

3. Invisible yet Invulnerable Asymptomatic Covid-19

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3.1 Summary:

The world is running on through a microbiological war, named Covid 19, which causative agent is SARS CoV-2. Till now this enemy killed a lot of people and many doctors, nurses, health workers and also police sacrificed their lives to make the human beings winner in this war but corona virus is continue changing its genetic characteristics by which it becomes uncontrollable to human beings.

Though vaccination has been started but the new Covid related problem is a symptomatic infection, that means the person is infected but not feeling and expressing any symptoms of Covid infection but he/ she is already spreading the virus.

These people can be detected as Covid positive only by clinical test. The main cause of a symptomatic Covid infection is that the novel Corona virus can hide its genome for being unrecognizable. And some other minor causes for a symptomatic infection are T-cell memory, immunity from childhood vaccination, biology and wear masks. By which virus infected people but not become severe in most of the cases and some cases it becomes critical and cause death.

3.2 Introduction:

Covid 19 is an ongoing microbial storm through all over the world that has already snatched a lot of lives and now also on its way of snatching. This pandemic causing Corona virus was 1st identified in December, 2019 at Wuhan and on 11th February, 2020 it was officially named "Severe Acute Respiratory Syndrome Coronavirus-2" or "SARS CoV-2" by 'International Committee on Taxonomy of Virus'.

Then SARS CoV-2 started its fatality in many countries and in India it started its divesting storm from March and continued it till September, 2020 which is named as the '1st wave of Covid'. Then the peak value of graph became slow down and was running in this way with maintaining this position but in February, 2021 SARS CoV-2 has started again its furious job that is now going on, named as the '2nd wave of Covid' and in the 2nd wave mainly India has been affected very much and due to scientific research works the 3rd wave of Covid can be appeared in about September, 2021.

Till now the worldwide Covid positive case is 17.8 Cr among which number of death case is 38.6L. In this case United States is on the top position and India is in the second position.

The symptoms by which normally a person is detected as Covid positive, are including cough, fever, fatigue, shortness in breathing, headache and smell problem and in the severe cases the symptoms are including pneumonia and heavy breathing problems with too much body pain.

But in the 2nd wave in many cases it is observed that there is no symptom of Covid infection on the victim but he/she is Covid positive. That is called Asymptomatic Infection. That means the asymptomatic Covid cases are laboratory confirmed cases, not detected by physically signs and this cases are very harmful for spreading the causative pathogen Corona virus.

The again and again researchers revealed that approx. 20% people carry out no symptoms those are tested positive for the infection of new corona virus.

Clinically assigned mild cases are patients with upper respiratory tract symptoms (&/ or fever) without shortness of breath and having oxygen saturation at room air of more than 94%.

