ORIGINAL RESEARCH

To study the characterization of the CT Brain in COVID 19

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ABSTRACT

Aim: To study the characterization of the CT Brain in COVID 19. **Material and methods:** Patients of COVID 19 who had neurological signs either before they were admitted or while they were in the hospital had a CT brain plain once during their time in the hospital. CT Brain plain presentations were shown to correspond with CNS symptoms, progression throughout the patients' hospital stays, and outcomes. Several tests, such as RT-PCR for COVID 19, CT Brain plain, complete blood count, liver function tests, renal function tests with electrolytes, and others were performed.**Results:** In the current investigation, there were a total of 50 patients, 46 (92%) of whom were male, while just 4 (8%), on the other hand, were female. The patients' ages ranged anywhere from 35 to 82 years old, with a mean of 65.85±8.69 years. NLR was 14.98±2.69 (range 1.31-47.5), mean LDH 992.17±25.69 (range 221-5125), and Hs-CRP was 171.22±22.69 (range 2.9-321.5). Mean haemoglobin of the patients was 11.12±1.85 (range 4-15 g/dl), total leukocyte count was 16580.63±5896.45, mean platelet count was 2.11±1.02 / lacs (0. 27 patients, or 54%, were discovered to have had an ischemic stroke, whereas 5 patients, or 10%, were found to have had a hemorrhagic stroke. The CT brain results were found to be abnormal in 30 individuals (or 60%), whereas in 20 patients (or 40%), they were determined to be normal. 11 (22%) of the patients required the assistance of a ventilator, 6 (12%), of the patients used a BiPAP, 2 (4%), of the patients used a Hudson mask, and 10 (20%) of the patients had NRM. **Conclusion:** In conclusion, we were surprised to find that the proportion of patients with severe COVID-19 infection who had abnormal brain CT scans was rather significant. Ischemic stroke was the most common kind of stroke that occurred in conjunction with aberrant CT results. We believe that the connection between aberrant brain CT and the fate of patients warrants further validation in a wider patient population.

Keywords: CT Scan, Corona virus, COVID-19

INTRODUCTION

SARS COV-2, also known as 2019-nCoV, is the virus that is responsible for causing the life-threatening sickness known as COVID 19. In December of 2019, the sickness was initially detected in Wuhan, which is located in China. It was first thought to have been transmitted via zoonotic transmission, but there was also a high rate of transmission from human to human. It soon spread to the rest of the globe, and the globe Health Organization proclaimed it a pandemic on March 11th, 2020[1]. Because of the very high rate at which it is transmitted, it has become a worldwide burden to the health and economy of the globe for the first time in many decades. It is a disease that affects both the upper and lower respiratory tracts, and it has a significant morbidity and fatality rate. The sickness is spreading quickly.Human corona virus (HCoV or HCoV19), as well as MERS (middle east respiratory disease), is another name for COVID 19, which is also known as 2019 new corono virus nCoV. It passed from person to person through disease transmission in close encounters by droplets at a distance of no more than 6 feet for more than 15 minutes, much like other viral illnesses. Its symptoms ranged from mild to severe, and it was more infectious than other viral diseases. Its incubation phase lasts anywhere from two to fourteen days, and the healing period may can anywhere from two to six weeks, depending on how serious the illness is. persons who have a history of smoking are at a larger risk of contracting the disease via hand-to-mouth contact. This also applies to persons over the age of 60 who have concomitant diseases such as cardiovascular disease, diabetes mellitus, hypertension, recent surgery, cancer, COPD, and so on. Although children and newborns are less likely to have this illness, it is still possible for them to do so. The virus enters the oral cavity (oropharynx, nasopharynx under the nasal sinuses), spreads to the

