IJPSR (2021), Volume 12, Issue 10 **(Review Article)**

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 16 June 2021; received in revised form, 28 July 2021; accepted, 21 August 2021; published 01 October 2021

COVID-19 PANDEMIC-A FORTUNATE SCENARIO FOR PHARMACEUTICAL SCIENTISTS

K. Swapna * and Y. Padhmanabha Reddy

Department of Pharmaceutical Analysis, Raghavendra Institute of Pharmaceutical Education and Research (RIPER) – Autonomous, K. R. Palli Cross, Anantapuramu - 515271, Andhra Pradesh, India.

Keywords:

COVID-19, Positive aspects, Pharmaceutical scientists, pandemic

Correspondence to Author:
K. Swapna

Professor,
Department of Pharmaceutical Analysis, Raghavendra Institute of Pharmaceutical Education and Research (RIPER) – Autonomous, K. R. Palli Cross, Anantapuramu - 515271, Andhra Pradesh, India.

E-mail: swapnakandlapalli97@gmail.com

ABSTRACT: Covid-2019: The pandemic that shook the entire world. There is no sarcasm if one says there will be a Pre and Post- COVID-19 world. Worldwide, millions of cases have been identified, and heaps have died. So many nations worldwide have issued a lockdown to stop the coronavirus's unfolding, which triggered giant financial fallout. Like each and every incident has two dimensions, Covid-19 possesses both positive and negative aspects. This unfortunate pandemic's positive aspect has been a fortunate scenario for many sectors, including pharmaceutical scientists all over the world, who are striving their best to discover antibodies that can fight the novel coronavirus. This review article mainly aims to study how this deadly pandemic has become a fortunate scenario for pharmaceutical scientists based on the data gathered (sources: websites, web blogs, reports on the internet study, newspapers, *etc*.). But there are some positive aspects, such as reducing pollution, reducing traffic accidents, and recognizing the importance of sanitation, hygiene, and social distancing. This pandemic revealed that there is a need to improve healthcare systems and clinical research. The pandemic situation has been a boon to the positive aspects of the pharma industry globally.

INTRODUCTION: The COVID-19 crisis, most commonly known as the Coronavirus pandemic, is an ongoing dreadful international health pandemic caused severe acute respiratory syndrome coronavirus 2 (SARS CoV-2) mainly affecting the respiratory system. The active spread of the emerging SARSCoV-2 pathogen and related coronavirus ailment 2019 (COVID-19) have hugely influenced international fitness and the day-to-day lives of heaps of humans internationally. The sickness was first seen in December 2019 in Wuhan, China. The crisis was declared an international public health emergency in January 2020 [1].

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.12(10).5300-07

This article can be accessed online on www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.12(10).5300-07

As of 28 July 2021, there were over 196, 006, 221 confirmed cases of COVID all over the world, with more than 4, 193, 322 deaths and about 177, 690, 506 recovered cases [2]. With the hope of a vaccine being totally examined for protection and efficacy, there may also be a chance to hastily re-arrange drugs currently developed to prevent SARS CoV-2 infections and enhance effective outcomes for sufferers already contaminated with contaminated COVID-19.

The common announcement that prevention is better than remedy holds across much of medicine. Vaccination in opposition to transmittable diseases, which is accountable for some of the major and most profitable improvements in public fitness, is some of the high-quality measures in this case. While developing a vaccine for COVID-19, there is a need to follow such pandemics that occurred earlier, such as Meningitis, a serious communicable inflammatory disease most prevalent in sub-Saharan Africa, affecting thousands of people

every year with high mortality rates. In which case, the vaccines first developed (polysaccharide and protein conjugate vaccines, respectively, outer membrane vesicle (OMV) vaccines) were found to be less stable and efficient than later WHO focused on developing much more efficient and stable vaccines (Gene manipulations; tailor-made OMV vaccines) [3, 4].

