

## **Impact of Social Distancing in the Prevention of N-Cov Disease - A Review**

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## Abstract

The review gives an overview on the impact of social distancing in the prevention of n-CoV disease. A thorough literature search was attempted to consolidate the effect of social distancing in prevention of n- CoV disease using search engines like Pubmed, Google Scholar. The articles ranging in between the time period 2000-2020 were screened and then were analysed for obtaining significant conclusions. The non pharmaceutical prevention methods have been effective in postponing the steepening of the covid curve in near future. However, rising public opposition to the quarantines owing to the lack of income, distrust in the government and deteriorating mental health has only furthered protests in many nations across the world. People have realised that without the discovery of any vaccine, the virus will simply spread once again when the quarantine is released and it is impossible for the quarantine to go on indefinitely. Perhaps the right move would be to re-open the economy while maintaining proper non-pharmaceutical infection prevention methods such as social distancing. To conclude, the present review throws insights into the implications of social distancing to prevent the spread of n-CoV-19 disease.

## Keywords

Covid - 19 , Corona, Social Distancing , Lock down , Transmission , Pandemic

## Introduction

The coronavirus emerged in the city of Wuhan in China's Hubei province in late 2019. Confirmed cases grew by several thousand per day in the country in late January and early February. (Callaway *et al.*, 2020)(Girija *et al.*, 2019) Coronaviruses are enveloped, positive-sense single-stranded RNA viruses with a nucleocapsid of helical symmetry (Zumla *et al.*, 2016)(Priyadharsini *et al.*, 2018a). The virus causing the n-Cov disease is a part of the SARS family of viruses. Coronaviruses have been widely identified as causing respiratory and intestinal infections in humans after the outbreak of severe acute respiratory syndrome (SARS) in Guangdong, China in 2002 and 2003 (Cui, Li and Shi, 2019)(Zhong *et al.*, 2003). The SARS virus was caused by SARS-CoV and emerged in a wet market where civets were sold (Paramasivam, Vijayashree Priyadharsini and Raghunandhakumar, 2020). Nearly 10 years later, the world witnessed another outbreak in the form of Middle East Respiratory syndrome (MERS) caused by MERS-CoV in the Middle East (Bawazir *et al.*, 2018)(Zaki *et al.*, 2012). While the researchers were still developing effective therapeutic strategies against MERS, the world witnessed the emergence of the epidemic outbreak in the form of COVID-19 (Khan *et al.*, 2020)(Smiline, Vijayashree and Paramasivam, 2018). The coronavirus of this recent 2019 outbreak was named SARS-CoV-2 due to its diminished resemblance to the MERS-CoV and significant resemblance to the SARS-CoV (Heemskerk *et al.*, 2015)(Maier, Bickerton and Britton, 2015)(Ji *et al.*, 2020). Structural analysis suggests that it is likely entering human cells through the ACE2 receptor (Zhou *et al.*, no date)(Girija, Jayaseelan and Arumugam, 2018).

Social distancing is a non-pharmaceutical infection prevention method (Scherbina, no date)(Briscese *et al.*, 2020) implemented to avoid or decrease contact between those who are infected with a disease causing pathogen and those who are not, in order to stop or slow down the rate and extent of disease transmission in a community. Social distancing refers to the physical distancing of people from each other and to staying at least 6 feet away from each other and to not be in any groups. It stresses on avoiding crowded places and huge gatherings.(Salath *et al.*, 2020). The spread of the n-CoV disease must be curbed as the situation in Italy showed how quickly the health care systems of the world can be overwhelmed due to patients entering critical conditions rather quickly and also needing a week of intensive care. (Salath *et al.*, 2020)(Priyadharsini *et al.*, 2018b). It is however very clear that these non pharmaceutical methods help in two respects. Firstly, it reduces the virus transmission rate and secondly it shifts the peak of the pandemic curve further to the future. From this it can be inferred that this is merely a method to slow down the spread of the epidemic and not a method to stop the pandemic (Scherbina, no date)(Cantore *et al.*, 2017).

In uncertain times, caused by the spread of the epidemic, and the lack of a vaccine at least for a period of 18 months (Scherbina, no date). Countries around the world are scrambling to take measures to prevent the spread of the virus. And in the lack of pharmaceutical infection prevention measures, there arises a need for a non-pharmaceutical infection prevention method (Scherbina, no date) (Ammann, 2020) (Ashwin and Muralidharan, 2015; Briscese *et al.*, 2020). Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Ariga *et al.*, 2018; Basha, Ganapathy and Venugopalan, 2018; Hannah *et al.*, 2018; Hussainy *et al.*, 2018; Jeevanandan and Govindaraju, 2018; Kannan and Venugopalan, 2018; Kumar and Antony, 2018; Manohar and Sharma, 2018; Menon *et al.*, 2018; Nandakumar and Nasim, 2018; Nandhini, Babu and Mohanraj, 2018; Ravinthar and Jayalakshmi, 2018; Seppan *et al.*, 2018; Teja, Ramesh and Priya, 2018; Duraisamy *et al.*, 2019; Gheena and Ezhilarasan, 2019; Hema Shree *et al.*, 2019; Rajakeerthi and Ms, 2019; Rajendran *et al.*, 2019; Sekar *et al.*, 2019; Sharma *et al.*, 2019; Siddique *et al.*, 2019; Janani, Palanivelu and Sandhya, 2020; Johnson *et al.*, 2020; Jose, Ajitha and Subbaiyan, 2020).

