Importance of physical activity during the pandemic

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INTRODUCTION

30th January 2020, this day goes down in history, the outbreak of novel coronavirus disease, which now is known as COVID-19, was declared as an International Public Health Emergency by the WHO. On 11 March 2020, COVID-19 was declared as a pandemic. On JULY 13, 2020, WHO reported 12681472 cases of COVID 19 and a total of 564420 deaths from various areas of the globe.

Between November 2002 and July 2003; an outbreak of SARS occurred in southern China, causing 8098 cases, resulting in 774 deaths in 17 countries (Kim, 2019).

Coronaviruses are a large family of viruses that are known to cause illness like the common cold to more severe disease such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). Total of 7 types of coronavirus are known to infect humans of whom SARS COV is beta coronavirus causing SARS and SARS COV-2.
COV-2 is novel coronavirus causing covid 19. SARS COV-2 belongs to a family of coronaviridae ‘subfamily ortho coronaviridae and order nidovirales. It is a single-stranded RNA virus with a crown-like spikes on its surface. The spikes made of glycoprotein (Hassan et al., 2020).

Most common symptoms of covid 19 are fever cough and shortness of breath. Fever is seen in 83% of cases. In more severe case of infection, pneumonia or severe acute respiratory syndrome or kidney failure or even death can occur. The screening criterion of covid 19 is1) new onset of fever and respiratory symptoms.2) A strong travel history3) Close contact with confirmed or suspected cases within 14 days. A most common mode of transmission is droplet infection. No definite treatment has been developed as yet. However, symptomatic treatment includes medications like hydroxychloroquine, ivermectine, tocilizumab. Also, supportive care for infected persons is recommended. Persons with age more than 65 years with comorbid conditions like diabetes, chronic lung kidney or heart diseases and other immunocompromised conditions are at an increased risk of developing severe form the disease. As a standard measure LOCKDOWN was called in India on 21 March 2020. Restrictions included complete lockdown of cities, restrictions on travelling, cinema halls, and borders, schools, gyms malls, and libraries.

Arogya setu is an Indian app basically developed for covid 19 contact tracing, self-assessment, it is a mobile app that was developed by national informatics centre under the Ministry of Electronics and Information Technology to spread awareness about covid 19 cases (Hassan et al., 2020). People were encouraged to start wearing N 95 masks, face shields and practice hand washing. People were asked to maintain 6 feet of distance between themselves since the most common mode of transmission of this virus is via droplets and practice cough etiquette. There are few evidences which show that SARS Cov 2 can be an airborne disease. N 95 are so called because they block 95% of small-sized particles of size 0.3 microns the size of coronavirus is itself 125 nm. Terms like Quarantine and Isolation were introduced to the public at large. An isolation period of 14 days is advised to all the people who came in contact with suspected cases of covid 19.

After a period of quarantine of 2 months, India recorded almost 820916 people infected with coronavirus disease with more than 22123 deaths recorded. During the lockdown, people find many reasons to move out of their home, be it for groceries shopping or some other physical activity. The impact of a sedentary lifestyle appears slowly and much later in children and adults, but far early and severe in the geriatric population and hence goes unnoticed in the young population. Importance of Physical activity is important for every individual is at the core, especially to have self-reliance for mental health, and for physical health. Physical inactivity among the geriatric population is the fourth highest risk factor for mortality and morbidity around the world. Individuals who do not engage in regular physical activity even like household chores, yoga, gymnning etc., the risk of mortality and morbidity is higher.

MATERIALS AND METHODS

Through the various research articles that were reviewed regarding the effects of routine physical activity and reduction in mortality and morbidities in patients, one cannot deny the resistance one gains to fight the virus through regular physical exercises. Through this article, one can understand that one’s own immunity is vital in fighting the virus, along with maintaining social distancing and other rules and regulations established by the government of India.

