

Impact of COVID-19 on healthcare system in India: A systematic review

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Abstract

Despite an extensive healthcare system in India, the COVID-19 Pandemic created havoc upon the existing Indian healthcare system by disrupting the supply of essential healthcare services to patients. It has also highlighted the significant-quality discrepancies of healthcare facilities between the rural-urban areas and between public and private healthcare providers. The not so advanced healthcare system of India was exposed through the lack of oxygen and essential drugs required for the treatment of COVID-19. Additionally, during the pandemic period there was a drastic decline in seeking non-COVID-19 disease related healthcare services. The objective of this systematic review is to determine whether COVID-19 has impacted the healthcare system in India.

Keywords

COVID-19, healthcare, India

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Introduction

India, the second most populous country in the world has been severely impacted by the ongoing COVID-19 pandemic since its emergence. COVID-19 has impacted every sector in the country including healthcare. Indian healthcare system crumbled under the massive burden of the global pandemic highlighting the gaps and challenges in the existing health delivery system.

COVID-19 or Coronavirus is an upper respiratory tract infection of high virulence. It was formerly known as ‘2019-nCoV’ and is caused by the SARS-CoV-2 virus.¹ It first originated from Wuhan city, Central Hubei province of China in December 2019. Several clusters of patients with viral pneumonia of unknown origin were reported to be epidemiologically associated with the Hunan seafood market, Wuhan, China.² Soon, cases of pneumonia were reported in other parts of the world as it spread rapidly crossing the borders of China. A massive number of people started losing their lives in China and following its spread to other countries; it was declared a public health emergency of international concern on 30th January 2020 by World Health Organization (WHO). After more than 118,000 cases in 114 countries, and 4291 people lost their lives, COVID-19 was declared as a pandemic by World Health Organization (WHO) on 11th March 2020.³ As the countries continued to

struggle with a lack of resources and capacity the viral outbreak spread rapidly worldwide, infecting millions of people all across the globe including India.

Those infected with Coronavirus disease (COVID-19) exhibit a varying range of symptoms ranging from mild to moderate. It affects people of all ages; however, the risk of serious infection increases with advancing age. Patients infected with coronavirus disease and presenting with pre-existing co-morbidities such as diabetes, asthma and cardiovascular diseases (CVDs) are more vulnerable to experiencing unfavourable outcomes or experiencing death.

A healthy individual can acquire COVID-19 infection directly by coming in close contact with an infected individual through the droplets emitted during sneezing or coughing. It can also be transmitted indirectly after coming in contact with contaminated surfaces such as door knobs. It affects every individual differently with cough,

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fever, sore throat, tiredness and lethargy being the most common symptoms of the illness. Individuals can also develop few lesser common symptoms such as loss of taste, diarrhoea, irritation of the eyes and rash on the skin among others. An individual can develop shortness of breath or experience difficulty in breathing and requires urgent medical attention. These symptoms may take 4–5 days to appear after coming in contact with a virus or as long as 14 days and can also be asymptomatic.

The first wave

In India, the first case of COVID-19 infection was reported on 27TH January 2020, when a 20 year old female with a travel history of China presented with a sore throat and dry cough in the emergency department of General Hospital, Thrissur, Kerala.⁴ Since then, COVID-19 has taken a serious toll in India and worldwide. To prevent the spread of COVID-19 infection, the Government of India announced a nationwide lockdown for 21 days on 24 March 2020, which was further extended. It was not until 30th May, that the government uplifted the restrictions in an ‘unlock’ phase-wise manner. Throughout, national advisories were generated and the norm of ‘social distancing’ and ‘work from home’ was introduced. People were advised to practise social distancing, wear masks and avoid going out unnecessarily and only people of ‘essential services such as doctors, nurses, police and home services’ were exempted. These preventive measures allowed the Indian Healthcare delivery system to prepare for the pandemic. These measures stopped the further spread of COVID-19 infection and the efforts of the Indian Government to contain the viral spread were applauded internationally. India has experienced three COVID-19 pandemic waves till now with a massive surge during the second wave in March 2021.⁵

