EFFECTS OF YOGA & PHYSICAL ACTIVITY ON IMMUNE SYSTEM AND WELLBEING

[1]DR. BALDEV SINGH [2]DR. KRISHAN GOPAL [3]DR. DARSHAN KAUR
[1&2]Associate Professor, Govt. National College,Sirsa, Punjab, India
[3]Author, Punjab, India

ABSTRACT

Physical health and wellbeing are the most important and something most commonly and consciously taken care of nowadays, especially by youth. This study aims to justify the relationship between physical activity, yoga and immune system. Physical activity in humans is well known to show positive impacts on their physical health such as improved cardiovascular health, body fat management as well as mental health. The physical practice of Yoga, which includes various different postures and breathing processes, bring calm and peace to ones' self. The immune system plays a pivotal role in protecting the body from harmful pathogen or bacteria/viruses which are not recognized by the body and can be harmful. Various studies show how physical activity and yoga can have positive impact on immune system. If analyzed separately, physical activity and immune system have a well-established relationship, regular exercise has been noted to improve overall immune health. Yoga, at the same time, has both movements and mindfulness that are found to have encouraging impacts on immune system. The research, thus, suggests how physical activity and yoga aid in healing both acute and chronic immune health issues.

***Keyword**: Physical Activity**,** Yoga and Immune Responses*

INTRODUCTION:

Physical activity and fitness have been shown to be beneficial to people of all ages. We are designed to walk, and many of our body's processes function best when we are physically on a daily basis active.

Any literature shows that increased amounts of physical activity (exercise that greatly increases our heart rates) could be correlated with stronger decreases in depressive symptoms when it comes to treating stress symptoms. Consider performing a form of physical exercise that requires

short bursts of greater strength once or twice a day (30-90 seconds). Some people achieve this at home by doing simulations. Such as jumping jacks, rock climbers, and weight building workouts in a specific order (i.e. standing squats, push-ups, sit-ups). Others can benefit from using home fitness equipment such as treadmills, elliptical machines, and weight machines.

Individuals with and without an anxiety condition have been found to benefit from strength training. Weightlifting with fitness equipment or popular household products (textbooks, packaged goods, milk jugs loaded with water, paint cans) will help us cope with stress and anxiety.

We all have the potential to be imaginative to incorporate physical activity and fitness into our daily routines. We can also reflect back on this trying period as a watershed moment when we discovered new strategies to strengthen our mental endurance and physical fitness.

Both Americans face difficulties in staying stable and leading an active lifestyle. About 19% of women and 26% of men in the United States actually follow the CDC's 2018 American Physical Activity Guidelines; This suggests that adults receive a mild aerobic physical exercise of at least 150 minutes or a vigorous endurance physical exercise of 75 minutes in a mixture similar to each week.

Physical Activity

Physical activity (PA) is characterized as any bodily action requiring energy expenditure that is provided by skeletal muscles. Physical exercise has two elements that must be considered:

Aerobic fitness: This normally entails mild to heavy exercise that makes you feel warm and allows your breathing rate, breathing depth, and heart rate to rise.

Strength and balance: This is an often overlooked aspect of physical exercise, but it is an essential one with many advantages.

Physical exercise can take several forms.

Physical activity

Interest in sports

Cycling is a common sport.

Going for a walk

Have fun

Dancing

Planting a garden

Washing the house

It is much more important for all to remain physically involved and if it's only a little break from your desk to go for a stroll or stretch, even anything as easy as this would help.

- Relieve muscle tension

- Relieves emotional stress
- Boost blood pressure
- Increase the muscle function

In these extraordinary days, create a structure of your day.

TYPES OF EXERCISE AND PHYSICAL ACTIVITY

Aerobic activity entails the constant and repeated contraction of broad muscle groups. Aerobic energy-producing devices are seen mainly in activities like walking, hiking, jogging, and swimming. Exercises of free weights, weight machines, body weight, or adjustable resistance bands are examples of resistance (strength) preparation. Flexibility drills increase joint range of motion. Balance drills improve gait and reduce the risk of falling. Tai chi and yoga are examples of exercises that incorporate stability, coordination, and resistance.