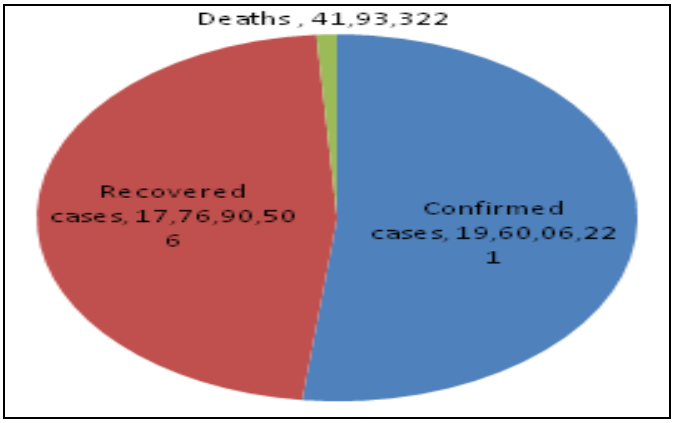
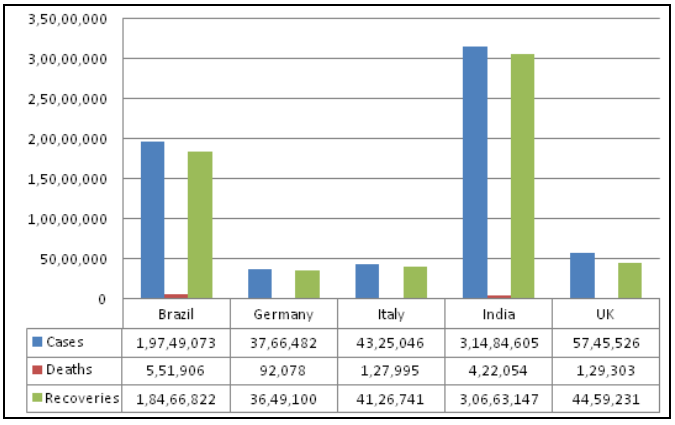


FIG. 1: PIE CHART SHOWING COVID-19 STATISTICS IN THE WORLD AS OF 28 JULY 2021

Meanwhile, whilst scientists are striving hard to develop a vaccine against SARS COV-2, a new variant of COVID-19 has been reported in the UK. The new variant coronavirus case was first reported in Britain in Dec 2020. India and several other countries have suspended flights to and from the UK to prevent the spread of the new coronavirus variant, which is spreading and growing rapidly.



	Brazil	Germany	Italy	India	UK
Cases	1,97,49,073	37,66,482	43,25,046	3,14,84,605	57,45,526
Deaths	5,51,906	92,078	1,27,995	4,22,054	1,29,303
Recoveries	1,84,66,822	36,49,100	41,26,741	3,06,63,147	44,59,231

FIG. 2: BAR GRAPH SHOWING COVID-19 STATISTICS IN SOME OF THE COUNTRIES AS OF 28 JULY 2021

The new variant is referred to as VUI (Variant under Investigation). Coronavirus can be stated as the 'virus in learning', as scientists all over the world are striving hard to study various strains of the virus for the development of an effective therapeutic regimen for the ongoing virus. From studying the new coronavirus variant, the experts said that the new variant "transmits more easily than other strains [5-7].

