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Evaluation of Functional Independence and Pain in Covid-19 Patients with Mild Neurological Impairments during the Hospital Stay

Vijay Krishna Kumar[1], Archana Puttaiah[2], Girija Murugan[3], Shruthi Raju[4]

[1]Principal, Department of Physiotherapy, Dr.B.R.Ambedkar Medical College and Hospital, Bangalore, India

[2]Student, Department of Physiotherapy, Dr.B.R.Ambedkar Medical College and Hospital, Bangalore, India

[3]Lecturer, Department of Physiotherapy, Dr.B.R.Ambedkar Medical College and Hospital, Bangalore, India

[4]Lecturer, Department of Physiotherapy, Dr.B.R.Ambedkar Medical College and Hospital, Bangalore, India

ABSTRACT

Background: Novel COVID 19 is a infectious disease caused by a recently discovered corona virus. It is characterized as an acute respiratory syndrome followed by neurological diseases like acute necrotizing encephalopathy/disseminated encephalomyelitis, Guillain – barre syndrome, stroke inflammatory neuropathy. Common clinical symptoms include headache, insomnia, dizziness, delirium, myopathy, ataxia, seizures, complete/partial anosmia, ageusia, hypoxia, muscle and nerve pain and peripheral nervous system manifestation. The purpose of this survey was to evaluate the functional independence and pain in Covid-19 patients with mild neurological impairments during the hospital stay.

Method: 85 covid–19 diagnosed patients with mild neurological impairments such as non-specific headache, anosmia, aguesia, myalgia, fatigue etc. of age group 25 to 60 years admitted in hospital were recruited. Patient function is assessed using the FIM instrument at the time of admission and at the time of discharge. The severity of the patient's pain and the impact of this pain on the patient's daily functioning was evaluated using the brief pain inventory scale. Patients with comorbidity diseases like surgery and cancer, infants, children, ventilated ICU patients were excluded from the study.

Results: The study found that among the 85 respondent participants majority of 53(62.4%) had severe pain and 82 of them(96.5%) had high pain interference. According to the interpretation the total FIM score shows a significant improvement from admission to discharge with the p-value of 0.000.

Conclusion: The study concluded that there was a significant difference on functional independence and pain in Covid-19 patients with mild neurological impairments during the hospital stay.

KEYWORDS: Covid-19, Neurological Impairments

ARTICLE DETAILS

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INTRODUCTION

COVID-19:

Corona virus disease 2019 (COVID-19), the highly contagious infectious disease caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) Corona viruses are enveloped, positive single-stranded large RNA viruses that infect humans, but also a wide range of animals[1].

The novel corona virus pandemic has spread rapidly throughout the planet. It is believed to have originated in the Wuhan province of China, but this highly contagious respiratory virus has spread to over 140 countries on 6 continents as of mid-March 2020, according to the WHO(World Health Organization).[2] India is also facing this very tough task for controlling the virus outbreak and has

managed its growth rate through some strict measures.[3] Although COVID-19 predominantly affects the respiratory system, evidence indicates a multisystem disease which is frequently severe and often results in death. [4]

SARS-CoV-2 is strictly related to SARS-CoV. It is believed to have a zoonotic origin. Corona virus genetically clusters with the genus Beta corona virus, in subgenus Sarbeco virus (lineage B), together with two bat-derived strains. At the whole genome level, it is 96% identical to other bat corona virus samples (BatCov RaTG13)[5].Similar to other viruses, SARS-CoV-2 infects lung alveolar epithelial cells through receptor-mediated endocytosis *via* the angiotensin-converting enzyme II (ACE2) as an entry receptor.[6]

The disease is believed to spread mainly with close contacts (within 1 to 2 meters), and through small droplets originating by people during sneeze, cough, or talk. The contagion can also occur by first touching a contaminated surface and then touching eyes, nose, or mouth [7]. Virus spread may happen before the symptoms appear, however if the people are symptomatic the virus is most contagious [8]

Epidemiology:

As per the latest World Health Organization report (August 24,2021), there were 3,24,62,293 confirmed COVID-19 cases along with 434756 deaths in India. The number of active cases are 3,13,218.