Benefits of Exercise and Physical Activity

- **Aerobic Exercise Benefits**

Aerobic exercise improves mitochondrial density, insulin sensitivity, endogenous enzymes, blood vessel compliance and reactivity, lung health, immune function, and cardiac performance, among other things. Normal to vigorous physical activity is beneficial with both type 1 and type 2 diabetes is linked to significantly lower cardiovascular and total mortality rates. Aerobic exercise enhances cardiopulmonary health, insulin resistance, lipid

levels, and endothelial function in people with type 1 diabetes. Regular exercise lowers A1C, triglycerides, blood pressure, in individuals with type 2 diabetes, and insulin resistance. In adults with type 2 diabetes, high-intensity interval training (HIIT) facilitates gradual improvements in skeletal muscle oxidative capability, insulin sensitivity, which glycemic control, and can be done without affecting glycemic control in type 1 diabetes.

- **Resistance Exercise Benefits**

Often related to diabetes are low muscle mass and rapid deterioration of muscle strength and functionality. Additional health benefits of the training of resistance for adults include improvements in muscle strength, body function, endurance, physical fitness, emotional stability, bone mineral density, insulin response, blood sugar, lipid profile and cardiovascular health. It is It is uncertain whether resistance training affects glycemic function in people with type 1 diabetes. However, preparation for resistance can help reduce the risk of exercise triggered hypoglycemia in people with type 1 diabetes. Force conditioning leads to fewer hypoglycemia in one session than first practice aerobic exercise in which resistance and aerobic activity are included. Glycemic regulation, insulin immunity, fat distribution, blood pressure, weight and lean body mass all have improved with type 2 diabetes.

Physical activity wards off disease

Because of three mechanisms, physical practice is an essential medicine for infectious disease.

To begin with, it protects against risk factors leading to death for infection. Obesity is less frequent in socially active adults, diabetes, respiratory disorders and cardiovascular disease. According to epidemiological studies, COVID-19 and other contagious respiratory diseases are more severe in people with these conditions.

Physical activity also reduces exhaustion and systemic inflammation, reducing the likelihood of dangerous or lethal diseases. The majority of deaths from COVID-19 and pneumonia is attributable to an uncontrolled inflammatory effect.

Finally, our immune system is strengthened by being physically sound.

We need to get moving

In order for individuals to be less vulnerable to infection conditions, epidemics and pandemics in the future, fitness is undeniably important. It can be used more rapidly and effectively to tackle the latest COVID 19 outbreak and to prevent disastrous social and economic effects of the pandemic by investing long term resources.

Governments encouraged the public to be active with the pandemic at an early stage to comply with lock-out measures. There has been an increase in interest in practice since the lockout in many communities. Unfortunately, this did not lead to a rise in rate of activity.

Instead, the global amount of physical activity seemed to decrease during the last year. That will make the population more vulnerable to infectious and chronic diseases in the short term. Let

unchecked, the disease burden and the associated social and economic costs will have an adverse, long-term effect.

Exercise and immunity

If you have a cough or a cold, are you constantly tired, If you go for a regular walk or do a basic workout routine a few days a week, you might feel stronger.

Information

Exercise will help you reduce the risk of heart attack. It also helps to maintain the stability and strength of your bones.

We don't know whether or how fitness boosts the immune system against such diseases. Several hypotheses have been proposed. None of these hypotheses, though, have been confirmed. There are some of the theories:

- Physical exercise may aid in the removal of bacteria from the lungs and airways. This may help you from catching a cough, flu, or other disease.
- The effect of exercise shifts antibodies and white blood cells (WBC). The WBCs are body immune system disease-fighting cells. Because these antibodies or WBCs propagate faster, pathogens may be identified more easily than ever. Nevertheless, nobody knows if these amendments deter infections are effective.

- A brief increase in body temperature during and immediately after exercise can inhibit bacterial growth. This increase in temperature will aid the body's ability to combat infection. (It's close to how you do when you have a fever.)
- Physical activity reduces the activation of tension hormones. Stress will raise the chances of getting sick. Lower levels of stress hormones can prevent you from getting sick.

Exercise is beneficial to your health, but you cannot overdo it. People who still workout need not improve their physical activity only to boost their immunity. Long-term, strenuous activity (such as distance running and intensive workout training) can be harmful.

According to studies, individuals who live a relatively active lifestyle profit the most by beginning (and committing to) an exercise regimen. A mild programme could include:

- Bicycling with your kids at least once a week
- Daily walks of 20 to 30 minutes
- Gym attendance the single day
- Regularly playing golf

You can feel better and more energetic after exercising. It has the potential to make you feel great about yourself. So, go ahead and sign up for the aerobics class or that stroll. You'll sleep happier and be safe as a result.