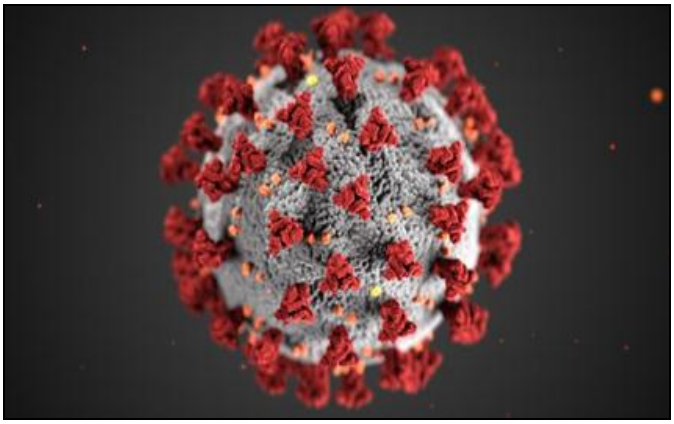


FIG. 3: CORONAVIRUS

As a response to the international COVID-19 pandemic, there has been a fundamental emphasis on vaccine development for SARS CoV-2. Herd immunity for COVID-19 is no longer probable to come to our support10. So, developing a remedial vaccine that can supply long-term effectiveness against COVID-19 should be the major objective. However, the capacity to improve a vaccine that is suitable for practical use in a well-timed manner seems to be seen in developing effective vaccines. With developed, applied sciences in vaccine production and development, to design, produce, and administer the vaccine to human subjects in phase I medical trials just 63 days after the viral genome sequence was first reported (Moderna, Cambridge-MA; National Institute of allergy and infectious disease – NIAID), there is nonetheless a long way to go before it [11]. Once the vaccine is approved, it ought to then be manufactured on site, although the parallel creation of vaccine manufacturing amenities personalized for each of the top existing vaccines presently underway should speed up this process [12 - 13]. In the interim, social distancing has been made obligatory in many territories and by most accounts, has been bit by bit, fairly profitable in slowing the unfolding of COVID-19. Many new and high throughput checks are being implemented for finding out the existence of an energetic septicemia *via* viral RNA and preceding contamination by way of antibody titer analysis. Hence, whilst a vaccine may additionally be a satisfactory, suitable remedy, modern day suitable-case scenario estimates put the availability of a practical potential vaccine in 12 – 18 months.

Even this would be just a two or three fold enhancement in contrast to the unique mumps vaccine, which withholds the document for the smallest time between virus isolation and vaccine improvement (1945-1948). But woefully, that vaccine capitulated solely to short term safety and used to be changed some decades ago by way of extra formidable, abiding vaccine [14 - 18].

FIG. 4: COVID-19 VACCINE

Convalescent plasma therapy may additionally help enhance outcomes in sufferers with extreme COVID-19, but its accessibility may be limited due to the dearth of donor plasma and difficulties in handling the plasma [19, 20]. Therefore, there is a need for pharmaceutical scientists to come up with solutions for the associated difficulties so that the time required for vaccine development is reduced. If demonstrated effective, these drugs offer advantages from a rapid response perspective, like known safety data and other related information in dealing with the consequences [21].

This pandemic had a severe impact on various sectors, such as education, culture, sports, and the economy [etc]. Among those, the pharma sector and related industries is the major. They played a fundamental role in both managing the crisis and in discovering the vaccine for its prevention, throughout the process. Even if the vaccine and drugs against COVID-19 were developed, there are still so many void situations that need to be filled because developing such medicines in such a short period of time is not exempt from being a miracle. The promising role of health peasants in the face of an epidemic is properly cherished by way of the lion's share. However, we should do a higher undertaking of offering them with secure operating pre-requisites against those who had existed at some stage in the cutting-edge COVID-19 pandemic. These people incommensurately and consistently engage with infected people, which will increase their risk of contracting the malady. They also communicate intimately (and mundanely) with the masses, and so each increases the intrinsic chance of contracting the sickness and unrolling it to others. Additionally, their persistent interactivity with other healthcare people creates the practicable for a dissemination sequence. Last but not least, they also incommensurately have interaction with humans likely to undergo the worst COVID-19 consequences, similarly, immuno-suppressed patients and sufferers with other comorbidities [22].

The point of major interest here is to note that pharmaceutical scientists may not actually be in direct contact with people infected with COVID-19, which does not mean they are at low risk of contracting the disease. Even though they are not in direct contact with humans infected with COVID-19, they deal with the biological samples collected from the infected persons. In order to overcome this, protection provided by PPE (Personal Protection Equipment) kits has been utilized widely. By the usage of pharmaceutical interventions for protection, we might also impede the spread of the sickness and keep healthcare manpower running at full potential when they are vital [23].

Major Impacts:

Pharma Industry: As prudences around the planet are affected by the affect of COVID-19, agencies are encountering diminution, people are without errands, and the multitudes face the assignment of an absolute turbulence in their way of life[24]. Nevertheless, pharmaceutical business captivating notoriety in the COVID-19 battle, such as Gilead and Eli Lilly, are perceiving a fantastic increase in the inventory alternate and a substitute flare-up of novelty in the infectious disease landscapes, the need for remedial endorsing for COVID-19 cure takes flies. In addition, vaccines (like COVAXIN and ASTRAZENECA) were developed for treatment against COVID-19, which were approved by the Central Drugs Standard Control Organization (CDSCO). Many healthcare systems have undergone and are still experiencing a convulsive change due to COVID-19. The sector's

old business model, where once there was a cut-throat competition to discover, develop and market medicines through the Innovative Medicines Initiative (IMI), is being transformed, where even former rivals, such as vaccine-makers GlaxoSmithKline (LSE: GSK) and Sanofi (Euronext: SAN), are working together to develop a safe and effective corona virus vaccine [25]. The Pharmaceutical industry has been one of the major industries in the management of COVID-19. Due to lockdown issues in several parts of various countries, even though there was no transportation or basic facilities, the pharmaceutical industry played a major role in the maintenance of public health during this crisis [26].

