

# Role of Teleconsultation and Telerehabilitation in Cerebral Palsy Patients during COVID-19 Era in India- A Review

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## ABSTRACT

Recently Coronavirus Disease-2019 (COVID-19) pandemic has caused major problems throughout the world. Apart from all morbidity and deaths due to this virus many patients with other chronic illness have also suffered due to lack of follow-up. Many general and specialised hospitals were turned into COVID centres and partial or complete lockdown was enforced by Governments. Due to this, patient with Cerebral Palsy (CP) were not able to follow their scheduled physical appointments. Many CP patients who were taking calibrated medication for different complication and following individualised rehabilitation programs were in turmoil without guidance of specialist doctors. This has led to exponential rise in use of telemedicine appointments. Telemedicine has both advantages and disadvantages which are discussed in this review. This review also focuses on rehabilitation of cerebral palsy patients using telemedicine in this dire situation where it is difficult for most patients to visit hospitals for physical appointments.

**Keywords:** Coronavirus disease-2019, Multidisciplinary approach, Spastic hemiplegia, Spastic quadriplegia, Spasticity, Telemedicine, Video call

## INTRODUCTION

Telemedicine is an effective way to provide healthcare facilities wherever physician and patient physical interactions is not necessary or not possible. Telemedicine services include telephonic consultation, video call, social media platform, health related videos, digital X-ray and remote surgery [1-3]. World Health Organisation (WHO) has defined telemedicine as, "the delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities" [4].

Multiple approaches, which are commonly used in telemedicine are (A) Virtual Visits: Live online meeting, (B) Chat-based Interactions: It transmit healthcare saved data (C) Remote Patient Monitoring: It is helpful in monitoring and management of chronic disease (D) Technology-enabled Modalities: In this method physician-to-physician approach and data transmission and interpretation is done [5].

Importance of telemedicine has significantly increased after coronavirus pandemic as this maintains social distancing and provides appropriate and cost-effective treatment to the patient. There is a possible risk of coronavirus like pandemic in future. Keeping this in mind, telemedicine technology can be developed further [6]. With the help of National Aeronautics and Space Administration (NASA) and Indian Space Research Organisation (ISRO) telemedicine gained momentum in India and lots of milestone has been achieved. Various national programmes such as the ICMR-AROGYASREE, the National e-Health Authority (NeHA) and the Village Resource Centre (VRC) are ongoing in India to empower telemedicine [7].

During COVID pandemic, Government of India started the e-sanjeevani Outpatient Department (OPD) which is a National consultation service through telemedicine. Despite all these initiative, there is low satisfaction among healthcare workers and patients. This may be due to non familiarity of healthcare workers for telemedicine, unavailability of appropriate guidelines and lack of appropriate internet services in India [7,8]. Telemedicine is essential in today's scenario as this can decrease burden on healthcare facilities in India [9].

With world's second highest population, India has a high population density and low income per capita, which pose major hurdle for fight against COVID in India [10]. Telemedicine may be the most practical solution accessible in India for the safety of patients and doctors. This is the right time to integrate digital technology in healthcare system on a larger scale [11]. Telemedicine can reduce long-distance travel and cost. With appropriate guidelines and training, telemedicine can be used even in post pandemic era as a routine patient consultation for infectious and non infectious chronic diseases [1,9].

"The term 'Cerebral palsy' is defined as a group of permanent disorders of the development of movement and posture, that cause activity limitation, and are attributed to non progressive insults to the developing foetal or infant brain. The motor impairment of cerebral palsy is often accompanied by sensory disturbances, perception, intellectual disability, communication, behaviour, by epilepsy and by secondary musculoskeletal problems" [12]. This review focuses on telemedicine technology; elaborate the approach towards the Cerebral Palsy (CP) patients, role of physician, patient examination by telemedicine, allied health personnel and patient's active involvement with proper implementation and future aspect of dealing CP patients and family members through telemedicine. Both health personnel and the CP patients can achieve satisfactory consultation at their convenience.

## TELEMEDICINE-AVAILABILITY AND ADVANTAGES

Despite availability of telemedicine services in India on a large scale, there are multiple challenges which still persist. Few of most are, doctor and patient unfamiliarity with telemedicine, poor financial background, lack of basic facilities (e.g., internet), poor education, unawareness with technologies and barriers to good quality of health services [13].