This review thus gives an overview on the impact of social distancing with its flaws in the real practice among the public.

### **Social Distancing general guidelines:**

The recent ICMR survey reports that in one month of lockdown, less than 1% were exposed stating the success in social distancing. The second phase of the survey is being administered in containment zones. Less than one percent of 26,400 people, randomly chosen from 65 districts with varied caseloads, were exposed to the coronavirus within the primary month of the national lockdown, according to the first phase of a nationwide sampling to check for the pandemic's spread via testing for antibodies. The initial screening of antibodies in patients in the containment zones implicates the spread of disease and the failure in the social distancing model slowly (Reluga, 2020).

General guidelines as recommended by WHO include a minimum of 1 metre (3 feet) distance between each other because when someone coughs, sneezes, or speaks they spray small liquid droplets from their nose or mouth which can contain virus. If too close, one can inhale the droplets, including the COVID-19 virus if the person has the disease. To avoid going to crowded places. Since when people are close in crowds, it is more likely to return into close contact with someone that has COVID-19 and it's harder to take care of physical distance of 1 metre (3 feet). To stay home and self-isolate even with minor symptoms like cough, headache, mild fever, until you recover.

### **Modes Of Transmission and social distancing:**

It was reported by the World Health Organisation (WHO) on January 14, 2020 that preliminary investigations conducted by the Chinese authorities have found no clear evidence of human to human transmission of the novel coronavirus. However, this statement was contradicted later when the same organisation revealed that some human to human transmission exists from the evidence present, but had not gained enough clarity to show the capacity of virus for its easy transmission among human beings (Parry, 2020). Data were missing in regard to the age range, animal source of the virus, incubation period, epidemic curve, viral kinetics, transmission route, pathogenesis, autopsy findings and any treatment response to antivirals among the severe cases (Institute of Medicine, Board on Global Health and Forum on Microbial Threats, 2004).

But as the case developed further, information and data kept pouring in. According to current evidence, COVID-19 virus is transmitted between people through respiratory droplets and contact routes (Gu and Wang, 2018) (World Health Organization and UNICEF., 1989; Smiline Girija, Vijayashree Priyadharsini and Paramasivam, 2018; Smiline, Vijayashree and Paramasivam, 2018). Droplet transmission occurs when a person is in close contact (within 1 m) with someone who has respiratory symptoms (e.g. coughing or sneezing,) and is therefore at risk of having his/her mucosae (mouth and nose) or conjunctiva (eyes) exposed to potentially infective respiratory droplets (which are generally considered to be  $> 5\text{-}10\text{ }\mu\text{m}$  in diameter). Droplet transmission may also occur through fomites in the immediate environment around the infected person (Ong *et al.*, 2020) (Pratha, Ashwatha Pratha and Geetha, 2017). Therefore, transmission of the COVID-19 virus can occur by direct contact with infected people and indirect contact with surfaces in the immediate environment or with objects used on the infected person (e.g. stethoscope or thermometer) (World Health Organization, 2015) (Marickar, Geetha and Neelakantan, 2014).

Airborne transmission is different from droplet transmission as it refers to the presence of microbes within droplet nuclei, which are generally considered to be particles  $< 5\text{ }\mu\text{m}$  in diameter, and which result from the evaporation of larger droplets or exist within dust particles. They may remain in the air for long periods of time and be transmitted to others over distances greater than 1m (World Health Organization, 2015). In the context of COVID-19, airborne transmission may

be possible in specific circumstances and settings in which procedures that generate aerosols are performed (i.e. endotracheal intubation, bronchoscopy, open suctioning, administration of nebulized treatment, manual ventilation before intubation, turning the patient to the prone position, disconnecting the patient from the ventilator, non-invasive positive-pressure ventilation, tracheostomy, and cardiopulmonary resuscitation) (World Health Organization, 2015; Paramasivam, Vijayashree Priyadharsini and Raghunandhakumar, 2020). In analysis of 75,465 COVID-19 cases in China, airborne transmission was not reported (Koh, 2020) There is some evidence that COVID-19 infection may lead to intestinal infection and be present in faeces. However, to date only one study has cultured the COVID-19 virus from a single stool specimen (Institute of Medicine, Board on Global Health and Forum on Microbial Threats, 2004). **There have been no reports of faecal-oral transmission of the COVID-19 virus to date** (Institute of Medicine, Board on Global Health and Forum on Microbial Threats, 2004))

The virus that causes COVID-19, is most likely to target specific cells present in the nasal passages, lungs, and small intestine (Cavanagh *et al.*, 1979) Testing for the disease is the first step in isolating the virus and reducing the steep curve of the spread of the virus. However, testing on its own will not stop the spread of SARS-CoV-2 (Ashwin and Muralidharan, 2015; Smiline, Vijayashree and Paramasivam, 2018; Maajida Aafreen, Rv and Thangavelu, 2019; Smiline Girija and Others, 2019). Testing is part of a strategy. The World Health Organization recommends rapid diagnosis and immediate isolation of cases, rigorous tracking and quarantining of close contacts. An exceptionally high degree of population understanding and acceptance of these measures are critical for countries with ongoing outbreaks (Lippi, Lavie and Sanchis-Gomar, 2020). Experts agree that a vaccine will most likely not become widely available until about 18 months from now (Scherbina, no date) and therefore the need for social distancing is all the more apparent. Mitigatory measures must take place for at least 18 months till the vaccine is found (Scherbina, no date).