Pathogenesis:

SARS-CoV-2 virus entry, into the host cells, is a complex process. After binding to the angiotensin-converting enzyme 2 receptor present on the host cell, these receptors are profusely expressed on lung tissues and arterial and venous endothelial cells and also expressed in the brain, particularly, in endothelial cells of cerebral capillaries. The enveloped virus fuses its envelope with the host cell membrane; subsequently, the virus delivers its nucleocapsid into the host cell cytoplasm. In the host cell, viral RNA multiplies and viral proteins which resembles viral genome are released in new uninfected cells, thus, virus spread takes place.[10]

Trans membrane protease, serine 2 (TMPRSS2) enzymes, is needed to activate the spike protein glycoprotein receptor binding domain of SARS-CoV-2. [11] Angiotensin-converting enzyme 2 receptor and TMPRSS2, in the brain, were highly expressed in the oligodendrocyte precursor cells and astrocytes of the substantial nigra and cortex.[12]

The pathogenesis of COVID-19 evolves in three phases. In the early infection phase, the inflammatory response is localized to the mucosa of the upper respiratory tract. During this phase, the patient is infected and transmits the disease to others. In the next pulmonary phase, the virus proliferates and invades the lungs. There are lung damage, hypoxemia, and cardiovascular dysfunction. In the last, inflammatory response phase, there is a cytokine storm. In the last phase, multiple body organs, including the nervous system, are likely to be affected. [13]

Central nervous system (CNS) invasion and functional impairment:

COVID-19, in most patients, presents with mild flu-like illness. Elderly patients with co morbidities, like hypertension, diabetes, or lung and cardiac disease, are more likely to have severe disease and deaths. Neurological complications are frequently reported in severely or critically ill patients with co morbidities. Studies suggest that the SARS-CoV-2 virus can break the blood–brain barrier and enter into the brain. [14] Angiotensin-converting enzyme 2 receptors that are present on endothelial cells of cerebral vasculature act as cell entry points for the virus [15]. Co morbidities, like diabetes and hypertension, enhance the angiotensin-converting enzyme 2 receptor expression in the brain and neurotropism of the SARS-CoV-2 virus.[16] Competitive blockage of angiotensin-converting enzyme 2 by the SARS-CoV-2 virus down-regulates angiotensin-converting enzyme 2 expression leading to uncontrolled blood pressure and the enhanced possibility of cerebrovascular accidents. In COVID-19, both central and peripheral nervous systems can be affected. The SARS-CoV-2 virus causes the disease COVID-19 and has the potential to invade the brain. The SARS-CoV-2 virus enters the brain either via a haematogenous route or olfactory system. Angiotensin-converting enzyme two receptors, present on endothelial cells of cerebral vessels, are a possible viral entry point. The most severe neurological manifestations, altered sensorium (agitation, delirium, and coma), are because of hypoxic and metabolic abnormalities. Characteristic cytokine storm incites severe metabolic changes and multiple organ failure. Profound Coagulopathies may manifest with ischemic or haemorrhagic stroke. Rarely, SARS-CoV-2 virus encephalitis or pictures like acute disseminated encephalomyelitis or acute necrotizing encephalopathy have been reported. Nonspecific headache is a commonly experienced neurological symptom. A new type of headache "personal protection equipment-related headache" has been described. Complete or partial anosmia and ageusia are common peripheral nervous system manifestations. Recently, many cases of Guillain-Barre syndrome in COVID-19 patients have been observed, and a post infectious immune-mediated inflammatory process was held responsible for this. Guillain-Barre syndrome does respond to intravenous immunoglobulin. Myalgia/fatigue is also common, and elevated creatine kinase levels indicate muscle injury.