Pharmacists and Pharmaceutical Scientists: As the lockdowns are taking place everywhere in the world and therefore the domestic level pharmacy gurus are pulling off their frontline roles. This review spotlights the title role of pharmacists and pharmaceutical scientists in the COVID-19 pandemic and the fortunate scenario the pandemic has created for them [27]. Pharmacists globally are providing services even with such a rampant, encompassing TRIAGE services, seeing sufferers and decreasing the sufferers' load on medical care services like clinics and general pharmacy practices. While pharmacists' work online dealing with patients, pharmaceutical scientists play a crucial role in developing drugs against COVID-19 [28].

By virtue of communal prophylactic measures recommended by WHO, the ordinary public is teaming up in their relevant nations to 'flatten the curve'. With a close to ample international lockdown, there looks to be an even higher vulnerability for druggists and pharmaceutical scientists as the foremost point of contact to fulfill the public's medical care needs. Drug stores round the planet are nearly only a scant few locations that are saved unfurled for benevolence even with stern lockdowns. Community pharmacists are important medical care contributors throughout the disaster; they abide by the Armageddon of communal health by serving as unmediated factors to retrieve their patients. Hospital pharmacists have a critical position throughout the outbreak in infection control and additionally, in affected person supervision and assistance [29].

The Nations most affected by the disaster are fairly cladding underrated medical services and paucity, in addition to the prostration of medical care gurus. The TRIAGE service has been applied as an encouraging technique all throughout the rhythm of a disaster, which accommodates pharmacists with different essential chief health care workers. A purveying of COVID-19 indoctrinated medical care experts prevails to help these amenities within the time of scarcity of medical and nursing personnel and to lengthen the overpassing of the amenities in Australia too. The American Pharmacist Association (APhA) has additionally furnished some recommendations and assets archives for the toughening and the alertness of neighborhood pharmacies as warfare front medical care workers in the international fitness pandemic [30 - 32].

Authenticity of records and management of scarce and deception are essential perturbations at some stage in the international unfolding of the disease. Community pharmacists, nevertheless, perform their role in the direction of communities, consecutive for ordinary resources of medicine, as well as assisting executives in proclaiming data on provisions interconnected to COVID-19 shake out, counting hand cleansing methods to the availability of face masks and directions for their appropriate utilization and discarding. Pharmacists also play an important role in educating the public about serious problems associated with self-medication practice (SMP). USP has furnished instructions for the amalgamating and pharmacists and makers for the formulation of hand sanitizers to deal with the shortages [33 - 34].

The community pharmacy has a special reliable function with proficiency in convenience. Pharmacists are a critical part of healthcare systems, carrying out gorgeous title roles in the untimely pandemics and health crises, with some like Ebola and Zika creating world health collateral perils also. Likewise, by using pitching-in in the avoidance, alertness, discovery, and feedback to COVID-19 pandemic pharmacists and pharmaceutical scientists are conveying their responsibility towards public fitness in consideration of this disaster [35-37]. In various countries, pharmacies have worked in immediate cooperation with the International humanitarian agencies like the Red Cross and native company

employees to extend their reach to the public and to ensure domestic consignment of medicaments [38 - 39]. In New Zealand, the pharmacist's benefit is acknowledged by the executive authorities by supplementary payments for his or her support. Helpline numbers are provided for uplifting mobile consultation and prescription dispositions for domestic components to scale again. The general visits are to be kept away just in the event of presumed and compulsive COVID cases. The pharmacies in Australia are stimulated in such a way that they help faraway dish out prescriptions using prescriptions collected via mail/fax/email or by exploiting electronic transfer of prescriptions (ETP) technology associated with domestic delivery services, especially for the aged and susceptible people [40].

