over BoNT alone, showing lower odds ratios for MAS (OR = 0.47, p = .04), GMFCS (OR = 0.171, p < .001), and a negative beta coefficient for H/M ratio (Beta = -0.137, p < .001). **Conclusion:** BoNT and rTMS reduce CP-related spasticity and improve motor function, however the combined therapy of these modalities demonstrates an additive effect. PMID: [39589895](#)

4. F-words and early intervention ingredients for non-ambulant children with cerebral palsy: A scoping review

No authors listed

Dev Med Child Neurol . 2024 Nov 28. doi: 10.1111/dmcn.16193. Online ahead of print.

No abstract available

PMID: [39607866](#)

5. Feasibility of Home-Based Early Infant Hybrid Therapy in Children with Unilateral Cerebral Palsy

Rocío Palomo-Carrión, Helena Romay-Barrero, Elena Pinero-Pinto, Rita-Pilar Romero-Galisteo, María Coello-Villalón, Asunción Ferri-Morales, Purificación López-Muñoz, Cristina Lirio-Romero

J Clin Med . 2024 Nov 8;13(22):6725. doi: 10.3390/jcm13226725.

Abstract

Background: The first stage of childhood is characterized by great neuronal plasticity. In Unilateral Cerebral Palsy (UCP), it is essential to carry out early treatment, with family involvement. The aim of this study was to investigate the feasibility of Early Infant Hybrid Therapy (eI-Hybrid) applied at home with family involvement in children with UCP aged 9-18 months, and to assess its preliminary effectiveness on bimanual functional performance. **Methods:** A single group of 10 children (12.8 months, SD = 3.4) performed the eI-Hybrid therapy. The main outcome was measured with the mini Assisting Hand Assessment scale (mini-AHA), functional goals were measured with the Goal Attainment Scale (GAS), and satisfaction expectations on intensive therapy were also recorded. Three measures were performed (week 0, week 10, and month 6). A repeated-measures ANOVA test was performed on the mini-AHA in order to observe the statistically significant differences in pairwise comparison. **Results:** Ten children completed the study and the parents' expectations were fulfilled, indicating high caregiver compliance and high adherence to the treatment. Clinically relevant changes were observed between pre- and post-intervention measurements in BFP (pre: 41.9 (SD: 7.7), post: 50.9 (SD: 6.0) and in the follow-up at 6 months (50.3 (SD:5.6); p < 0.001). Families reported a high satisfaction. **Conclusions:** infant hybrid treatment is feasible to be performed at home with the family's involvement, obtaining improvements in the affected upper limb for early-age UCP. PMID: [39597871](#)

6. Unravelling age-related gait decline in cerebral palsy: insights into physiological changes and functional implications through an observational study—a French study protocol in a laboratory setting

Anders Gravholt, Bruno Fernandez, Diana Rimaud, Narimane Zeghoudi, Hugo Bessaguet, Loic Espeit, Léonard Feasson, Guillaume Y Millet, Annemieke I Buizer, Thomas Lapole

Observational Study *BMJ Open* . 2024 Nov 27;14(11):e090096. doi: 10.1136/bmjopen-2024-090096.

Introduction: Cerebral palsy (CP) presents a complex neurodevelopmental disorder with a spectrum of motor impairments stemming from early brain injury. Whereas CP is traditionally viewed as a non-progressive condition, emerging evidence suggests a progressive decline in mobility and function, particularly in adulthood. Despite the prevalence of self-reported age-related gait decline in adults with CP, objective evidence supporting this phenomenon remains limited. Moreover, mechanistic insights into these functional alterations and their comparison with typically developing (TD) peers are lacking. To address this gap, our study aims to objectively assess age-related changes in gait performance among individuals with CP while examining physiological differences compared with TD peers.

Methods and analysis: This protocol will compare the mobility of individuals with and without CP within two age groups (18-25 and 35-50 years old). Participants at Gross Motor Function Classification System levels I-II at age 18 will be invited to partake in the study. Every participant will be invited to complete four visits investigating a wide range of mobility related measures: walking performance, muscle strength, cardiopulmonary performance, fatigability, cost of walking and quantitative gait analysis. Through this comprehensive analysis encompassing gait performance metrics, self-reported outcomes, muscle strength, biomechanics and metabolic cost of walking, and fatigability, we seek to elucidate the underlying mechanisms driving age-related gait decline in adults with CP and inform targeted interventions to maintain function and quality of life.

