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# **Editorial**

Dear Readers,

Greetings from the Editorial Team.

With this issue we present to you the second issue of 2020. On behalf of the editorial team let me begin by thanking one and all who have contributed directly or indirectly to make this issue see the light of the day. Our sole motto here has been to publish the research articles and have always focused on quality rather than quantity. The purpose of this online journal of the University is being aptly served as it is encouraging broader submission of wide array of articles. It was interesting to note that the articles are in sync with the COVID pandemic era and will make for an interesting read for one and all. The journal is observing a good submission rate and we are trying to maintain a healthy acceptance rate.

The recent times have been unprecedented and focus has been shifting from adapting to new mannerisms and ways of living. Social distancing, wearing a facemask and washing the hands regularly is the new norm of the day and everyone seems to abide by it.

The government has come out with the new education policy after a hiatus of almost 34 years. The stress is being laid on not just learning but also the application of what is being learned. The learners will now have a wider choice when it comes to selecting where they would like to see themselves in the near and distant future. We need to update and upgrade ourselves and the prime intention should be on blending the technology so as to add more value to human life and mankind. Sharing of views and information and knowledge across various online platforms is on the rise and has shrunk the world and everything now seems to be in reach at the click of a button. On a larger spectrum, hope that these times have a favorable impact on the generations to come.

Coming back to the journal, I seek your support and look forward to welcoming your submissions for next issue and your valuable suggestions are eagerly awaited.

Stay Safe, Stay Happy, Stay Healthy

Happy Reading

Dr Vijay Wadhwan

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**Review Article****COVID Virus and its Treatment****Verma Vikrant<sup>1</sup>**

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**Abstract**

The COVID-19 global pandemic is not even over yet but it has already taught us a lot of lessons the hard way. The vast majority of the global community has blamed the Chinese illegal wildlife markets for the origin of this pandemic. The United States of America is the most affected country with the highest patients of about 0.7 million. Despite great efforts, there is no treatment of this disease. However, prevention and management are the best options. COVID-19 was originated from Wuhan city of Hubei Province in China in December 2019. Since then it has spread in more than 210 countries and territories. The disease due to SARS-CoV-2 was named as COVID-19. About 2.2 million people have been infected with more than 0.15 million deaths globally. The United States of America is the most affected country with the highest patients of about 0.7 million. It is a viral disease due to the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) virus. The patients show flu-like symptoms with a dry cough, sore throat, high fever, and breathing problems. Antiviral drugs combination of hydroxyl chloroquine and azithromycin possibly the best option to take care of the patients. Allopathic treatment together with Unani therapy possibly helpful. This article describes SARS-CoV-2 disease and its treatment.

**KEY WORDS:** Covid, Plasma therapy, Immune system, virus**Address for correspondence:** Verma Vikrant, Associate Professor Department of Pharmacy, Kharvel Subharti College of Pharmacy, Swami Vivekanand Subharti University, Meerut, UP, 250005**Mail:** [vijeetsingh84@rediffmail.com](mailto:vijeetsingh84@rediffmail.com)**Contact:** +917351096954**Introduction**

Coronaviruses have a link with the Coronaviridae family and show up just like spiked rings when observed via an electron microscope. The surface appears with a number of spikes, which are beneficial to assault and bind living cells. These are the viruses inflicting the simple frequent cold disorder to extreme ailments like Middle East Respiratory Syndrome (MERS-CoV), Severe Acute Respiratory Syndrome (SARS-CoV). The source of these viruses is some animals such as bats. The phrase coronavirus is a spinoff of the Latin corona, which means crown or halo, that states to the normal look indicative of a crown or a photo voltaic corona round the virions. These viruses are having a positive-sense single-stranded RNA genome (27 to 34 kilobases) and helical symmetry nucleocapsid.<sup>[1-2]</sup>

There are several outbreaks from time to time due to these viruses. The most notorious outbreaks were in 2003, 2012, 2015 and 2018 with 774, 400, 36 and 42 deaths, respectively. It is important to mention that the 2019–2020 outbreak is started in Wuhan, Hubei Province, China in December 2019 (The Editorial Board, 2020) when a new strain of coronavirus was detected on 31st December 2019 (WHO, 2020).<sup>[3]</sup> World Health Organization (WHO) has given name to this virus as 2019-nCoV (Novel Coronavirus 2019, 2020) which was later renamed as Severe Acute Respiratory Syndrome

Coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses.<sup>[4]</sup>

**Classification of Corona Virus**

Different types of human corona viruses vary in how severe the resulting disease becomes, and how far they can spread. Physician currently recognize seven types of corona virus that can infect humans.