3.2.1 Asymptomatic Infection:

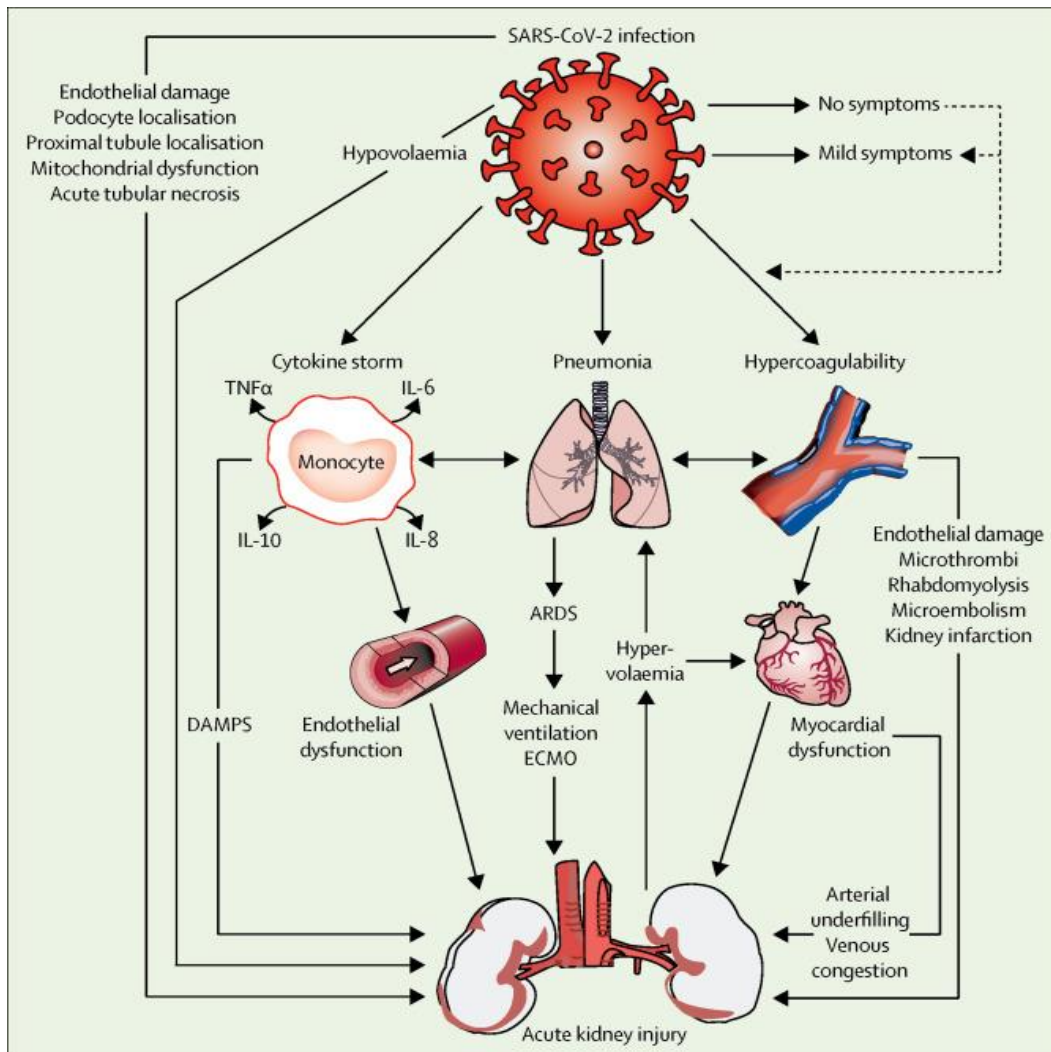
Asymptomatic infection means an infection that is only confirmed by clinical tests because the infected person does not carry out any symptoms or physical features of that particular disease.

It is also called as pre-infection or in apparent infection. Most young and healthy people may be infected but likely asymptomatic. However, some healthy people became very ill and some died. In terms of percentage it seems very low, but the chance is not zero. Asymptomatic patients carry a lot of viruses in their body.

Recently, from several studies scientists have observed that there are a huge asymptomatic Covid cases. The amount of viral load is same among asymptomatic patients and symptomatic patients.

Researchers at the Center for DNA Fingerprinting and Diagnostics (CDFD) in Hyderabad suggested examining asymptomatic primary and secondary communications, which need to be monitored in India's fight against the corona virus.

In addition to this study, even recent studies in South Korea have shown that asymptomatic and symptomatic people carry a similar viral load on their bodies, the amount of virus in the throat and nose indicating that asymptomatic people can spread the corona virus just as much as symptomatic.



Recently, Indian scientists have observed a higher association between asymptomatic COVID-19 cases and viral load, or the amount of virus in an infected person’s bodily fluid, in a study of over 200 patients with SARS-CoV-2 virus in Telangana. The researchers, including those from the Centre for DNA

Fingerprinting and Diagnostics (CDFD) in Hyderabad, advise testing asymptomatic primary and secondary contacts followed by surveillance as now an essential thing in India’s fight against Corona virus.