RESULTS AND DISCUSSION

About physical fitness and the covid pandemic

Research and studies linking the possibility of physical fitness in helping reduce mortality and morbidity were initially done in Wuhan in China the epicentre of the disease. As per the results of the study, it is concluded that the physical fitness of an individual is in fact, the supreme quality to defeat the coronavirus. Perse, physical fitness is linked to an individual’s immunity and immunity the first barrier in fighting the virus. The researchers recommended the usual activities like strengthening exercise push up squats weight lifting aerobics yoga Sana tai chi going up and down the stairs picking groceries sit-ups, and a combination of these can be performed for at least 30 -45 minutes per day at least 5 times per week With the shutting down of gyms exercises can be done at the comfort of home with exercise videos and online professional guidance. In fact, our own prime minister Narendra Modi Ji stressed so much upon the importance of yoga and physical exercises during one of his episodes of Mann Ki Baat which is telecast live throughout India.

Simultaneously research was also going on the USA and Spain about the benefit of physical fitness in the elderly and their ability to fight the virus. So it was also recommended for the elderly to start reg-
ular physical exercises with b online professional help to combat physical and mental consequences of the pandemic (Jakobsson et al., 2020). Researchers also suggested reducing of sedentary behaviour like watching TV and binge eating and junk foods the time we spend sitting except for the time we spend sleeping as these would alleviate our co morbidities.

Physical Inactivity, Our Immune System and the pandemic

The novel coronavirus spread via droplets of the diseased individual or the carrier. Once these droplets enter the normal individuals, they cross the nasal cavity and start attacking the lung epithelial cells. The antigen-presenting cells of our body, present the virus antigen to b cell, b cell on identifying the virus s as foreign starts producing antibodies t cells are also recruited an in an attempt to kill the virus. This complex reaction cause fever cough malaise and breathlessness in an individual. But still, our immune system is ineffective in fighting this virus, and hence we depend of medicines. Drugs like hydroxychloroquine remdesivir tocilizumab anti TB drugs have been used in treatment but are not effective therapeutically. Definitive vaccines have also not been developed.

The closing down of gyms to combat the spread of the virus was an unfortunate event since regular physical activity boosts immunity and counteracts the co-morbidities like d.mellitus obesity, hypertension that makes us more susceptible to the virus. For example, the rate secretion of salivary lactoferrin increases for around couple of hours post mild to moderate physical exercise. Mucosal lactoferrin contains immunoglobulin A which prevents viruses form infecting cells of our body as it itself binds and blocks host receptors (Woods et al., 2020).

Low levels of Immunoglobulin A are associated with upper respiratory tract infection in some athletes undergoing intense training. Regular physical exercise also recruits white blood cells in our body, which help fight microorganisms. So innate immunity can help us combat the coronavirus thought the efficacy varies greatly from individual to individual and the type of pathogen. B cells produce antibodies, and t cells are part of cell-mediated cytotoxicity against viruses.

Physical Inactivity and the Respiratory System

Endurance building exercises that are the exercises that improve our stamina also increase the pumping actin of our lungs. With regular endurance training, the lungs pump out pathogens effectively. Until now, in many countries, it has been observed that a majority of covid 19 patients develop RF and require MV to maintain adequate pulmonary gas exchange. The virus first attacks the lung epithelial cells of the periphery leading to the characteristic fibrotic changes that can be seen on CT and MRI of the chest (Harada et al., 2020). A recent report revealed that nearly 50 % of patients have a respiratory failure with nearly 30%patients requiring mechanical ventilation. Mechanical ventilation has been found to be a lifesaving procedure, but prolonged ventilation there is respiratory muscle weakness due to diaphragm muscle atrophy. Although most of our organ systems adapt to high endurance exercises, nevertheless it has been seen that the depth of respiration improves but the gaseous exchange taking at the level of alveoli cannot be altered. Specifically, endurance training causes certain biochemical alterations in the diaphragm that help improve the depth of respiration even in the face of prolonged mechanical ventilation (Inciardi et al., 2020). Even as few as 10 days of conditioning with endurance building exercises results in significant protection against covid 19, it has been seen that endurance-trained individuals who were covid positive had a better outcome in comparison to patients with low endurance due to exercise-induced preconditioning of the diaphragm. Alas, most patients that are being infected are not preconditioned with endurance training before infection.

