Internship Training

at

Foundation of Healthcare Technologies Society

On

Long term effects of Covid-19: A Scoping Review

By

Name: Dr Akansha Saini
Enroll No.: PG/20/120

Under the guidance of
Dr. Pankaj Talreja

PGDM (Hospital and Health Management)
2020-22

International Institute of Health Management Research

New Delhi

Completion of Dissertation from Foundation of Healthcare Technology Society

The certificate is awarded to

Dr. Akansha Saini

in recognition of having successfully completed his/her Internship
and has successfully completed his/her Project on

Long-term Effects of Covid-19: A Scoping Review

From: **12th April to 12th July 2022**

At

Foundation of Healthcare Technology Society

She comes across as a committed, sincere & diligent person who has a
strong drive & zeal for learning.
We wish her all the best for future endeavors.

Dr. Ashish Joshi PhD, MBBS, MPH
Dean, School of Public Health, University of Memphis
Founder, FHTS

Mansi Gupta BPT, PGDHA, MSW
V-INSPIRE Coordinator, FHTS

(This may be noted that the dissertation topic is a part of a major project of FHTS and can't be used in any publication, conference or presentation other than dissertation presentation.)

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Dr. Akansha Saini student of PGDM (Hospital & Health Management) from International Institute of Health Management Research, New Delhi has undergone training at (April 2022) FHTS from April 2022 to July 2022

The Candidate has successfully carried out the study designated to him during internship training and his/her approach to the study has been sincere, scientific and analytical. The Internship is in fulfillment of the course requirements.

I wish her all success in all his/her future endeavors.

Dr. Sumesh Kumar
Associate Dean, Academic and Student Affairs
IIHMR, New Delhi

Mentor
IIHMR, New Delhi

CERTIFICATE OF APPROVAL

The following summer internship project if titled **"LONG TERM EFFECTS OF COVID-19: A SCOPING REVIEW"** at **Foundation of Healthcare Technology Society** is hereby approved as a certified study in management carried out and presented in a manner satisfactory to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Hospital and Health Management** for which it has been submitted by **DR. AKANSHA SAINI**. It is understood that by this approval the undersigned does not necessarily endorse or approve the report only for the purpose it is submitted.

Dr. Pankaj Talreja
Mentor
IIHMR Delhi

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled **Long-term effects of Covid-19; A scoping review** and submitted by **Dr Akansha Saini** Enrollment No. **PG/20/120** under the supervision of **Dr. Pankaj Talreja** for award of PGDM (Hospital & Health Management) of the Institute carried out during the period from **12/04/2022 to 12/07/2022** embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Akansha
Signature

Certificate from Dissertation Advisory Committee

This is to certify that Dr. Akansha Saini a graduate student of the PGDM (Hospital & Health Management) has worked under our guidance and supervision. She is submitting this dissertation titled "Long-term effects of Covid-19: A Scoping review" at "Foundation of Healthcare Technology Society" in partial fulfilment of the requirements for the award of the PGDM (Hospital & Health Management).

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Dr. Ashish Joshi PhD, MBBS, MPH
Dean, School of Public Health, University of Memphis
Founder, FHTS

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(This may be noted that the dissertation topic is a part of a major project of FHTS and can't be used in any publication, conference or presentation other than dissertation presentation)

Certificate of Approval

The following dissertation titled "**Long Term Effects of Covid-19: A Scoping Review**" at "**FHTS Dehradun**" is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **PGDM (Hospital & Health Management)** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted. Dissertation Examination Committee for evaluation of dissertation.

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CERTIFICATE ON PLAGIARISM CHECK

Name of Student (in block letter)	Dr. AKANSHA SAINI		
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Title of the Dissertation/Summer Assignment	Long-term effects of Covid-19: A scoping review		
Plagiarism detects software used	"TURNITIN"		
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FEEDBACK FORM

Name of the Student: Dr Akansha Saini

Name of the Organisation in Which Dissertation Has Been Completed: Foundation of Healthcare Technology Society

Area of Dissertation: Long-term effects of Covid-19: A scoping review

Attendance: 72 days

Objectives achieved: Yes

Deliverables: She was punctual in delivering the work and the revisions advised

Strengths: Akansha maintains a steady and positive attitude about work at hand.

