Unveiling Indian Coping Tactics for Neurobehavioral Disorders in COVID-19 Confinement

Shrivastav Y., Balekar N.*

IPS Academy College of Pharmacy, Indore, Rajendra Nagar, A.B. Road, Indore (M.P.) 452012
Email: neelambalekar@ipsacademy.org

Received 27 June 2023, Accepted for publication 30 June 2023, Published 30 June 2023

ABSTRACT

The COVID-19 Pandemic brought an increase in Mental Health Problems for the general population, but the most substantial phase was for people who had Pre-existing Neurobehavioral Disorders, especially Adolescents and Children. As the COVID-19 Confinement Policies brought a lot of problems in Medication Adherence, Interventions, Assessment and Diagnosis of the patients with Neurobehavioral Disorders. The adoption of virtual support tools and online platforms for patients with neurobehavioral disorders in India during the pandemic is highlighted in this review. Some of the Neurobehavioral Disorders, such as Attention Deficit Hyperactivity Disorder (ADHD), have both positive and negative effects with home confinement. The Text-Message based Disorder monitoring approach is used for ADHD patients. In patients with Autism Spectrum Disorder (ASD), where Online Diagnosis Tools are used for intervention. The children with Intellectual Disability (ID) faced problems understanding the hand washing protocols for the COVID-19 pandemic, though parents were advised to use visual charts for making the children understand hand washing protocols. Obsessive Compulsive Disorder (OCD) symptoms got worse with home confinement. Patients with Multiple Sclerosis (MS) have sleep cycle disturbances and sleeping difficulties. Education and Awareness Campaigns on coping strategies for families and caregiver through online platforms, maintaining medication adherence for patients with neurobehavioral disorders has become a key link to reduce the impact of disrupted routines and limited physical activities on patient’s symptoms.

Keywords: COVID-19, Attention Deficit Hyperactivity Disorder, Autism Spectrum Disorder, Intellectual Disability, Obsessive Compulsive Disorder, Multiple Sclerosis.

INTRODUCTION

The first human Coronavirus cases were identified in China in December 2019, and the WHO officially announced a worldwide Pandemic in March 2020. Governments throughout the world implemented an assortment of public health policies and physical restrictions in response to this global pandemic and the constantly increasing number of COVID-19 cases. These actions have included quarantining, travel limitations, nationwide lockdowns, shutdown of non-essential facilities, with the primary goal of reducing individual contact and COVID-19 transmission.\(^1\) Individuals with Neurobehavioral Disorders were more susceptible than the general public during COVID-19 pandemic because treatment interruptions in the area of mental health support which had an adverse impact on persons who are already having psychological disorders.\(^2\) Pre-existing psychological conditions become more severe under quarantine, which had resulted in PTSD or even Suicide thoughts and attempts. The overwhelming nature of Anxiety had given rise to Paranoia and Depressing Hallucinations.
Relapses were seen more likely to occurred in patients with Schizophrenia and Bipolar Disorder.\[3\] The pandemic had mostly ignored the needs of people with mental illnesses. Stress contributed to the onset and aggravation of pre-existing psychiatric illnesses. With the start of the COVID-19 pandemic, there were a few difficulties in the availability of therapy and healthcare services for those with pre-existing mental conditions. Owing to their circumstances, these individuals could find it challenging to complete routine checkups, interventions, and medication adherence, as well as to find the proper medical facility when hospitalization was necessary.\[4\] The communal aspect of inpatient and outpatient mental health systems created issues with social isolation and physical distance-making strategies that decreased the likelihood of receiving support from friends, counsellors, caretakers and relatives. Premature evacuation from psychiatric hospitals and cancellation of anticipated in-person appointments for mental health services were additional challenges encountered by COVID-19 participants. The elements that caused a person's mental health problems to worsen if they got sick are shown in Fig. 1.\[5\]