Apart from this study, even a recent study from South Korea found that asymptomatic and symptomatic people carry a similar viral load in their bodies, which is the amount of virus located in throats and noses that indicates asymptomatic people could potentially spread the Corona virus just as readily as those with symptoms.

3.2.2 Pathogenesis:

Like SAR-CoV, SARS-CoV-2 used Angiotensin-converting enzyme 2 (ACE 2) as its receptor to attack cells. ACE2-mediated Angiotensin II (Ang II) plays an important role in the causing of severe lung failure after invasion by the degenerative virus. The level of transmission of the virus depends on the maturity and binding capacity of ACE2.

Therefore, low levels of ACE2 or its weak binding ability to SARS-CoV-2 should be a major factor that leads to infectious infections. It has been studied that only a specific mild immune response occurs in asymptomatic patients by SARS-CoV-2 attack.

However more clinical samples should be collected, and a relative test of ACE 2 should be performed and different types of COVID-19 cases should be compared. This would be a more effective way to explain its pathogenesis.

3.2.3 Cause of Asymptomatic Covid Infections:

In our lungs there is a special type of immune cell, named as Alveolar Macrophages that functions in the maintenance of health environment in lungs. As the alveolar macrophages present in lungs in huge amount, it's the 1st cell type that invade virus encounter.

When our body able to identify a viral infection, then and there our immune system starts to produce interferon's which is a group of cytokines that function in immune response to fight against the viral infection. Not only in case of Covid infection but the alveolar macrophages also produce interferons in case of influenza that is already previously shown.

As SARS CoV-2 causes respiratory syndromes. It normally starts infection from the parietal pleura layer of lungs. Some recent studies reveal that the interferon production in the viral infected cells. It causes in the lower productivity of interferon's and allows the immune system to play its role but with limited activity. As these parietal pleura are the main target of infection of the virus particles, it must be taken up as the main cell type for viral attack.

The most effective cause of asymptomatic Covid infection is the again and again mutation of corona virus, and as a result the SARS-CoV-2 virus become able to hide its genome from being unrecognized. The results of researches show that alveolar macrophages effectively produce interferons when infected with known viruses, such as influenza. It becomes also confirmed that the alveolar macrophages have the potential to produce large amounts of interferons during a viral infection.

Therefore all of these results suggest that the SARS-CoV-2 virus may hide its genomic material from being recognized in the alveolar macrophages, thereby not inducing the production of interferons. That is why there will be no activation of the immune system in the early stages of a SARS-CoV-2 infection, allowing the virus to spread further in the community before symptoms occur.

The results of research reveal that when the infection is caused by a known virus the alveolar macrophages start interferon production with high efficiency and rapidity –

3.2.4 T-Cell Memory:

For the 'memory' T-cells, i.e., the white blood cells somebody have partial immunity against the corona virus T cells control the immune system by recognizing the invaders. Where they made a comparative examination by taking blood samples from the Covid 19 recovering persons and the unaffected persons who donated blood between 2015 to 2018. Due to their research studies in the old samples' the T-cells come forward to identify the novel corona virus in 40% to 60%.

This partial immunity appears for the previous infection of corona virus that cause common cold. And according to the research studies immune response is against the spike proteins of corona virus to destroy cells.

3.2.5 Immunity from Childhood Vaccination:

Some research studies suggest that the childhood vaccines can supply the partial immune against the novel corona virus infection in case of some patients. Researchers found that seven types of childhood vaccines—administered one, two, or five years previously—were associated with having a lower infection rate from the corona virus.

This was especially true among people who recently received a pneumonia vaccine, which was associated with a 28% reduction in corona virus-infection risk, and polio vaccines, which were associated with a 43% reduction in corona virus-infection risk. And those associations held even after adjusting for a variety of factors, including geographic incidence of the virus, demographics, and underlying conditions.

3.2.6 Biology:

Due to some research study ACE2 receptors may affect the severity of illness a person develops from the new corona virus. According to Cha, the corona virus can be caught onto ACE2 receptors, which in healthy people keep blood pressure stable, then travel through the body and replicate. Researchers are intrigued by the receptors because they've theorized that minimizing those receptors may obstruct the virus' ability to replicate or "trick the virus into attaching itself to a drug" instead, so it's not able to replicate and travel through the body.