Neurological manifestations are common in advanced stages of the disease. In severe COVID-19, systemic disorders like hypoxia, sepsis respiratory and metabolic acidosis, hyper coagulable states, and disseminated intravascular coagulation (DIC) are largely responsible for most of the clinical manifestations, including neurological.

Neurological manifestations can also be caused by prolonged stays in the intensive care unit and drug toxicities. The central and peripheral nervous system, both, can be affected in COVID-19.[17]

These manifestations will further lead to functional disability and affects the Quality of life of the patients and deprive them from participating in the society.

NEED OF STUDY

Globally 10 million people are affected by COVID-19, lakhs in states, and thousands in Bangalore. In a weekly census conducted with 500 COVID 19 patients in the Dr. B.R. Ambedkar Medical College and Hospital, nearly 50 – 60% patients were reported with covid -19 with mild neurological impairment. This study intends to evaluate the functional independence and pain in Covid-19 patients with mild neurological impairments during the hospital stay . This survey gives an information about the level of a patient's functional independence which indicates the percentage of functional activities been affected, the duration of dependency ,how much assistance is required for the individual to carry out the activities of daily living and the severity of the patient's pain and the impact of this pain on the patient's daily functioning.

METHODOLOGY

- **Study criteria:**
  Study design –longitudinal survey
  Study setting – subjects were taken from the Bangalore city
- **Sample criteria:**
  Sample design - simple random sampling
  Sample size – 80
  Sampling population – patients affected with COVID-19 with fulfilling the inclusion and exclusion criteria of this study are the population of this study.
- **Criteria for sample collection:**
- **Inclusion criteria:**

A) covid-19 patients with mild neurological impairments such as non-specific headache, anosmia, aguesia, myalgia, fatigue etc.

B) 25 to 60 years of age

- **Exclusion criteria:**
  A) Ventilated ICU patients
  B) Infants and children
  C) Co -morbid diseases like surgeries, cancer etc.
- **Place of study:**

Dr.B.R.Ambedkar Medical College and Hospital, Bangalore-48

- **Study Duration:**
  6 months
- **Materials used in the study:**
  Pen
  Paper
- **Procedure**

The survey was conducted on 85 randomly selected patients who had been diagnosed as having covid-19 by Dr.B.R.Ambedkar Medical College and Hospital Bangalore.The purpose and procedure of the survey was explained to each subject and consent were taken.The basic demographic data of each individual were collected and the functional independence measure scale and brief pain inventory scale has been employed to assess the functional impairment and pain respectively, among the covid-19 patients.Patient function is assessed using the FIM instrument at the time of admission and at the time of discharge.The severity of the patient's pain and the impact of this pain on the patient's daily functioning were evaluated using the "brief pain inventory scale".

- **Assessment Tools:**
  Functional independence measure scale(FIM scale)
  Brief pain inventory scale(BPI scale)

RESULTS

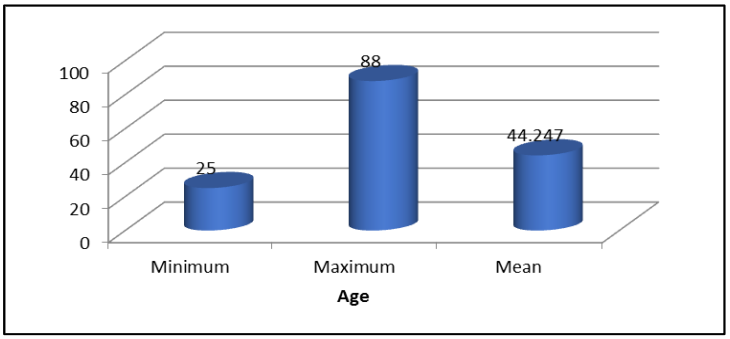
The aim of the study was to evaluate the functional independence and pain in Covid-19 patients with mild neurological impairments during the hospital stay. Statistical analysis was done using SPSS 24 version. Descriptive statistics found using mean, SD and frequency percentage. Pre post comparison was done by paired t test. Significant level was set at 5%.