There is no solid proof that consuming immune vitamins and exercise together reduces the risk of disease or infection. We depend on facets of our innate immunity to cope with the initial infection since this virus strain is new to the human immune system. If we overcome most viral infections, we grow antibody and cell-mediated immune responses unique to the virus over the span of weeks. In certain cases, this 'training' of our immune systems as a result of exposure provides us with long-term defence from re-infection or, whether we are re-infected, far milder illness symptoms. However, we don't yet know whether our answer to SARS-CoV-2 is strong enough to be both defensive and long-lasting. There is a clear need for vaccine production and testing to assess if our immune system is sufficient to defend us, in addition to checks for the existence of virus particles and plasma antibodies.

To deter the transmission of SARS-CoV-2, public health guidelines (such as stay-at-home directives and park, gymnasium, and exercise centre closures) have the ability to limit everyday physical activity (PA). These guidelines are unfortunate because physical activity will help us fight the disease by improving our immune systems and counteracting some of the co-morbidities that render us more vulnerable to extreme COVID-19 sickness, such as obesity, diabetes, asthma, and serious cardiac disorders.

Exercise influences the immune system and the antiviral reactions. Severe exercise performed before (i.e. training) or after diagnosis (for a few days prior to the emergence of symptoms) in respiratory tract animals with influenza infection and herpes simplex virus 1 (HSV 1) has been shown to improve morbidity and mortality. On the other side, preclinical studies have shown that

physical activities accelerate the initiation of infections by respiratory virus. Follow-up analysis also provided a glimpse of the mechanisms behind these results.

It is not advisable to initiate an intensive fitness routine or do extremely intense sustained exercise if you are not used to those exercises, since animal tests have shown that intense training or intense, prolonged single exercise bouts will contribute to diminished immune responses. Starting with lower intensities and durations and gradually increasing them is a safe technique. Walking, for example, is the most common and functional means of exercise, as well as being helpful to a variety of organ systems. Before starting an activity regimen, anyone with existing health problems can meet with a primary care provider.

A Brief Insight to the General Immune Response to Viral Infections

Almost all viral infections cause the body to attract and activate such inflammatory cell types such as macrophages and, in certain circumstances, neutrophils. This causes a cascade of proinflammatory and tissue-damaging molecules to be released, including cytotoxic cytokines, cationic proteins, lipid mediators, metalloproteinases, and oxygen burst components. The inborn and adaptive immune systems usually alter the extent and type of the tissue damage, which is a key method for determining a therapeutic outcome of the infection. 9 The host innate immune system is used to combat the adverse consequences of viral infections through anti-inflammatory cytokines (such as IL10 and TGF) (such as resolving and galectins). In particular, this hampers the formation of proinflammatory cytokines and chemokines. The expression of the Major

Histocompatibility Complex Class II gene and many mechanisms of signalization leading to development of proinflammatory cytokines. 9 IFN is also produced to induce the virus destruction and the infected cells of macrophages and natural killer/cyto-toxic cells (NK cells), respectively. The stimulation of cytotoxic T lymphocytes—CD8+ cells that exert cytotoxicity by lysing contaminated cells and viruses—sets in motion adaptive immunity toward viral antigens. CD4+ cells, which work with B cells to generate antibodies, are often activated by the adaptive immune system. Antibodies help by sticking to viruses and preventing them from infecting cells that aren't contaminated. By intercepting the mechanism of viral host cell attachment, Antibodies perform a vital protective role in an already sensitized host to reinjection of such viruses (whether by infection or immunization). Although other variables such as viral dosage, infection path, host age, host genetic vulnerability, concurrent infection with other agents, or prior exposure to reactive agents, all play a role in the interplay between host viruses, the host's effective immune response is especially important in determining the susceptibility, duration, severity, and ultimately the clinical outcome of a virus infection.

