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International Journal of Pharmacognosy & Chinese Medicine
ISSN: 2576-4772

Covid-19 & Obsessive Compulsive Disorder – Clinical Intricacies

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Review Article
Volume 7 Issue 2
Received Date: July 10, 2023
Published Date: August 11, 2023
DOI: 10.23880/ipcm-16000245

Abstract

The globe-gripping pandemic of COVID-19 in 2020 compelled us to impose quarantines and lockdowns in many countries to curb the spread of this highly infectious disease, as well as, to follow safety guidelines like frequent handwashing, wearing masks or social distancing prescribed by the Center for Disease Control (CDC) for its prevention. The deadly virus has many mental health implications as well, which included depression, anxiety, and even obsessive-compulsive disorder (OCD). In fact, the preventive safety guidelines promoted behaviors resembled the acts observed in the individuals with OCD, e.g., contamination fear, related obsessions and compulsions worsened as a consequence. The fear of COVID-19 and increased stress levels contributed to increasing the risk of OCD among individuals. Children, elderly, youth, women during menstruation, pregnant women or health care workers were observed to be most vulnerable and at risk for developing OCD symptoms. The health belief model, the Stress Diathesis model and other social and environmental factors explained the theoretical rationale behind the development of related symptomology among individuals since the beginning of the COVID-19 pandemic. Intervention techniques like CBT, supportive therapy or psychoeducation can help the at-risk as well as the affected individuals. Finally, some limitations and directions of future researches have been proposed.

Keywords: COVID-19; Obsessive Compulsive Disorder; Contamination; Health Anxiety

Abbreviations: PTSS: Post-Traumatic Stress Symptoms; CDC: Center for Disease Control; OCD: Obsessive Compulsive Disorder; CSS: COVID Stress Scale; CBT: Cognitive Behavior Therapy; ERP: Exposure and Response Prevention.

Introduction

December 2019 saw the rapid outbreak of a novel contagious pneumonia that was called as Coronavirus Disease 2019 (COVID-19). The outbreak started in Wuhan, a district in China Zhu, et al. [1] and Huang, et al. [2]. By February 2020, the disease speeded rapidly across the whole world due to its highly contagious nature [3-6]. On 11th March 2020, the COVID-19 caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was declared as a pandemic across the world by the World Health Organization WHO [7]. By September 2020, 30 million cases had been reported of COVID-19 worldwide [8]. To curb the spread of the disease government mandated quarantines and curfews everywhere and this not only impacted the physical health, but also affected the mental health of the individuals.

An unusual time since the global outbreak of the disease Walker, et al. [9] caused a large-scale economic difficulties all around Ebrahim, et al. [10], difficulties due to the halt in transportation, financial losses people faced due to loss of jobs, shutting down of work places and educational institutes [11]. Mandatory quarantine and social isolation increased cases of depressive disorders three years later, post-traumatic stress symptoms (PTSS) [12,13] stress, anxiety

and even higher risk of suicides among individuals who have recovered from COVID-19 Chan, et al. [14] and Yip, et al. [15]. Being in proximity with someone infected with COVID-19 was also associated with increased rates of anxiety Ko, et al. [16]. Increased chances of relapse, missing medications, stress, decreased self-care, stigma and even suicidality among individuals with pre-existing mental disorders have also been observed during pandemics [1]. A study conducted by that assessed the survivors of the SARS epidemic a year post their recovery, reported that even though these individuals had a good physical recovery from the illness, a significant depletion in their mental health status was reported by them and their caregivers. These findings point towards importance of understanding the severity of mental health issues that are triggered or aggravated following a situation as stressful as a pandemic.