### **Necessity of Social Distancing in controlling the spread of n- CoV disease**

The virus, although first believed not to be transmissible from human to human contact, was proven untrue when the virus spread rapidly across the world. The virus spreads through aerosols such as droplets and through human contact (Callaway *et al.*, 2020) The World Health Organisation however quickly declared that the Covid 19 was strictly not airborne. (Mph *et al.*, 2020)(Tripp and Mark Tompkins, 2018)(Backer, Klinkenberg and Wallinga, 2020). The virus is also known to be transmitted by touching eyes, nose and mouth. Since, hands are exposed to touch many surfaces and may devour viruses. Once contaminated, hands can transfer the virus to eyes, nose or mouth. From there, the virus can enter the body and lead to infection. Being a droplet borne infection, it can enter through the respiratory route in a crowded place, thus face masks covering mouth and nose together with the bent elbow or tissue once you cough or sneeze is recommended. The infection spreads through droplets when the infected person coughs,

sneezes or talks. The droplets from an infected person when transmitted to a non infected person quickly settles into the lungs causing respiratory pneumonia(Armstrong and Lavery, 2016; Shahana and Muralidharan, 2016; Vaishali and Geetha, 2018) Self isolation along with social distancing and wearing masks and taking proper sanitary precautions have shown promising results in the reduction of the spread of the pandemic in various communities (Rogers *et al.*, 2020). However, to the contrary, the self quarantine might not actually be doing much good in the prevention of deaths due to the virus. Recent studies mention that proper exposure to sunlight might actually help the people to be more immune to the disease than self isolation (Alipio, no date) (Raharusun *et al.*, no date) However, further data is needed to support these claims.

### **Containment based social distancing:**

Once a region is reported with more cases of covid, government takes immediate measures to contain the area and thus an alternative form of social distancing is implemented. However, the success in this method relies on the public to follow the guidelines of a containment zone properly. The containment of the spread of the pandemic faces more pressing issues. Testing is of paramount importance in identifying the carriers of the disease so that they can be treated or isolated. While people who exhibit symptoms will immediately go for testing, people exhibiting no symptoms or the so called “asymptomatic” carriers of the disease will not exhibit any symptoms, but they still carry the risk of spreading the disease to others. This only adds on to further difficulty in containing the spread of the disease. (Girija *et al.*, 2019; Bai *et al.*, 2020)

In a study published in April 2009, certain non pharmaceutical infection prevention methods were suggested to arrest the development of a epidemic due to a novel strain of influenza, the measures suggested were primarily social distancing, which meant the closure of schools, increased case isolation which meant that the infected people had to be quarantined in their homes, workplace non-attendance and community contact reduction (Kelso, Milne and Kelly, 2009)(Dalton, Corbett and Katelaris, no date). Non-pharmaceutical social distancing interventions are capable of preventing influenza epidemics with R0 values of up to 2.5, and of significantly reducing the rate of development and overall burden of epidemics with R0 values of up to 3.5, but only if used in combination, activated without delay, and maintained for a relatively long period (Leavitt, 1996)(Dalton, Corbett and Katelaris, no date). These measures may be critical in holding back an epidemic until vaccines are deployed on a sufficient scale that subsequent relaxation of these rigorous measures will not result in a consequential acceleration in the scale of the outbreak (Kelso, Milne and Kelly, 2009)(Dalton, Corbett and Katelaris, no date; Renuka and Muralidharan, 2017).

### **Implementation Of Social Distancing and periodical lock-down measures:**

It is widely agreed that social distancing measures cannot be implemented properly without public support. Public engagement in ethically laden pandemic planning decisions may be

important for transparency, creating public trust, improving compliance with public health orders, and ultimately, contributing to just outcomes (Leavitt, 1996)(Baum, Jacobson and Goold, 2009) Participants in a focus group expressed concerns about job security and economic strain on families if businesses or school closures are prolonged.(Baum, Jacobson and Goold, 2009) Group discussions provided recognition of an extant duty not to infect others, while some also acknowledged strong self-interest. Participants conveyed desire for opportunities for public input and education, and articulated distrust of government.(Baum, Jacobson and Goold, 2009))

Social distancing measures may be challenging to implement and sustain due to strains on family resources and lack of trust in government (Baum, Jacobson and Goold, 2009). Immediate economic needs, job security, the need for essential goods and services, and long-term effects on the economy from extended business or school closure or quarantine were among concerns addressed. Several parents in lower-income communities, viewed staying home from work to care for children during school or daycare closures as a luxury not all families could afford. And distrust of the government and politicians was expressed by all participants in the focus group (Baum, Jacobson and Goold, 2009).

### **Challenges faced during the practice of social distancing**

The pandemic of COVID-19 has clearly entered a new stage with rapid spread in countries outside China and all members of society must understand and practise measures for self-protection and for prevention of transmission of infection to others (Bedford *et al.*, 2020). Countries need to rapidly and robustly increase their preparedness, readiness, and response actions based on their national risk assessment and the four WHO transmission scenarios (World Health Organization, 2015) for countries with no cases, first cases, first clusters, and community transmission and spread (4Cs). All countries should consider a combination of response measures: case and contact finding; containment or other measures that aim to delay the onset of patient surges where feasible; and measures such as public awareness, promotion of personal protective hygiene, preparation of health systems for a surge of severely ill patients, stronger infection prevention and control in health facilities, nursing homes, and long-term care facilities, and postponement or cancellation of large-scale public gatherings.