- **AGE DISTRIBUTION:**

	N	Minimum	Maximum	Mean	Std. Deviation
Age	85	25.00	88.00	44.247	14.925

Table No 1:- Mean and SD of Age

The above table shows the mean and SD Of age. The minimum age is 25 years and the maximum age is 88 years. The average mean of the age is 44.247 with the Standard deviation of 14.925.



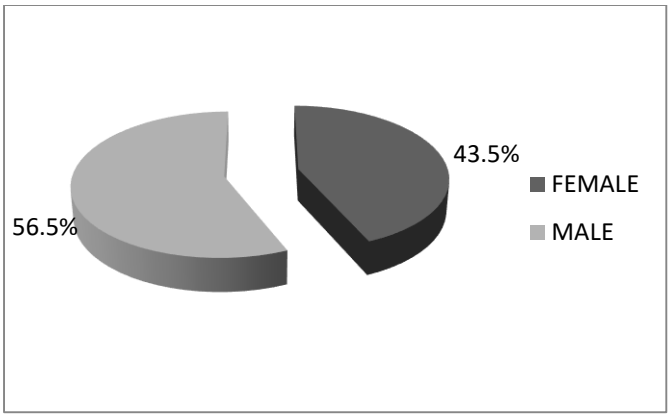
Graph No 1:- Mean and SD of Age

- **GENDER DISTRIBUTION:**

	Frequency	Percent
Female	37	43.5
Male	48	56.5
Total	85	100.0

Table 2: -Distribution Based On Gender

The above table shows distribution based on gender. Among the 85 respondent participants 37 are female and 48 are male. In percentage 43.5% of population were females and 56.5% of population were male.



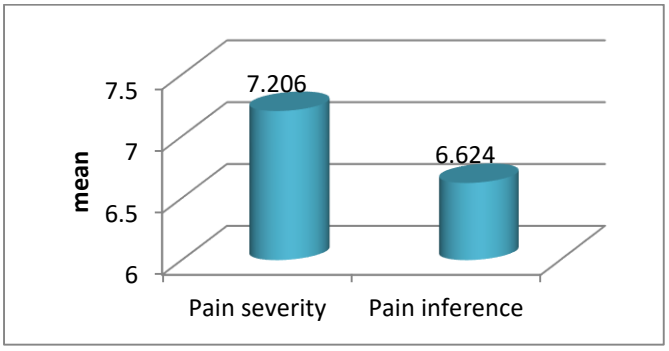
Graph No 2:- Distribution Based on Gender

- **PAIN SEVERITY AND PAIN INTERFERENCE**

	Mean	Std. Deviation
Pain severity	7.206	1.375
Pain interference	6.624	1.210

Table No 3:- Average Pain Severity and Pain Interference

The above table shows the average pain severity and average pain interference. The average pain severity is 7.206 with the standard deviation of 1.375 and the average pain interference is 6.624 with the standard deviation of 1.210.



Graph No 3:- Average Pain Severity and Pain Interference

- **PATTERN OF PAIN SEVERITY**

	Frequency	Percent
MILD	5	5.9
MODERATE	27	31.8
SEVERE	53	62.4
Total	85	100.0

Table No 4:- Pattern of Pain Severity

The above table shows the pattern of pain severity. Among the 85 respondent participants majority of 53(62.4%) had severe pain, 31.8 % had moderate pain and 5.9% of the participants had mild pain.