Numerous studies from various societies had found that people with neurobehavioral disorders had a higher chance of getting and spreading infections, had worsened disease prognoses, required longer stays in hospitals, and were more likely to die. It has been discovered that their average lifespan was whittled down by 7 to 25 years when compared to people without neurobehavioral disorders, primarily because of physical illness. Under the circumstances, it was discovered that patients undergoing psychiatric treatment were unable to follow the guidelines for a few reasons, which are depicted in Figure 2. In addition, a variety of problems, including Metabolic Disorders brought on by the negative side effects of Psychiatric Medications, accessibility issues to care, and Cognitive Abnormalities, were added as risk factors. The economic and social status of this patient group has worsened than that of the normal community, and the general living condition has also gotten worse.\[6, 7\]

### NEUROBEHAVIORAL DISORDERS AND ITS CAUSES

Neurobehavioral refers to the link between the nervous system, specifically the brain, and behaviour and learning, as assessed by behavioural observation of neurologic functioning, or relating to a method of behaviour analysis that accentuates the significance of nerve and brain function.\[8\]

A category of ailments known as Neurobehavioral Disorders are linked to brain damage, disorders, or illnesses which include Tourette's syndrome, Attention Deficit Hyperactivity Disorder (ADHD), Autism, Obsessive-Compulsive Disorder (OCD), Intellectual Disability (ID), Anxiety Disorder, Post Traumatic Stress Disorder (PTSD), Dementia,
Multiple Sclerosis (MS) and many more. The brief overview of signs and symptoms of Neurobehavioral Disorders is outlined in Table 1.\[9\]

**Table 1: Neurobehavioral Symptoms Clustering**

<table>
<thead>
<tr>
<th>Signs and Traits</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioural</td>
<td>Aggressive, Pessimistic, Lacking Empathy and Enthusiasm, Change in Personality, Irritability, Hostility, Impulsivity, Moodiness</td>
</tr>
<tr>
<td>Cognitive</td>
<td>Memory decline, Reduced processing speed, Disorganized, Poor self regulation, Learning issues, Loss of attention and concentration, Impaired executive functioning</td>
</tr>
<tr>
<td>Physical</td>
<td>Sensitivity, Decreased sensory functioning, Clumsiness, Headaches, Insomnia, Chronic pain, Change in appetite</td>
</tr>
<tr>
<td>Psychiatric</td>
<td>Depression, Obsessive Compulsive Disorder (OCD), Post Traumatic Stress Disorder (PTSD), Emotional Distress, Anxiety And Panic Attacks, Addiction</td>
</tr>
</tbody>
</table>

It is unsure exactly what causes neurobehavioral problems to arise, beyond brain damage or a brain abnormality. The majority of the diseases in this category are very certainly brought on by a combination of risk factors which are depicted in Fig. 3. According to a 2016 study, there is a direct correlation between drinking alcohol while pregnancy and the emergence of neurobehavioral problems. According to some experts, prenatal alcohol exposure-related neurobehavioral problems ought to be recognized as a distinct mental health diagnosis. There is evidence of epidemiological and experimental data supporting the hypothesis that Mental, Behavioural, Emotional, and/or Cognitive Illnesses can be brought on by chemical and/or physical factors acting during critical stages of brain development. It has been suggested that environmental toxins, addictive substances, narcotics, starvation, excessive stress, and/or hypoxia-ischemia cause functional brain maldevelopment that leads to neurobehavioral problems.\[10, 11\]

**Fig. 3: Neurobehavioral Disorders Risk Factors**

**Attention Deficit Hyperactivity Disorder (ADHD)**

ADHD patients struggle to understand directions and recognize the sophistication of the disease and pandemic because they have a poor ability to tolerate uncertainty. The enforced lifestyle at home, which had given rise to various problems shown in Fig. 4, increased the likelihood of more severe hyperactivity and impulsiveness in their behaviours, making it challenging for the caretakers to involve the child in productive activities.\[12\]

**Fig. 4: Problems Faced by ADHD Patients during Quarantine**

Researchers observed benefits in restlessness and in the length of the study in relation to a decrease
in distress caused by the rhythm of imposed academic tasks. In contrast, other researchers confirmed the deterioration of ADHD symptoms.\cite{13, 14}