Lower-income and middle-income countries that request support from WHO should be fully supported technically and financially. It is also necessary to understand the risks that asymptomatic carriers of the disease pose to the rest of the population, which highlights the importance of testing for the virus. (Cheng and Khan, 2020) It is also unclear whether the virus can be transmitted through rodents and other vectors as there is simply not enough research supporting this claim. Further challenges include the mental and fiscal health of the people in quarantine, particularly in developing countries where food shortages are rampant and people depend on their daily wages for food for the day, the possibility of an extension of the lockdown is very negligent as it would further damage the health of the economy of nations and the citizens of such nations. Protests can be seen all over the USA and other major developed countries over

the extension of the lockdown which clearly shows the sentiments of the people. Our institution is passionate about high quality evidence based research and has excelled in various fields ( (Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

## Conclusion

The deadliness and the incredible rate at which the disease spreads is fairly obvious in the recent pandemic of n-CoV disease. Although the projected death rate curves were much higher than what was proposed, there is no doubt that the social distancing had a major impact in the same. However, rising public opposition to the quarantines owing to the lack of income, distrust in the government and deteriorating mental health has only furthered protests in many nations across the world. Though there were many flaws in the implementation of social distancing, the review had overviewed the importance of the same to curb the spread of covid disease among the community.

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## Author Contributions

Kayal V.M contributed to the data acquisition and drafting of the manuscript. Dr.A.S.Smiline Girija contributed to the design, editing and critical revision of the manuscript.

## Conflict of Interest

The authors declare no conflict of interest.

## Reference

1. Alipio, M. (no date) 'Vitamin D Supplementation Could Possibly Improve Clinical Outcomes of Patients Infected with Coronavirus-2019 (COVID-2019)', *SSRN Electronic Journal*. doi: 10.2139/ssrn.3571484.
2. Ammann, C. (2020) *Women, Agency, and the State in Guinea: Silent Politics*. Routledge. Available at: [https://play.google.com/store/books/details?id=54\\_UDwAAQBAJ](https://play.google.com/store/books/details?id=54_UDwAAQBAJ).
3. Ariga, P. *et al.* (2018) 'Determination of correlation of width of Maxillary Anterior Teeth using Extraoral and Intraoral Factors in Indian Population: A systematic review', *World journal of dentistry*, 9(1), pp. 68–75. doi: 10.5005/jp-journals-10015-1509.
4. Armstrong, D. and Lavery, L. (2016) *Clinical Care of the Diabetic Foot*. American Diabetes Association. Available at: <https://play.google.com/store/books/details?id=Dgw0CwAAQBAJ>.

5. Ashwin, K. S. and Muralidharan, N. P. (2015) 'Vancomycin-resistant enterococcus (VRE) vs Methicillin-resistant Staphylococcus Aureus (MRSA)', *Indian Journal of Medical Microbiology*, p. 166. doi: 10.4103/0255-0857.150976.
6. Backer, J. A., Klinkenberg, D. and Wallinga, J. (2020) 'Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20–28 January 2020', *Eurosurveillance*. doi: 10.2807/1560-7917.es.2020.25.5.2000062.
7. Bai, Y. *et al.* (2020) 'Presumed Asymptomatic Carrier Transmission of COVID-19', *JAMA: the journal of the American Medical Association*. doi: 10.1001/jama.2020.2565.
8. Basha, F. Y. S., Ganapathy, D. and Venugopalan, S. (2018) 'Oral hygiene status among pregnant women', *Journal of advanced pharmaceutical technology & research*, 11(7), p. 3099. doi: 10.5958/0974-360x.2018.00569.3.
9. Baum, N. M., Jacobson, P. D. and Goold, S. D. (2009) "'Listen to the People": Public Deliberation About Social Distancing Measures in a Pandemic', *The American Journal of Bioethics*, pp. 4–14. doi: 10.1080/15265160903197531.
10. Bawazir, A. *et al.* (2018) 'MERS-CoV infection: Mind the public knowledge gap', *Journal of infection and public health*, 11(1), pp. 89–93. doi: 10.1016/j.jiph.2017.05.003.
11. Bedford, J. *et al.* (2020) 'COVID-19: towards controlling of a pandemic', *The Lancet*, pp. 1015–1018. doi: 10.1016/s0140-6736(20)30673-5.
12. Briscese, G. *et al.* (2020) 'Compliance with COVID-19 Social-Distancing Measures in Italy: The Role of Expectations and Duration'. doi: 10.3386/w26916.
13. Callaway, E. *et al.* (2020) 'The coronavirus pandemic in five powerful charts', *Nature*, pp. 482–483. doi: 10.1038/d41586-020-00758-2.
14. Cantore, M. C. *et al.* (2017) *Optimal Fiscal and Monetary Policy, Debt Crisis and Management*. International Monetary Fund. Available at: <https://play.google.com/store/books/details?id=uTPLDgAAQBAJ>.
15. Cavanagh, D. *et al.* (1979) 'The Localization of Influenza Virus in the Respiratory Tract of Ferrets: Susceptible Nasal Mucosa Cells Produce and Release More Virus than Susceptible Lung Cells', *Journal of General Virology*, pp. 505–514. doi: 10.1099/0022-1317-44-2-505.
16. Chandrasekar, R. *et al.* (2020) 'Development and validation of a formula for objective assessment of cervical vertebral bone age', *Progress in orthodontics*, 21(1), p. 38. doi: 10.1186/s40510-020-00338-0.
17. Cheng, S. O. and Khan, S. (2020) 'Europe's response to COVID-19 in March and April 2020 - A letter to the editor on "World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19)" (Int J Surg 2020;76:71-6)', *International Journal of Surgery*, pp. 3–4. doi: 10.1016/j.ijssu.2020.04.011.
18. Cui, J., Li, F. and Shi, Z.-L. (2019) 'Origin and evolution of pathogenic coronaviruses', *Nature Reviews Microbiology*, pp. 181–192. doi: 10.1038/s41579-018-0118-9.
19. Dalton, C., Corbett, S. and Katelaris, A. (no date) 'Pre-Emptive Low Cost Social Distancing and Enhanced Hygiene Implemented before Local COVID-19 Transmission Could Decrease the Number and Severity of Cases', *SSRN Electronic Journal*. doi: 10.2139/ssrn.3549276.