She is a punctual and responsible intern.

Suggestions for Improvement: She should delve more into the subject matter and enhance scientific writing skills.

Suggestions for Institute (course curriculum, industry interaction, placement, alumni):

FHTS looks forward to collaborations for various academic and research activities

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Signature of the Officer-in-Charge/ Organisation Mentor (Dissertation)

Date: 07-08-2022

Place: New Delhi

(This may be noted that the dissertation topic is a part of a major project of FHTS and can't be used in any publication, conference or presentation other than dissertation presentation)

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Certificate of Internship

This is to certify that Akansha Saini has successfully completed her dissertation at Foundation of Healthcare Technologies Society from 12th April'22 to 12th July'22.

She is energetic, punctual, innovative, professional, and supportive and carries good social skills.

We wish her all the best for her future endeavours.

Dr. Ashish Joshi PhD, MBBS, MPH
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Founder, FHTS

Mansi Gupta BPT, PGDHA, MSW
V-INSPIRE Coordinator

Date - 31-07-2022

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LIST OF SYMBOLS AND ABBREVIATIONS

ScR- Scoping review

SARS - Severe acute respiratory syndrome

RCT- Randomized controlled Trial

CT- Computed tomography

ICU- Intensive care unit

CMR- Cardiovascular magnetic resonance imaging

ECG- Electrocardiogram

CHAPTER-1

Overview of Organisation

FHTS – foundation of healthcare technologies society is a non-profit organisation working in the field of public health. It uses SMAART to implement the research into the system.
SMAART stands for Sustainable, multisector, accessible, affordable, reimbursable, tailored.
FHTS basically address the following problems:
Lack of research based innovation Limited mentorship
Lack of intervention research Inadequate skills.

Mission

To translate research into practice through use of technology based solutions that can empower individuals and the environment where they live in for the well being of themselves, their families and the communities.

Vision

To improve population outcomes through innovative multispectral and evidence based practices using informatics applications that can empower individuals, communities and institutions for their overall wellbeing.

Values

Integrity

- Giving honest feedback
- Providing honest assessments and telling people what they need
- Acting with transparency
- Trusting and being trustworthy Education
- Creating a vibrant learning community
- Encouraging everyone to be open and share knowledge
- Connecting the dots for people until they are able to do it themselves
- Helping people understand the bigger picture

Availability, Accessibility, Affordability

- Breaking down barriers and boundaries
- Reaching out to marginalized populations
- Providing culturally competent services
- Providing affordable, cost effective, reliable and evidence driven informatics solutions

Building a sustainable community

- Helping create desire in people to learn, particularly from one another
- Helping create change and change agents in the community
- Relevant to the community and to the nonprofit organizations we serve
- Taking a long term view in developing an economically more vibrant community with equity among people of different race and ethnicity
- Helping non-profit leaders Infuse energy, passion and focus into their work, their organizations and the community

Message from the President

The Foundation of Healthcare Technologies is a National Society and is the first of its own kind that integrates multi-sectoral segments through use of innovative informatics platforms for an overall improvement of population health in underserved settings.

Economic situations in developing countries have resulted in increased disparities in terms of health, economic growth, and access to resources that are valuable to the overall growth of the populations. The foundation aims to establish a center of excellence in developing a skilled workforce in the area of informatics through human resource development, capacity building, innovative research, translation and dissemination of research findings into practice, and health systems strengthening.

The foundation will promote innovative ideas that can be practiced at the grassroots level so that solutions that are provided can be personalized, evidence based, research driven, context specific, and goal oriented and culturally adaptable to meet the needs of the diverse group of users.

The foundation will form collaborations and partnerships across boundaries to address the growing challenges for providing better living to the individuals, families and the environment they live. We aim to build a unique environment that will bring innovations across multiple sectors resulting in a healthier ecosystem.