3.2.7 Mask:

In the asymptomatic infection of SARS CoV-2 the wide spreader use of mask has a role. Due to some survey and research works researchers found that different asymptomatic case numbers were on two different cruise ships. On the Diamond Princess, where masks weren't used, 47% of those infected with the virus were asymptomatic.

But on an Argentine cruise ship, where all passengers were given surgical masks and crew received N95s, 81% of cases were asymptomatic. In some early corona virus outbreaks where people weren't wearing masks, 15% of those infected were asymptomatic.

However, later in the pandemic, when more people were wearing masks, asymptomatic rates jumped between 40% and 45%.

3.3 Classifications of People Based on the Severity of the Disease Symptoms:

The symptoms may shift from mild to moderate symptoms or vice-versa during the course of illness. With so many people that are affected, everyone may not fit perfectly into the simple groups of classification.

If the symptoms are predominantly mild, with one or two moderate symptoms, he/she may be classified as one with mild to moderate symptoms. People with COVID-19 are classified broadly as follows:

- a. Silent carriers
- b. Patients with mild to moderate symptoms
- c. Patients with moderate to severe symptoms
- d. Critically ill patients with multi-organ dysfunction.

Asymptomatic /Presymptomatic	Positive for SARS-CoV-2 using a test but no symptoms that are consistent with COVID-19
Mild Illness	Signs and symptoms of COVID-19 but no shortness of breath, dyspnea, or abnormal chest imaging
Moderate Illness	Signs and symptoms of lower respiratory disease or abnormal imaging and $SpO_2 \geq 94\%$ on room air at sea level
Severe Illness	$SpO_2 < 94\%$ on room air at sea level, $PaO_2/FiO_2 < 300$ mm Hg, respiratory frequency > 30 breaths/min, or lung infiltrates $> 50\%$
Critical Illness	Respiratory failure, septic shock, and/or multiple organ dysfunction

3.3.1 Silent Carrier:

These silent carriers or spreaders are those people who are infected with corona virus but show little or no symptoms of the disease. As a result, these people carry on with their daily lives, meeting family and friends, going to work, and spreading the disease without their own knowledge.

It appears that most asymptomatic carriers are healthy young adults and children. If person come to contact with people who are positive for Covid-19, he/ she may be positive but not showing any symptoms of the disease.

Types of Silent Carriers:

The terminologies, used for classifying the silent carriers are:

a. Mildly Symptomatic Carriers:

People who display very mild symptoms like a mild cough or may just be feeling a little low come in this category. The virus mainly affects the upper respiratory tract and may cause mild cough or mild breathlessness on exertion. His fever may not reach 37.8°C, lose sense of smell, have mild headaches, or develop a runny nose. These symptoms usually last for seven to ten days. It has been seen that some people showing mild symptoms can rapidly deteriorate, more often among people in the high-risk group.

b. Pre-Symptomatic Carriers:

Some people do not develop any symptoms for up to a week after contracting the disease. They may later on experience cough, fever, or breathing difficulty.

c. Asymptomatic Carriers:

These are people who show no signs or symptoms of infection for the entire duration of the incubation period. It can last about 14 days. As a result, they spread the virus to large numbers of people. It fuels the epidemic in a quick and dangerous way.