Ethics and dissemination: The study has been approved by the French ethics board (#2022-A02510-43) and will be communicated through conferences, articles and to participants through layman terms.

Trial registration number: NCT06163950.

PMID: [39609007](#)

7. Aquatic therapy for spastic cerebral palsy: a scoping review

Aomeng Xiang, Yanxin Fu, Chengshuo Wang, Dan Huang, Jingman Qi, Ruoxuan Zhao, Liang Wu, Chunliang Fan, Qin Zhang

Review *Eur J Med Res* . 2024 Nov 29;29(1):569. doi: 10.1186/s40001-024-02171-1.

Background: Cerebral palsy (CP) is a group of dysfunction syndrome. Spastic CP is the most common form of CP. As a specific treatment, aquatic therapy (AT) can improve spasticity, increase range of motion, and increase muscle strength due to its particular properties.

Objectives: This article aims to review the research status of AT in patients with spastic CP.

Methods: We conducted a wide-ranging review of all existing literature on using AT to intervene with spastic CP from 10 databases from the earliest to May 2024. It follows the methodological framework for conducting a scoping review proposed by the Joanna Briggs Institute. The physical, physiological, and social-psychological functions were summarized and analyzed.

Results: 18 articles were included and analyzed. The gross motor ability of patients with spastic CP improved significantly after AT, and walking efficiency was improved; muscle strength showed significant improvement, enhancing the ability to perform daily activities and quality of life. Aerobic forms of exercise are a commonly used treatment for AT, and five weekly interventions are the most effective. Notably, functional improvements were correlated with child age, CP type, and gross motor function classification system grade.

Conclusions: AT can improve the gross motor function, cardiopulmonary function, daily living, and social communication ability of patients with spastic CP. This scoping review can be used as a starting point for future research on AT for children with spastic CP to design the most efficient exercise regimen.

PMID: [39609887](#)

8. Impact of eating difficulties and gastrointestinal problems on the nutritional status of children and adolescents with cerebral palsy

M E Cieri, M M Ruiz Brunner A L Condinanzi, J Escobar, C Gil, E Cuestas

Eur J Clin Nutr . 2024 Nov 26. doi: 10.1038/s41430-024-01549-y. Online ahead of print.

Introduction: This study was to analyze the impact of dietary difficulties and gastrointestinal problems on the nutritional status of people with CP from 2-19 years old who attend rehabilitation centers in the province of Córdoba-Argentina.

Methods: This was a retrospective observational-cohort study. Data from 105 people of both sexes with a CP. Motor compromise was assessed with GMFCS. Multiple logistic regression models with a binomial response were used, with a $p < 0.05$.

Results: 63.8% boys were collected. The mean age was 11 y 6 m (SD 4,4). The dependence on a caregiver at mealtime presents 4 ($p = 0.027$) times more chances of having undernutrition than those who feed independently. Requiring a change in food consistency was almost 7 ($p = 0.021$) times more likely to present undernutrition.

Conclusion: A relationship was identified between dysphagia and constipation with a greater nutritional compromise. The food difficulties in those children with disorders highlights the need to implement specific and adapted nutritional strategies.

PMID: [39592782](#)

9. Computer-Based Gamified Tools for Facial Rehabilitation: A Scoping Review

Daniel Lima Sousa, Silmar Teixeira, Adonias Caetano de Oliveira, Lucas Daniel Batista Lima, Rayele Moreira, Francisco Silva, Ariel Soares Teles

Review Games Health J. 2024 Nov 26. doi: 10.1089/g4h.2023.0220. Online ahead of print.