Yoga for alleviation of erratic immune responses

Yoga efficacy for individuals who are at risk or already suffer from inflammatory disorders is highlighted in current evidence as a complementary intervention. According to many findings, yoga seems to have the capacity to decrease systemic inflammation and increase immune function in stressful conditions. According to available evidence, the yoga exercise was also shown to suppress pro-inflammatory markers. Among its impact on pro-inflammatory markers

have been significant decreases in interleukin-1 (IL-1) beta, as well as evidence of reductions in IL-6 and tumour necrosis factor (TNF)-alpha. Extreme COVID-19 correlates with an elevated cytokine tempest (IL-6, IL-10 and TNF-), a cytokine (CD4+ and CD8+ T) and a lowered CD4+ T cell IFN expression. These findings promote the usage of yoga for people who are at or who already have COVID-19 at risk. The length of the yoga procedure will have a significant influence on the inflammatory markers of yoga. Pullen et al. found that in groups at elevated risk of heightened inflammation, such as those with cardiac disease, a shortened course of therapies of just 8 weeks is necessary to suppress inflammatory processes. According to the authors, the magnitude of deviation from standard physiology has a mutual effect on the length of intervention needed.

Yoga for Better Respiratory Capacity

In some trials, the respiratory mechanism has been helpful through breathing exercises. Pranayama, a respiratory practise focused on yoga, is a simple to cheap procedure that can be integrated easily into day-to-day activities and proved effective in people of all ages, even elderly people. The efficiency of both the exhalatory and the inspiratory muscles has been seen to improve. Joshi et al. observed an improvement in ventilatory lung function in the 6-week pranayama course. The authors have all recorded enhanced ventilation functions as reduced respiratory rate (RR) and forced vital capability (FVC), forced expiratory volume at the end of the former S (FEV1%), maximum free-voltage ventilation (MVV), peak expiratory fluid (PEFR), and a time of automerization. Repetitive use of pranayama in stable individuals has been shown

to increase cardiovascular respiratory pairings and to improve parasympathy. Kapalabhati consists of heavy exhalations combined by diaphragmatic muscle contractions and passive inhalations. This procedure consists of strong exhalation. Kapalabhati supports proper preparation and toning of diaphragms and abdominal muscles. It also helps absorb bronchial tree secretions and purifies the respiratory passages and alveoli. A change in yogic breathing techniques has increased the pulmonary functions in healthy swimmers.

Psychological Health Issues

Almost every researcher said they had experienced mental wellbeing problems as a result of the COVID-19 pandemic and resulting lockout. Frustration, anxiety, terror, and tension were all felt by the participants. For instance, participant 11 said,

> "I'm getting frustrated every day because I'm stuck at home 24 hours a day, staring at the same people, and I'm not able to go anywhere. Workplace anxiety and potential situations occupy a large portion of my thoughts. What if I have to do my work for the rest of my life? That's the kind of thing I'm talking about. And particularly fearing the loss of my ever charismatic personality, my family's economic standing, no income or lower wages, less jobs in the future, a work transition, and my family's health care."

The pandemic-related closing has generated a sense of doubt regarding one's own future, as well as the future of one's family and friends, which is expressed in psychological states such as anger, anxiety, terror, and tension.

Individuals who are unable to priorities their daily hours due to a lack of a well established routine and work are experiencing unexplained laziness and exhaustion. Participant 7 claims, for example, that "Physical exhaustion has decreased due to the lack of a physical burden or set working hours, but emotional fatigue and pressure have skyrocketed. Concerns have grown. Because there is more spare time than is expected, lethargy has increased. The amount of dissatisfaction is rising."

The monotonous and closed life cycle of someone who is restricted to their own home has often culminated in severe sleep disruptions. Participant 5 states, for example:

"Much, much sleep!! Consider that after the lockout I slept 10-12 hours. My sleep pattern was earlier developed because of my work, but the lack of routine has now made it disruptive. I have even simulated meetings because I can get up at 9.40, wash my face and attend the meeting if the meeting was set to start at 10 a.m. I'm up for another break afterwards. I sleep eight hours in the morning. I wake up and work, so I'm able to work my schedule versatility. I only want gymnastics to open, to keep an eye on me and scrutinize me for sleep and a routine."

As a consequence of these examples, it is clear that the advent of the COVID-19 pandemic has culminated in psychological issues such as anger, anxiety, terror, and tension. The sleep–wake cycle is disrupted, resulting in drowsiness and emotional exhaustion.