lower respiratory tract, and attaches itself to some receptors (ACE) on the pulmonary alveoli. It then begins replicating and destroying the alveolar cells of the lungs basis as well as the other lobes of the lungs (three on the right side and two on the left side). It may wreak chaos depending on the person's immunity as well as the virulence of the virus strain, which might, in extreme situations, lead to inflammation. Additionally, blood clots may form in the lungs, which is referred to medically as pneumonia. In severe situations, additional poisons such as cytokines are released, which leads to the formation of a cytokine storm, which in turn causes acute respiratory distress characterized by low oxygen saturation in the lungs. More than 2.8 million people have been verified to have the coronavirus disease 2019 (COVID-19) pandemic up to this point[2]. This pandemic has been spreading rapidly over the whole planet. In the beginning phases, the emphasis has been on the normal respiratory symptoms that patients come with, such as fever, cough, and dyspnea; however, accumulating evidence indicated that it is, in essence, a multi-system illness. This was the case when the focus was on the typical respiratory symptoms that patients present with. Researchers from all around the world have noticed that COVID-19 individuals are exhibiting neurological signs and symptoms, which adds another layer of difficulty to the care of these patients. Mao et al. carried out a research, and the results of that investigation [3] indicated a variety of neurological signs shown by verified COVID-19 individuals. They looked at 214 individuals and discovered that 36.4% of them had neurological symptoms such as skeletal muscle damage, decreased awareness, and acute cerebrovascular disorders. Of these 78 patients, 36.4% were found to have neurological manifestations.The neurological manifestations of Covid-19 include a wide variety of conditions, including headaches (Anosmia and Agusia), impaired consciousness (encephalopathy, encephalitis, ADEM(acute dissem- inated encephalomyelitis), seizures, stroke (ischemic haemorrhagic CVT), ataxia, transverse myelitis, and AHNE (acute haemorrhagic necrotizing encephalopathy). A research that was published not too long ago suggested that improper cleanliness was the reason for India's low mortality rate from covids. According to a study, nations like India that have inadequate cleanliness, sanitation, and quality of water tend to have a lower covid-19 case mortality rate when compared to wealthy countries that have superior sanitary circumstances. Even though it trails behind most other states in terms of socioeconomic development metrics, the state of Bihar in India has managed to maintain its mortality rate at 0.5%, which is one third of the national average (1.5% national fatality ratio). In a similar manner, Kerala and Assam both had a rate of 0.4%, Telangana had a rate of 0.5%, and Jharkhand and Chhattisgarh both had a CFR of less than one. On the other side, Maharashtra, Gujarat, and Punjab all had CFS values of 2 or higher [4]. The natural history of this illness is poorly understood due to the lack of available information. It is well knowledge that host defense systems play an important part in the prevention and management of diseases. Knowing a lot about the COVID-19 virus, the sickness it produces, and how it moves from person to person is the most effective method for preventing the virus from spreading and slowing it down. Due to the fact that COVID-19 is a newly developing illness, there is not yet adequate evidence on the disease; thus, further research is required. As a result, the current research was carried out to investigate the results of CT Brain scans performed on COVID-19 patients and to determine how well those findings correlate with clinical profile and prognosis.

MATERIAL AND METHODS

The current research is a retrospective investigation that included fifty different patients. In the current research, participants had to have a confirmed case of COVID 19 as determined by real-time PCR. In addition, they had to be at least 18 years old and have neurological symptoms of COVID 19 either at the time of admission or while they were staying in the hospital. Patients who did not have detectable infections based on the results of the real-time PCR were not included in the research. Patients of COVID 19 who had neurological signs either before they were admitted or while they were in the hospital had a CT brain plain once during their time in the hospital. CT Brain plain presentations were shown to correspond with CNS symptoms, progression throughout the patients' hospital stays, and outcomes. Several tests, such as RT-PCR for COVID 19, CT Brain plain, complete blood count, liver function tests, renal function tests with electrolytes, and others were performed.

STATISTICAL ANALYSIS

At the end of the study, the data was analysed statistically by using Independent t-test and Chi-square test. A p value of <0.05 was considered significant.

RESULTS

In the current investigation, there were a total of 50 patients, 46 (92%) of whom were male, while just 4 (8%), on the other hand, were female. The patients' ages ranged anywhere from 35 to 82 years old, with a mean of 65.85±8.69 years. NLR was 14.98±2.69 (range 1.31-47.5), mean LDH 992.17±25.69 (range 221-5125), and Hs-CRP was 171.22±22.69 (range 2.9-321.5). Mean haemoglobin of the patients was 11.12±1.85 (range 4-15 g/dl), total leukocyte count was 16580.63±5896.45, mean platelet count was 2.11±1.02 / lacs (0. 27 patients, or 54%, were discovered to have had an ischemic stroke, whereas 5 patients, or 10%, were found to have had a hemorrhagic stroke. The CT brain results were found to be abnormal in 30 individuals (or 60%), whereas in