Patients of CP and their parents face more difficulties in both telemedicine and physical appointment. Telemedicine can help CP children with long duration problems and decrease economic burden of hospital visit [3,9]. Study conducted by Harper DC in 2010 concluded that telemedicine evaluation was as good as face to face evaluation [14]. Grigsby J et al., suggested that unanticipated

consequences like increased risk of certain complications are likely while using telemedicine. This may be due to underuse or excessive use of telemedicine [15]. Jnr. BA, suggested that this mode is safe and easily available but due to lack of infrastructure, funds and experience may limit its use [16].

At present many hospitals are targeting for reduction of spread of COVID as much as possible. Since onset of pandemic, teleconsultation facilities have significantly increased in healthcare system [17]. Turer RW et al., mentioned telemedicine as an electronic personal protective equipment because of zero chances of spread of infection [17]. In this pandemic, CP child may face increased stress levels which can alter their quality of life [18,19]. At early stages of pandemic most of the countries including India closed basic OPD services which affected follow-up of new and old CP patients. So, for these types of patient's teleconsultation and telerehabilitation is a boon, as we know many children with CP are capable of using mobile phones, tablet and computer [9].

## CHANGES IN HEALTHCARE SYSTEM DURING COVID-19

Cerebral palsy is a disorder that needs long lasting and consistent treatment to prevent further complications and for improving patient's participation, integration in society and quality of life [20]. Physical therapy, orthotic prescription, medicines, Botulinum neurotoxin A injection, baclofen pump, rhizotomy, and musculoskeletal correction operations are currently accessible for CP patients. All these options require regular follow-up for effectiveness and management of complications [21]. After outbreak of COVID, healthcare system has changed, and all scheduled appointments were postponed and were more focused on implementation of tele-healthcare system [22]. If a patient needs any intervention, patient's physical check-up become necessary [22,23]. With telemedicine, patient can be evaluated to some extent [9]. For spasticity, any improvement in joint Range of Motion (ROM), (Activity of Daily Living (ADL) need constant monitoring, this may need physical appointment. However, some complaints of patient does not need regular physical consultation and these can be monitored through telemedicine including dietary habit, medications, sleeping pattern, community participation and quality of life [3,9,24].

Patient's priorities such as elective surgeries can be monitored with the help of telemedicine and can be scheduled according to their need and the patients can be called for physical examination similar to neurosurgery patients where they were categorised in A, A+ and A++, in which A++ require urgent treatment, A+ appointment can be given in 7-10 days and category A appointment can be given in month [25]. Health Insurance Portability and Accountability Act (HIPAA) compliant platform can be used. This is for Indian companies who are providing telemedicine platform and secures medical data [22]. Medical Council of India (MCI) with the help of National Institute for Transforming India (NITI) Aayog issued telemedicine guidelines which should be followed before planning any procedure. The Tele-guided and Structured Continuous Care (TGSCC) can be used among patients and doctors. In this pandemic time, these guidelines can be used for patient care and further follow-up. However, these guidelines can also be used in postCOVID period to avoid transmission of infection other than COVID [26].

## CHANGES IN CEREBRAL PALSY

Cerebral palsy is a disease of heterogenous group of permanent and non progressive disorder of movement and posture due to insult of foetal brain or infant. The life expectancy of cerebral palsy patients is almost normal with a smaller number of mortalities. In these approximately 10% children die in childhood who have associated epilepsy, severe motor changes, poor communication

and poor intellectual ability. Care of cerebral palsy require long term follow-up, continuous monitoring of rehabilitation, education, psychological support and social participation. If a patient who is not on regular rehabilitation programme, then he may suffer muscle or tendon tightness, altered range of motion, subluxations or dislocations of joints, poor ADL outcome and behavioural changes [20,21]. Hip dislocation and scoliotic changes are common in CP child which is strongly associated with Gross Motor Function Classification System (GMFCS). Hip surveillance programme is based on hip displacement in child and preventing this by early monitoring can reduce incidence of pain, decreased function and quality of life. There are lots of limitations for hip displacement monitoring but still solutions are available. Regular clinical examination, radiographs are major tools for finding hip joint abnormality. GMFCS level and migration percentage should be considered while planning management. If migration percentage is more than 33% surgery plays an important role. Gradual changes occur in CP child and finding these abnormalities could be challenging because these are gradual and no time limit is fixed about when they will develop. Routine check-up is most effective method [9,27-30]. Due to COVID, regular follow-up of CP child has significantly suffered; which can lead to increase in chances of complications such as contracture, dislocations, deconditioning etc. This could require change of treatment option.