20. Duraisamy, R. *et al.* (2019) 'Compatibility of Nonoriginal Abutments With Implants: Evaluation of Microgap at the Implant-Abutment Interface, With Original and Nonoriginal Abutments', *Implant dentistry*, 28(3), pp. 289–295. doi: 10.1097/ID.0000000000000885.
21. Ezhilarasan, D., Apoorva, V. S. and Ashok Vardhan, N. (2019) 'Syzygium cumini extract induced reactive oxygen species-mediated apoptosis in human oral squamous carcinoma cells', *Journal of oral pathology & medicine: official publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology*, 48(2), pp. 115–121. doi: 10.1111/jop.12806.
22. Gheena, S. and Ezhilarasan, D. (2019) 'Syringic acid triggers reactive oxygen species-mediated cytotoxicity in HepG2 cells', *Human & experimental toxicology*, 38(6), pp. 694–702. doi: 10.1177/0960327119839173.
23. Girija, A. S. S. *et al.* (2019) 'Plasmid-encoded resistance to trimethoprim/sulfamethoxazole mediated by dfrA1, dfrA5, sul1 and sul2 among Acinetobacter baumannii isolated from urine samples of patients with severe urinary tract infection', *Journal of Global Antimicrobial Resistance*, pp. 145–146. doi: 10.1016/j.jgar.2019.04.001.
24. Girija, S. A. S., Jayaseelan, V. P. and Arumugam, P. (2018) 'Prevalence of VIM- and GIM-producing Acinetobacter baumannii from patients with severe urinary tract infection', *Acta Microbiologica et Immunologica Hungarica*, pp. 539–550. doi: 10.1556/030.65.2018.038.
25. Gu, J. and Wang, X. (2018) *Single Cell Biomedicine*. Springer. Available at: <https://play.google.com/store/books/details?id=YgdiDwAAQBAJ>.
26. Hannah, R. *et al.* (2018) 'Awareness about the use, ethics and scope of dental photography among undergraduate dental students dentist behind the lens', *Journal of advanced pharmaceutical technology & research*, 11(3), p. 1012. doi: 10.5958/0974-360x.2018.00189.0.
27. Heemskerk, D. *et al.* (2015) *Tuberculosis in Adults and Children*. Springer. Available at: <https://play.google.com/store/books/details?id=TrI0CgAAQBAJ>.
28. Hema Shree, K. *et al.* (2019) 'Saliva as a Diagnostic Tool in Oral Squamous Cell Carcinoma - a Systematic Review with Meta Analysis', *Pathology oncology research: POR*, 25(2), pp. 447–453. doi: 10.1007/s12253-019-00588-2.
29. Hussainy, S. N. *et al.* (2018) 'Clinical performance of resin-modified glass ionomer cement, flowable composite, and polyacid-modified resin composite in noncarious cervical lesions: One-year follow-up', *Journal of conservative dentistry: JCD*, 21(5), pp. 510–515. doi: 10.4103/JCD.JCD\_51\_18.
30. Institute of Medicine, Board on Global Health and Forum on Microbial Threats (2004) *Learning from SARS: Preparing for the Next Disease Outbreak: Workshop Summary*. National Academies Press. Available at: [https://play.google.com/store/books/details?id=GSY0Tjq\\_M74C](https://play.google.com/store/books/details?id=GSY0Tjq_M74C).
31. Janani, K., Palanivelu, A. and Sandhya, R. (2020) 'Diagnostic accuracy of dental pulse oximeter with customized sensor holder, thermal test and electric pulp test for the evaluation of pulp vitality: an in vivo study', *Brazilian dental science*, 23(1). doi: 10.14295/bds.2020.v23i1.1805.
32. Jeevanandan, G. and Govindaraju, L. (2018) 'Clinical comparison of Kedo-S paediatric rotary files vs manual instrumentation for root canal preparation in primary molars: a double blinded