The study by Shah R et al. used an online survey; a short text-message-based intervention was carried out to evaluate its feasibility among 48 parents. It was observed that 50% of the children had increased signs of ADHD, including an increase in level of activity, irritation, and an unsettling or disruptive attitude. Moreover, they observed that lockdown was "linked with some beneficial effects," as seen by the fact that nearly half of the kids spent more time studying, becoming creative, and assisting their parents with domestic duties. The researchers noted that their text-based approach was a "feasible" substitute for regular medical treatment. The results of the study contribute to research because, as using a text-based approach just requires reading or seeing media texts or videos, it may be more appropriate for families that are less digital, especially in India with inconsistent data access.\cite{15}

**AUTISM SPECTRUM DISORDER (ASD)**

Just informal information shared in unofficial forums has been documented on the pandemic's effects on ASD in Indian children. It could trigger behavioural changes and have an impact on biological processes, including eating and sleeping. The backdrop for many people was likely to worsen as a result of the cancellation of treatment sessions, the closing of day-care facilities, financial struggles, parents working from home, the anxiety of COVID-19 infection, and stress from responsibilities.\cite{16}

During April–May 2020, when India was under a total national lockdown, Kaku et al. performed a study to evaluate the condition of children with ASD and family coping mechanisms. The surveys included 650 families as participants, which were parents of individuals with ASD (2 to 25 years of age) and people who stayed with a single parent or both parents throughout the lockdown. The study found that several children struggled to keep up a pattern, and the days were becoming disorganized because they had a poor concept of the pandemic. Children spent more time on screens than normal during the lockdown. Online therapy was observed to be helpful for families during the pandemic as it provided convenient access to a clinician, helped to save time, helped to develop skills, attempted to avoid hospitals, and prevented social distancing.

Some families did not need to see a psychologist or psychiatrist with children taking medications, which could be easily accessed. Yet the majority of families said they weren't sure whether to keep using online counselling. The reported challenges with using online treatment methods included the kid being rebellious, unable to sit still for a prolonged period of time, exposed to too much screen media, internet connection concerns, an inability to connect with other families, and difficulty making new friends. The majority of families claimed to have seen improvements in their children, which included improving their ability to help themselves, controlling their emotions better, participating in home tasks, keeping a schedule, obeying instructions, and collaborating better in treatment sessions, as depicted in Fig. 5.\cite{17}

![Fig. 5: Treatment Approaches used for ASD patient in COVID-19 Pandemic](image)
The Indian Scale for Assessment of Autism (ISAA) and the INCLEN Diagnostic Tool for Autism Spectrum Disorder (INDT-ASD) are the current Indian diagnostic tools used in ASD. There was agreement in the diagnoses assigned to 37 children out of the 39 children for whom the videos were evaluated by the pair of examiners. The findings concluded that 32 children had been suffering from ASD. Based on their recordings, they also concurred that none of the 5 kids had ASD. Regarding the diagnosis for two children, they disagreed. In resource-limited situations during the pandemic, video-based assessment had been utilized as an alternative evolution tool to begin prior intervention for children with ASD.[18]

A pilot study of an evidence-based parent-mediated intervention (Project ImPACT) for children with ASD was conducted in Mumbai. Program structure was modified to take context and cultural differences into account, and a mixed-method approach was used to assess the model's acceptance, practicality, and initial efficacy. The quantitative findings revealed high completion rates, considerable gains in parent intervention adherence, and children's social-communication abilities. All group and individual sessions were attended by all 12 mothers; 8 fathers participated in at least 75% of all sessions.

The results of the satisfaction survey revealed that mothers perceived an improvement in their children's social communication skills and found the coaching to be understandable, helpful, and responsive to their culture, needs, and strengths. Mothers also repeatedly reported a deeper understanding of how to employ the strategies at home. Children's social communication ratings increased dramatically in all categories, including social participation, verbal ability, following instructions, and social mimicry. The family discovered the online mode to be of greater convenience and satisfaction, found the sequential model of meetings especially helpful, and perceived positive changes to their own parenting practices and child developmental profiles after completion.[19]

In nations with a large population, such as India, masks must always be worn in public areas. There is proof that suggests that wearing a surgical or disposable cotton cloth mask in public can help prevent SARS-CoV-2 infection. The study assessed the outcomes of training caregivers using telehealth technology on how to train children with ASD to wear face masks. From all across the world, six individuals with a history of dysfunctional behaviour related to mask use were chosen, and they underwent training utilizing graduated exposures, molding, and conditional rewarding. From India, two boys were recruited for the study, whose names were Abhi and Selva. Abhi successfully performed two generalization probes using a surgical mask and a new cloth mask. He completed the intended 10 minutes of mask usage during the two probes. During the course of the research, Abhi exhibited six different instances of problematic behaviour.