The second wave and Indian healthcare system

The first wave had a low infectivity rate since the lockdown was imposed and individuals practised social distancing. Therefore, it largely affected the economy and livelihoods of Indians without any serious implications on the healthcare system. However, during March 2021, the country witnessed the most dangerous second wave that created havoc as individuals started taking preventive measures more casually due to ‘pandemic fatigue’. This was characterized by an increasing number of cases between 25 and 50 years of age, a shortage of essential medicine and equipment, and medical professionals.⁶ Indian healthcare system failed to meet daily oxygen demand, Intensive Care Units (ICU) beds and oxygen beds due to which many hospitals had to turn the patients away, resulting in higher mortality rates. This led to the disruption of routine immunization procedures, and treatment of

Non-communicable and communicable diseases.⁷ This revealed the overstretched and overburdened existing Indian Healthcare system. This also highlighted the failing healthcare management system and lacking public health system and efficient healthcare models in India. The Indian government failed to respond to the second wave effectively unlike the first wave.

The third wave of COVID-19 in India

With the emergence of the new Omicron variant of SARS-CoV2, the cases increased in January 2022.⁸ The majority of the cases were asymptomatic or mildly symptomatic. With increased administration of the COVID-19 vaccine, the patients admitted in ICU were mostly unvaccinated or with pre-existing co-morbidities. The demand for hospital beds, oxygen beds and ventilators were low and mostly remained unoccupied.

The third wave was different from the first two waves due to various factors such as low virulence of the omicron variant despite high transmissibility and administration of either single or both doses of COVID—19 vaccine to the adult population, authenticating the effectiveness of the vaccine.

Therefore, the COVID-19 pandemic has significantly disrupted the healthcare systems in India. Hence, this review aims to describe the impact of COVID-19 on the healthcare system concerning the patient visit and reception of treatment, diagnostic tests done and referral services in India. It is necessary to conduct this review as it will aid in developing new healthcare models in order to manage the COVID-19 pandemic at present and prevent any further waves from arising in the future.

Health care system in India

A sound and effective healthcare system enable the country to respond to a pandemic efficiently by overcoming the challenges and barriers encountered in providing healthcare.

The Indian healthcare system is a mixed framework, including both public and private healthcare service providers. However, a large proportion of private healthcare providers are present in urban India, providing secondary and tertiary healthcare services.⁹

Objective

The objective of this systematic review is to determine the impact of the COVID-19 pandemic on the healthcare system in India.

Rationale: The rationale for this study is to investigate the impact of the COVID-19 pandemic on the healthcare system in India, considering the challenges, gaps and disruptions experienced during this global health crisis.

Material and methods

Study design

This systematic review was conducted on the available online published studies in high-quality journals related to COVID-19 impact on healthcare services in India.

Search strategy

A thorough extensive literature search was conducted between 14 February 2022 and 20 February 2022 on the electronic database 'PubMed' for quality studies published between time period 2019 and 2022 using the search strategy (impact) AND (COVID-19) AND (healthcare system) OR (Primary Health centre)) OR (secondary health centre)) OR (community health centre)) OR (tertiary health centre))) OR (hospital)) OR (government)) OR (private)) AND (India).

The following keywords and Medical Subject Headings (MeSH) entries were used:

COVID-19, healthcare system, India.

Studies that met the eligibility criteria were selected based on the inclusion and exclusion criteria after screening the database for this systematic review.

Inclusion and exclusion criteria

This systematic review included the studies conducted in the English language during the COVID-19 Pandemic assessing the healthcare system in India. Studies involving outpatient clinics visit, hospital admissions, diagnostic tests done, minor and major surgeries and case referrals were also included.

Studies which were conducted in private clinics & not involving government, primary, secondary and tertiary centres, along with the studies conducted on the physical & mental health status of healthcare providers through surveys were excluded as shown in Table 1.

Data extraction

After completion of the initial screening process, a total of seven articles were selected to be included in this systematic review. The study selection process is illustrated in Figure 1, representing the PRISMA (Preferred reporting items for systematic reviews and meta-analysis) flow diagram for this systematic review.

From the selected articles following data was extracted by preparing an MS Excel spreadsheet: title of the study, study objectives, study methodology and conclusion.

Table 2 shows the summary of all the included articles in this systematic review.

Results

According to the objective of this systematic review the results described based upon the Impact of the COVID-19

Pandemic on the health care system in India on various parameters – number of outpatients, number of inpatients, number of patients undergoing minor and major surgeries, emergency trauma cases, patients undergoing nonurgent elective procedures.