Pharmaceutical scientists around the planet are competing to advance the most advanced, high quality COVID-19 vaccine. Untimely endeavors suggest a word of honor, but an unexpected bounce in the unprecedented corona virus instances in the fall means the quicker a vaccine is successfully developed, the more lives can be rescued and the pharmaceutical scientists portray an essential contribution to this uncovering. Early data from the discoveries of pharmaceutical scientists suggests that their contemporary aspirant vaccine brings about an immune kickback by means of invigorating the organism to fabricate neutralizing antibodies. In the past, this type of antibody was proven to defend at odds with severe acute respiratory syndrome (SARS), another corona virus compared to the virus inflicting COVID-19. Right now, there is a compulsion on the pharmaceutical industry and scientists to hasten vaccine developments and remedies that will not solely enhance clinical ability, but save lives and forestall the virus considerably. There is a remarkable stimulation of therapy and vaccines precisely when we most needed them. Pharmaceutical scientists played a crucial role in this. History is being made in the drug development process, thanks to the chronic endeavors of personnel functioning in pharmaceuticals, biotechnology, and medicine to produce a vaccine within 12-18 months [41].

Positive Aspects: The lockdown triggered with the aid of COVID-19 has precipitated interferences in all sectors. Pharma sector has been staggered too, but there is anticipation that things will ease and increase will recommence. Many of the professionals said that, this is the most opportune time for the pharmaceutical enterprise and the Indian authorities to put in force the katoch committee hints and enforce many of the advised incentives to position India as the international pharmaceutical hub. The pharmaceutical scientists also have the opportunity to showcase their skills. The pharmaceutical scientists also have the governments' support in innovation and R & D [42].

This dreadful pandemic has brought so many favorable changes to the health care systems and related systems in such a short notice. Despite of huge competition between government and private institutions, the pandemic brought them together for the betterment of the public, healthcare systems. Database information released from several countries', pharmaceutical scientists are accessible through the WHO (World Health Organization). Pharmaceutical scientists were given many favorable circumstances to carry out their work. Pharmaceutical scientists have deep scientific expertise received from a long time of trip with similar viruses. The pharma scientists can utilize their skills under such circumstances to the best of their ability [43].

Upcoming legendary pharma scientists from different backgrounds with competitive skills can be encouraged. In the process of developing vaccines while collaborating public and private sectors, an inter sector relationship can be strengthened. Even international relationships can be promoted (Bharath Biotech, INDIA and Thomas Jefferson, US – Collaborated on COVID-19 vaccine). With Intra and Inter country collaborations, there is scope for pharmaceutical scientists to explore their knowledge and skills for the betterment of the nation and its public. There will also be increased net profits of the country's [44].

CONCLUSION: We should consider this pandemic seriously and be ready with roadmaps necessary to tackle such pandemic situations in future. This crisis showed that, there is need to improve our health care systems and related sectors. Pharma industries are one of such sectors. Pharma industries play a vital position in the production and supply of medicines, surgical and

related materials. Pharmaceutical scientists play a crucial role in the management of crisis, development of vaccines, development of treatment methods, carrying out clinical trials etc., from designing of vaccine or medicine to the monitoring of adverse effects or progress of marketing products. Even when many of the industrial sectors are shut down due to this pandemic, pharma industries were given much more priority and opportunities. Hence, pharma related sectors should consider this pandemic as an opportunity to develop the sector and for the overall development of the countries.

As a result of continuous efforts of pharmaceutical scientists all over the world, vaccines such as COVAXIN (Bharath Biotech), COVISHIELD (AstraZeneca), SPUTNIK V (R-Pharm) were developed for treatment against COVID-19, which were approved by Central Drugs Standard Control Organization (CDSCO). Drugs such as REMDESIVIR are also used in the COVID-19 treatment. Besides implementation of several vaccines for COVID-19, the pharmaceutical scientists have to take care of surfacing side effects of these vaccines, which are presently in clinical trials, without compromising on their safety and efficacy. Amidst of all the challenges, the pharmaceutical scientists are striving hard for the development of vaccines against COVID-19 with minimal and/or less serious side effects grasping their opportunity for the overall betterment. COVID-19 pandemic has been a boon for pharmaceutical scientists.