There were three crying episodes at baseline, one crying episode, and two mask-removing episodes during training. Selva also kept the mask on for 10 minutes throughout two generalization probes using both surgical and novel cotton masks. During the baseline, he made two shouting gestures. He exhibited no problematic conduct while undergoing training. Participants' percent of oxyhemoglobin saturation was unaffected by wearing a mask, and caregivers thought the intervention was helpful. The results back up earlier reviews of tolerance training treatments for children with behavioural issues who showed resistance to medical procedures.[20]

INTELLECTUAL DISABILITY (ID)

Children with developmental disorders suffer long-term effects when necessary therapies are discontinued. The functional capacity had also deteriorated, and regular physiotherapy has been discontinued. Lack of awareness of the pandemic's impacts, refusal to adapt, and an unwillingness to adopt new techniques can cause behavioural issues in these kids, especially those who have intellectual disabilities, to worsen or perhaps develop entirely.

These children's parents were likewise experiencing a challenging period. The worry associated with their children's health that was
formerly shared by parents, schools, and treatment facilities handled by them alone. Parents had established a circle of protection for their children by strictly adhering to safety precautions since children with special needs were not capable of adhering to the standard respiratory protocol like wearing masks and maintaining social distance due to their health problems and behavioural disorders. Children with intellectual disabilities benefited from visual charts on hand washing and social distance.\textsuperscript{[21]}

One of the NGO working for Psychosocial rehabilitation centre in bangalure India whose name is ‘Chetana’ Day Care Centre with Vocational training. During both pandemic waves, it was agreed to temporarily shut down Chetana. Prior to the lockout, 14 clients with intellectual disabilities were enrolled in the Chetana daycare center. The majority of customers' daily schedules were disturbed while Chetana was shuttered. Four qualified employees answered calls after closing and helped clients with their questions. The number of employees was gradually decreased to 2.

The client list was divided up among the staff, who phoned each client and caregiver once every two to three weeks at a time that worked for both parties to check on medication compliance, assist arrange the day, and address mental health issues. Depending on the client's needs, Whatsapp Audio/video calls served as the primary form of communication. Customers received education on COVID-19 and recommended safety measures. It was difficult to get three individuals with intellectual disabilities to help out around the household chores, and they experienced mood swings.\textsuperscript{[22]}

**OBSESSIVE COMPULSIVE DISORDER (OCD)**

For people with OCD, the home confinements enforced during COVID-19 pandemic have shown effects on their mental health which could be particularly severe. OCD is thought to be 2% common and, if left untreated, tends to become chronic as per American Psychiatric Association, 2013.\textsuperscript{[23]} A lot of the time, the OCD patient’s worries are centred on the fear of germs, getting sick, and infecting others. Those with contamination anxieties could be particularly impacted by the pandemic risk due to the SARS-CoV2 virus’ high transmissibility, which induces COVID-19.\textsuperscript{[24]}

Young individuals with an early assessment of OCD in a health care facility and hospitals were enlisted in order to study the effects of the COVID-19 virus and related home confinement on OCD profiles. To assess the symptom pattern, symptom intensity, and aggravation during the pandemic, individuals were reached via phone calls or online tools. The intensity and profile of symptoms both before and during pandemic times were rated using the Children's Yale-Brown Obsessive Compulsive (CY-BOCS) and Clinical Global Impression-Severity (CGI-S) Scales. The prevalence of infection obsessions and cleaning/washing compulsive behaviours significantly increased during the pandemic period. In the COVID-19 pandemic phase, young individuals having OCD may acquire new symptoms or even have their pre-existing symptoms get worse.\textsuperscript{[25]}

The research led by author Chakraborty et al. at Kolkata, West Bengal, where objective was to determine if the current environment, namely the obsession with contamination and the washing compulsion, had any negative impacts on individuals who already had OCD. Phone interviews were conducted with 84 individuals that had previously been identified with contamination obsession and excessive hand washing. The individual’s results on the Yale Brown Obsessive Compulsive Scale (Y-BOCS) were matched to their before pandemic scores.