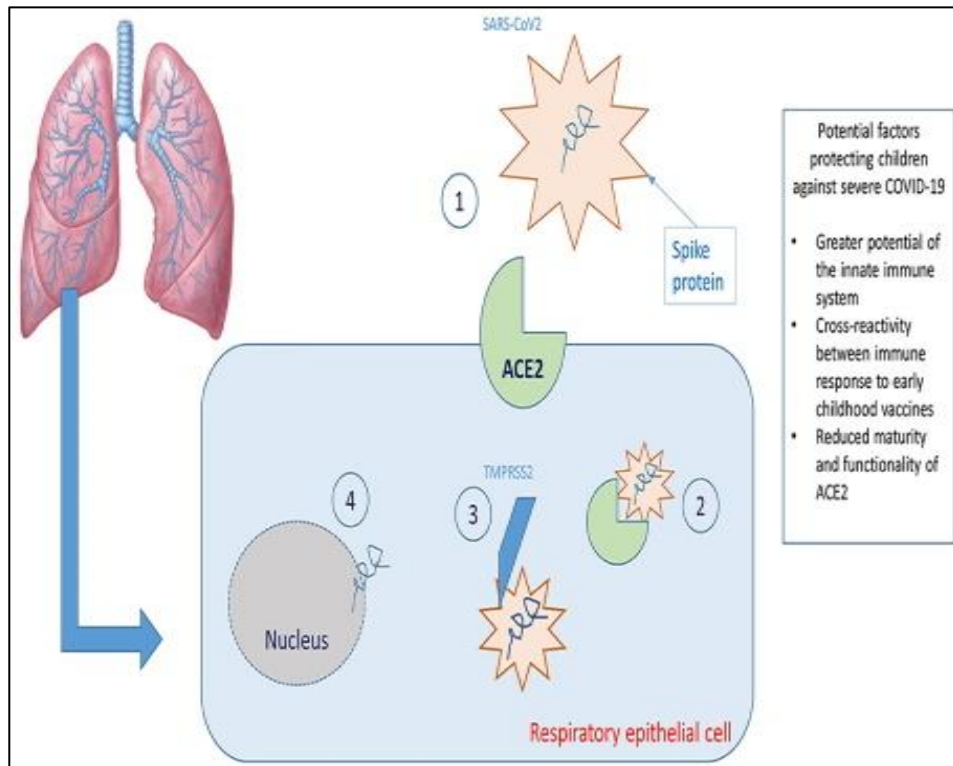
3.3.2 Unusual Symptoms:

Some people may develop symptoms that are not typical to COVID-19. These include symptoms such as loss of smell, loss of taste, and diarrhea. This means that some of the people placed in the category of asymptomatic carriers could be shifted to the mildly symptomatic category keeping these symptoms in mind. Until these symptoms have been categorized, it is best to follow strict personal hygiene practices and Government protocols for quarantine and lockdown.

3.3.3 Children May Be Silent Carrier Of Covid 19:

New research has suggested that children may be carrier of Covid 19 disease even if they never show any symptoms. In asymptomatic condition also children carries more contagious and higher load of virus. Greater the load of virus greater will be the chance of transmission of disease. Children infected with SARS-CoV-2 may have many of these shows symptomless infection, or may have only a few symptoms, such as upper respiratory distress or gastrointestinal symptoms, or asymptomatic. The most common symptoms in children are cough and / or fever. Signs and symptoms of Covid-19 in children are similar to other infections such as influenza, streptococcal pharyngitis, and allergic rhinitis. The lack of specificity of the signs or symptoms and the significant proportion of asymptomatic infections make the development of symptom-based screening for SARS-CoV-2 detection in children may quite challenging.

Clinical Synopsis of COVID-19



COVID-19 IN CHILDREN

COMMON SYMPTOMS

- Diarrhoea
- Vomiting
- Pain in the abdomen
- Fever
- Breathing difficulty
- Mild cough
- Fatigue
- Lack of appetite
- New loss of taste or smell

RATE OF COMPLICATION

- While in the previous waves, fewer children developed moderate to severe symptoms, this time around such cases have increased
- There are multiple instances of infants and children requiring admission
- In rare cases, children are also reporting multisystem inflammatory syndrome, which is a serious condition. In such cases, some parts of the body – for example, the heart, lungs, blood vessels, kidneys and brain – become severely inflamed