20 patients (or 40%), they were determined to be normal. 11 (22%) of the patients required the assistance of a ventilator, 6 (12%), of the patients used a BiPAP, 2 (4%), of the patients used a Hudson mask, and 10 (20%) of the patients had NRM. Ten of the eleven patients who were receiving assistance from a ventilator passed away, while the remaining patient was released from the hospital. In a similar vein, three patients out of 27 who suffered from ischemic stroke passed away. Five patients had a hemorrhagic stroke, and two of them passed away. Normal CT brain results were reported in 20 individuals, of whom 18 patients were able to leave the hospital and 2 patients passed away as a result of their condition. An further examination of the data from the research revealed a comparison of aberrant and normal CT brain results (Table 1).

Table 1: Parameters

Parameters	Abnormal 30	Normal 20	Total	Statistical analysis
Age (Mean±SD)	67.12±7.88	62.58±8.96	65.85±8.69 y	0.33
Sex Male Female	 30(100%) 0	 16(80%) 4(20%)	 46(92%) 4(8%)	0.03
Hb (Mean±SD)	11.24±1.85	10.88±1.69	11.12±1.85	0.52
TLC (Mean±SD)	17145.88± 4259.44	12698.88±7789.63	16580.63±5896.45	0.63
Platelet (Mean±SD)	2.21±1.11	1.91±1.22	2.11±1.02	0.26
NLR (Mean±SD)	17.11±2.36	12.22±4.25	14.98±2.69	0.37
LDH (Mean±SD)	941.55±236.89	1122.5±369.58	992.17±25.69	0.29
Hs-CRP (Mean±SD)	191.63±25.98	129.89±22.69	171.22±22.69	0.33
Ventilator support during hospital stay	9(30%)	2(20%)	11(22%)	0.44
Ischemic stroke	27(90%)	0	27(54%)	0.001
Haemorrhagic shock	5(16.67%)	0	5(10%)	0.36
Discharge from hospital	15(50%)	18(90%)	33(66%)	0.06
Death	15(50%)	2(10%)	17(34%)	0.06

Finally, out of 50 patients, 33(66%) patients discharged from the hospital and 17(34%) patients died.

DISCUSSION

As of the 8th of September 2020, the severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2) was responsible for more than 26.5 million confirmed illnesses and 875,000 fatalities globally [5]. SARS-CoV-2, like other diseases produced by members of the coronavirus family, shows itself with infections of the upper respiratory tract and symptoms that are similar to those of the flu, the severity of which may vary [6]. However, Covid-19 is one of a kind since it has the potential to create an illness that affects several organs, including the central nervous system and the peripheral nervous system in certain people. In their investigation, Liotta and colleagues investigated the cerebral symptoms of the condition in 509 individuals who had been hospitalized consecutively with confirmed cases of Covid-19. They compared individuals who had neurologic signs to those who did not have neurologic manifestations in terms of the severity of Covid-19 and the outcomes. Neurologic signs were seen at the time of the initiation of Covid-19 in 215 (42.2%) patients, at the time of hospitalization in 319 (62.7%) patients, and at any point throughout the course of the illness in 419 patients (82.3%). Myalgias (44.8%), headaches (37.7%), encephalopathy (31.8%), dizziness (29.7%), dysgeusia (15.9%), and anosmia (11.4%) were the neurologic signs that occurred the most often. Strokes, movement problems, motor and sensory deficits, ataxia, and seizures were all rather infrequent, affecting between 0.2 and 1.4% of patients each. Among the patients, 134 (26.3%) were found to have severe respiratory illness that required them to have mechanical ventilation [7].In their retrospective investigation, Castellano et al. reported brain CT results in 23 individuals with COVID-19 infection (21 males, 2 females, mean age 60.2± 7.9 years). These patients had similar demographics as the participants in the current study. In nine out of twenty-three patients (39%) examined, CT scans revealed the presence of acute lesions. In seven out of nine instances, or thirty percent of the total patients, very mild superficial enhancement following the injection of contrast showed multifocal, linear hyperdensities that were indicative of hemorrhages. These hyperdensities included both the cortex and the subarachnoid space that was next to the cortex. The other two instances revealed cortical–subcortical zones of hypoattenuation with sulcal effacement, which is compatible with acute–subacute ischemia. One of the cases (4.3%) displayed hemorrhagic change. those who tested positive for CT exhibited substantially higher levels of C-reactive protein (173.4 vs. 64 mg/L, p = 0.002) and increased levels of D-dimer (2.96 vs. 1.54 g/mL, p=0.018) compared to those who tested negative for CT. Patients who had a positive result on their brain CT had a PaO2/FIO2 ratio that was considerably lower (116 vs. 161, p = 0.033) [8]. In their retrospective observational case series, Radmanesh et al. reported 242 patients with COVID-19 who had had CT or MRI of the brain within 2 weeks after receiving a positive response from viral