Out of the 84 individuals, 57 took prescribed medications on a regular basis, 13 just sometimes out of concern over running out of medicine, and 14 had quit taking their medications because they were not readily available at the surrounding pharmacies. Just five patients—three of whom were in full remission and two of whom were in partial remission reported symptoms getting worse during the interview.
Due to lack of medical shops availability, all 5 patients weren’t really taking their prescribed drugs at the time they were interviewed. Every other patient stated that their symptoms remained unchanged. The family members did not notice any worsening of the symptoms either. Almost all of the patients’ Y-BOCS scores were similar to those from their last visit. The hand washing practice does not make patients feel more compelled to wash their hands. Individuals are also not more concerned of contamination due to the fear of developing COVID-19. [26]

In the case report by author Sahoo S et al. presented a 28-year-old man who had been prescribed pill fluoxetine 60 mg/day for his OCD as doing well, but he had really recovered from the behaviours. However, following the COVID-19 pandemic and after hearing (on television) as well as reading (in newspaper articles and on social media sites) about the various hand hygiene precautions, routes of infectious disease, and possible causes of COVID-19 infection, he gradually started to feel more anxious. Within a couple of days, his anxiety increased, along with all of his OC symptoms like inspecting objects and washing hands. He became wholly disruptive at both his home and job within a week of the recurrence of symptoms, and he quit his job. He began often washing his hands at home and would spend about 7-8 hours cleaning, washing his face, and taking a bath to get rid of persistent obsessive thoughts and fears about contracting an infection.

He gradually began to stay depressed and experience syndromal depression, a mild kind of anxiety free of somatic symptoms. He was sent to emergency services due to severe psychosocial dysfunction, where he was treated and given an increase in fluoxetine capsule dosage to 80 mg/day. He received psycho education on how to curb his overzealous washing habits without jeopardizing the spread of illness. Also, he received instruction in breathing techniques, and supporting psychotherapist sessions were initiated over the phone.

His anxiety symptoms significantly reduced as a result of this. There are a few things to note in order to differentiate between OC-related contamination worries and following basic hygiene procedures in relation to performing hand hygiene as well as other measures to prevent infections in accordance with health recommendations as shown in Table 2. [27]

<table>
<thead>
<tr>
<th>Suggestions for Reducing OCD Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restricting News Exposure</td>
</tr>
<tr>
<td>Develop the Ability to Disregard the Need to Wash Hands</td>
</tr>
<tr>
<td>Learn to Ignore the Need to Clean Everything Someone had Touched</td>
</tr>
<tr>
<td>Staying in Touch with Loved Ones, Family, and Friends</td>
</tr>
<tr>
<td>Setting a Schedule for Self-Care</td>
</tr>
<tr>
<td>Trying to have Empathy for Oneself</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distinguishing OCD Symptoms from Hand washing Habits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determining the Level of Concern with Contamination</td>
</tr>
<tr>
<td>Length of Time Spent Participating in Hand-washing/Cleaning Procedures</td>
</tr>
<tr>
<td>Examine Ritualistic Washing Habits (to see whether there is a link between present washing and COVID-19-related infection management methods)</td>
</tr>
<tr>
<td>Explore the Person's Insight,(how concerned the person is with his or her altered behaviour, or if the person is able to recognize that he or she is engaging in excessive washing routines or avoidance behaviour)</td>
</tr>
</tbody>
</table>