Impact of COVID-19 on cancer care in India

From the seven included articles in this review, two articles described the disrupted oncology services in India by comparing these before and during the pandemic. A cohort study to describe the impact of COVID-19 on cancer care in India compared the oncology services provisions by cancer patients between 01 March 2020 and 01 March 2020 with similar duration for 2019 and concluded that there was a 54% reduction in new patient registration, 46% reduction in patient follow-up visit, 36% reduction in hospital admissions, 37% reduction in outpatient chemotherapy, 49% reduction in number of major surgeries, 52% reduction in minor surgeries, 23% reduction in patients accessing radiotherapy, 38% reduction in pathological diagnostic testing, 43% reduction in radiological diagnostic tests and 29% reduction in palliative care referrals. It also found that there was more reduction of oncology services for larger metro cities than smaller cities.¹⁰ Another study, A retrospective analysis from western India determining the impact of the COVID-19 lockdown on Cancer care stated reduced patient visits and number of treatments received during the lockdown with chemotherapy being the most common treatment received.¹¹

Impact of COVID-19 on nephrology services in India

Only one study out of the seven included studies described the impact of the COVID-19 pandemic on nephrology and transplant services at a tertiary care centre, in Ahmedabad, India. The study concluded that there was significant reduction in a number of outpatients and inpatients between April 2020 and June 2020 when compared with a similar duration in 2019 almost by 50%. There was also a reduction in donor transplants, haemodialysis and non-elective procedures such as renal biopsies and arteriovenous fistulas during March 2020.¹²

Impact of COVID-19 on ophthalmic care in India

Three out of seven included studies reported the impact of COVID-19 on ophthalmic care in India. A study conducted at a tertiary care ophthalmic institute in India reported a decrease of 97.14% in the routine patient visit, a decline of 35.25% in emergency outpatient visits, a decrease in routine and emergency ward admissions by 95.18% and 61.66% respectively, a reduction of elective surgeries by

Table 1. Summary of excluded studies.

S No.	Criteria for exclusion	Authors	Study summary
1	Study determining the experience of teleconsultations in Indian hospital during COVID-19 lockdown.	Ravindran et al., 2021	This study provided 977 free of cost teleconsultation to the patients ensuring continuity of treatment and medicinal prescriptions were provided to the patients and WhatsApp was preferred modality for communication.
2	Study to determine effects of COVID-19 on maternal health and complications due to delayed obstetric care.	Goyal et al., 2020	This study was conducted on pregnant women to determine various complications due to delay in seeking obstetric care.
3.	Study to determine impact of COVID-19 lockdown on health services, physical, mental and social well-being of population	Raman et al., 2021	This study concluded negative impact between health variables, depression, depression, social loneliness with various lockdown stages.
4.	Study to determine association between psychological association and physical symptoms among healthcare workers during COVID-19 breakout.	Chew et al., 2020	906 healthcare workers were evaluated, and significant association was found between physical symptoms and psychological outcomes of depression, anxiety, stress, post-traumatic stress disorder (PTSD) during COVID-19 outbreak.
5.	Study to determine stress levels among healthcare workers during COVID-19	Wadasadawala et al., 2021	A survey conducted on 758 healthcare workers during COVID-19 Pandemic revealed significant levels of anxiety, depression and stress among them.
6.	Study to determine mental health and quality of life among Indian healthcare professionals during Covid-19 pandemic.	Suryavanshi et al., 2020	This study was conducted on 197 Indian Healthcare Professionals during COVID –19 pandemic and concluded a high prevalence of symptoms of depression and anxiety and low Quality of life among them.
7.	Study to determine mental health status of healthcare workers during COVID-19 outbreak.	Sil et al., 2020	This study was conducted through online semi structured questionnaire on front line dermatologists during COVID-19 outbreak and concluded significant prevalence of symptoms of depression and stress among them.
8.	Study to evaluate mental health status of Indian front-line doctors during COVID –19 pandemic.	Das et al., 2020	This study evaluated 422 responses and concluded significant prevalence of symptoms of depression and stress among frontline COVID-19 doctors.
9.	Study to determine health status of healthcare workers due to long working hours, repeated exposure to COVID-19 infection, stress and fatigue.	Banerjee et al., 2020	This study concluded that out of 274 healthcare workers, 75 were found to be positive for SARS-CoV2, and they are at higher risk for being to COVID-19 infection.