Research domains of FHTS:

- Inequities
- COVID-19
- Public health data science
- Decision support systems
- Nutrition informatics
- Social determinants of health
- Urban poor
- Population health informatics
- Health communication
- Disability informatics
- m-health
- Infodemic and misinformation
- Consumer health informatics
- Digital health interventions
- Sustainable development goals
- Implementation science
- Laboratory informatics

CHAPTER-2

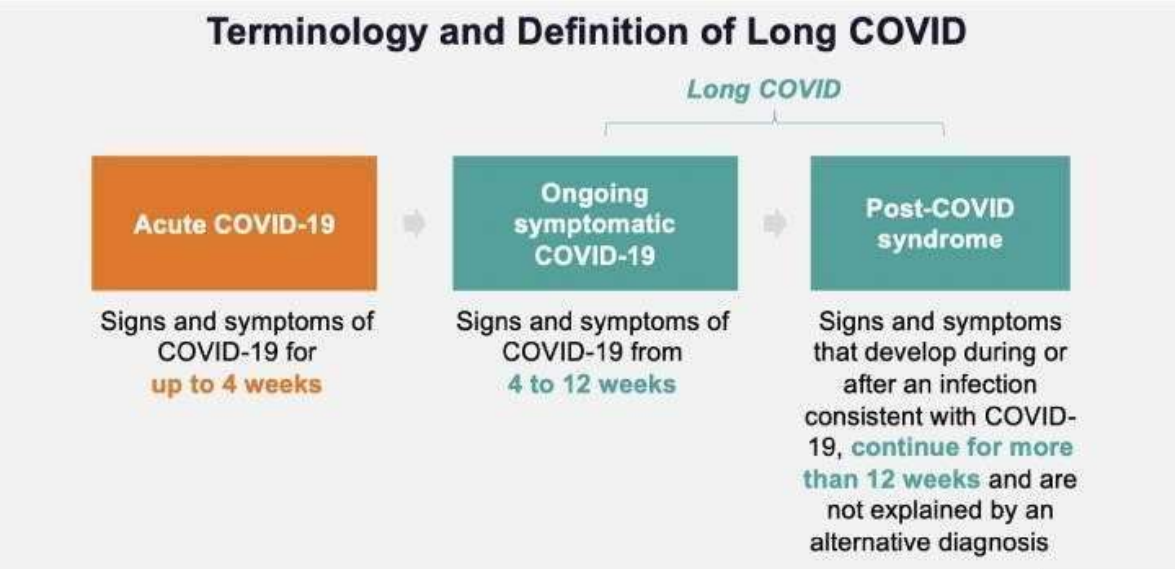
Project Outline

Introduction

COVID-19, shook the healthcare system of the entire world. It started from Wuhan in China in December 2019 and first case of COVID-19 virus was reported in 2020 January in India. In March 2020, it was declared pandemic. World has experienced some of the most devastating virus in the past also, be it the MERS and SARS which affected the human respiratory system. But this new pandemic of COVID-19 was different as it has the highest transmission rate. It is believed that this virus also originated from the bats to humans It caused major health challenges worldwide. COVID-19 spread through the transmission of respiratory droplets. The incubation period is six to seven days. The signs and symptoms are fever, common cold, cough, fatigue, dyspnoea. These sign and symptoms are very likely to normal viral fever and that's why it was another challenge for everyone around the world. Various guidelines were released by the WHO including the social distancing, wear a mask, use sanitizers, maintain hygiene. Public healthcare systems of every country worked to find the epidemiology, treatment and the ways to control the spread of this virus. The most affected country included, Italy, USA, India, Brazil. To control the spread of this deadly infection complete lockdown was imposed throughout the globe which impacted the economy. Everything was shut from airlines to cargo ships and road vehicles. Import and export was closed and this is why people suffered with huge loss, now the problem was not only the health but also the economy. Due to the fall in economy, recession took place and hence along which the migrant daily wage workers, the people with full time permanent jobs also suffered. All these scenarios overburdened the governments of even the super power countries of the world. Coronavirus 2019 (COVID-19) is a disease that has led to unprecedented mental health risks worldwide. While psychological support is given to patients and health workers, public mental health in general also requires significant attention. Other symptoms and conditions that can be easily caused include panic attacks, phobias, and OCD.