FIG. 5: COVAXIN

As a result of the continuous efforts of pharmaceutical scientists all over the world, vaccines such as COVAXIN (Bharath Biotech), Covishield (Astra Zeneca), and Sputnik V (R-Pharm) were developed for treatment against COVID-19, which was approved by the Central Drugs Standard Control Organization (CDSCO).

Drugs such as REMDESIVIR are also used in the COVID-19 treatment. Besides the implementation of several vaccines for COVID-19, pharmaceutical scientists have to take care of surfacing side effects of these vaccines, which are presently in clinical trials, without compromising on their safety and efficacy.

FIG. 6: COVISHIELD

Despite all the challenges, pharmaceutical scientists are striving hard to develop vaccines against COVID-19 with minimal and/or less serious side effects, grasping their opportunity for the overall betterment. The COVID-19 pandemic has been a boon for pharmaceutical scientists.

TABLE 1: LIST OF ABBREVIATIONS

COVID-19	Corona virus disease – 2019
SARS CoV - 2	Sever acute respiratory disease coronavirus - 2
UK	United kingdoms
OMV	Outer Membrane Vesicle
VUI	Variant under investigation
NIAID	National institute of allergy and infectious diseases
PPE	Personal protection equipment
CDSCO	Central drugs standard control organization
IMI	Innovative medicines initiative
TRIAGE	Targeting relativity intervals analytics grouping explorer
APhA	American Pharmacist association
USP	United states pharmacopoeia
SMP	Self Medication Practice
ETP	Electronic transfer of prescriptions
WHO	World health organization

ACKNOWLEDGEMENTS: Authors are extremely thankful to Raghavendra Institute of Pharmaceutical Education and Research (RIPER) management, Anantapur for their support.

Funding: Nil

CONFLICTS OF INTEREST: The authors declare no conflict of interest, financial or otherwise.

REFERENCES:

1. https://en.m.wikipedia.org/COVID-19_pandemic
2. World Health Organization: Home / Emergencies. Diseases / Corona virus disease (COVID-19) / Global research on corona virus disease (COVID-19).
3. Kin SP: History of vaccination. Proceedings of the National Academy of Sciences of the United States of America 2014; 12283-87. DOI; 10.1073/pnas.1400472111. Epub 2014 Aug 18.
4. Majee SB and Soupayan P: Preclinical studies and clinical trials in determination of safety and efficacy of meningococcal vaccines: present scenario. Asian Journal of Pharmaceutical and Clinical Research 21 January 2021; DOI; https://doi.org/10.22159/ajpcr.2021.v14i4.40509.
5. Sheriff KM: The Indian express; Explained: how rapidly does the new corona virus strain found in UK spread? Will it affect vaccination. Available on ; indianexpress.com
6. Singh M, Nagpal M, Sigh V, Sharma A, Dhingra GA, Maman P and Puri V: Covid-19: Epidemiology, pathogenicity and global updates. International Journal of Applied Pharmaceutics oct 2020; DOI https://doi.org/10.22159/ijap.2020v12i5.38439.
7. Niharika D, Niharika B, Aishwarya T, Nikitha A, Butool R, Ibrahim M and Dharakeshware R: Coronavirus-A virus in learning. Int J of current Pharma Research 2020; DOI https://doi.org/10.22159/ijcpr.2020v12i4.39078.
8. Ioannou L: Expert claims they identified human enes that can protect against Vcovid-19. Healthy returns 2020; 20.
9. SS. China in talks with WHO over global use of local COVID-19 vaccines. Pars today. 06 Oct 2020.
10. https://journals.sagepub.com/pb-assets/cmscontent/Microsites_SAGE/coronavirus/coronavirus_microsite.jpg
11. Betsch C, Böhm R and Korn L: On the benefits of explaining herd immunity in vaccine advocacy. Nat Hum Behav 1, 0056 (2017). https://doi.org/10.1038/s41562-017-0056.
12. Bock W, Adamik B and Bawiec M: Mitigation and herd immunity strategy for COVID-19 is likely to fail. medRxiv 2020; https://doi.or/10.1101/2020.03.25.200431091.
13. Walter A: Orenstein and Rafi Ahmed. Simply put: Vaccination saves lives PNAS 2017; 114(16): 4031-4033; April 10, 2017; https://doi.org/10.1073/pnas.1704507114.
14. Cohen J: With record-setting speed, vaccine makers take their first shots at the new coronavirus. Science 2020; https://doi.org/10.1126/science.abb9996.
15. Noah T and Gates B: Bill gates on fighting coronavirus. The daily social distancing show. 2020; https://www.youtube.com/watch?v=iyFT8qXcOrM
16. The Lancet Infectious Diseases. Challenges of coronavirus disease 2019. Lancet infectious Diseases 17 Feb 2020; 261- 20 (3). DOI; 1.1016/S1473-3099(20)30072-4.
17. Strauss S: Biotech drugs too little, too late for Ebola outbreak. Nat Biotechnol 2014; 32: 849-50. https://doi.org/10.1038/nbt0914-849a
18. Hamborsky J, Kroger A and Wolfe S: The Pink Book 13th ed Washington DC: Centers for Disease Control and Prevention. Epidemiology and prevention of vaccine-preventable diseases. in: Public Health Foundation 2015; 247-60.
19. Lewnard JA and Lo NC: Scientific and ethical basis for social-distancing interventions against COVID-19. Lancet Infectious Diseases 2020; https://doi.org/10.1016/S1473-3099 (20)30190-0.
20. Huillier AL: Evaluation of Altona Diagnostics RealStar Zika Virus Reverse Transcription-PCR Test Kit for Zika Virus PCR Testing 25 April 2017; DOI: https://doi.org/10.1128/JCM.02153-16
21. Júlia Vergara-Alert, Judith MA and van den Brand: Livestock Susceptibility to Infection with Middle East Respiratory Syndrome Coronavirus Emerg Infect Dis. 2017; 23(2): 232–240. doi: 10.3201/eid2302.161239.
22. Shen C, Wang Z and Zhao F: Treatment of 5 critically ill patients with COVID-19 with convalescent plasma. The Journal of the American Medical Association 2020; 1582–89. https://doi.org/10.1001/jama.2020.4783.
23. Duan K, Liu B and Li C: Effectiveness of convalescent plasma therapy in severe COVID-19 patients. Proceedings of the National Academy of Sciences of the United States of America 2020; 9490–96.
24. Arrow KJ, Panosian C and Gelband H: Eds. saving lives, buying time: economics of malaria drugs in an age of resistance. Washington D.C: Institute of Medicine (US) Committee on the Economics of Anti malarial Drugs. The cost and cost-effectiveness of anti malarial drugs. In: The National Academies Press 2004; 61-78.
25. Guan WJ, Liang WH and Zhao Y: Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. European Respiratory Journal 2020; 2000547. https://doi.org/10.1183/13993003.00547-2020.
26. Ferguson NM, Laydon D and Nedjati-Gilani G: Impact of non-pharmaceutical interventions (NPIs) to reduce COVID19 mortality and healthcare demand. Imperial College 2020; DOI: https://doi.org/10.25561/77482.
27. Aggarwal M: 2020. Within 10 Days of the Lockdown, India was Consuming 20% Less Power than Usual. Quartz India. Available on; https://epic.uchicago.edu/news/indias-power-consumption-falls-by-19-percent-during-covid-19-lockdown/
28. Pharmanews Intelligenc Xtelligent Healthcare Media – How Covid-19 is changing pharmaceutical research and development. Available on; https://pharmanewsintel.com/features/how-covid-19-is-changing-pharmaceutical-research-and-development.
29. Peter whenrwein. Chronicles of Bad Times at the CDC: Mistakes, White House Meddling. 16 Oct 2020. Available on;https://www.managedhealthcareexecutive.com/view/chronicles-of-the-cdc-s-collapse-self-inflicted-wounds-white-house-meddling.
30. Press release UK Government (April 2, 2020) £300 million announced for community pharmacies to support them during coronavirus outbreak, Department of health and social care. Available on; https://www.gov.uk/government/news/300millionannounced-for-community-pharmacies-to-support-them-during-coronavirusoutbreak.
31. Rutter V, Chan AHY, Tuck C, Bader L, Babar ZUD and Bates I: Weaving the health and pharmaceutical care agenda through the themes of the commonwealth heads of