- **PATTERN OF PAIN INTERFERNCE**

	Frequency	Percent
HIGH	82	96.5
LOW	3	3.5
Total	85	100.0

Table No 5:- Pattern of Pain Interference

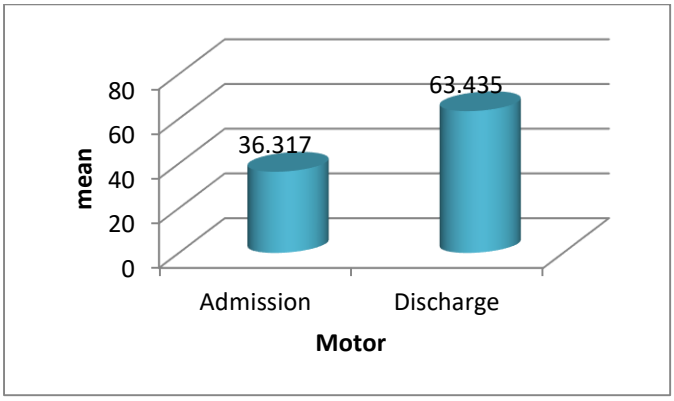
The above table shows the pattern of pain interference. Among the 85 respondent participants majority of 82(96.5%) had high pain interference and 3 of them (i.e. 3.5%) had low pain interference.

- **COMPARISON IN MOTOR SCORE FROM ADMISSION TO DISCHARGE**

Motor	Mean	SD	Average difference from admission to discharge	t value	P value	Result
Admission	36.317	16.499	27.117	24.903	0.000	P<0.05
Discharge	63.435	11.923				

Table No 6:- Comparison in Motor Score from Admission to Discharge

The above table gives the comparison in motor score from admission to discharge. During admission the motor score was 36.317±16.499 and at the time of discharge it is increased to 63.435±11.923. Average difference from admission to discharge is 27.117 .The p-value is 0.000. The p-value is <0.05.Therefore,it shows statistically significant improvement in motor score from admission to discharge.



Graph No 4:- Comparison in Motor Score from Admission to Discharge

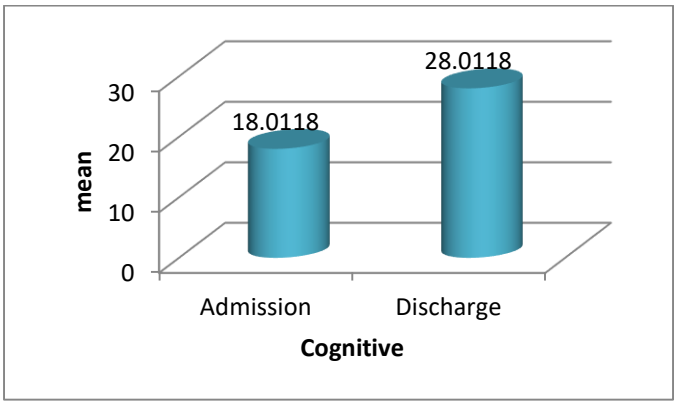
- **COMPARISON IN COGNITIVE SCORE FROM ADMISSION TO DISCHARGE**

Cognitive	Mean	SD	Average difference from admission to discharge	t value	P value	Result
Admission	18.011	7.063	10.0	16.786	0.000	P<0.05
Discharge	28.011	6.781				

Table No 7:- Comparison in Cognitive Score from Admission to Discharge

The above table gives the comparison in cognitive score from admission to discharge. During admission the cognitive score was 18.011±7.063 and at the time of discharge it increased to 28.011±6.781. Average difference in cognitive score from admission to discharge is 10.0. The p-value is 0.000.The p-value is <0.05.

Therefore it shows statistically significant improvement in cognitive score from admission to discharge.



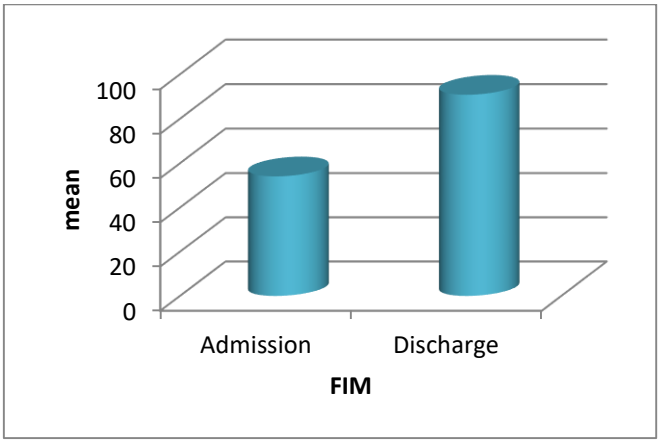
Graph No 5:- Comparison in Cognitive Score from Admission to Discharge