The long-term consequences of Covid-19 on the overall health of the infected population are investigated in this scoping review. After being discharged from the hospital, the impacts of the COVID-19 virus are stated in a number of articles and studies.

There are not many words that describe Covid-19. Long Covid-19- People with a history of SARS-CoV-2 infection, whether it was suspected or confirmed, are considered to have a post-COVID-19 condition, which is characterised by illness that typically manifests three months after the start of COVID-19 and has symptoms and effects that last at least two months. The signs and symptoms of the post COVID-19 syndrome cannot be effectively described by an alternative diagnosis



In this review paper, we will discuss and make an analysis on whether the Covid-19 can affect the humans at a long term and what all can be the long-term effects of the Covid-19. Many studies are going on this topic to conclude whether it can affect the people at long term basis and few have already been done. We will review all the articles and studies done on this topic.

Rationale of the study:

We faced many problems globally in the acute symptoms of COVID-19. A thorough assessment of the patient and documentation of their symptoms should indicate which symptoms are secondary to a complex form of COVID-19 and which sequelae are common to all severe infections. It is necessary to conduct research on the COVID-19's long-term effects in order to be ready for any problem and to manage it. The purpose of this review is to help you better grasp COVID-19's long-term sequel.

Objectives

The objectives of this scoping review is to:

To conduct a systematic search and analysis on the COVID-19's long-term impacts on general health in individuals post COVID-19 infection.

Methodology

To conduct a systematic search the COVID-19's long-term impacts on general health in the survivors of COVID-19 in a comprehensive way, literature available on Pubmed, Cochrane and Google scholar using some Mesh terms.

Mesh terms used are: long term effects, COVID-19, Chronic, Respiratory, Pulmonary, Cardiovascular, Health, Immune system, Neurological, SARS-CoV-2, Fatigue, Dysponea etc.

‘Long term effects” AND ‘COVID-19’

‘Long term effects’ AND ‘COVID-19’ AND ‘Respiratory system’

‘Long term consequences’ AND ‘COVID-19’ AND ‘Respiratory system’ OR ‘Pulmonary system’

‘Long term consequences’ AND ‘COVID-19’ AND ‘Neurological system’ OR ‘Brain’ OR ‘Nervous system’

‘Long term effects’ AND ‘COVID-19’ AND ‘Health’.

‘Long term effects’ AND ‘COVID-19’ AND ‘Fatigue’ OR ‘Weakness’ AND ‘Dyspnoea’

All the literature review paper on this topic is read and analysed PRISMA-ScR guidelines are used for the review.

Identification of relevant studies

Original articles published from 2020 to 2022 are reviewed and the databases used are PubMed, Google scholar, and Cochrane. Few criteria were set to include the articles.

Inclusion criteria

• Those pertaining to COVID's long-term impacts.

• Those pertaining to symptoms, signs, and treatments

• Reviews, editorials, and original research (cohort, RCT, case-control, report, series, and qualitative), point of views, instructions, letter to editors, and commentaries were all included.

• The articles must have been reported in an organisation or released in a journal that has undergone peer review.

Exclusion criteria

• Those unrelated to COVID-19;

• Those pertaining to lengthy COVID-19;