Impact on Obsessive-Compulsive Disorder (OCD)

Some measures to ensure safety of individuals and curb the transmission of the disease have been issued by the WHO and the Center for Disease Control (CDC) and these safety measures include frequent handwashing, maintaining physical distance and wearing a mask in all public places. While such behaviors are extremely important to prevent the spread of COVID-19, it may be counterproductive, if performed excessively, in obsessive compulsive disorder (OCD) [17] characterized by intrusive thoughts or images (Obsessions) and also repeated and ritualistic behavior or actions (Compulsions) [18]. The common obsessions include fear of contamination or contracting an illness, or obsession with symmetry or exactness or intrusive thoughts involving blasphemy. Compulsions, on the other hand, may include behaviors like frequent and excessive hand washing, checking, arranging, counting or reassurance seeking etc [18]. Cleaning symptoms [19] as well as aggressive obsessions Lensi, et al. [20] are observed more frequently among females with OCD, while obsessions of symmetry [20], numbers [21], touching rituals [22] or sexual symptoms [19] are observed more frequently in males with OCD.

While this disorder was previously placed under the section of anxiety disorders in Diagnostic and Statistical Manual for Mental Disorders (DSM-IV), it has now been shifted to a separate classification of 'obsessive-compulsive disorders' in the new version that is DSM-5 [23]. A lifetime prevalence of 8% Helzer, et al. [24] and an annual prevalence ranging from 1.1%-1.8% Weissman, et al. [25] has been observed in various epidemiological studies of OCD. Any Indian prevalence data?? The condition generally runs a chronic course [26] and is one of the most disabling mental conditions [25] with psychological and neuropsychiatric etiologies Stein, et al. [27].

The topic of OCD in relation to COVID-19 situation has been extensively reviewed to enhance our understanding about how the mental disorder is affected by the crisis. It has been known previously that mental disorders are increased during and post such pandemics. It was especially interesting to look into this as the behaviors that COVID-19 promotes i.e. repeated handwashing, cleaning etc., are what is considered to be counterproductive and maladaptive according to the diagnostic criteria of obsessive-compulsive disorder according to International Classification of Diseases 10th [28]. While the hypervigilance and health anxiety Asmundson, et al. [29] can be productive and help individuals protect themselves from infection, for some people it may be maladaptive if done in excessive proportions [30]. An extensive review of literature was conducted on OCD and COVID-19 using the search engines like Google Scholar, Pubmed, Psycinfo, Research gate, APA Psycnet etc. The keywords used in literature search were 'OCD & COVID-19', 'COVID-19 & mental health issues', 'COVID-19 & Illness anxiety', 'OCD & pandemics' etc., from 2019 to 2021, were included and systematic analysis of the obtained researches was conducted through qualitative content analysis to draw meaningful inferences from it.

COVID-19 and OCD

Researches conducted in the past found significant correlation between the symptomology of OCD and illness outbreaks occurred in the past like H1N1 swine flu [31,32] or the Ebola virus [33] or even the Zika virus threat [34]. As previously discussed, the COVID-19 pandemic has bought with it several implication with respect to mental health of all individuals Rajkumar [35]. A study by Zandifar, et al. [36] stated uncertainty pertaining to the situation, large scale of misinformation Bao, et.al. [37], fear of death among patients and feeling of loneliness due to the isolation or quarantining [38] as the salient reasons contributed to increased levels of stress among people. This stress, in turn, leads to several serious mental health conditions like depression and anxiety Dar, et.al. [39]. While the present time has witnessed a sudden increase in the cases of the aforementioned conditions [40] it has had a very major impact on individuals with a diagnosis of OCD Davide, et.al. [41]. Fear of contamination is one of the most common symptom observed in individuals with OCD Rasmussen, et al. [42] with around 47.6% of such individuals reporting this to be their primary symptom [43]. Rachman [44] attempted to provide a theoretical explanation for the fear of contamination as a subtype of OCD and he believed that "compulsive cleaning is driven by fears of contamination. It is an attempt to clean away a perceived contaminant in order to reduce or remove a significant threat posed by the contaminant". He also proposed three systems that he believed interrelated and are collectively called the three systems of fear Rachman [45]. Firstly, the behavioral

component that is expressed in the form of compulsive and repetitive acts or rituals e.g. repeated handwashing or bathing etc. Secondly, the cognitive component that is observed through the information processing bias and a tendency to catastrophically misinterpret the intrusive object or thought. As results, a higher focus on individuals' obsessive beliefs and its incorrect appraisal are observed in the affected individuals. And lastly, the physiological component that is observed from the autonomic reactivity displayed by the affected individuals even in the anticipation of encountering contaminated and feared stimuli.