- **COMPARISON IN FIM SCORE FROM ADMISSION TO DISCHARGE**

FIM	Mean	SD	Average difference from admission to discharge	t value	P value	Result
Admission	54.105	22.614	36.705	27.178	0.000	P<0.05
Discharge	90.811	15.404				

Table No 8:-Comparison in FIM Score from Admission to Discharge

The above table gives the comparison in FIM score from admission to discharge during admission the FIM score was 54.105±22.614 and at the time of discharge it increased to 90.811±15.404. Average difference from admission to discharge is 36.705. The p-value is 0.000.The p-value <0.05.Therefore it shows statistically significant improvement in FIM score from admission to discharge.



Graph No 6:- Comparison in FIM Score From Admission To Discharge

DISCUSSION

The aim of this study was to evaluate the functional independence and pain in Covid-19 patients with mild neurological impairments during the hospital stay. The researcher collected 85 samples of the patients with covid-19 with mild neurological impairments .The subjects were evaluated with data collection form, neurological assessment, BPI scale and FIM scale at the time of admission and at the time of discharge. According to the received data, the most common mild neurological impairments which were found in covid-19 patients were non-specific headache, complete or partial anosmia, aguesia, myalgia, fatigue, delirium, altered sensorium.

According to age distribution we can interpret that 25 years was the lowest age and 88 years was the highest age

with the mean age of 44.247.According to gender distribution, 43.5% of population were females and 56.5% of population were male.

In the BPI scale interpretation, the aim was to evaluate severity of the patient's pain and the interference of this pain on the patient's daily functioning during their hospital stay. According to the interpretation, among the 85 respondent participants majority of 53(62.4%) had severe pain, 31.8 % had moderate pain and 5.9% of the participants had mild pain during their hospital stay. The average pain severity is 7.206 with the standard deviation of 1.375. The average interference of pain is 6.624 with the standard deviation of 1.210 in covid-19 patients during their stay in hospital. Majority of 82(96.5%) had high pain interference and 3 of them (i.e. 3.5%)had low pain interference which limited their functional activities and eventually affected level of a patient's functional independence which was assessed using the FIM scale

The FIM scale aimed to assess the patient's motor and cognitive functional independence during their hospital stay .According to the interpretation it was found that the total FIM score during admission was 54.105±22.614 and at the time of discharge it is increased to 90.811±15.404. Average difference from admission to discharge is 36.705. During the admission, it was found that the motor score was 36.317±16.499 and at the time of discharge it is increased to 63.435±11.923. Average difference from admission to discharge is 27.117. The cognitive score at the time of admission was 18.011±7.063 and at the time of discharge it increased to 28.011±6.781. Average difference in cognitive score from admission to discharge is 10.0.Therefore the total FIM score shows a significant improvement from admission to discharge. At last we can say that the covid-19 patients with mild neurological impairments who had severe pain and high pain interference in their functional activities during their hospital stay showed a significant improvement in the level of functional independence following the medical treatment from admission to discharge with the p-value of 0.000. In all the above interpretation the score is said to be statistically significant if the p-value is less than 0.05.

CONCLUSION

As per the data analysis and interpretation null hypothesis is rejected and the alternative hypothesis is accepted which states that" there was a significant difference on functional independence and pain in Covid-19 patients with mild neurological impairments during the hospital stay". Hence, the study concluded that there was significant improvement in the level of functional independence in covid-19 patients with mild neurological impairments from the time of admission to discharge.