Physical Inactivity and Heart

One cannot stress the importance of regular physical activity in the prevention of heart diseases like CAD sudden cardiac death heart attack stroke physical activity in this era of a pandemic has taken a backseat for most due to the closing down of pools gyms markets malls and so on. Coronavirus attacks the lung but can also affect the heart, especially a diseased heart. Elderly people very often facing isolation in their homes also reported having increased symptoms of heart diseases. one should also not stop from taking medications of heart diseases in this pandemic. Not taking regular medications can, in fact, increase the risk of mortality in patients (Topcuoglu, 2020). So it becomes essential for people who have recovered from mild covid infection to gradually start a routine of physical exercises. Even individuals who have recovered from severe covid infection should gradually go back to regular physical exercises. In case the recovered individuals do complain of chest pain breathlessness dizziness or nausea while exercising regularly evaluation of the patient with cardiac imaging and stress testing may be necessary to rule out covid 19 damage before moving on to higher levels of physical activity (Basu-Ray et al., 2020).
Physical Inactivity and the Muscles

Physical inactivity is associated with loss of aerobic fitness, muscle strength, cognitive function, imbalance in hormonal levels, weakening of bones. Of the many hormones of the body, one hormone that is especially affected by physical inactivity is insulin. Insulin the hormone that controls our blood sugar level, body fat level and protects us against comorbidities like obesity and diabetes mellitus. By breaking down sugars, insulin provides us with the energy it also prevents the accumulation of peripheral fat in our body, and it also regulates mitochondrial functions of cells. People should continue taking their insulin and anti-diabetic medications. All these functions take a downhill course in the absence of regular exercising. Indoor exercises should be done. Around 10,000 steps in a day is considered good physical activity, whereas less than 1000 steps per day is considered low physical activity (Guo et al., 2020).

How to fight the virus

So far, the researches carried out by various countries have not yielded any specific treatment or vaccination to treat or prevent the viral disease. Animal trials have started and have yielded positive results, and a human trial has also occurred, but much research is still underway. And a full proof vaccine coronavirus will only to available to the entire population by the next year 2021 (Sharma et al., 2020). So only one feasible alternative is to strengthen one’s immune system. one way to do that is through regular physical activity or improving our diets. Adequate levels of physical activity improves body’s response to a vaccine, lowers chronic inflammation and improves oxygenation flushes out toxins through sweat improves mental fitness and raises acquired immunity against many comorbid conditions like obesity human immunodeficiency virus diabetes heart diseases. Though this adaptive immunity depends on the intensity and duration of exercise

Health experts suggest moderate-intensity exercise for at least 4 minutes in a day for up to 5 weeks is adequate for the maintenance of the immune system. It can include household chores, loading and unloading groceries going up and down the stairs yoga Sana. On the other hand, strenuous exercising deteriorates the functioning of organ systems causing fever sore throat body ache. Since the geriatric population is at higher risk of sars cov infection mild to moderate physical exercises for 30 minutes for at least 2-3 times in a week have been proven to be beneficial in improving their immunity. Vitamins and minerals also play a crucial role in the proper functioning of our immunity. Of all the vitamins the most crucial is vitamin c and vitamin D whenever a pathogen enters our body for the t cell to kill it the t cell has to project a vitamin d receptor cell also helps in conversion of calcidiol to calcitriol the mature form of the vitamin that performs many functions. Vitamin D can reduce the cytokine storm by inhibiting expression of pro-inflammatory cytokines, such as TNFα and interferon γ (IFN-γ) while stimulating anti-inflammatory cytokines expression by macrophages (Woods et al., 2020).

Sleep deprivation increases the levels of hormones like cortisol epinephrine and nor epinephrine these, in turn, reduce levels of leptin growth hormone and pituitary hormones these hormone recruits pro-inflammatory cytokines. Also, melatonin produced during sleep is reduced oxidative stress by reducing the production of free radical ions. Vitamin c boosts immunity in many ways vitamin c promotes the production of b cells and t cells and pro-inflammatory cytokines. It induces local prostaglandin production and nitrous oxide production and hydrogen peroxide locally which kills microbe vitamin c promotes wound healing and maintain the strength of collagen of tissues it enhances immune response of vaccine it acts as an antioxidant and helps to treat and prevent the common cold.

Vitamin A maintains vision and retinol, retinal and retinoic acid, and also helps in maintaining immunity system function. Vitamin helps in t cell proliferation in the thymus. It’s also in the proliferation of blood cell lines in the bone marrow. Vitamin A is an important component in formation of mucosal and epithelial barriers it enhances immune response measles and influenza vaccination. Vitamin b2 decreases the level of mers virus in the blood vitamin b3 is helpful in treating ventilator-associated injury inpatient by reducing pro-inflammatory response an increasing anti-inflammatory response of body s pyridoxine vitamin b6 is especially helpful to improve host immune response (Mahajan et al., 2020).