98.18%, decrease of 58.81% in emergency surgeries, reduction of 99.61% in the number of donor corneas collected between 25 March 2020 and 15 July 2020 with comparison on previous year data of the same duration.¹³ A study conducted in rural eye centres of Southern India reported that between 23 March 2020 and 19 April 2020, the total number of patients reduced during the lockdown-I period versus pre-lockdown. Only essential procedures were performed and most of the patients were treated for conjunctivitis.¹⁴ A third study, which was conducted in a tertiary eye care Institute reported that there was a reduction in the number of patients presenting with ocular trauma in their emergency department during the lockdown as compared to the previous year.¹⁵

Impact of the COVID-19 pandemic on the clinical practice of trauma and orthopaedics

A single epidemiology study out of seven studies included in this article, which was conducted at a tertiary care centre in New Delhi, explained various outcomes of the COVID-19 pandemic on the practice of orthopaedics and trauma

through comparison between the pandemic period and pre-lockdown. It stated a reduction by 71.93% in outpatient attendance, a reduction of 59.35% in inpatient admissions, 55.78% reduction in surgical procedures including arthroplasty surgery, trauma and arthroscopic surgery during the pandemic period.¹⁶

Discussion

This study is being conducted to investigate the impact of the COVID-19 pandemic on the health care system in India by a systematic review approach based upon the eligibility criteria, seven articles related to the purpose of the study were screened after inclusion and the final analysis was prepared. The included studies defined various parameters – number of outpatients, number of inpatients, number of patients undergoing minor and major surgeries, emergency trauma cases, patients undergoing nonurgent elective procedures, follow-up visits for assessment of the impact of the COVID-19 pandemic on overstretched and overburdened health care system of India. The studies included in this article reported that the