COVID-19, that was believed to spread through contact and, therefore, several preventative measures were suggested by various health agencies. These were social distancing, wearing masks to ensure respiratory hygiene, maintaining hand hygiene by washing hands with soap or alcohol based sanitizers and even washing the groceries or any other item that might be contaminated [46]. While these steps have prevented the transmission of the virus, these behaviors have been counterproductive for individuals who already had OCD, especially the ones with a fear of contamination [47]. A recent research by Davide, et al. [41] on individuals in remission with a previous diagnosis of OCD by comparing their symptoms before and after the quarantine to observe if any change is observed in their condition. In findings, a significant increment in the obsessive symptoms and the compulsive tendencies was observed among these individuals post the quarantine. The catastrophic reporting of news from all around the world, the flood of horrifying statistics from the social media all led to increased levels of anxiety and fear being experienced by these already vulnerable individuals [48]. The hygiene tips being promoted everywhere by celebrities, health workers, government authorities etc. added to their high level of stress Davide, et.al, [41].

Banerjee [49] in an address to the editor of Psychiatric journal pointed out that it might take months to understand to true extent of the damage caused by the pandemic in aggravating the cases of OCD. He also highlighted tremendous media attention towards increased demands for handwashing, emphasis of washing hands for a recommended time duration with prescribed certain steps leading to increase in ritualistic behavior tendencies promoting symptoms of OCD. Besides, washing hands with soap or sanitizers after every potential exposure to an infected person or surface can lead individuals with OC tendencies carrying out the behavior under the pretext of the threat and, therefore, this will be a 'cognitive justification' of the maladaptive behavior. A generalized normalizing of repeated rumination with hygiene and cleanliness through the media has also been stated as one of the causes for it. The recent time also witnessed an increased number of cases of hoarding, which is a part of the OC Spectrum according to DSM-5 [23] and Banerjee [49]. Fear and anxiety that the people had due to the uncertainty led to increase in the hoarding to sanitizers, face masks and medications. Hoarding of groceries was also observed to be on a very large scale [49,50]. This led to a subsequent shortage of the essential items like medications, and this further contributed to the increased levels of anxiety. Although there is a lack of data in this context, it can be expected that an increase in the cases of hoarding will be seen in the years after the pandemic [51].

COVID-19 and OCD Complications in Various Age-Groups

The present stressors have also led to the youth being susceptible to developing OCD symptoms. A research study by Seçer, et al. [51] observed a positive relationship between COVID fear and OCD symptoms. A fear of the adverse conditions that arise due to COVID lead to increase in levels of Anxiety and this triggers OCD symptoms among the youth Reis, et al. [52] and Seçer [53] and Li, et al. [2]. Emotional reactivity, depression-anxiety and experiential avoidance were the variables that were recognized to be the predictors that mediated the relationship between OCD and the COVID fear. A high emotional reactivity enhances the effect of COVID on OCD [54-56] as the fear associated with the outbreak may increase the risk of depression, anxiety and OCD among the adolescents. These triggered mental disorders like depression and anxiety can further predict OCD symptoms as the adolescents may indulge in obsessive ruminative thoughts and ritualistic compulsions as result of the fear of COVID Ornell, et al. [57] and Shigemura, et al. [58] and Xiang, et al. [5] and Wang, et al. [59]. And finally, experiential avoidance Hayes, et al. [60,61] was also seen to mediate the relationship. Experiential avoidance reveals the cognitive, behavioral and emotional strategies of individuals against the circumstances Ottenbreit, et al. [62] and explains how the negative avoidance attitudes related to COVID can escalate the OCD as well as the hoarding symptoms Briggs, et al. [61] Santanello, et al. [63] and Mahaffey, et al. [64].