Abstract

Motor rehabilitation in patients with facial disorders, such as facial paralysis (FP), has faced challenges in maintaining the patients' engagement and motivation in the intensive and repetitive execution of the exercises. To assist in the facial rehabilitation process, gamified tools (GTs) have been proposed to promote stimulation and engagement in affected patients. This study provides a comprehensive review on the use of GTs to aid facial rehabilitation, with the aim of investigating the potential of such computer-based tools to motivate facial mime exercises. A systematic search conducted on May 22, 2024, across five databases (Scopus, Web of Science, IEEE Xplore, ACM Digital Library, and MEDLINE/PubMed) returned 1043 articles. The selection of studies resulted in 15 articles included for analysis, most of which were intended for patients recovering from FP. Bell's palsy, paralysis resulting from stroke, orofacial apraxia, and cerebral palsy were the patient disorders addressed in the articles. Facial mimic movements used for rehabilitation varied, the main actions considered in the studies were opening and closing the eyes, smiling, and raising the eyebrows. Studies focused on developing tools and conducting experiments with participants. Despite advances made by the selected studies, proposed computer-based tools for facial rehabilitation have not yet reached the necessary maturity for their use in clinical settings. Consequently, additional efforts are needed to perform new studies to mitigate the challenges presented in this research area. Therefore, this is a constantly evolving area of research and offers a huge window of opportunity for further research.

PMID: [39587944](#)

10. Parents' experiences of early screening for cerebral palsy: A qualitative reflexive thematic analysis

Kate L I Cameron, Free Coulston, Amanda Ka-Ling Kwong, Koa Whittingham, Catherine Morgan, Roslyn N Boyd, Cathryn Crowle, Hiam Sakakini, Alicia Spittle

Dev Med Child Neurol . 2024 Nov 28. doi: 10.1111/dmcn.16190. Online ahead of print.

Aim: To explore parents' experiences of early screening for cerebral palsy (CP) in three Australian states.

Method: This is a qualitative description study using semi-structured interviews. Participants were parents of children who had CP ($n = 5$), or high risk of CP ($n = 10$), or no CP ($n = 11$) at 2 years, and had completed early screening for CP. Data were analysed using reflexive thematic analysis.

Results: Three themes describe parents' experiences of early screening. (1) 'A new, destabilized world' explores how parents are thrown into an unexpected parenting pathway with the birth of an infant at high risk of having developmental challenges. (2) 'Early is best ... but not easy' explores parents' desire for information, screening, and developmental support, to be delivered as early as possible, even when this was experienced as emotionally challenging. (3) 'Trying to reach stable ground' describes the resources and actions parents used to move forward and reach a place of stability and control. These included access to

knowledge, proactive 'next steps', and supportive relationships with health-care professionals.

Interpretation: Parents valued and desired early information and support for their child regardless of a diagnosis of CP. Early screening was most valued when it was clearly associated with practical supports, such as early intervention and access to funding.

PMID: [39607951](#)

11. Parent carer and disabled young people's perspectives on the impacts of changes to service provision for children and young people in England during the COVID-19 pandemic: a qualitative study

Hannah Merrick, Helen Driver, Lily Potts, Catherine Exley, Amanda Allard, Christopher Morris, Jeremy R Parr, Lindsay Pennington; Resetting Services Group

BMJ Open. 2024 Nov 27;14(11):e085144. doi: 10.1136/bmjopen-2024-085144.

Objectives: In England, the delivery of health, education and social care services changed substantially during COVID-19. Some services closed, some had reduced capacity and there was a shift to the use of telehealth. This study aimed to understand how families of children and young people with neurodisability experienced these service changes, what did or did not work well for them and what impact the service changes had on them.

Design: Qualitative study with parent carers of children (aged 0-19 years) with neurodisability accessing children's health, social care and education-based services during the COVID-19 pandemic.

Setting: Participants were recruited from five local authority areas in England and interviewed via telephone and/or video call. **Participants:** 48 parent carers (45 mothers, three fathers) were interviewed and nine young people (aged 8-16 years). Across the parent carers there were 55 children with neurodisability (43 males, 12 females), ranging from 3 to 19 years. Children had a range of diagnoses, including autism, attention deficit hyperactivity disorder, cerebral palsy, genetic conditions and epilepsy. Nine young people (aged 8-16 years; eight males, one female) were interviewed; two individually, three in a focus group and four with their parent carer.