• Full text not available

Data Extraction

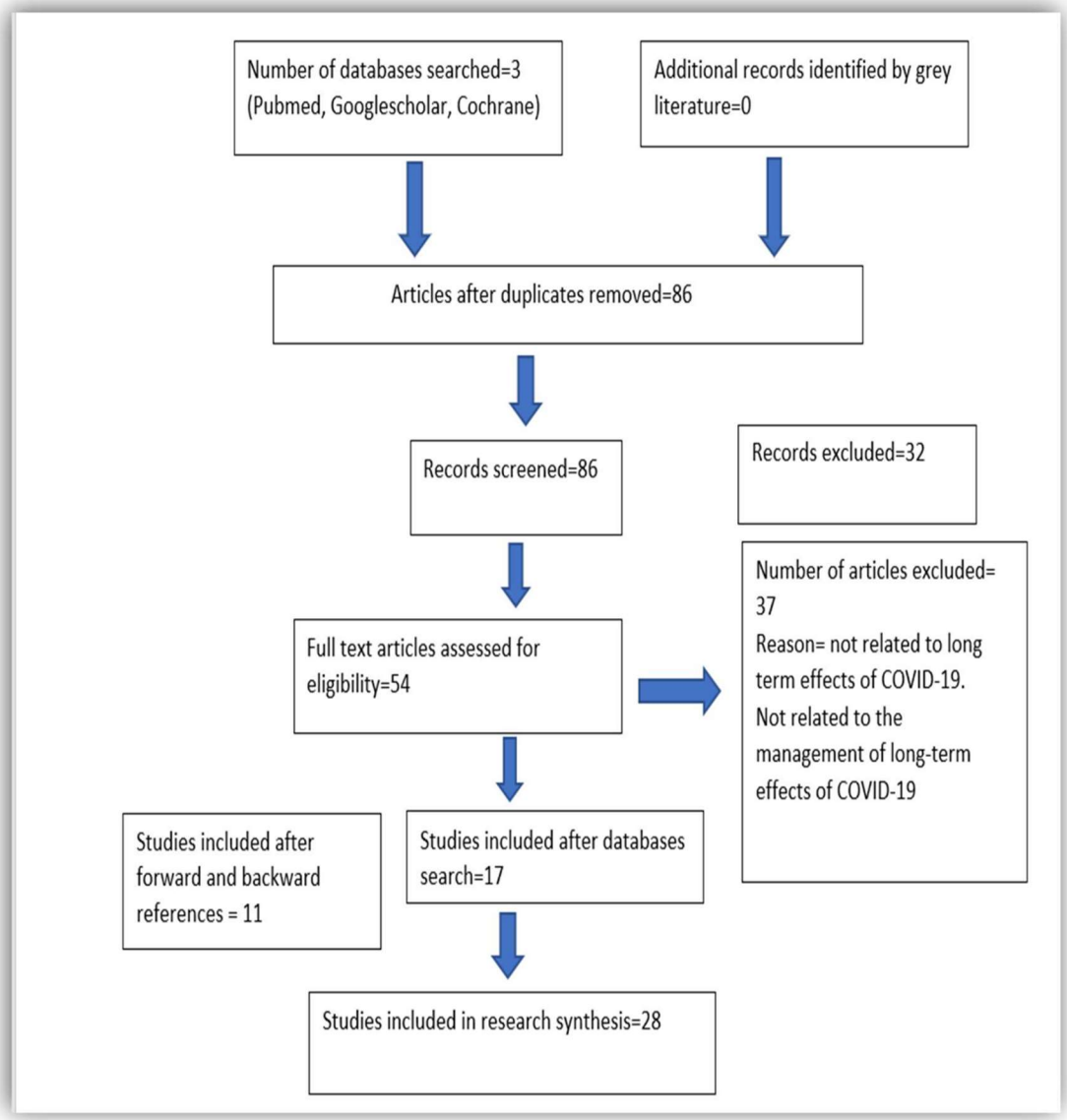
Date of submission and publication

Studies and literature interest is growing on long tern effects of COVID-19. This review/research included all the papers/articles from June 2020 to April 2022. One article was reviewed published in April 2010 and October 2010 hence we rejected it, it was on SARS virus. All the papers mentioned have been reported with published date.

