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# Telephysiotherapy as a Mode of Enhancing Motor Skills of Cerebral Palsy Children in School Settings: A Review

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## Abstract

**Aim:** The aim of this review article was to the discuss about role of telephysiotherapy for cerebral palsy children in school settings by searching all relevant data. **Method:** A total of 46 journal articles were selected first. With the different combinations of Key terms, articles were screened on relevance based on the inclusion and exclusion criteria which resulted in 11 articles for this review.**Results:** Various researchers reported the effect of telephysiotherapy on gross and fine motor skills along with ADLs in cerebral palsy children in school settings. **Conclusion:** Review of articles revealed that telephysiotherapy for Cerebral Palsy children is effective mode of treatment in enhancing motor skills along in educational settings.

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**Key Words: Cerebral Palsy, Telerehabilitation, Virtual Reality, Physical, Technology**

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## Introduction

The Telerehabilitation is an emerging field and its scope is very vast in medical and other related fields, since it faces challenges related to both medical and community care settings. In the last few years, research has demonstrated the potential for improving telerehabilitation processes based not only on mobile technologies and the internet in general, but also on virtual reality. The aim of telerehabilitation is to provide rehabilitation services at a distance to help people to regain their psycho-physical functions through the use of new technologies. Medical telerehabilitation is more focused on curative medicine and involves intensively trained clinicians and different health professionals particularly physiotherapists (Thais et.al, 2014). Cerebral palsy is a neurodevelopment disorder characterized by movement and posture abnormalities. Incidence of CP in countries of the western world is approximately 2-3 per 1,000 births. Children with CP usually show signs of muscle weakness, sensory deficits as well as spasticity and accompanied by loss of functionality and dependence on others for many daily activities. Children with cerebral palsy, as well as other motor disabled individuals, have different motor abilities and thus the capabilities of learning a new skill (Josip et. al., 2016). A cure for CP, which means repair of the underlying brain damage, is not currently available; therefore, the management of children with CP usually focuses on maintaining and improving quality of life and function and preventing secondary complications. Patients with CP are at a high risk of developing musculoskeletal problems that are mainly related to physical growth, abnormal muscle tone, a weakness, lack of mobility, poor balance and loss of selective motor control. (Cristinia et al., 2016). Telerehabilitation techniques mimic virtual reality and rehabilitation for neurological conditions by using robotics and gaming techniques. Telerehabilitation allows for treatment of the acute phase of diseases by substituting the traditional face-to-face approach in the patient rehabilitation interaction (Alessandro et al., 2017). Families are choosing educational programming for their students that provide learning opportunities using

Internet-based methods. Despite the ability to access teacher support on-line, all students with special needs must still have access to appropriate special education services, including related services of speech therapy, occupational therapy and physical therapy (Criss 2013). The aim of telerehabilitation is to provide rehabilitation services at a distance to help people to regain their psycho-physical functions through the use of new technologies. The scope of telerehabilitation is vast, since it faces challenges related to both medical and community care settings. In the last few years, research has demonstrated the potential for improving telerehabilitation processes based not only on mobile technologies and the Internet in general, but also on virtual reality (Gilberto and Velta 2016). Telerehabilitation is a delivery model that uses telecommunications technology to provide therapeutic services at a distance. Telerehabilitation is a feasible service delivery model that has the potential to improve access and reduce the costs associated with delivery of early intervention services in rural communities (Jana 2011). Telehealth technology is effective in delivering paediatric acute care to children in schools. Paediatric providers, nurses, parents, and children reported primary care school-based telehealth as an acceptable alternative to traditional health care delivery systems (Young and Ireson 2003).

**Materials and Methods**

This is a review article collected from period of 2010 to 2017. The collected sources are from databases like Pub Med, Science direct and Pedro along with books and thesis. The search was based on the following MeSH terms as "Cerebral Palsy", "Video Games" and "Tele Rehabilitation". When no MeSH - term was available, the following key-terms were used like "virtual", "virtual reality", "virtual environment". When combining MeSH and Key terms, this resulted in a total of 46 articles, of which 34 articles were founded in Pub Med and 12 in Pedro. With the different combinations of Mesh and Key terms, a lot of double articles were found. In PubMed there were 12, in Pedro there were 10 double articles. The total articles after exclusion of the double articles were 22. These 22 articles were screened on relevance based on the inclusion and exclusion criteria which resulted in 13 articles but only 11 articles were selected for this review. Because of poor evidence about telerehabilitation physiotherapy in children with CP, case studies, pilot studies were also included. Selection criteria were made by use of PICO.

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|---|---|
| **Population** | Children with CP |
| **Intervention** | Telephysiotherapy rehabilitation |
| **Comparator** | Motor skills |
| **Outcome** | Results of motor learning |
| **Study design** | Clinical trials, case reports, pilot study and review |

During the screening of the articles, the following inclusion and exclusion criteria were used:

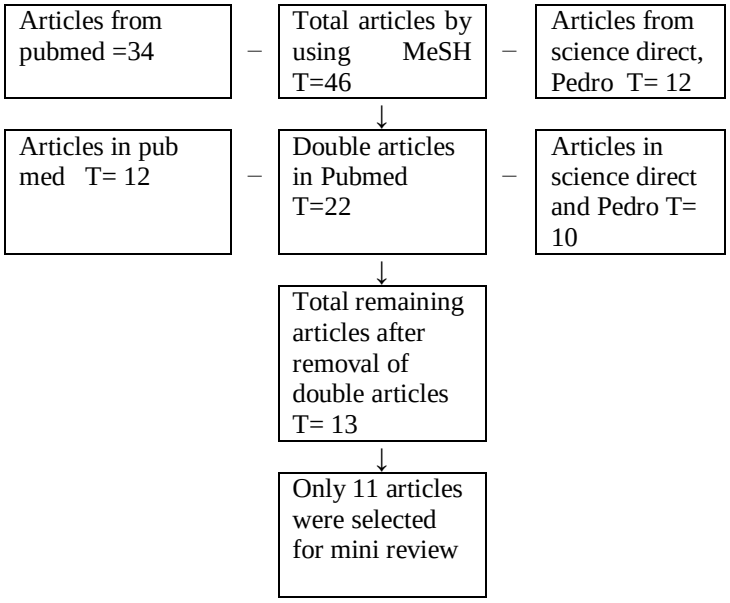
*Inclusion Criteria*

1) Selected articles in English language.
2) Population: Cerebral Palsy children.
3) Intervention: Use of telerephysiotherapy as a tool for rehabilitation.
4) Outcome: Effect of telephysiotherapy intervention on motor skills.

*Exclusion Criteria*

1**)** All other disabled children like developmentally delayed, spina bifida.
2) All other forms of intervention or rehabilitation measures used for Cerebral Palsy children.

*Exclusion procedure by literature review*




**Results**

After data extraction based on the exclusion criteria, the search resulted in

| S.No. | Author | Article type | Population, time duration | Intervention | Measurement outcome | Tool of measurement |
|---|---|---|---|---|---|---|
| 1 | Josip Glavic et al | Case study, Age=18 years. | Spastic cerebral palsy children Training frequency = 5 times per week for 12 weeks. Session=40 min. | Robotic assisted training using armeo spring system | Improving upper limb functions | Fugel meyer score FM |
| 2 | Sara benham, varleisha gibbs | Case study N=2, Age=3-12 years | School children 6weeks,20 sessions, frequency=30 min. | Telerehabilitation motion capture programme in school settings. | Improved motor skills (gross and fine motor skills) | Bruininks-oseretsky test of motor proficiency (BOT 2-SF) |
| 3 | Melanie Joy Criss | Pilot study N=8, Age = 6-11 years. | School children, 6 intervention sessions,30 min.session /week | Virtual telerehabilitation programme using web camera | Improved fine motor skills especially handwriting | Print tool™ |

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| 4 | Amy J. Brisben ,Charlotte S. Safos. | Pilot study N=6, Age=4-10 years | Cerebral palsy children, 16weeks period, with once in week | Robot with Gestural sensors | Improved gross and fine motor skills, improve upper extremity strength, coordination and dexterity | Cosmobot ™ |
| 5 | Diane Solomon et al. | Pilot study, N=3, Age=13-15 years | Hemiplegic Cerebral palsy, 22 hrs | Virtual rehabilitation telerehabilitation programme | Improved gripping activities | Bruininks-oseretsky test of motor proficiency(BOT 2-SF) |
| 6 | Pedro Caro U et al. | Case study, N=3, 10-18 years | Spastic Cerebral palsy, 10 sessions during 40 minutes | Rehabitic® software | Marked changes in strength, tone, quality of exercise performance | GMFCS 1 and 2 |
| 7 | Golomb MR et al. | 3 months Pilot study, N=3 | Hemiplegic cerebral palsy,5days/week for 30 min. a day | Vrtual reality videobased games rehabilitation systems using sensored glove | Improved functions of plegic hand, improved finger ROM | Standardized assessments ,remote assessments of finger ROM, DXA,PQCT, fMRI of hand grip task |
| 8 | Danielle Levac et al. | pilot non randomised control trial ,N=5 | Cerebral palsy ambulatory children, 7 weeks prog. 1 hr trg. for 5 days clinical based VR system | Therapist monitored videogame AVG PROG. | Neither intervention improved outcome in small sample | GMFM-CM, 6MWT |
| 9 | Judith E Deutch, Megan Borbely, Jenny Filler, Karen Huhn et al. | Retrospective and prospective case report in school settings ,8-15 yrs | Cerebral palsy children, 11 trg. sessions of 60-90 minutes | Wii sport games ,software | Positive outcomes with Wii games | Visual perceptual skills test, functional mobility and postural control measures |

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| 10. | Luna Oliva, Laura, et al. | Preliminary study in school environment, N=11 | Cerebral palsy children, 8 weeks prog. | Virtual reality tech. Kinect box 360 | Improvement in balance and ADL skills | GMFM,AMPS motor, PRT |
| 11. | Anupriya Kanitkar, Tony Szturm, Sanjay Parmar et al. | Randomized control ,single blind, clinical trial, N=140,4 - 10 yrs | Cerebral palsy children, Control gp.=45 min./session,3 times a week for 16 weeks | Computer based games | Improvement in gross and fine motor skills. | QUEST,PDMS-2 |

## Conclusion

This mini review study reveals that telephysiotherapy through virtual reality, robotic therapies and other systems of telerehabilitation can develop and promote meaningful functional outcomes in motor skills of children with cerebral palsy as noticed by review of articles. This study suggests that telephysiotherapy for cerebral palsy children is effective mode of treatment in developing motor skills along with educational settings as in schools especially in special schools. Keeping in mind the few articles in study included, telephysiotherapy could be handy mode of therapeutics for children with cerebral palsy in school settings. This paper provides an overview of current literature on telephysiotherapy for cerebral palsy children in improving motor skills in school settings.

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Conflict of Interest: None declared