The aged and elderly individuals have also been at a higher risk of getting infected with the virus and should therefore be monitored carefully. Epidemiological studies have shown that elderly women are at a greater risk of developing late onset OC symptoms [65,66]. They had to adhere to the restriction imposed for longer durations of time to ensure their safety. And this meant longer durations of social isolation from their social circles, distancing from family members as they may also pose as a risk for infection, feeling of neglect from family members who are otherwise occupied. All these social and psychological issues may degrade the mental health status of the elderly [67]. Fear of getting infected, fear of being hospitalized, not being able to meet family members, health related issues and doctor

checkups amidst the pandemic, lack of physical activity, trouble in sleeping and eating can also adversely affect their well-being [68-70]. And this can lead to behavioral issues like obsessive compulsive disorder through the manifestation of repeated handwashing or sanitizing household items [71,67].

Another section of the population that is vulnerable is children. It is known that trauma during early years of life can trigger OCD symptoms and can also aggravate symptoms of those already suffering from the condition Adams, et al. [72] and may even exceed to several years post an epidemic [73]. A recent study of Çoban, et al. [74] found that childhood trauma directly predicts the severity of the OCD symptoms among individuals with a diagnosis of OCD. It also observed that it can predict comorbidity with ADHD, impulsivity, other anxieties and a lower level of education received by these patients. The past year has led to children being confined to their homes due to the lockdowns and the curfews. Schools have been operating through the online modes and these children have to complete their work by receiving supervision through the virtual modes only. Not being able to spend time with peers can also lead these children to feel isolated [75]. The fear of COVID infection can be responsible for this childhood trauma and may increase the vulnerability of these children towards depression, anxiety [75,76] PTSD [77], psychotic disorders and suicidality as a consequence of the COVID fear [51]. The social isolation can also lead to acute stress disorders, grief or adjustment disorders among the children [78].

Therefore, a severe aggravation in OCD symptoms was observed in children and adolescents with OCD post the COVID-19 pandemic [79,75]. High amount of cases with relapse in symptoms was also observed [79]. Looking for COVID related information from the surroundings, an everyday preoccupation with COVID-19, duration since the diagnosis of OCD and a COVID infection in someone in the family were some of the factors that were observed to have contributed to exasperated symptoms among the children [49,47,80]. In addition, an early onset of OCD, a family history of ADHD or tics disorder [81], poor insight at baseline, a low tolerance to uncertain situations [82,83] and aggressive or sexual OC thoughts [51,75] were also seen to contribute to the symptomology.

A research study by Vulink, et al. [84] concluded that gonadal steroids affect the OCD symptom severity and therefore menstruating women are prone to be affected by increased severity of symptoms. While the incidence of OCD is higher in boys before puberty, post puberty girls see a marked increase in OCD cases [85,25]. We can therefore say that the cases of OCD among females after menarche exceed the cases in males. Exacerbation of OCD symptoms during premenstrual periods is observed in about 42% women [25]. Dillon, et al. [86] observed an increase in cleaning behaviors during the luteal phase of the menstrual cycle in a non-clinical sample. However, the further exacerbation of this behavior in light of COVID-19 has not been explored yet. Women during pregnancy are also at a higher risk for developing OCD with an aggravated risk ration of 1.79 Russell, et al. [87] and therefore their mental health should be closely monitored. Fear of contamination or fear that intentional harm may fall upon the child and many such intrusive thoughts and images can occur during pregnancy and these thoughts may be even more excessive due to the COVID-19 fear. Contamination fear can also become excessive among health care professionals who are in very close contact with the virus as they are surrounded by affected patients and are the firsthand witness of their distress. They may also have the additional fear of infecting their relatives and therefore, OCD symptoms can appear in the high-pressure situation they are presently in Pozza, et al. [88].