Selection of sources of evidence

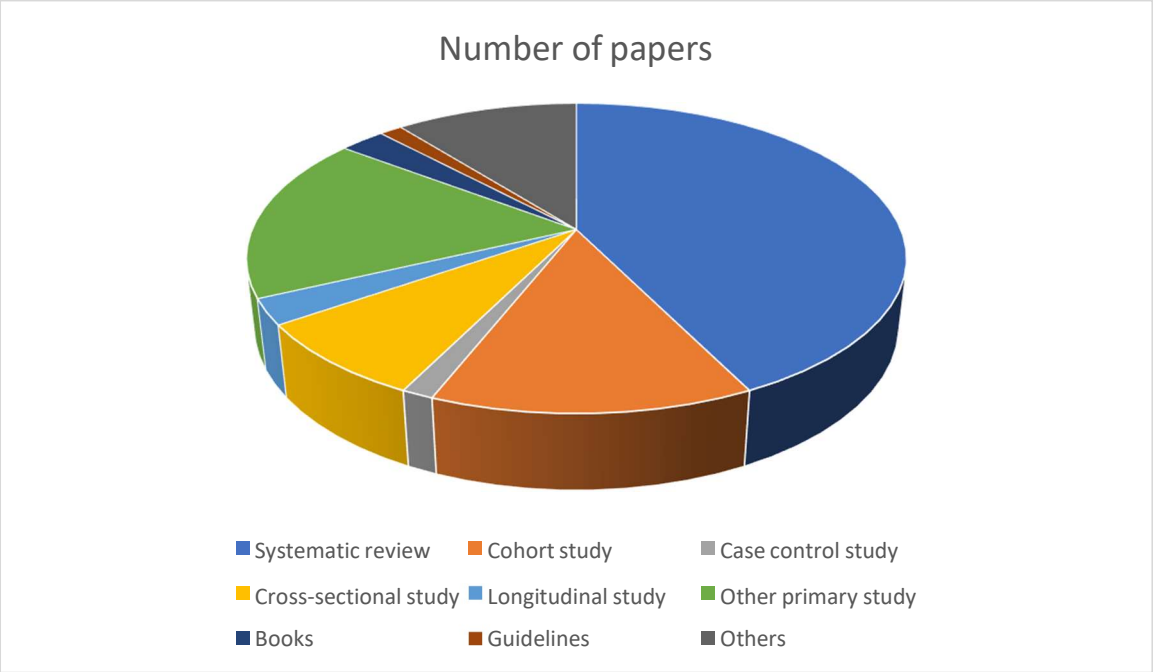
From our search, 86 publications were found. (Fig. 1). 32 papers were excluded after removing the duplicates and then screened. 54 papers were in full texts eligibility criteria and out of them 37 were excluded as they were not in the context of long-term effects of COVID-19.

Now the 17 articles and along with them 11 articles extracted from the backward and forward screening after checking the references and citations were included in the study and at the end 28 articles were included based on the complete analysis.



PRISMA-ScR FLOW CHART

Types of Included papers in the review



The graph shows the number and type of papers included in the study. Maximum number of the articles fetched after the search on the 3 databases were Systematic reviews followed by the cohort studies and other primary studies.

The number of articles used in the final analysis of result includes the cross-sectional study, cohort study, longitudinal study and other primary studies. Guidelines were taken as the references to understand the management.

CHAPTER-3

DISCUSSION

Total studies included after putting up the filters included 28 papers and the review paper is categorized in 3 headings: Signs and symptoms, and Result

Signs and Symptoms

General signs and symptoms

After meeting all exclusion criteria, Maestre-Muiz MM et al. at Tomelloso General Hospital included 766 patients in their cross-sectional study on. Of these, 445 patients had severe to critical COVID-19 and were admitted to the hospital, 321 patients had mild-to-moderate COVID-19 and were discharged from the emergency room, and 543 patients The author of this study made it very apparent that although though COVID-19 is a very mild infection, it nevertheless has long-term effects on survivors and is not just an acute infection. Fatigue and dyspnea are the symptoms or long-term repercussions. Anosmia, headaches, hair loss, joint discomfort, anxiety, and mood disorders (1)

Another long-term study comparing symptoms between 6 and 12 months after hospital discharge was undertaken in Wuhan and was titled. Out of 2469, 1276 had completed both follow-ups, with men making up 53% of the group. The population was 59 years old on average. Following this investigation, the authors discovered that anxiety and depression rose from 26% in 6 months to 30% in 12 months. This investigation came to the conclusion that survivors are functionally recovering and their health is returning to normal(2)