REFERENCES

I. Velavan TP, Meyer CG. La epidemia de COVID-19.Trop Med Int Health. 2020; 25(3).
II. Cron RQ, Chatham WW.The rheumatologist's role in COVID-19.
III. Gupta R, Pal SK, Pandey G. A comprehensive analysis of COVID-19 outbreak situation in India. MedRxiv. 2020 Jan 1.
IV. Barker-Davies RM, O'Sullivan O, Senaratne KP, Baker P, Cranley M, Dharm-Datta S, Ellis H, Goodall D, Gough M, Lewis S, Norman J. The Stanford Hall consensus statement for post-COVID-19 rehabilitation. British journal of sports medicine. 2020 Aug 1; 54(16):949-59.
V. Velavan TP, Meyer CG. The COVID-19 epidemic. Tropical medicine & international health. 2020 Mar; 25(3):278.
VI. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, Ren R, Leung KS, Lau EH, Wong JY, Xing X. Early transmission dynamics in Wuhan, China, of novel coronavirus–infected pneumonia. New England journal of medicine. 2020 Jan 29.
VII. Antonelli A, Elia G, Ferrari SM, Foddis R, De Marco S, Cristaudo A, Fallahi P. The COVID-19, epidemiology, clinic and prevention. Current genomics. 2020 Apr; 21(3):157.
VIII. Luo H, Tang QL, Shang YX, Liang SB, Yang M, Robinson N, Liu JP. Can Chinese medicine be used for prevention of corona virus disease 2019 (COVID-19)? A review of historical classics, research evidence and current prevention programs. Chinese journal of integrative medicine. 2020 Apr; 26(4):243-50.
IX. World Health Organization. World Health Organization coronavirus disease (COVID-19) dashboard. World Health Organization. 2021.
X. Hoffmann M, Kleine-Weber H, Schroeder S, Krüger N, Herrler T, Erichsen S, Schiergens TS, Herrler G, Wu NH, Nitsche A, Müller MA. SARS-CoV-2 cell entry depends on ACE2 and TMPRSS2 and is blocked by a clinically proven protease inhibitor. cell. 2020 Apr 16; 181(2):271-80.
XI. Coutard B, Valle C, de Lamballerie X, Canard B, Seidah NG, Decroly E. The spike glycoprotein of the new coronavirus 2019-nCoV contains a furin-like cleavage site absent in CoV of the same clade. Antiviral research. 2020 Apr 1; 176:104742.
XII. Qi J, Zhou Y, Hua J, Zhang L, Bian J, Liu B, Zhao Z, Jin S. The scRNA-seq expression profiling of the receptor ACE2 and the cellular protease TMPRSS2 reveals human organs susceptible to SARS-CoV-2 infection. International Journal of Environmental Research and Public Health. 2021 Jan; 18(1):284.
XIII. Shi Y, Wang Y, Shao C, Huang J, Gan J, Huang X, Bucci E, Piacentini M, Ippolito G, Melino G. COVID-19 infection: the perspectives on immune responses.

XIV. Snoeck M, Van Engelen BG, Küsters B, Lammens M, Meijer R, Molenaar JP, Raaphorst J, Verschuuren-Bemelmans CC, Straathof CS, Sie LT, de Coo IF. RYR 1-related myopathies: a wide spectrum of phenotypes throughout life. European journal of neurology. 2015 Jul;22(7):1094-112.

XV. Li MY, Li L, Zhang Y, Wang XS. Expression of the SARS-CoV-2 cell receptor gene ACE2 in a wide variety of human tissues. Infectious diseases of poverty. 2020 Dec; 9(1):1-7.

XVI. Puelles VG, Lütgehetmann M, Lindenmeyer MT, Sperhake JP, Wong MN, Allweiss L, Chilla S, Heinemann A, Wanner N, Liu S, Braun F. Multiorgan and renal tropism of SARS-CoV-2. New England Journal of Medicine. 2020 Aug 6; 383(6):590-2.

XVII. Garg RK. Spectrum of neurological manifestations in Covid-19: a review. Neurology India. 2020 May 1; 68(3):560.