Theoretical Explanation

Being quite a recent phenomenon, little research has been conducted till date to explain the theoretical basis of a possible explanation for the link between COVID anxiety and fear and OCD symptoms. Researchers conducted about past pandemic point out that the anxiety in response to threats of such illnesses have observed OCD-related factors like disgust sensitivity Wheaton, et al. [32] and obsessive beliefs [31] as probable causes to explain their presentation. A recent study by McKay, et al. [89] reported that anxiety sensitivity & disgust propensity were predictors of fear of contracting COVID-19. A phenomenon that came into existence recently is 'COVID Stress Syndrome' that is given by Taylor, et al. [90] and is measured by the COVID Stress scale (CSS) also formulated by Taylor, et al. [91]. This condition is characterized by a broad set of distress symptoms that occur in response of COVID-19. These are (a) fear about potential contamination with COVID-19 and its dangers, (b) worry about the economic consequences it will have, (c) fear of contracting COVID-19 from foreigners or Xenophobia, (d) Traumatic stress symptoms related to COVID and (e) reassurance seeking and compulsive checking related to COVID Taylor, et al. [90]. We clearly observe similarity with OCD symptoms in two of the five domains. Results on the CSS showed a high correlation with obsessive compulsive contamination related issues as well as with ritualistic checking. It also had a correlation with hoarding behavior [90].

Intolerance to uncertainty has also been observed to be a mediating factor between COVID-19 fear and OCD symptom development [92,83]. Initially, the threat related to COVID-19 lacked clarity with a new set of information and

newer findings being circulated in the media every day. Some information exaggerated the threat while some downplayed it and therefore there was a lot of uncertainty associated with the situation and therefore, the tendency to have an aversion response to the ambiguity and the uncertainty could intensify the distress about COVID-19 and lead to the symptoms [92].

The Health Belief Model given by Rosenstock [93] has also been utilized to understand and explain the beliefs and behavior of the people towards the threat that is, COVID-19. The model had been designed to explain the rationale behind the likelihood to participate in preventative programs and it is based on the principle that people's preventative behavior is influenced by their belief about being at risk (perceived susceptibility), the fatality of the risk (perceived severity), presence of a way to reduce the occurrence or severity of the condition (perceived benefit), and a larger cost versus benefit of taking action (perceived barriers). And on the basis of the personal evaluation of the aforementioned factors, individuals take or do not take the necessary action [94,95] which, in this case can be maintaining all COVID related safety measure, getting tested if symptoms develop, quarantining etc. Researches conducted during the pandemic found that following COVID safety protocols was associated with lower levels of anxiety and depression [59]. Following better hygiene practices, not sharing utensils during meals showed a correlation with lower psychological effect and lower levels of depression and anxiety [96].

The Diathesis-Stress Model given by Rubinstein [97] mentions the importance of an individual's social environment and the influence it exerts in response to a stressful situation, like COVID-19 [92]. Research evidence on SARS survivors point out the importance of perceived social support and its effect on the survivors' mental health by the mediational influence of self-efficacy and self-care [98]. Having to experience emotions like loneliness or boredom and social isolation due to recommended quarantine guidelines had a traumatic impact of the individuals and led to psychological conditions like anxiety about SARS [99,100]. And therefore, we can say that adequate perceived social support may act as a protective factor from psychological illness like anxiety or OCD in face of such outbreaks [101].

Another model called the 'Bull's Eye' model of disaster explains the close proximity to the stressful situation leads to higher levels of distress Marshall, et al. [102] and Dennis, [92]. Those at the epicenter of the situation e.g., those who had close family members or friends catch the disease, or those in quarantine or having had a direct exposure to the stressful condition displayed higher levels of anxiety, fear of dying (Sahni, et al. [103] and post-traumatic stress symptoms [104].

Prevention or Intervention of OCD Symptoms Due to Covid-19 Threat

Mental health professionals have a very major role to play in remission of individuals with OCD as well as preventing relapse in individuals during the period of social restrictions [41]. It is paramount to ensure early identification and prevention of individuals with OCD at a time especially like the one we are presently facing. These vulnerable groups can be those with a family history of OCD Chacon, et al. [105], the elderly [67], children [75] or pregnant women. If left untreated for a longer duration of time, this illness tends to have a worse prognosis due to higher resistance to treatment. Therefore, early identification is the key [106].