A prospective cohort study on by Jessica Seebal et. al found that some symptoms were still present after a year, including fatigue, dyspnea, decreased exercise tolerance, and some significant neurocognitive symptoms that were more common in females than in males. According to reports, patients do not always have symptoms, but the most common ones are decreased exercise tolerance, dyspnea, and weariness(3)

In a study by Angelo Carfi et al. titled the authors evaluated patients' ongoing symptoms after being released from the hospital. Dyspnoea is the second-most common persistent symptom after fatigue, according to a study that included 143 of 179 potentially eligible patients. Other symptoms include joint pain, chest pain, cough, anosmia, Sicca syndrome, rhinitis, red eyes, headache, vertigo, appetite loss, myalgia, and sore throat. (70)

The results of a cohort research on the conducted by Chaolin Huang et al. revealed that after 6 months, patients primarily experienced fatigue or muscle weakness, sleep problems, and anxiety or sadness. Patients with serious illnesses had aberrant chest imaging symptoms and severely reduced pulmonary diffusion capabilities(4)

According to Adrian O' Dowd's article which was published in BMJ, real-time assessments of 580707 patients who were 18 years of age and older from September 2020 to February 2021 by Imperial College London revealed that about 1/3 of patients had long-lasting symptoms (atleast 1). The most typical ongoing signs and symptoms include fatigue, difficulty sleeping, muscle aches, and shortness of breath(5)

Respiratory system

After COVID-19 recovery, several symptoms were proposed in a paper by Mohammad Zarei et al. titled. A retrospective research on 57 patients conducted 30 days after discharge revealed that they had decreased muscle strength, aberrant lung imaging, and impaired diffusion capacity. Patients admitted to the ICU after three months of discharge had poor lung function and obstructive sleep apnea(6)

65 patients were assessed six months after being discharged from the hospital due to COVID-19 infection in the study . 49 of the 65 patients were men and 16 were women. The general health indicators are determined to be below average. Chest CT scans of 26 individuals revealed minor alterations, while 4 patients had significant pulmonary fibrosis and 9 patients had lung involvement ranging from 10 to 50 percent. (38)

In a study by Schandl A et al., examined 248 patients who were brought to the ICU due to COVID-19; 200 of them survived, and 113 attended the follow-up visit. Patients who needed invasive ventilation got it in 62% of cases. Most patients reported having a lower quality of

life connected to their health. 26 percent of individuals had reduced lung capacity overall. According to the findings of this study, after 5 months, the conditions of COVID-19 survivors who needed ventilation—both invasive and non-invasive ventilation—were the same for both groups(7)

In a separate study by conducted in Spanish hospitals, a total of 100 patients were examined after leaving the facility, and it was found that after 104 days, diffusion deficit was present and was linked to the most severe SARS-CoV-2 cases(8)

In a study by Cirulli ET et al. 357 COVID-19 positive cases, 5497 SARS-CoV-2-negative control subjects, and 19095 untested persons were included. In addition, 9 instances out of 357 COVID-19+ cases were hospitalised, and it was discovered that 14.8% of COVID-19 positive cases and 36.1% of cases have symptoms that last longer than 90 days. Inability to concentrate, dyspnea, memory loss, disorientation, chest pain and pain with deep breathes, anosmia, and ageusia are some of the long-term symptoms of COVID-19. Patients who were critically unwell are likely to be those who experience long-term COVID-19 problems(9)

First findings from the national prospective observational Swiss COVID-19 lung trial were reported in a prospective cohort research. It was conducted by Sabin A. Guler et al. 113 COVID-19 survivors showed some substantial radiological and functional problems 4 months after being discharged. The causes are lung parenchymal disease and small airways(55)

Cardiovascular system

Results of a cohort study. According to Puntmann VO et al., cardiac involvement was found in 78 out of 100 patients, and myocardial inflammation was seen in 60 out of 78 patients(10)