CONCLUSION:

In order to avoid the coronary virus from contracted to move during a serious infection time, the power of the human immune system will be crucial. Current guidelines for public health, encouraging physical activity during COVID-19, are supported by significant immunity benefits. To delay the pandemic growth, unparalleled social distance and home instructions had been created. Probable lack of physical activities and sedentary gains have resulted in these measures. Isolation may also be affected by harmful psychological and social effects on immune systems and physiological wellbeing. The exercise reversed these results. It is essential to accept healthier living uniformly in your home in order to limit the long-term impacts of increased sedentary time, reduced physical activity and social isolation. If social distancing and residence orders are revoked, their enforcement will benefit physical fitness habits on a long-term basis.

Physical activity in humans is well known to show positive impacts on their physical health such as improved cardiovascular health, body fat management as well as mental health. The physical practice of Yoga, which includes various different postures and breathing processes, bring calm and peace to ones' self. The immune system plays a pivotal role in protecting the body from harmful pathogen or bacteria/viruses which are not recognized by the body and can be harmful. Various studies show how physical activity and yoga can have positive impact on immune system. If analyzed separately, physical activity and immune system have a well-established relationship, regular exercise has been noted to improve overall immune health. Yoga, at the same time, has both movements and mindfulness that are found to have encouraging impacts on

immune system. The research, thus, suggested how physical activity and yoga aid in healing both acute and chronic immune health issues

References:

Agha NH, Mehta SK, Rooney BV, et al. Exercise as a countermeasure for latent viral reactivation during long duration space flight. Faseb J. 2020;34(2):2869–2881.

ACSM. Keeping children active during the coronavirus pandemic. Exerc Med. 2020 Current recommendations of exercise during the COVID19 period.

World Health Organization. Coronavirus Disease (COVID-19) Outbreak. World Health Organization; 2020.

Pan A., Liu L., Wang C. Association of public health interventions with the epidemiology of the COVID-19 outbreak in Wuhan, China. J Am Med Assoc. 2020;323(19):1915–1923. doi: 10.1001/jama.2020.6130.

Lake M.A. What we know so far: COVID-19 current clinical knowledge and research. Clin Med (Lond). 2020;20(2):124–127. doi: 10.7861/clinmed.2019-coron.

Gabutti G., d'Anchera E., Sandri F. Coronavirus: update related to the current outbreak of COVID-19. Infect Dis Ther. 2020;8:1–13. doi: 10.1007/s40121-020-00295-5.

Mousavizadeh L., Ghasemi S. Genotype and phenotype of COVID-19: their roles in pathogenesis. J Microbiol Immunol Infect. 2020 doi: 10.1016/j.jmii.2020.03.022.

Gasmi A., Noor S., Tippairote T., Dadar M. Individual risk management strategy and potential therapeutic options for the COVID-19 pandemic. Clin Immunol. 2020;7:108409. doi: 10.1016/j.clim.2020.108409.

Yuki K., Fujiogi M., Koutsogiannaki S. COVID-19 pathophysiology: a review. Clin Immunol. 2020:108427. doi: 10.1016/j.clim.2020.108427.

Scavone C., Brusco S., Bertini M. Current pharmacological treatments for COVID-19: what's next? Br J Pharmacol. 2020 doi: 10.1111/bph.15072.

Singh, M., Kadhim, M.M., Turki Jalil, A. *et al.* A systematic review of the protective effects of silymarin/silibinin against doxorubicin-induced cardiotoxicity. *Cancer Cell Int* **23**, 88 (2023). https://doi.org/10.1186/s12935-023-02936-4 https://cancerci.biomedcentral.com/articles/10.1186/s12935-023-02936-4

Singh, *Analysis of set shot in basketball in relation with time to perform the course and displacement of center of gravity*, American Journal of Sports Science, Vol.2 Issue.5 pp: 122-126 (2014). Retrieved from https://www.sciencepublishinggroup.com/journal/paperinfo.aspx?journalid=155&doi=10.11648/j.ajss.20140205.13

Singh (2010). *Evaluation And Improvement Of Sports Techniques Through Biomechanical Updated Analyzing Technology*, University News, Journal of Higher Education Association

of Indian Universities, Association of Indian Universities, Vol:48:Issue.05;2010 Pp45-57, 2010

Mandeep Singh Nathial, *A Study of Adjustment and Emotional Intelligence of University Coaches in India*, American Journal of Applied Psychology. Volume 3, Issue 6, November 2014 , pp. 122-126. doi: 10.11648/j.ajap.20140306.11