- randomised clinical trial', *European archives of paediatric dentistry: official journal of the European Academy of Paediatric Dentistry*, 19(4), pp. 273–278. doi: 10.1007/s40368-018-0356-6.
33. Ji, W. *et al.* (2020) 'Cross- species transmission of the newly identified coronavirus 2019- nCoV', *Journal of Medical Virology*, pp. 433–440. doi: 10.1002/jmv.25682.
34. Johnson, J. *et al.* (2020) 'Computational identification of MiRNA-7110 from pulmonary arterial hypertension (PAH) ESTs: a new microRNA that links diabetes and PAH', *Hypertension research: official journal of the Japanese Society of Hypertension*, 43(4), pp. 360–362. doi: 10.1038/s41440-019-0369-5.
35. Jose, J., Ajitha and Subbaiyan, H. (2020) 'Different treatment modalities followed by dental practitioners for Ellis class 2 fracture – A questionnaire-based survey', *The open dentistry journal*, 14(1), pp. 59–65. doi: 10.2174/1874210602014010059.
36. Kannan, A. and Venugopalan, S. (2018) 'A systematic review on the effect of use of impregnated retraction cords on gingiva', *Journal of advanced pharmaceutical technology & research*, 11(5), p. 2121. doi: 10.5958/0974-360x.2018.00393.1.
37. Kelso, J. K., Milne, G. J. and Kelly, H. (2009) 'Simulation suggests that rapid activation of social distancing can arrest epidemic development due to a novel strain of influenza', *BMC Public Health*. doi: 10.1186/1471-2458-9-117.
38. Khan, S. *et al.* (2020) 'Novel coronavirus: how things are in Wuhan', *Clinical microbiology and infection: the official publication of the European Society of Clinical Microbiology and Infectious Diseases*, 26(4), pp. 399–400. doi: 10.1016/j.cmi.2020.02.005.
39. Koh, G. (2020) 'Faculty Opinions recommendation of Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19)', *Faculty Opinions – Post-Publication Peer Review of the Biomedical Literature*. doi: 10.3410/f.737509210.793572110.
40. Kumar, D. and Antony, S. D. P. (2018) 'Calcified canal and negotiation-A review', *Journal of advanced pharmaceutical technology & research*, 11(8), p. 3727. doi: 10.5958/0974-360x.2018.00683.2.
41. Leavitt, J. W. (1996) *The Healthiest City: Milwaukee and the Politics of Health Reform*. Univ of Wisconsin Press. Available at: <https://play.google.com/store/books/details?id=rm2f9-VdmNwC>.
42. Lippi, G., Lavie, C. J. and Sanchis-Gomar, F. (2020) 'Cardiac troponin I in patients with coronavirus disease 2019 (COVID-19): Evidence from a meta-analysis', *Progress in cardiovascular diseases*. doi: 10.1016/j.pcad.2020.03.001.
43. Maajida Aafreen, M., Rv, G. and Thangavelu, L. (2019) 'Evaluation of antiinflammatory action of Laurus nobilis-an in vitro studyf anti-inflammatory action of Laurus nobilis-an in vitro study', *International Journal of Research in Pharmaceutical Sciences*, 10(2), pp. 1209–1213.
44. Maier, H. J., Bickerton, E. and Britton, P. (2015) *Coronaviruses: Methods and Protocols*. Springer New York. Available at: <https://play.google.com/store/books/details?id=IXHCrQEACAAJ>.
45. Manohar, M. P. and Sharma, S. (2018) 'A survey of the knowledge, attitude, and awareness about the principal choice of intracanal medicaments among the general dental practitioners and

- nonendodontic specialists', *Indian journal of dental research: official publication of Indian Society for Dental Research*, 29(6), pp. 716–720. doi: 10.4103/ijdr.IJDR\_716\_16.
46. Marickar, R. F., Geetha, R. V. and Neelakantan, P. (2014) 'Efficacy of Contemporary and Novel Intracanal Medicaments against *Enterococcus Faecalis*', *Journal of Clinical Pediatric Dentistry*, pp. 47–50. doi: 10.17796/jcpd.39.1.wmw9768314h56666.
  47. Mathew, M. G. *et al.* (2020) 'Evaluation of adhesion of *Streptococcus mutans*, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: Randomized controlled trial', *Clinical oral investigations*, pp. 1–6. Available at: <https://link.springer.com/article/10.1007/s00784-020-03204-9>.
  48. Menon, S. *et al.* (2018) 'Selenium nanoparticles: A potent chemotherapeutic agent and an elucidation of its mechanism', *Colloids and surfaces. B, Biointerfaces*, 170, pp. 280–292. doi: 10.1016/j.colsurfb.2018.06.006.
  49. Mph, D. I. H. *et al.* (2020) 'The Epidemiological Characteristics of an Outbreak of 2019 Novel Coronavirus Diseases (COVID-19) In Bangladesh: A Descriptive Study', *Journal of Medical Science And clinical Research*. doi: 10.18535/jmscr/v8i4.94.
  50. Nandakumar, M. and Nasim, I. (2018) 'Comparative evaluation of grape seed and cranberry extracts in preventing enamel erosion: An optical emission spectrometric analysis', *Journal of conservative dentistry: JCD*, 21(5), pp. 516–520. doi: 10.4103/JCD.JCD\_110\_18.
  51. Nandhini, J. S. T., Babu, K. Y. and Mohanraj, K. G. (2018) 'Size, shape, prominence and localization of gerdy's tubercle in dry human tibial bones', *Journal of advanced pharmaceutical technology & research*, 11(8), p. 3604. doi: 10.5958/0974-360x.2018.00663.7.
  52. Ong, S. W. X. *et al.* (2020) 'Air, Surface Environmental, and Personal Protective Equipment Contamination by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) From a Symptomatic Patient', *JAMA*, p. 1610. doi: 10.1001/jama.2020.3227.
  53. Paramasivam, A., Vijayashree Priyadharsini, J. and Raghunandhakumar, S. (2020) 'N6-adenosine methylation (m6A): a promising new molecular target in hypertension and cardiovascular diseases', *Hypertension research: official journal of the Japanese Society of Hypertension*, 43(2), pp. 153–154. doi: 10.1038/s41440-019-0338-z.
  54. Parry, J. (2020) 'China coronavirus: cases surge as official admits human to human transmission', *BMJ*, 368, p. m236. doi: 10.1136/bmj.m236.
  55. Pc, J., Marimuthu, T. and Devadoss, P. (2018) 'Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study', *Clinical implant dentistry and related research*. Available at: <https://europepmc.org/article/med/29624863>.
  56. Pratha, A. A., Ashwatha Pratha, A. and Geetha, R. V. (2017) 'Awareness on Hepatitis-B vaccination among dental students-A Questionnaire Survey', *Research Journal of Pharmacy and Technology*, p. 1360. doi: 10.5958/0974-360x.2017.00240.2.
  57. Priyadharsini, J. V. *et al.* (2018a) 'An insight into the emergence of *Acinetobacter baumannii* as an oro-dental pathogen and its drug resistance gene profile – An in silico approach', *Heliyon*, p. e01051. doi: 10.1016/j.heliyon.2018.e01051.
  58. Priyadharsini, J. V. *et al.* (2018b) 'In silico analysis of virulence genes in an emerging dental