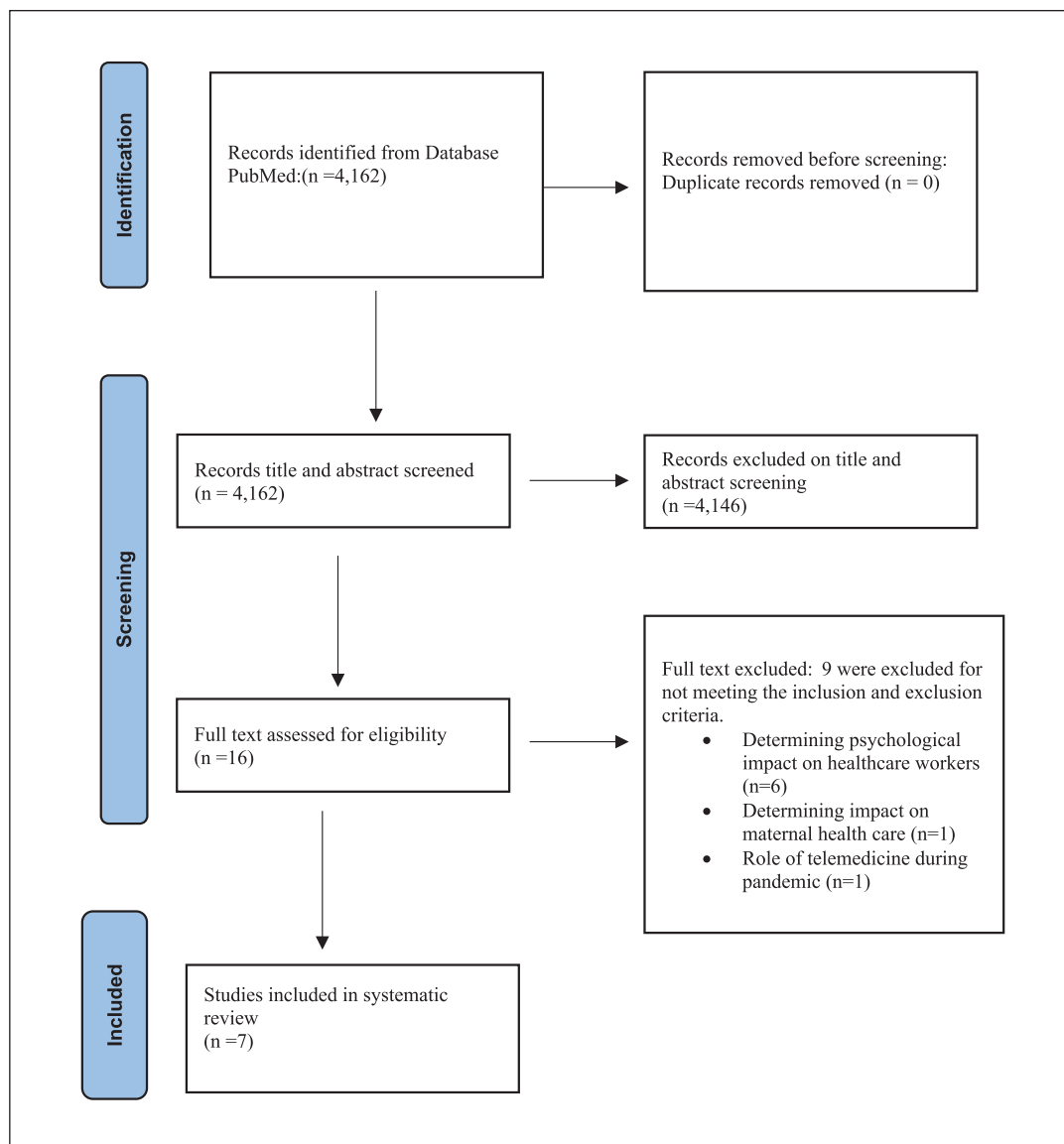


Figure 1. PRISMA flow diagram of the systematic search.

COVID-19 pandemic has sharply affected the health care services in India including cancer care, nephrology services, ophthalmic care, trauma practice and orthopaedics care.

The COVID-19 Pandemic has led to a disrupted health-care system which has subsequently impacted non-COVID disease conditions. The observed reduction in the number of new patient registrations, hospital registrations, major and minor surgeries, and transplant procedures as summarized in various studies during March 2020–April 2020 could be due to fear of infection among patients. The patients residing in rural parts of India found it difficult to access health services in metro cities due to travel restrictions during the lockdown period and this has led to delays in early screening, correct diagnosis and appropriate treatment which is of grave concern. These patients may

present with advanced stages of the disease and create a backlog of patients by overloading the healthcare system.

Hospitals faced certain challenges that inhibited them from providing appropriate care to the patient such as many hospitals being converted to COVID-19 dedicated treatment facilities and as result, they faced a widespread shortage of Personal Protective Equipment (PPE) supplies. Hospitals reported a shortage of adequate staff as they were themselves exposed to the virus. Various hospitals reported lack of necessary medical equipments such as ICU beds and Ventilators which was a major threat.

Despite the lockdown and various challenges encountered, hospitals realized the need of improving the accessibility of healthcare through teleconsultation along with in-person visits during these challenging times. In the absence of direct consultations to the

Table 2. Summary of included studies.