Limiting the use of social media has also been observed as one of the most essential preventive measures, as social media is flooded with catastrophic reporting of news, misinformation and this could be especially anxiety arousing for those who are more vulnerable [48]. Recommending watching news only from reliable sources and that too for only a fixed duration of time during the day might be a robustly useful preventative technique [41]. While these techniques may be useful for highly vulnerable people, however, these may be insufficient to help those who already have OCD, or had previously recovered but are vulnerable to relapse. The restrictions due to pandemic made seeking psychiatric aid very difficult for all individuals facing such issues. As a result, many alternate formats or platforms emerged to deliver therapy and treatment to help patients recover or prevent relapse. Digital Psychiatry or Online consultation therefore gained immense popularity recently [107,108]. However, if online consultation is provided without adequate training and supervision and by not following the appropriate guidelines, it make the symptoms of the patients even worse. For the treatment of individuals with OCD the first line of treatment that is prescribed is primarily pharmacotherapy, especially during the pandemic [30]. SSRI's [109], clomipramine [110] or adjunctive antipsychotics (in low doses) can be prescribed to these patients. Psychotherapy techniques can also be used. Cognitive Behavior therapy (CBT) can be a useful tool as it can help patients effectively deal with the intolerance to uncertainty by working on their abilities to cope with it better [111], especially in light of the pandemic threat to deal with the anxiety they are facing. Working on the maladaptive and faulty core belief and working through the cognitive distortion can be helpful. Exposure and Response prevention (ERP) is one of the most widely used and effective therapeutic technique for patients with OCD, but its effectiveness in the present situation is debatable. COVID-19 is a highly infectious disease and the process of ERP can possibly expose the patients to the virus, especially if it involves in-vivo exposure done without supervision or through online counselling modes. And therefore, it is essential that all ERP or even CBT

techniques used are tailored to be in accordance with the CDC safety guidelines as safety against COVID should be of utmost importance [30,112].

Patients with a good insight can also be offered imaginal exposure or danger ideation reduction therapy (Fineberg et al., 2020). Besides, Supportive Psychotherapy could also be useful as individuals may be extremely anxious due to the COVID-19 threat and, therefore, helping them be calm can be an essential element of care Fineberg, et al. [30]. It can also help to prevent symptom deterioration, encourage restrain to carry out compulsions [112], reduce risk of development of a comorbid depression [113] and foster resilience. Keeping a regular check on the patients, using technology to ensure that the patients are not engaging in compulsive behavior can also be done. Psychoeducation for the patient and the family can also go a long way. It can help reduce the anxiety they are facing due to misinformation they might be carrying about the safety protocols. Informing them about the physical and mental health implications of COVID-19 and, also the appropriate safety protocol can help them deal with the uncertainty they are facing [30]. A report of extensive research from US published in the Times of India (April, 2021) disclosed that after extensive research of experts from the US have confirmed that COVID-19 infection occurs primarily through coming in contact with an infected person and is therefore, airborne, rather than being transmitted through infected surfaces or objects and they have confirmed that the excessive fear which had gripped the individuals from the starting of the pandemic and led to vigorous use of sanitizers and washing of groceries, may not be required as such. This report has also been confirmed by the CDC Anthes [114]. While sharing such news can be useful for the patients, it should be ensured that in no way, following of safety measures of preventing transmission is undermined.

In addition, maintaining a healthy daily routine and activity scheduling can also be useful. Communicating with friends and family through platforms or engaging in one's hobbies or leisure activities like gardening can also improve mental health [115,30]. Physical exercise also helps cope with the distress experienced due to pandemic and aerobic exercises is observed to have a positive effect on OCD symptoms [116]. Girdhar, et al. [67] mentioned specialized intervention programs for the elderly to prevent serious mental disorders like OCD. One such intervention is called 'Befriending Intervention' where they aim to help the elderly from new friendships through telephone and help reduce their loneliness through companionship [117,118]. Utilizing alternative therapies like yoga, meditation, relaxation or mindfulness activities also have a positive effect on one's mental health as these help control and calm down one's aroused state of emotional responsiveness and instills feelings on connectedness and hope Hobfoll, et al. [119,120].