testing (mean age, 68.76±16.5 years; 150 men/92 women [62.0%/38.0%]). These patients had a positive result from viral testing (mean age, 68.76±16.5 years). Alteration in mental state (42.1% of imaging indications), syncope/fall (32.6% of imaging indications), and localized neurologic impairment (12.4% of imaging indications) were the three most prevalent reasons for imaging. Nonspecific white matter microangiopathy was the imaging result that was seen the most often (134/55.4%), followed by chronic infarct (47/19.4%), acute or subacute ischemic infarct (13/5.4%), and acute hemorrhage (11/4.5%). White matter microangiopathy was related with increased mortality at two weeks (P 0.001) in this study. [9] Their findings revealed that in the absence of a focused neurologic loss, brain imaging in individuals with early COVID-19 who had an altered mental state may not be illuminating. This was the case in their study.There is a dearth of published material to date that discusses the results of patients' brain imaging tests who have been found to have a positive COVID-19 infection. A study that was published by Filatov et al[10] described an older male patient who presented with headaches and a disturbed mental condition. Brain computed tomography (CT) revealed that the patient had an ancient posterior cerebral artery infarct. In a different study that was published by Zhang et al[11], the authors described a young patient who had dysphagia, dysarthria, and encephalopathy. On CT and MRI, the researchers discovered that the patient had imaging results that were consistent with acute disseminated encephalomyelitis (ADEM). Two patients who were suffering from headaches and eye problems were found to have imaging evidence of cerebral venous thrombosis on CT and MRI scans, as was described by Ferro et al. [12]. In these individuals, the hypothesis that COVID-19 infection may induce hyperactivation of inflammatory factors and damage to the coagulation system, leading to D-dimer and platelet abnormalities, may potentially play a major role. This hypothesis is based on the fact that previous research has shown that COVID-19 infection is associated with an increased risk of cardiovascular disease. The research conducted by Hoffmann et al. [13] uncovered neurologic symptoms and imaging of the brain. Imaging was performed on all 13 patients in their series to investigate the inexplicable encephalopathy, and the results showed that 8 of the patients had leptomeningeal enhancement (62%), 3 of the patients had ischemic stroke (23%), and 11 of the patients had perfusion abnormalities (100%). According to a study from India's Ministry of Information and Broadcasting in July 2020, the case fatality rate in the nation was the lowest in the world, coming in at 2.41%, and it has been gradually decreasing[14]. At the middle of May 2020, a total of six cities, namely Delhi, Mumbai, Chennai, Ahmedabad, Pune, and Kolkata, accounted for nearly half of all recorded cases in the nation [15]. [Citations omitted] Lakshadweep was the only area in which there was not a single positive case as of the 10th of September 2020 [16]. It wasn't until the 10th of June that India's recoveries surpassed the country's active cases [17]. September saw the beginning of a major fall in infection rates, as well as a quick decline in the number of daily newly reported cases and active cases [18]. In October, a government commission on COVID-19 made the announcement that the pandemic had reached its zenith in India and that it may be brought under control by February 2021[19]. Over 30 anti-COVID vaccines are now being developed in different phases of production in India, and the first of these vaccines is anticipated to be made available somewhere around the beginning of 2021.These days, COVID-19 is a frequent disorder that may damage both the central nervous system and the peripheral nervous system. Headaches, vertigo, and changes in level of awareness are the neurological symptoms brought on by the COV infection. These symptoms may manifest in individuals of any age. Because there are not enough published data, there is a need for additional research that focuses on the neurological changes that occur in Covid 19 patients.

CONCLUSION

In conclusion, we were surprised to find that the proportion of patients with severe COVID-19 infection who had abnormal brain CT scans was rather significant. Ischemic stroke was the most common kind of stroke that occurred in conjunction with aberrant CT results. We believe that the connection between aberrant brain CT and the fate of patients warrants further validation in a wider patient population.

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