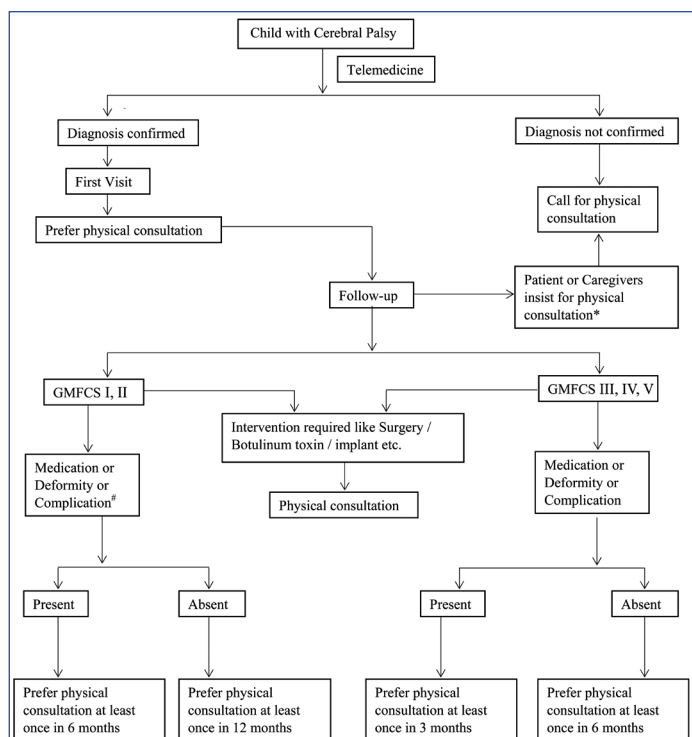
## TELEMEDICINE IN CEREBRAL PALSY

Telemedicine can be efficacious for regular follow-up and management of cerebral palsy child. Training of doctors, nursing officer, physical therapist, occupational therapist and speech therapist should be done for telemedicine for regular follow-up and prevention of further complications [9,31].

Cerebral palsy surveillance programme depends on CP type, grade of Gross Motor Function Classification System (GMFCS) and clinical examination. GMFCS score III-V are at more risk of dislocations. Physical examination of the patient can determine the severity of CP and the likelihood of dislocation, following which a rehabilitation programme can be planned based on the patient's needs [32]. By telemedicine, gait and radiological finding (If radiographs are available) can also be assessed but need further expert guidance. Tele-hip monitoring can detect hip abduction, with appropriate camera position. All these measures can reduce severe complications and decrease disability burden of cerebral palsy on society and improve quality of life [9,33]. Patient selection for telemedicine and physical consultation should be done according to their clinical status and need [Table/Fig-1].

## Integrative Approach

Availability of doctors and paramedical staff are already limited in India. Patients with CP require highly trained personnel and cutting-edge technologies [20,21]. Integrative approach from many specialities like Physiatry, Paediatrics, Neurology and Orthopaedics is highly recommended. It is helpful for physiatrist in designing a comprehensive rehabilitation protocol in CP. This leads to proper management of patients in well organised manner and increase trust in patient's relatives [3,27]. Although this type of approach is quite difficult when social distancing is required as CP patient require more physical visits as compared to others. Due to the closing of a special school for CP patients and a reduction in transportation facilities, challenges for CP patients and their caregivers have worsened during this epidemic. Integrative management through telemedicine is less time consuming and decrease caretaker burden. Telemedicine gives a proper platform to the patients and healthcare providers with secured conditions [14,26,34-36]. There is no need for Personal Protective Equipments (PPE), gloves, sanitisers, extra masks, or social distancing with a telemedicine method. Doctor can examine and talk to the patients directly and make them comfortable



**[Table/Fig-1]:** Flowchart showing patient selection for physical consultation according to their clinical status.  
 #Complications :- Spasticity, Contracture, Bladder problems, Bowel problems, Abnormal movements, Drooling, Nutrition related, Orthosis or Wheel chair related or any other.  
 \*Physical consultation should not be denied if caregivers or patient are requesting for it.

along with safety [18]. Following the pandemic, healthcare workers should become more acquainted with telemedicine and use it on a regular basis. This integrative approach should be harmonising and centred on the needs of the patient. [22,37,38]. There are varieties of platforms available that allow numerous people to connect via video chat at the same time. This can improve communication because doctors will be available on one platform at the same time and will be able to provide appropriate management [39].