- pathogen *A. baumannii* and related species', *Archives of Oral Biology*, pp. 93–98. doi: 10.1016/j.archoralbio.2018.07.001.
59. Raharusun, P. *et al.* (no date) 'Patterns of COVID-19 Mortality and Vitamin D: An Indonesian Study', *SSRN Electronic Journal*. doi: 10.2139/ssrn.3585561.
  60. Rajakeerthi and Ms, N. (2019) 'Natural Product as the Storage medium for an avulsed tooth – A Systematic Review', *Cumhuriyet Üniversitesi Diş Hekimliği Fakültesi dergisi*, 22(2), pp. 249–256. doi: 10.7126/cumudj.525182.
  61. Rajendran, R. *et al.* (2019) 'Comparative evaluation of remineralizing potential of a paste containing bioactive glass and a topical cream containing casein phosphopeptide-amorphous calcium phosphate: An in vitro study', *Pesquisa brasileira em odontopediatria e clinica integrada*, 19(1), pp. 1–10. doi: 10.4034/pboci.2019.191.61.
  62. Ramadurai, N. *et al.* (2019) 'Effectiveness of 2% Articaine as an anesthetic agent in children: randomized controlled trial', *Clinical oral investigations*, 23(9), pp. 3543–3550. doi: 10.1007/s00784-018-2775-5.
  63. Ramesh, A. *et al.* (2018) 'Comparative estimation of sulfiredoxin levels between chronic periodontitis and healthy patients - A case-control study', *Journal of periodontology*, 89(10), pp. 1241–1248. doi: 10.1002/JPER.17-0445.
  64. Ravinthar, K. and Jayalakshmi (2018) 'Recent advancements in laminates and veneers in dentistry', *Journal of advanced pharmaceutical technology & research*, 11(2), p. 785. doi: 10.5958/0974-360x.2018.00148.8.
  65. Reluga, T. C. (2020) 'Social distancing', *Definitions*. doi: 10.32388/q7f4ke.
  66. Renuka, S. and Muralidharan, N. P. (2017) 'Comparison in benefits of herbal mouthwashes with chlorhexidine mouthwash: A review', *Asian J Pharm Clin Res*, 10, pp. 3–7.
  67. R, H. *et al.* (2020) 'CYP2 C9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene', *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology*, pp. 306–312. doi: 10.1016/j.oooo.2020.06.021.
  68. Rogers, L. C. *et al.* (2020) 'All Feet On Deck—The Role of Podiatry During the COVID-19 Pandemic: Preventing hospitalizations in an overburdened healthcare system, reducing amputation and death in people with diabetes', *Journal of the American Podiatric Medical Association*, pp. 0000–0000. doi: 10.7547/20-051.
  69. Salath, M. *et al.* (2020) 'COVID-19 epidemic in Switzerland: on the importance of testing, contact tracing and isolation', *Swiss Medical Weekly*. doi: 10.4414/smw.2020.20225.
  70. Samuel, S. R. (2021) 'Can 5-year-olds sensibly self-report the impact of developmental enamel defects on their quality of life?', *International journal of paediatric dentistry / the British Paedodontic Society [and] the International Association of Dentistry for Children*, 31(2), pp. 285–286. doi: 10.1111/ipd.12662.
  71. Scherbina, A. D. (no date) 'Determining the Optimal Duration of the COVID-19 Suppression Policy: A Cost-Benefit Analysis', *SSRN Electronic Journal*. doi: 10.2139/ssrn.3562053.
  72. Sekar, D. *et al.* (2019) 'Methylation-dependent circulating microRNA 510 in preeclampsia patients', *Hypertension research: official journal of the Japanese Society of Hypertension*,