ADVISORY

- If your child is sick, consult a physician
- Symptoms, such as fever, cough and diarrhoea, could be due to Covid
- If they test positive, keep checking all vitals, including oxygen saturation
- Tele or video consultation is advised for children with mild symptoms
- Do not give them anti-viral drugs, steroids or antibiotics without consulting a physician
- Keep the children away from grandparents to prevent the spread of infection

If symptoms worsen, visit a hospital

Figure 3.1: Instructions for the Patient:

- a. Patients must isolate himself from other household members by staying in an identified room and keep distance mainly from the co-morbid patients those have hypertension, cardiovascular disease etc.
- b. Patients must have to use mask for all time and should leave it after using 8 hours and also when he/she becomes wet. All time the patient should use N95 mask.
- c. Patient should at all times use triple layer medical mask. Discard mask after 8 hours of use or earlier if they become wet or visibly soiled. In the event of care giver entering the room, both care giver and patient may consider using N 95 mask.
- d. After disinfecting with 1% sodium hypochlorite ask should be left.
- e. For maintaining adequate hydration in body the patient must have to drink sufficient amount of water and hydrated foods.
- f. Every time try to follow the respiratory protocols.
- g. Frequently wash hands with hand wash during 40sec and sanitize with alcoholic sanitizers.
- h. Avoid shearing of personal things to others in the house.
- i. All time try to clean the surfaces with 1% sodium hypochlorite which are in touch of the Covid patient.
- j. Self-monitoring of blood oxygen saturation with a pulse oximeter is strongly advised.
- k. The patient will self-monitor his/her health with daily temperature monitoring and report promptly if any deterioration of symptom as given below is noticed.

3.4 Treatment for Patients with Mild/ Asymptomatic Disease in Home Isolation:

- a. Patients must in contact with a treating physician and report any deterioration immediately.
- b. Continue medications for other co-morbidities after consulting with the treating physician.
- c. Follow-up of patients for fever, runny nose and cough as warranted.
- d. Patients can take hot water gargle or steam inhalations twice a day.
- e. If fever is not controlled with the maximum dose of tablet. Patients can have Paracetamol 650 mg four times a day, consult a treating physician who may consider prescribing non-steroidal anti-inflammatory drugs (NSAIDs) as other drugs (for example: tab naproxen 250 mg twice a day).
- f. Consider tablet Ivermectin (200 mcg / kg once a day on an empty stomach) for 3 to 5 days.

3.5 References:

- a. Johansson MA, Quandelacy TM, Kada S, et al. SARS-CoV-2 transmission from people without COVID-19Symptoms.JAMA Newt Open. 2021;4(1): e2035057. Doi:10.1001/jamanetworkopen.2020.35057.
- b. Byambasuren O, Cardona M, Bell K, Clark J, Mc Laws M-L, Glasziou P. Estimating the extent of asymptomatic COVID-19 and its potential for community transmission: systematic review and meta-analysis. J Association of Medical Microbiology and Infectious Disease Canada, 2020.Google Scholar.