Results: Four themes were identified: (1) communication of service changes, (2) access to services during the pandemic, (3) impacts of service changes and (4) learning for future emergencies and resetting services. Communication of service changes was reported as poor and confusing. Access to services during the pandemic varied. Medical services continued with least disruption; therapeutic, education-based and social care services were severely disrupted. Service changes had a detrimental impact on families coping with high levels of medical care and physical and behavioural support. Young people experienced negative impacts of service change on their physical, mental and behavioural health.

Conclusions: Services for children with neurodisability require a person-led, family centred approach with strong multidisciplinary team working. Findings indicated the need for improved communication within and between services, and between services and families and young people. Planning for future emergencies needs to factor in the specific health and care needs of children with neurodisability and maintain access to services, in particular, those accessed through schools.

PMID: [39608991](#)

12. Family-centred communication: A pillar for better health outcomes for children with cerebral palsy

Thuy Mai Luu

Editorial Acta Paediatr . 2024 Nov 28. doi: 10.1111/apa.17514. Online ahead of print.

No abstract available

PMID: [39609564](#)

13. Navigating challenges with cerebral palsy in low- and middle-income countries

María Del Consuelo Ibarra-Rodríguez

Editorial Dev Med Child Neurol . 2024 Nov 28. doi: 10.1111/dmcn.16195. Online ahead of print.

No abstract available

PMID: [39607868](#)

14. Parental expectations and perceptions of augmentative and alternative communication: A Sri Lankan perspective

Shyamani Hettiarachchi, Shamra Nizar, Gopi Kitnasamy, Dilani Gopi

Autism . 2024 Nov 25:13623613241298061. doi: 10.1177/13623613241298061. Online ahead of print.

Abstract

Everybody has a right to communicate in any way they can, which includes augmentative and alternative communication. The uptake of augmentative and alternative communication in everyday life may be influenced by awareness, perceptions and acceptance of augmentative and alternative communication by caregivers, family members and the wider society. This study aimed to uncover what parents thought about augmentative and alternative communication in a Global South context. Eleven mothers and five fathers (16 participants) of children with complex communication needs were included. Data were collected using an interview guide from a focus-group discussion and semi-structured interviews. The data were analysed using Framework Analysis and from a gender and critical disability theory viewpoint. The key theme found was fear of augmentative and alternative communication stopping the child from learning to speak. The parents wondered if siblings might also use the alternative communication method and stop talking. They worried whether the communication device will negatively highlight their child in society. As parents' views on augmentative and alternative communication influence whether they use it with their child, informing and preparing parents before introducing augmentative and alternative communication to a child and on-going parent training should be considered.

PMID: [39587840](#)

15. A Socioecological Framing of the Experiences of Caregivers of Children With Cerebral Palsy in South Africa Post COVID-19

Skye Adams, Aneesah Moosa, Razina Borhat

J Child Neurol . 2024 Nov 26:8830738241292844. doi: 10.1177/08830738241292844. Online ahead of print.

Background: Post COVID-19, caregivers of children with cerebral palsy in South Africa face unique challenges.

Methods: A qualitative exploratory approach was used. Semistructured interviews were conducted with 14 caregivers of children with cerebral palsy in Gauteng, South Africa. Interviews were audio-recorded, transcribed verbatim, and analysed using thematic analysis.

Results: Lockdown restrictions have had lasting effects on families' routines and events, reshaping their internal and external functioning. The pandemic introduced new challenges, such as increased physical pain due to the child's weight gain, persistent emotional distress, and a lack of social and governmental support.

Conclusion: Post COVID-19, it is crucial to develop innovative support mechanisms for children with cerebral palsy and their caregivers, focusing on comprehensive health services, robust social support, and targeted interventions to address the ongoing and new challenges faced by these families.

PMID: [39587934](#)

16. Reliability and validity of the Italian version of the Caregiver Priorities and Child Health Index of Life with Disabilities in children with cerebral palsy

Federica Giorgi, Nicolò Sproccati, Corrado Zenesini, Francesca R Pulvirenti, Nicoletta Battisti, Nadia Sommella, Alessandra Feliciangeli, Antonella Cersosimo

Minerva Med . 2024 Nov 27. doi: 10.23736/S0026-4806.24.09537-5. Online ahead of print.