The article by Kumar P et al. presented a case report of the male patient, age 22, from Himachal Pradesh who is unmarried and belongs to a nuclear family. Due to a 3-month sickness of obsessive images, combined with excessive delusional thinking that even if he did not say prayers to God, his family or he would become sick, together with other compulsions, he had already been diagnosed
with OCD in August 2018. He reacted to fluvoxamine 300 mg daily and aripiprazole 5 mg daily, and by November 2019, he had stopped exhibiting symptoms. He then stopped his medication in January 2020 and was asymptomatic until June 2020, when his prior symptoms reappeared along with a new, obsessive dread of coronavirus. This led to significant impairment and extensive cleaning procedures, which made the individual and their family feel socially isolated. At first, he refused to reach out for help. After trying escitalopram 20 mg daily, Clonazepam 0.5 mg daily, and counselling for two months with no progress, teleconsultation was sought in August 2020. He reacted effectively to the change to 150 mg of clomipramine per day, showing a 90% improvement, though some coronavirus-related thoughts and anxiety are still present. The quarantine was linked to a higher prevalence of OCD symptoms getting worse. Another element that made OCD more likely to reoccur amid the anxiety of a COVID-19 pandemic was the discontinuing of medication. **[28]**

**MULTIPLE SCLEROSIS (MS)**

Among the most common symptoms in MS patients are poor quality sleep, cardiac autonomic dysfunction, and a low quality of life. Physical inactivity exacerbates these symptoms, and COVID-19 pandemic limits may make them worse. After confinement at home, actigraphic sleep quality (sleep time and efficiency), subjective quality of sleep (sleep quality), bedtime comfort, convenience of getting to sleep, ease of waking up, and getting adequate sleep all drastically deteriorated. Heart rate variability (HRV) and other quality of life indicators did not change. House confinement has reduced MS patient’s sleep quality but not their quality of life or cardiac autonomic function. **[29]**

With the COVID-19 outbreak in consideration, the proposed consensus expert opinion article seeks to assess any possible issues that may arise while treating individuals who have inherent CNS auto-immune demyelining illnesses. The author Bhatia et al, have suggested various drugs which are used during the pandemic time for the treatment of MS, such as β-interferon, Glatiramer acetate, dimethyl fumarate (DMF), Teriflunomide, Fingolimod, Siponimod and many more.**[30]**

**CONCLUSION**

In this Review, the literature analysis found that the COVID-19 Pandemic has presented unanticipated challenges for individuals with pre-existing Neurobehavioral Disorders in India who were confined to their homes. Coping techniques and strategies played a crucial role in managing the impact of the pandemic on their mental health and overall well-being. For the ADHD patients, a short text-message-based intervention among 48 parents revealed that 50% of the children exhibited increased signs of ADHD during the lockdown and some had positive effects. In patients with Autism Spectrum Disorder (ASD), Video Based Assessment Technique and Online Therapy have been used for diagnosis of children which was found be effective. Children with intellectual disabilities benefited from visual charts on hand washing and social distance. The main means which was used to contact the individuals with intellectual disabilities was Whatsapp Audio/Video calls, during which they also learned about COVID-19 also advised safety precautions. Patients with OCD who regularly used prescribed medications reported not experiencing any worsening of the symptoms. Multiple Sclerosis patients had sleep cycle disruptions and sleeping problems.

During the COVID 19 epidemic, numerous medication regimens were introduced to treat the symptoms for multiple Sclerosis patients. In Conclusion, Online counselling services played valuable resources for individuals with Neurobehavioral Disorders, providing them with personalized guidance by caregivers. By raising awareness, establishing routines, prioritizing physical and mental well-being, maintaining social connections, engaging in meaningful activities, and seeking professional support, individuals with neurobehavioral disorders had navigated the
challenges of home confinement more effectively and improved their overall quality of life.

ACKNOWLEDGMENTS: The Authors are thankful to the Principal, IPS Academy Collage of Pharmacy, Indore, Madhya Pradesh, India for providing necessary help for carrying out the work.

Conflict of Interest: The Authors declare there is no conflict of interest.

Financial Support: None.

Ethics Statement: None.

REFERENCES


27. Sahoo S, Bharadwaj S, Mehra A, Grover S. COVID-19 as a “nightmare” for persons with obsessive-compulsive disorder: A case report from