Author	Title of Paper	Year of Publication	Major Findings	Limitations
Davide, et al. [41]	The impact of the COVID-19 pandemic on patients with OCD: effects of contamination symptoms and remission state before the quarantine in a preliminary naturalistic study	2020	Changes in symptoms due to quarantine of OCD patients in remission was studied and a significant increase in OC behavior was observed.	A small sample size and low controls in inclusion criteria reduced the ability to establish causality between the variables.
Banerjee [49]	The other side of COVID-19: Impact on obsessive compulsive disorder (OCD) and hoarding	2020	Provides information about the changes in OC symptoms and Hoarding behavior among people due to COVID-19 and the factors that contribute to it.	Being a letter to the editor, the publication provides the perspective of the author and hence is not backed up by empirical evidences.
Tanir, et al. [79]	Exacerbation of obsessive compulsive disorder symptoms in children and adolescents during COVID-19 pandemic	2020	An increase in contamination obsessions and cleaning compulsions post COVID-19 among young subjects with OCD due to increased exposure to social media to obtain COVID-19 related information, preoccupation with COVID etc.	Causality could not be established as the study was cross-sectional and hence, long-term effects could not be assessed.

Nissen, et al. [75]	The immediate effect of COVID-19 pandemic on children and adolescents with obsessive compulsive disorder	2020	Discusses factors like family history of psychiatric illness, baseline insight suggesting vulnerability etc. that increase vulnerability of children and adolescents towards OCD due to COVID-19.	A small size and use of a self-rated non-validated questionnaire decreased the reliability of results.
Fontenelle, et al.	The impact of COVID-19 in the diagnosis and treatment of obsessive-compulsive disorder.	2020	Discusses the impact of COVID-19 on individuals with a diagnosis of OCD as well as the non-clinical population and reflects on probable preventative or treatment strategies.	Does not discuss the shortcomings or challenges that may be expected to occur while carrying out the proposed interventions.
Pozza, et al. [88]	Risk for pathological contamination fears at coronavirus time: Proposal of early intervention and prevention strategies	2020	Mentions the increased vulnerability of OCD in light of COVID-19 of individuals with OCD & those with subclinical tendencies & points towards the importance of early identification and prevention.	Being a perspective article, it sheds light on the authors understanding of the phenomena and therefore may lack empirical evidences.
Zheng, et al. [48]	Prevalence and Characteristics of Obsessive-Compulsive Disorder Among Urban Residents in Wuhan During the Stage of Regular Control of Coronavirus Disease-19 Epidemic	2020	Observed that being single, a student, having a family psychiatric history, psychiatric comorbidity or a longer sleep latency as being predictors of OCD in light of the pandemic.	Causality could not be established as the study was cross-sectional; small sample size decreased generalizability of results.
Seçer, et al [51]	An Investigation of the Effect of COVID-19 on OCD in Youth in the Context of Emotional Reactivity, Experiential Avoidance, Depression and Anxiety	2020	The mediating role of emotional reactivity, experiential avoidance and depression-anxiety in COVID-19 fear and OCD among young is examined.	Non-clinical sample, self-report measure and a cross-sectional research design size decreased generalizability of results.
Dennis, et al. [92]	A Perfect Storm? Health Anxiety, Contamination Fears, and COVID-19: Lessons Learned from Past Pandemics and Current Challenges.	2021	Reviews articles that examine anxiety in response to past epidemics and focuses on the role of belief-based cognitive variables, transdiagnostic processes, social and environmental factors as contributors.	Being a review research, the article has gaps in research as it is a reductive approach.
Kumar, et al. [47]	Dealing with Corona virus anxiety and OCD	2020	The address mentions the negative impacts of print, electronic & social media being flooded with COVID related information on individuals with OCD.	Being a letter to the editor, the publication provides the perspective of the author and hence is not backed up by empirical evidences.