Nathial,. A COMPARATIVE AND ANALYTICAL STUDY OF SELF-ESTEEM AND JOB SATISFACTION IN ATHLETES AND NON ATHLETES. *Journal of Advances in Social Science and Humanities*, *2*(10).https://doi.org/10.15520/jassh210123

Singh, M., Kour, R., & Kour, A.,. A collaborative diversified investigation of respective responses of sports person coaches and organizations on criminalization of doping.International Journal of Health Sciences,6(S3), 11295–11310. https://doi.org/10.53730/ijhs.v6nS3.8641

Mandeep Singh., Assessment of Vocational Interests of Pahadi&Bakarwal School Students In Relation To Their Gender. Int J Recent Sci Res. 9(3), pp. 24817-24819. DOI: http://dx.doi.org/10.24327/ijrsr.2018.0903.1731

Dr. Singh, 2017. "A study of awareness of inhouse doping errors among national level players and sports administrators in J&K state of India", International Journal of Current Research, 9, (01), 45226-45227. http://www.journalcra.com/sites/default/files/issue-pdf/20036.pdf

Singh, 2019; "**Effect of Mobile Screen Psychomotor Digital Image Motivators in Person Technique in Reducing Anxiety Level of Intervarsity Players of Cluster University Jammu,** Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). Volume-9 Issue-1, October 2019, PP: 3750-3752, DOI: 10.35940/ijeat.A9811.109119. https://www.ijeat.org/portfolio-item/A9811109119/

Singh. (2018). THE AWARENESS OF MOVEMENT AND FITNESS SCIENCES AMONG SCHOOL, UNDER GRADUATE AND POST GRADUATE LEVEL STUDENTS: EMPOWERING EDUCATION THROUGH PHYSICAL EDUCATION. European Journal of Physical Education and Sport Science, 4(3).https://doi.org/10.5281/zenodo.1218149

SINGH SIDHU, A., & SINGH, M. (2022). KINEMATICAL ANALYSIS OF HURDLE CLEARANCE TECHNIQUE IN 110M HURDLE RACE. *International Journal of Behavioral Social and Movement Sciences*, *4*(2), 28–35. Retrieved from https://ijobsms.org/index.php/ijobsms/article/view/267

Singh, A., & Singh , D. M. (2013). PROMOTION OF RESEARCH CULTURE –ENHANCING QUALITY IN HIGHER EDUCATION. *International Journal of Behavioral Social and Movement Sciences*, *2*(2), 202–208. Retrieved from https://ijobsms.org/index.php/ijobsms/article/view/152

SINGH, M., & SINGH SIDHU, A. (2016). A COMPARATIVE STUDY OF BODY COMPOSITION AND RELATIVE HEALTH STATUS AMONG RESIDENT AND NON-RESIDENT STUDENTS IN DIFFERENT SCHOOLS OF J&K. *International Journal of Behavioral Social and Movement Sciences*, *5*(3), 08–13. Retrieved from https://ijobsms.org/index.php/ijobsms/article/view/320

Singh Nathial, D. M. (2012). ANALYZING THE CREDIT BASED SYSTEM IN PHYSICAL EDUCATION. *International Journal of Behavioral Social and Movement Sciences*, *1*(3), 172–176. Retrieved from https://ijobsms.org/index.php/ijobsms/article/view/37

SHARMA, N. P., & SINGH, M. (2014). SENIOR AGE GROUP RELATIVE EXERCISES AND IMPACT ON THEIR LIFESTYLE. *International Journal of Behavioral Social and Movement Sciences*, *3*(04), 78–82. Retrieved from https://ijobsms.org/index.php/ijobsms/article/view/246

J N Baliya, 2013; "**A study of family stress among working and non-working parents",** International Journal of Research in Social Sciences.Vol 2, 2. 194-201. https://indianjournals.com/ijor.aspx?target=ijor:ijrss&volume=2&issue=2&article=013

Xiao H, Zhang Y, Kong D, Li S, Yang N. Social Capital and Sleep Quality in Individuals Who Self-Isolated for 14 Days During the Coronavirus Disease 2019 (COVID-19) Outbreak in January 2020 in China. Med Sci Monit. 2020 Mar 12;26.

Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel corona virus-infected pneumonia in Wuhan, China. JAMA. 2020;7:e201585