- c. He J, Guo Y, Mao R, Zhang J. Proportion of asymptomatic corona virus disease 2019: A systematic review and meta-analysis. *J Med Virol* 2020. Doi:10.1002/jmv.26326 Pmid: 32691881 Cross Ref Pub Med Google Scholar.
- d. Cevik M, Tate M, Lloyd O, Maraolo AE, Schafer's J, Ho A. SARS-CoV-2, SARS-CoV, and MERS-CoV viral load dynamics, duration of viral shedding, and infectiousness: a systematic review and meta-analysis. *Lancet Microbe* 2020 doi:10.1016/S2666-5247(20)30172-5 CrossRef Google Scholar.
- e. Imperial College London. Real-time Assessment of Community Transmission (REACT) Study. <https://www.imperial.ac.uk/medicine/research-and-impact/groups/react-study>.
- f. 6) Linton NM, Kobayashi T, Yang Y, et al. Incubation period and other epidemiological characteristics of 2019 Novel Corona virus infections with right truncation: a statistical analysis of publicly available case data. *J Cline Med*. 2020; 9:538. [PMID: 32079150] doi: 10.3390/jcm9020538.
- g. Y. Bai, L. Yao, T. Wei, F. Tian, D.Y. Jin, L. Chen, et al. Presumed asymptomatic carrier transmission of COVID-19 *Jama*, 323 (14) (2020), pp. 1406-140 Cross Ref View Record in Scopus Google Scholar.
- h. K. Mizumoto, K. Kagaya, A. Zarebski, G. Chowell Estimating the asymptomatic proportion of corona virus disease 2019 (COVID-19) cases on board the Diamond Princess cruise ship, Yokohama, Japan, 2020 *Euro Surveill*, 25 (10) (2020), p. 2000180 View Record in Scopus Google Scholar.
- i. A. Kimball, K.M. Hatfield, M. Aarons, A. James, J. Taylor, K. Spicer, et al. Asymptomatic and presymptomatic SARS-CoV-2 infections in residents of a long-term care skilled nursing facility – king county, Washington, March 2020 *MMWR (Morb Mortal Wkly Rep)*, 69 (13) (2020), pp. 377-381 CrossRef View Record in Scopus Google Scholar.
- j. L. Zou, F. Ruan, M. Huang, L. Liang, H. Huang, Z. Hong, et al. SARS-CoV-2 viral load in upper respiratory specimens of infected patients *N Engl J Med*, 382 (12) (2020), pp. 1177-1179 Cross Ref View Record in Scopus Google Scholar.
- k. H. Kai, M. Kai Interactions of corona viruses with ACE2, Angiotensin II, and RAS inhibitors-lessons from available evidence and insights into COVID-19 *Hyper tens Res* (2020 Apr 27), 10.1038/s41440-020-0455-8 PMID: 32341442 Google Scholar.
- l. Walsh KA, Jordan K, Cline B, et al. SARS-CoV-2 detection, viral load and infectivity over the course of an infection. *J Infect* 2020; 81:357-71. Doi: 10.1016/j.jinf.2020.06.067. Pmid: 32615199 Cross Ref Pub Med Google Scholar.
- m. Qiu X, Nergiz AI, Maraolo AE, Bogoch II, Low N, Cevik M. Defining the role of asymptomatic and pre-symptomatic SARS-CoV-2 transmission: a living systematic review. *medRxiv*. 2020 Oct 06; 2020.09.01.20135194. [Preprint.] <https://www.medrxiv.org/content/10.1101/2020.09.01.20135194v2> Google Scholar.
- n. Health Protection (Notification) Regulations. 2010. <https://www.legislation.gov.uk/ukxi/2010/659/regulation/4> Google Scholar.
- o. Office for National Statistics. Corona virus (COVID-19) Infection Survey, <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/coronaviruscovid19infectionsurveypilot/11december2020>.
- p. WHO. Media briefing on COVID-19–11 March 2020. Accessed from <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19—11-march-2020>.

- q. JHONS HOPKINS corona virus resource center. COVID-19. Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU).
- r. Grant MC, Geoghegan L, Arbyn M, Mohammed Z, McGuinness L, Clarke EL, et al. The Prevalence of Symptoms in 24,410 Adults infected by the Novel Corona virus (SARS-CoV-2; COVID-19): A Systematic Review and Meta-Analysis of 148 Studies from 9 Countries. Avail. Doi: 10.1371/journal.pone.0234765. Pmid: 32574165.
- s. An P, Song P, Wang Y, Liu B. Asymptomatic patients with novel corona virus disease (COVID-19). *Blood*. 2020 Apr 13; 3:12–0.
- t. Aarons MM, Hatfield KM, Reddy SC, Kimball A, James A, Jacobs JR, et al. Presymptomatic SARS-CoV-2 infections and transmission in a skilled nursing facility. *New England journal of medicine*. 2020 Apr 24.
- u. Chun JY, Baek G, Kim Y. Transmission onset distribution of COVID-19 in South Korea. *Med Rxiv*. 2020 Jan 1.