Pericarditis/myocarditis was found to be prevalent in 40% of patients in a study by Eiros R et al. in healthcare workers done on 139 healthcare workers recovered from SARS-CoV infection. In 11% of patients, myocardial inflammation was found along with pericarditis. 50% of patients have ECG abnormalities, while 75% of participants have CMR abnormalities. Additionally, dyspnea, chest discomfort, and an increased troponin level were noted in 42 percent of patients(11)

In a study by Rajpal S et al. discovered that out of 26 competitive athletes who were diagnosed with COVID-19 without having any symptoms, cardiac magnetic resonance revealed evidence of myocarditis 12-53 days later(12)

In order to determine whether SARS-CoV-2 may or may not cause myocardial vascular infection, 731 healthcare workers were included in a prospective case-control study by George Joy et al. concluded that it is the same between positive and negative patients. (13)

In a case-control study by Yan Xie et al. 153,760 people with COVID-19 and two sets of control cohorts with 5,637,647 (contemporary controls) and 5,859,411 (historical controls) participants each were revealed the risk and 1 year burden of the cardiovascular system due to acute Covid-19. The investigation came to the conclusion that fatigue and Covid-19 long term consequences have a favourable correlation. Cardiovascular sequelae are far less common in persons who are not hospitalised and much more common in ICU patients. The important ones include ischemic heart disease, dysrhythmia, inflammatory heart disease, and cerebral vascular diseases(14)

Neurological system

The COVID-19 virus affects the brain as well, and according to a review by Zubair AS et. al., some symptoms have been reported in the brain for up to 2 to 3 months; these symptoms include encephalitis, seizures, mood swings, and brain fog that appear after the initial illness's onset. (15)

Some immediate and long-term effects of the COVID-19 were suggested in another study by Michael T. Heneka. In addition to dizziness, headache, reduced consciousness, and seizure, acute covid-19 symptoms can include olfactory and gustatory sensations. Alterations in coagulation, in particular changes to inflammation-induced disseminated intravascular coagulation, are included among the long-term repercussions(16)

CHAPTER-4

Limitation

The sole drawback of this evaluation is that there aren't many research on the long-term effects of COVID-19 that are also not conducted on a very big population, thus we were only able to evaluate 17 publications to reach our conclusion. The information provided in this evaluation is current through April 2022.

CHAPTER-5

RESULT

After analysing 28 papers, including a cohort study, cross-sectional research, and a longitudinal study, we discovered that there are numerous commonalities among the studies after applying all the exclusion criteria. All of the articles suggested long-term consequences, ranging from radiological changes to symptoms, and they did not depend on the severity of Covid-19 but might be significant in the presence of any co-morbidity. After recovering from Covid-19 virus infection, some patients displayed severe cardiovascular issues. Myocarditis, anomalies in the ECG and CMR, and chest discomfort are some of these cardiovascular symptoms. The patient who has recovered from the illness continues to experience neurological symptoms such as headaches, encephalitis, mood swings, and dizziness over an extended period of time. The respiratory system is one of the key organs impacted by the virus.

Conclusion

After the analyses and review of all the articles, it is concluded that the maximum patients recovered from the COVID-19 face the long-term effects of the COVID-19. These symptoms all varies with severity of COVID-19. Patient recovered from the infection require proper care and screening. Proper management is required to avoid these effects of this infection and the guidelines are already released for the same by WHO. It is needed that these guidelines should be implemented by the healthcare facilities without any failure to avoid complications. For the management of the long-term effects of the COVID-19 the manpower is require to set up the regular screening of the COVID-19 recovered patients. These should be mandatory for all the healthcare facilities. Along with the screening a good lifestyle is also mandatory to recover properly from the infection.

CHAPTER-6

Recommendations

We have studies showing the long-term effects but still there are many subjects which are unnoticed and need to be consider. Many females complain of irregular menstruation even after 1 year of COVID-19 but no study has been conducted to verify this, hence more studies are needed to conclude and work in the direction to manage the long –terms sequalae in a better way.

CHAPTER-7

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