**Inclusive Approach**

Participatory medicine is becoming new concept in medical field which is given in P4 concept where Ps stands for predictive, preventive, personalised and participatory [40]. In today's technological world, it's important to encourage patients and family members to learn about technology and to engage with social media platforms like WhatsApp, Facebook, Instagram, Telegram, and Twitter. Here they can get self-education and get advance information about the disease [41,42]. But these apps also have potential of being misused and must be used cautiously [43]. People are becoming more aware and responsible and they are welcoming this participatory medicine. People have been more worried about their health and became creative in sharing ideas on social media to raise awareness throughout this pandemic. Before pandemic most of the people even many healthcare workers did not know about telemedicine but now many are getting to know about it [22]. In chronic issues such as CP, participatory medicine is more effective. Patient and caretaker's participation in management may improve outcomes of intervention [44,45]. In time, telemedicine will grow and will be the main tool of healthcare system to provide better treatment option for patient [9].

**DISCUSSION**

This review is focused on availability and accessibility of telemedicine for cerebral palsy patients. CP patients and families are markedly affected in COVID era due to less community participation, financial insecurity and emotional instability. Consultation through telemedicine can provide continuous patient management. Medications, exercises, orthosis and dietary changes can be advised through telemedicine.

Telemedicine can also provide regular follow-up with increase in contribution from patient and their caretakers [9,42,44]. Most of the patients favour video calling type of teleconsultation rather than telephonic and chatting [23,46]. After this global attack of COVID-19; telemedicine is now practised globally [17,37,38]. After worldwide lockdown, normal OPD services were limited only to urgent medical conditions, India also suffered in this pandemic but somehow telemedicine facilities are being used to overcome the disease burden in society [8,23].

Due to lack of regular follow-up, CP patients may develop complications such as spasticity, infection and psychological disturbance [19,21,27]. The flow of healthcare can be maintained by sharing prerecorded videos of patient's daily routine activities such as eating, dressing, walking, playing, studying and while interacting to the people. During this pandemic, there are lots of benefits of telemedicine for patients but still many problems are faced by patient and doctors such as lack of physical examination, privacy, payment transaction, difficulties in patient's compensation [9]. More drawbacks are patient recognition, privacy issues and authorisation from patient. But these problems can be controlled by regular change in approach and can be modified according to needs [22]. Patient facilities have improved in world in last few months after increased utility of telemedicine in this pandemic [37]. All healthcare workers should regularly follow new changes and acquire them. After many years of telemedicine still there are lots of misconceptions both for patients and doctors. Many doctors, nursing officers and therapists are not friendly with technology-based treatment especially for CP, but after proper training this can get better results [23,36,37,47]. In India and other developing countries, there is lack of high-end devices, even most of the people don't have mobile phone so communication with these people is so much difficult. Government should install telemedicine booth facilities situated in a community so that they can go there and attend the session of consultations. Telemedicine cannot replace face to face interaction with doctors but it can be useful in these pandemic-like situations.

As many advantages of telemedicine have been discussed but still most of health professionals oppose this way of management [Table/Fig-2] [35,36,48]. Telemedicine is accessible and can be used for prevention of complications like contracture for CP patients [9]. Ben-Pazi H et al., suggested that execution of "Guideline and Structured Continuous Care" (TGSCC) for CP patients will be effective. According to this, telemedicine programme should be patient oriented and should bring motivation for patient and caretakers participation in managements [9]. Patient and caregiver's perspectives on disease progression and treatment efficacy might also be beneficial. Telemedicine services for cerebral palsy patients would help to maintain or improve quality of life of CP patients.

Advantage	Disadvantage
Decreased exposure of contagious disease for both patient and doctors	Required video-conferencing skill
Cost-effective	Requirement of good internet facility and computer or smart phone
Distance does not matter	Requirement for atleast 2 adults (care givers) , one for assessing and one for making video
Less time consuming for patient and caregivers	Physical therapy depend on caregivers (untrained) rather than skilled professionals
Multiple specialist consultation at same time	Difficulty in assessing complications like spasticity & contracture
Less stressful for CP child and caregivers	Decreased belief of caregivers on video conferencing (most caregivers want their patient should be checked physically)
Very good accessible option for CP child	Difficulty in giving customised orthosis
	Difficulty in assessment when patient is being assessed first time

**[Table/Fig-2]:** Advantage and disadvantage of teleconsultation in Cerebral Palsy (CP) patients [35,36,48].



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