Silva, et al.	Obsessive-compulsive disorder during the COVID-19 pandemic	2020	Mentions possible implications of the pandemic on OCD and includes various models to explain the behavior. Further preventative and treatment processes are proposed.	As the article shares the perspective of the author, it lacks empirical evidences from longitudinal research studies.
Ji, et al.	Effects of the COVID-19 Pandemic on Obsessive-Compulsive Symptoms Among University Students:Prospective Cohort Survey Study	2020	Indicates that the environment and the fear or anxiety associated with it interact and lead to increase in OCD symptoms due to COVID-19 among university students.	Individuals in the study were classified with OCD only on the basis of their scores on YBOCS as face-to-face interviews were not conducted.
Taylor, et al. [29]	Development and initial validation of the COVID Stress Scales	2020	Developed a 36-item COVID Stress Scale to assess the behavior changes in specific domains among individuals due to the stress, anxiety or fear of COVID-19.	Being a fairly recent tool, it has limited reliability. It did not include a structured diagnostic assessment.
Taylor, et al. [29]	COVID stress syndrome: Concept, structure, and correlates	2020	Further explores the multifactorial structure that is the basis of the COVID Stress Scale & reveals that worry about the hazardous nature of COVID as a primary feature of the syndrome.	The position of the condition in the formally used classificatory systems of DSM-V of ICD-10 is not clarified.
Wheaton, et al.	Intolerance of uncertainty as a factor linking obsessive-compulsive symptoms, health anxiety and concerns about the spread of the novel coronavirus (COVID-19) in the United States	2020	Observed that intolerance to uncertainty connected OCD and health anxiety to concerns about COVID-19.	Data was collected online through self-report measures thus decreasing the generalizability of results.

Table 1: Please find some major research papers along with their major findings and observed methodological flaws given below in a tabular form.

Conclusion and Future Suggestions

Hence, we are thankful to scientists of healthcare conducted several studies on detrimental impacts of the COVID-19 on physical and mental health as well. However, the reported researches are not without major shortcomings. Being an extremely recently occurred phenomenon, there is an extreme lack of research evidences to support the findings. Most of the researches have been conducted in China, with limited applicability in the rest of the world. Data of most studies has been collected through online modes due to the restrictions and therefore the authenticity of data is also debatable. The generalization of research findings from previous epidemics like SARS or Ebola has been useful to gauge an idea about what we should prepare for, but the impact of the COVID-19 pandemic in comparison to these has been massive, and therefore its effects also cannot be extrapolated from the limited results of the previous findings. Further, exploring the gender differences that exist in the presentation of OCD symptomology due to COVID-19 and the differential preventative or treatment measures that can be taken, has not been explored yet. The pandemic has created a great havoc in the lives of people from all domains, be it students, elderly, the working population, health care-workers etc [120]. And while we are still at a stage where we are only trying to manage the already caused damage [121], we should also remember that its effects would persist for years from now. The implications it may have on the mental health of individuals and the rise of mental disorders among people would only be known in the years to come.

Further studies and researches can be conducted to understand and map extent of the aftermaths of the pandemic, its long-lasting impact of mental health issues, and its effect on individuals with pre-existing mental disorders like OCD [122]. The effect of vaccination on the OCD symptoms can

also be explored further. Children are also at a higher risk for development of OC tendencies since the pandemic started. While research has been conducted to understand the causes for it, specialized intervention plans can be explored in future researches. Research can also be conducted to bring out intervention plans to help other individuals belonging to the vulnerable population [123-128]. Changes or alterations and the effects of already practiced therapeutic techniques e.g. Exposure Response Prevention (ERP) may need to be altered according to the COVID-19 crisis and hence should also be explored. In this context, the authors suggest that promotion of resilience in persons with mental health issues of OCD and others too, is relatively more important as it could be highly helpful in facilitating insight into the health problems. The pertinent and various types of researches in this context require to involve patients as well as vulnerable population, and a combined interdisciplinary approach from medical & psychiatric clinicians, clinical psychologists, health psychologists and positive psychologists could be felt as a dire need of professional services.

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