Background: The Caregiver Priorities and Child Health Index of Life with Disabilities (CPCHILD™) questionnaire is a reliable indirect indicator of functional, health status and quality of life in children with severe Cerebral Palsy (CP), as well as the caregiving burden. The aim of the study is to validate the Italian translation of Caregiver Priorities and Child Health Index of Life with Disabilities (CPCHILD™) questionnaire and assess its reliability and validity.

Methods: A cross-sectional study was conducted. The study involved 60 caregivers of children with CP, classified according to the Gross Motor Function Classification System (GMFCS) levels I-V. There was a self-compilation of the CPCHILD™ by primary caregivers during the clinical visit and a re-administration of the questionnaire 2-3 weeks after the first to a defined sample (N.=30, GMFCS IV-V). The Italian version of CPCHILD™'s psychometric properties were evaluated through internal consistency, test-retest reliability, and validity analyses.

Results: The translated CPCHILD™ questionnaire showed excellent test-retest reliability (Intraclass Correlation Coefficient - ICC=0.97) across most sections, with significant construct validity, differentiating well between the various GMFCS levels.

The internal consistency was robust (Cronbach's alpha=0.852) except for the health section. The face validity indicated high relevance of the questionnaire items to the caregivers, particularly in emotional well-being and social interaction. Conclusions: The Italian version of CPCHILD™ questionnaire is a reliable and valid tool for assessing the quality of life in children with severe CP, offering insights into the care burden and health status impacts perceived by caregivers. PMID: [39602159](#)

17. Advancing the management of neonatal hemorrhages: clinical evaluation of external ventricular drainage efficacy

Yi Yuan, Zhi Hu Li, Zong Jian An, Fei Gao, WeiLi Xu, Yong Sun

Childs Nerv Syst . 2024 Nov 29;41(1):18. doi: 10.1007/s00381-024-06671-7.

Objective: To evaluate the clinical efficacy of external ventricular drainage (EVD) in the treatment of neonatal intraventricular hemorrhage (IVH).

Methods: A retrospective analysis was conducted on the clinical data of neonates with IVH admitted to the Department of Neurosurgery at Qingdao Women and Children's Hospital from January 2018 to February 2024. All patients received a definitive diagnosis followed by EVD treatment. Regular follow-ups were conducted, and patients who developed posthemorrhagic hydrocephalus (PHH) underwent ventriculoperitoneal shunt (VPS) procedures.

Results: Among the 44 neonates with IVH, 28 were male and 16 were female. The median gestational age at birth was 36 weeks (range: 24-40 weeks), and the median birth weight was 2.9 kg (range: 0.78-4.33 kg). There were 3 cases of grade II IVH, 34 cases of grade III IVH, and 7 cases of grade IV IVH. The average duration of EVD was 12.2 ± 5.6 days. All patients were followed up for at least 1 year. Twelve patients (27%) developed hydrocephalus, of which 8 cases (18%) with progressive ventricular enlargement underwent VPS, and 4 cases (9%) had arrested hydrocephalus and remained stable without VPS. During the follow-up period, 39 patients exhibited normal development, 3 patients (6.8%) developed epilepsy, and 2 patients (4.5%) developed cerebral palsy.

Conclusion: EVD is an effective treatment for intraventricular hemorrhage. It improves survival rates and outcomes for patients while effectively reducing the incidence of hydrocephalus.

PMID: [39611996](#)

18. Short-term selective dorsal rhizotomy responders among children with bilateral cerebral palsy

Eirini Papageorgiou, Laure Everaert, Guy Molenaers, Els Ortibus, Kaat Desloovere, Anja Van Campenhout

Dev Med Child Neurol . 2024 Nov 28. doi: 10.1111/dmcn.16160. Online ahead of print.

Aim: To identify the short-term effects of selective dorsal rhizotomy (SDR) on gait and clinical impairments in children with bilateral spastic cerebral palsy (CP) and subgroups based on baseline gait patterns.