- 42(10), pp. 1647–1648. doi: 10.1038/s41440-019-0269-8.
73. Seppan, P. *et al.* (2018) ‘Therapeutic potential of *Mucuna pruriens* (Linn.) on ageing induced damage in dorsal nerve of the penis and its implication on erectile function: an experimental study using albino rats’, *The aging male: the official journal of the International Society for the Study of the Aging Male*, pp. 1–14. doi: 10.1080/13685538.2018.1439005.
  74. Shahana, R. Y. and Muralidharan, N. P. (2016) ‘Efficacy of mouth rinse in maintaining oral health of patients attending orthodontic clinics’, *Research Journal of Pharmacy and Technology*, 9(11), pp. 1991–1993. Available at: <http://www.indianjournals.com/ijor.aspx?target=ijor:rjpt&volume=9&issue=11&article=035>.
  75. Sharma, P. *et al.* (2019) ‘Emerging trends in the novel drug delivery approaches for the treatment of lung cancer’, *Chemico-biological interactions*, 309, p. 108720. doi: 10.1016/j.cbi.2019.06.033.
  76. Siddique, R. *et al.* (2019) ‘Qualitative and quantitative analysis of precipitate formation following interaction of chlorhexidine with sodium hypochlorite, neem, and tulsi’, *Journal of conservative dentistry: JCD*, 22(1), pp. 40–47. doi: 10.4103/JCD.JCD\_284\_18.
  77. Smiline, A. S. G., Vijayashree, J. P. and Paramasivam, A. (2018) ‘Molecular characterization of plasmid-encoded blaTEM, blaSHV and blaCTX-M among extended spectrum  $\beta$ -lactamases [ESBLs] producing *Acinetobacter baumannii*’, *British Journal of Biomedical Science*, pp. 200–202. doi: 10.1080/09674845.2018.1492207.
  78. Smiline Girija, A. S. and Others (2019) ‘CLSI based antibiogram profile and the detection of MDR and XDR strains of *Acinetobacter baumannii* isolated from urine samples’, *Medical journal of the Islamic Republic of Iran*, 33, p. 3. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6505532/>.
  79. Smiline Girija, A. S., Vijayashree Priyadharsini, J. and Paramasivam, A. (2018) ‘Prevalence of VIM and GIM producing *Acinetobacter baumannii* from patients with severe UTI’, *Acta microbiologica et immunologica Hungarica*, 16, pp. 1–12.
  80. Sridharan, G. *et al.* (2019) ‘Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma’, *Journal of oral pathology & medicine: official publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology*, 48(4), pp. 299–306. doi: 10.1111/jop.12835.
  81. Teja, K. V., Ramesh, S. and Priya, V. (2018) ‘Regulation of matrix metalloproteinase-3 gene expression in inflammation: A molecular study’, *Journal of conservative dentistry: JCD*, 21(6), pp. 592–596. doi: 10.4103/JCD.JCD\_154\_18.
  82. Tripp, R. A. and Mark Tompkins, S. (2018) *Roles of Host Gene and Non-coding RNA Expression in Virus Infection*. Springer. Available at: <https://play.google.com/store/books/details?id=IymBDwAAQBAJ>.
  83. Vaishali, M. and Geetha, R. V. (2018) ‘Antibacterial activity of Orange peel oil on *Streptococcus mutans* and *Enterococcus*-An In-vitro study’, *Research Journal of Pharmacy and Technology*, 11(2), pp. 513–514. Available at: <http://www.indianjournals.com/ijor.aspx?target=ijor:rjpt&volume=11&issue=2&article=016>.

84. Vijayashree Priyadharsini, J. (2019) 'In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens', *Journal of periodontology*, 90(12), pp. 1441–1448. doi: 10.1002/JPER.18-0673.
85. Vijayashree Priyadharsini, J., Smiline Girija, A. S. and Paramasivam, A. (2018) 'In silico analysis of virulence genes in an emerging dental pathogen *A. baumannii* and related species', *Archives of oral biology*, 94, pp. 93–98. doi: 10.1016/j.archoralbio.2018.07.001.
86. World Health Organization (2015) *Public Health for Mass Gatherings: Key Considerations*. World Health Organization. Available at: <https://play.google.com/store/books/details?id=SkyKrgEACAAJ>.
87. World Health Organization and UNICEF. (1989) *Protecting, Promoting and Supporting Breast-feeding: The Special Role of Maternity Services : a Joint WHO/UNICEF Statement*. World Health Organization. Available at: <https://play.google.com/store/books/details?id=BAmBQgAACAAJ>.
88. Zaki, A. M. *et al.* (2012) 'Isolation of a Novel Coronavirus from a Man with Pneumonia in Saudi Arabia', *New England Journal of Medicine*, pp. 1814–1820. doi: 10.1056/nejmoa1211721.
89. Zhong, N. S. *et al.* (2003) 'Epidemiology and cause of severe acute respiratory syndrome (SARS) in Guangdong, People's Republic of China, in February, 2003', *The Lancet*, pp. 1353–1358. doi: 10.1016/s0140-6736(03)14630-2.
90. Zhou, P. *et al.* (no date) 'Discovery of a novel coronavirus associated with the recent pneumonia outbreak in humans and its potential bat origin'. doi: 10.1101/2020.01.22.914952.
91. Zumla, A. *et al.* (2016) 'Coronaviruses - drug discovery and therapeutic options', *Nature reviews. Drug discovery*, 15(5), pp. 327–347. doi: 10.1038/nrd.2015.37.