S. No.	Title of the study	Link of the study	Objective of the study	Study design	Major findings	Conclusion
1.	Impact of COVID-19 on cancer care in India: a cohort study	https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(21)00240-0/fulltext	To determine how COVID-19 has impacted cancer care in India	Ambidirectional cohort study	Reduction in new patient registration, follow up visits, chemotherapy, major surgeries, radiotherapy, reduction in pathological and radiological diagnostic tests, palliative care referrals between March 1 and 31 May 2020.	The cancer care services have been affected in India during pandemic when compared from between March 1 and May 2020 with 2019.
2.	The Impact of COVID-19 Pandemic on Nephrology and Transplant Services and Clinical Training in India	https://pubmed.ncbi.nlm.nih.gov/34325623/	to determine the effects of the COVID-19 on nephrology and transplant services and clinical training at the Institute of Kidney Disease and Research Centre (Ahmedabad, India)	Prospective observational study	<ul style="list-style-type: none"> There was reduction in the number of outpatients and inpatients in 2020 during pandemic compared with data from 2019. Reduction in patients undergoing following- haemodialysis, renal transplant, nonelective procedures 	Pandemic has affected the nephrology and transplant services
3.	Impact of nationwide lockdown on cancer care during COVID-19 pandemic: A retrospective analysis from western India	Impact of nationwide lockdown on cancer care during COVID-19 pandemic: A retrospective analysis from western India – ScienceDirect	To determine the effects of COVID-19 pandemic on Cancer patients in receiving treatment and patient visits for cancer care at Gujarat Cancer and Research Institute	Retrospective observational study	<ul style="list-style-type: none"> Conducted pre-lockdown and during lockdown (from January to May 2020) Reduced patient visits of patients during lockdown. Chemotherapy was most received treatment by the patients. Reduction in overall treatment received by the patients. 	During the pandemic lockdown negatively impacted the care of cancer patients in terms of visits and treatment received.
4.	Impact of COVID-19 pandemic, national lockdown and unlocking on an apex tertiary care ophthalmic institute	https://pubmed.ncbi.nlm.nih.gov/33120625/	Determine the impact of COVID-19 pandemic, national lockdown, and unlocking on ophthalmic care provided by the government-funded apex health institute of India in March 23, 2020, to July 15, 2020, compared with that from March 23, 2019, to July 15, 2019.	Retrospective observational study	<ul style="list-style-type: none"> During the lockdown period routine outpatient flow reduced, Emergency services decreased, Mechanical trauma, microbial keratitis, and conjunctivitis were the most common reported presentations, The number of donor corneas collected and emergency therapeutic keratoplasties performed also reduced routine patient consultations were significantly lower than of last year during unlocking phase. 	<ul style="list-style-type: none"> COVID-19 pandemic and national lockdown impacted the delivery of ophthalmic care by the apex-ophthalmic institute severely. lifting of pandemic associated lockdown did not improve patient inflow.
5.	Impact of COVID-19 on the practice of orthopaedics and trauma – an epidemiological study of the full pandemic year of a tertiary care centre of New Delhi	https://pubmed.ncbi.nlm.nih.gov/33835246/	To Determine the impact of COVID-19 pandemic on the clinical practice of trauma and orthopaedics, in a tertiary care hospital of New Delhi, by collecting the hospital data for 2019 and 2020 and analysing it after comparing.	Observational study	<ul style="list-style-type: none"> Reduction in outpatient attendance, admission, surgery procedures. Reduction in arthroplasty surgery, paediatric orthopaedic cases, and spinal surgery 	during the lockdown period, orthopaedics and trauma's clinical practice saw a reduction in the outpatients, admissions, and surgery.
6.	Impact of COVID-19-related lockdown-I on a network of rural eye centres in Southern India	https://pubmed.ncbi.nlm.nih.gov/33120626/	To define the demographic profile and ocular disorders from 20 rural eye centres during lockdown-I and its comparison with the pre-lockdown period in the era of pandemic.	A retrospective cross-sectional observational study	<ul style="list-style-type: none"> As compared to the pre-lockdown, during lockdown-I, the patient visits were higher in cornea and anterior segment During lockdown-I, the number of patients reduced compared to pre-pandemic period. 	Lockdown-I severely impacted the eye patient care in rural areas.
7.	Impact of COVID-19 pandemic and national lockdown on ocular trauma at a tertiary eye care institute	https://pubmed.ncbi.nlm.nih.gov/33595506/	To determine the impact of COVID-19 pandemic and national lockdown on the demographic profile and clinical profile of patients presenting with ocular trauma in a tertiary eye care institute.	A retrospective, hospital-based, comparative study	<ul style="list-style-type: none"> After the lockdown was announced, no patient presented to the emergency department in the initial 1-week period. But, the no of patients increased gradually over months. 	During the COVID-19 pandemic, there was a decline in the number of patients with ocular trauma.

patients, telemedicine was conducted to address the concerns of outpatients and therefore, reduce their need to visit the hospital.

In general, the COVID-19 Pandemic has posed a serious threat to all aspects of the healthcare system in India by affecting the activities of hospitals that provide treatment services to patients for non-COVID-19 diseases.

Conclusion

The results of this study show that Indian Healthcare System during the COVID-19 pandemic has suffered serious challenges, which can be a wake-up call because due to delayed diagnosis, a large number of patients will present with advanced stages of the non- covid-19 disease such as cancers, which may require emergency treatment. Strengthening of the Indian healthcare system is required so that it does not crumble under future pandemics if any. Need of the hour is a robust healthcare model and effective healthcare policies with regular updates to manage the current pandemic along with more emphasis on telemedicine as this is not the last pandemic that India will face. In conclusion, the COVID-19 pandemic has significantly impacted the healthcare system in India.

Limitations of the study: This study has limitation regarding language inclusion, as the researchers' proficiency was limited to English, resulting in the exclusion of articles written in other languages. Another major limitation is the bias as the he papers relies on available online published studies in high-quality journals, which may introduce a bias towards studies that have been published and accessible. There may be relevant studies that have not been included in the review, potentially leading to a skewed representation of the impact of COVID-19 on the healthcare system in India.

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Ethical statement

No Ethical approval is needed.

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