Method: Eighty-nine children with bilateral spastic CP (55 males, mean age [SD] before SDR: 9 years 5 months [2 years 3 months]; Gross Motor Function Classification System level I: 18; II: 54; III: 17) received three-dimensional gait analyses at two time points (baseline and 1 year after SDR); their baseline gait patterns were classified. The analysis included the comparisons of (1) sagittal plane kinematic waveforms, the Gait Profile Score, and non-dimensional spatiotemporal parameters between the two time points, (2) the kinematic waveforms of both time points to those of typically developing children, and (3) composite impairment scores of spasticity, weakness, and selectivity between the two time points.

Results: Overall, kinematics improved distally but deteriorated proximally in the entire sample, especially in genu recurvatum and crouch gait patterns. Jump gait showed the most improvements after SDR, followed by apparent equinus and crouch gait. Spasticity was reduced after SDR, but not at the expense of strength or selectivity.

Interpretation: The potential merit of investigating short-term SDR effects on gait according to baseline gait patterns was shown, with an overview of changes after SDR that may facilitate patient-tailored treatment.

PMID: [39607874](#)

19. The thalamus-L-sign in hypoxic-ischemic injury likely reflects secondary circuit injury and is only a feature on delayed magnetic resonance imaging in children with established cerebral palsy: reply to Merhav et al

Shyam Sunder B Venkatakrisna, Christelle Ackermann, Jelena Curic, Antrea Zouvani, Luis Octavio Tierradentro-Garcia, Savvas Andronikou

Pediatr Radiol . 2024 Nov 27. doi: 10.1007/s00247-024-06108-y. Online ahead of print.

No abstract available

PMID: [39601861](#)

20. Raloxifene Protects Oxygen-Glucose-Deprived Astrocyte Cells Used to Mimic Hypoxic-Ischemic Brain Injury

Nicolás Toro-Urrego, Juan P Luaces, Tamara Kobiec, Lucas Udovin, Sofía Bordet, Matilde Otero-Losada, Francisco Capani

Int J Mol Sci . 2024 Nov 12;25(22):12121. doi: 10.3390/ijms252212121.

Abstract

Perinatal asphyxia (PA) is a clinical condition characterized by oxygen supply suspension before, during, or immediately after birth, and it is an important risk factor for neurodevelopmental damage. Its estimated 1/1000 live births incidence in developed countries rises to 5-10-fold in developing countries. Schizophrenia, cerebral palsy, mental retardation, epilepsy, blindness, and others are among the highly disabling chronic pathologies associated with PA. However, so far, there is no effective therapy to neutralize or reduce PA-induced harm. Selective regulators of estrogen activity in tissues and selective estrogen receptor modulators like raloxifene have shown neuroprotective activity in different pathological scenarios. Their effect on PA is yet unknown. The purpose of this paper is to examine whether raloxifene showed neuroprotection in an oxygen-glucose deprivation/reoxygenation astrocyte cell model. To study this issue, T98G cells in culture were treated with a glucose-free DMEM medium and incubated at 37 °C in a hypoxia chamber with 1% O₂ for 3, 6, 12, and 24 h. Cultures were supplemented with raloxifene 10, and 100 nM during both glucose and oxygen deprivation and reoxygenation periods. Raloxifene 100 nM and 10 nM improved cell survival-65.34% and 70.56%, respectively, compared with the control cell groups. Mitochondrial membrane potential was preserved by 58.9% 10 nM raloxifene and 81.57% 100 nM raloxifene cotreatment. Raloxifene cotreatment reduced superoxide production by 72.72% and peroxide production by 57%. Mitochondrial mass was preserved by 47.4%, 75.5%, and 89% in T98G cells exposed to 6-h oxygen-glucose deprivation followed by 3, 6, and 9 h of reoxygenation, respectively. Therefore, raloxifene improved cell survival and mitochondrial membrane potential and reduced lipid peroxidation and reactive oxygen species (ROS) production, suggesting a direct effect on mitochondria. In this study, raloxifene protected oxygen-glucose-deprived astrocyte cells, used to mimic hypoxic-ischemic brain injury. Two examiners performed the qualitative assessment in a double-blind fashion.

PMID: [39596189](#)