Vitamin e induces cellular and humoral immunity though no study reveals beneficial impact during upper respiratory tract infections. Along with vitamins minerals like selenium reduced death in covid 19. Selenium is involved in the production of selenium-dependent glutathione oxidase that reduces reactive oxygen species and hence the oxidative stress in the body helping fight covid 19. Similarly, mineral zinc as per studies has been shown to improve immune system response against viral infections like covid 19. so in view of the multi-
ple benefits of vitamins and minerals a combination of these inadequate quantity to fight covid mortality and morbidity. In the end, we can conclude that regular physical activity adequate sleep balanced diet and supplements of vitamins and minerals can relatively improve our chances of survival against coronavirus. Thought the mainstays of treatment are drugs and vaccines.

Learning from examples from all around the world

Quarantine and isolation is a way of protecting people from covid 19, but the STAY AT HOME initiative also has its own disadvantages. Most people lack the knowledge of the use of gym equipment’s the exercises that are right for their needs physical attributes etcetera. Loneliness also accelerates not just physical but cognitive decline in senile individuals. There are currently many online physical activity groups, like FFPEVG online videos, available on the website of the FM of sports of U K, which aims at encouraging older people to remain physically active at home. From the news from all around the world, we hear individuals doing achieving extraordinary feats.

Shanta balu pawar common women started performing on the roads of Pune India, showcasing her skill of martial arts, using only a lathi. She is 75 years old and was forced to earn money this way after she decides to quit begging to look after children of an orphanage where she lives. They were suffering from financial problems after the lockdown started. The 21-day lockdown amid the lockdown, 46-yr-old- Krishnan Padmakumar completely amazed people globally as his ran an entire marathon within the confines of his home. It took him 4 hours and 26 minutes to cover 42.2km. Krishnan is an engineer by profession and had to start working from home after the lockdown was declared in the city. Desperate times call for desperate measures as shiviyer a finance professional based in Mumbai completed a 52 km marathon in the bedroom. Marathon enthusiast Elisha Nochomovitz ran the distance of a marathon on his 23-foot balcony — twice. In California USA proud owner of Inspire South Bay Fitness gym, Peet Sapsin had to shut down his gym like many others after the lockdown was initiated. After a few months of lockdown, sapsin knew that he has to get super creative for the clients so that they feel safe coming back to gyms. So after cutting down the number of people in a class, sapsin and his wife created plastic workout pods to be used by a single person while still maintaining rules of social distancing.

Practising Yoga asana and meditation gives natural support to the immune system. Yoga lowers stress hormones in your body like cortisol dopamine and strengthens the immune system. Yoga also conditions the lungs, and respiratory tree stimulates the lymphatic system to remove toxins from the body, ensuring optimal functioning of all the organs systems. It can be practiced anywhere and at any time because it does not need any equipment such as weights or machines etc. When we begin our day with Yoga, it keeps us active, energetic, positive and clear-headed. Following a regular practice of certain basic asana like dhanurasana (like dhanush band; a bow), meditation techniques along with a nutritious diet to is helping to emerge stronger, and healthier post the lockdown.

CONCLUSIONS

That regular physical activity adequate sleep balanced diet and supplements of vitamins and minerals during a lockdown of self-isolation is important during a pandemic to remain mentally and physically fit and also reducing morbidity and mortality. The medical sector is a top priority in every country. In summary: all types of physical activity are beneficial. Completely sitting for a prolonged time and reduces sedentary lifestyle with active breaks every now and then. As per health experts, 45 minutes of mild to moderate physical exercises for a minimum 5 times a week is beneficial for elderly 30 minutes a day and minimum3 times a week.1000 steps in a day is a moderate physical activity and less than 1000 steps in a day low physical activity. People should also take advantage of health and fitness apps for motivation for exercises as per their requirement. Over-exercising should be avoided and also avoid doing them when one is infected. So regular physical exercises will help in the prevention of coronavirus pandemic or any kind of viral pandemic in the future.

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Conflict of Interest

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