government meeting (CHOGM), London 2018. Journal of Pharmaceutical Policy and Practice 2018; 10. DOI; https://doi.org/10.1186/s40545-018-0140-3
32. NHS England and NHS Improvement. Novel coronavirus (COVID-19) standard operating procedure-Community Pharmacy. Available on: https://www.england.nhs.uk/wp-content/uploads/2020/02/20200305-COVID-19-Primary-Care-Sop-Comm-Pharm-Publication.Pdf.
33. American Pharmacist Association. Pharmacists' Guide to Coronavirus. Available on; https://www.pharmacist.com/coronavirus.
34. Anna Durbin, Annelies Wilder-Smith; An update on Zika vaccine developments 2017; 781-787 https://doi.org/10.1080/14760584.2017.1345309
35. Richner JM and Himansu S: Modified mRNA Vaccines Protect against Zika Virus Infection Cell 2017; 1: 23. https://doi.org/10.1016/j.cell.2017.02.017
36. Higgs ES: Accelerating Vaccine Development During the 2013–2016 West African Ebola Virus Disease Outbreak. In: Mühlberger E., Hensley L., Towner J. (eds) Marburg- and Ebolaviruses. Current Topics in Microbiology and Immunology, vol 411. Springer, Cham. https://doi.org/10.1007/82_2017_53
37. Pharmaceutical Group of European Union. Press Release-Community pharmacists in the frontline in the fight against the novel corona-virus disease (COVID-19). Available on: https://www.pgeu.eu/publications/pressrelease-community-pharmacists-in-the-frontline-in-the-fight-against-thenovel-corona-virus-disease-covid-19/.
38. The United States Pharmacopoeia Commission. Hand Sanitizer Toolkit. Available on: https://bit.ly/2ytnKaM.
39. Osama M. Al-Quteimat and Amer Mustafa Amer, SARS-CoV-2 outbreak: how can pharmacists help. Research in Social and Administrative Pharmacy 2020; https://doi.org/10.1016/j.sapharm.2020.03.018.
40. Zheng SQ: Recommendations and guidance for providing pharmaceutical care services during COVID-19 pandemic: a perspective. Research in social and administrative pharmacy 2020; https://doi.org/10.1016/j.sapharm.2020.03.012.
41. Pharmaceutical Society of New Zealand (Inc.). COVID-19: Guidance provided By the Society for Pharmacy. Available on: https://www.psnz.org.nz/Story?Action=View&Story_id=111.
42. Australian Government Department of Health. Fact Sheet-Coronavirus (COVID-19) Health Plan, Primary Care-Home Medicine Services Response to COVID-19. Available on: https://www.health.gov.au/sites/default/files/documents/2020/03/covid-19-national-health-planprimary-care-homemedicines-services-to-support-the-response-to-covid-19.pdf.formulary watch–managed healthcare executive- The pharmaceutical industry's role in a covid-19 vaccine.
43. COVID-19 Pandemic lockdown in India 2020. Corona virus lockdown in India. En.wikipedia.org.
44. Gopinath 2020. Limiting the Economic Fallout of the Corona virus with Large Targeted policies. IMF Blog. Available on; https://blogs.imf.org/2020/03/09/limiting-the-economic-fallout-of-the-coronavirus-with-large-targeted-policies/
45. Pearson0612, 20 May 2020. Bharath Biotech and Thomas Jefferson partner on COVID-19 Vaccine. Available on: https://www.pharmaceutical-technology.com/news/bharat-biotech-covid-19-vaccine/
46. Covaxin, Indian Council of Medical Research. Available on: https://vaccine.icmr.org.in/images/team/Covxin.png
47. Vijay Shankar Balakrishna. The arrival of sputnik V. The lancet Infectious Diseases. Oct 2020. DOI: https://doi.org/10.1016/S1473-3099(20)30709-X. Available on: https://els-jbs-prod-cdn.jbs.elsevierhealth.com/cms/asset/bbf6e6c0-fae5-4815-9c39-5ec673166ec7/fx1.jpg

How to cite this article:
Swapna K and Reddy YP: Covid-19 pandemic-a fortunate scenario for pharmaceutical scientists. Int J Pharm Sci & Res 2021; 12(10): 5300-07. doi: 10.13040/IJPSR.0975-8232.12(10).5300-07.