Universal types

1. 229E (alpha coronavirus)
2. NL63 (alpha coronavirus)
3. OC43 (beta coronavirus)
4. HKU1 (beta coronavirus)

Uncommon strains that cause more stern complications consist of MERS-CoV, which causes Middle East respiratory syndrome (MERS), and SARS-CoV, the virus accountable for severe acute respiratory syndrome (SARS). In 2019, a hazardous novel strain called SARS-CoV-2 started disseminating, leading to disease COVID-19.<sup>[5]</sup>

**Genetic structure of SARS-CoV-2**

It has diameter of 80-120nm, a single strand RNA virus divided mainly in four major types:  $\alpha$ -corona virus ( $\alpha$ -COV),  $\beta$ -corona virus ( $\beta$ -COV),  $\delta$ -corona virus ( $\delta$ COV) and  $\gamma$ -corona virus ( $\gamma$ -COV).<sup>[6]</sup>



Six corona viruses were formerly recognized to be the root of disease in humans, SARSCoV-2 is the seventh member of the corona virus family that infects human beings after SARS-CoV and MERS-CoV<sup>[6]</sup> Structure of SARS-CoV-2 is given in figure 1.

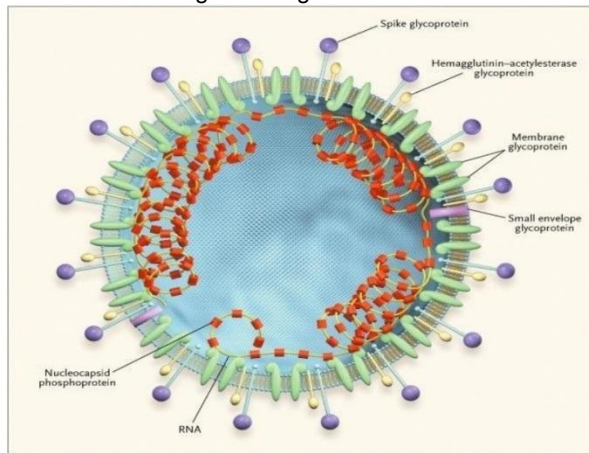


Fig.1 Structure of SARS-CoV-2

### Treatment of corona virus

There is no particular therapy for coronavirus however prevention, administration and assisting healthcare may additionally grant remedy in the outbreak of COVID-19. However, some procedures have been or might also be used to control this disease. These tactics may also be classified in Homeopathic, Allopathic and Unani treatments. But before all this treatment, plethora of testing facilities have to be reachable to the fitness care sectors.

### Enhancing Immune system

It is determined that early deaths had been in older people, probable due to the fact of the poor immunity, which fosters quicker development of COVID-19. Therefore, it is significant to enhance our immune system. It is essential to recommend that humans need to use some dietary supplements to increase their immune systems. Healthy humans need to take lots of citrus fruits having quite a number vitamins. Some dry fruits (almonds, walnuts, and dates) are additionally beneficial to enhance the immune system. However, older humans and the sufferers can also take nutritional vitamins and zinc dietary supplements with the consultation of clinical practitioners. The essential nutritional vitamins are A, C, D and E. It is additionally recommended to take zinc and iodine intakes. It is too sensible no longer to smoke and take different narcotic products. Always an enough sleep is necessary to increase up the immune system. Avoid any stress and do appropriate and ordinary workout routines. <sup>[7-8]</sup>

### Blood purification

At the beginning uninterrupted blood purification treatment might decrease workload of renal and assist to encourage the revival of renal

function<sup>[9]</sup>. Extracorporeal blood purification expertise in the treatment of severe patients. Kidney might be main target of attack for novel corona virus.<sup>[10]</sup>

### Allopathic treatment

Coronavirus may additionally exhibit related proteins for virus replication to human immunodeficiency virus (HIV). Therefore, HIV protease inhibitors and nucleoside analogs might also be operative to deal with COVID-19. A mixture of lopinavir and ritonavir, before used for SARS-Cov and MERS-Cov, might also be beneficial <sup>[11-13]</sup>

DNA synthesis inhibitors (lamivudine, tenofovir and disoproxil), peptide (EK1), neuraminidase inhibitors, may be beneficial to manage COVID-19. Also, two (ACE2)-based peptides (an angiotensin-converting enzyme), 3CLpro-1 (3CLpro inhibitor) and vinylsulfone protease inhibitors are regarded to exhibit antiviral activities.

The extensive range of spectrum antibiotics may additionally be used to control the extra bacterial contamination after a virus attack. Some drugs are under scientific trial and outcomes are nevertheless awaited. The great strategy to fight with viruses is vaccination. Therefore, scientists are attempting to strengthen a vaccine for this virus and likely may additionally be reachable after some time.<sup>[14]</sup>

### Plant based system

Generally, the Unani drugs (plant-based medicines) are un Hazardous and besides any side effects. Unani and Ayurvedic strategies of the therapy are primarily based on the plant materials. The distinct components of the a variety of plants are nicely acknowledged for a long time for their anti-viral activities.<sup>[15-16]</sup>

The most necessary vegetation are *Glycyrrhiza glabra*, *Allium cepa*, *Allium sativum*, *Ocimum sanctum*, *Ocimum tenuiflorum*, *Piper nigrum*, *Cinnamomum verum*, *Daucus maritimus*, *Curcuma longa*, etc. An aqueous extract of these plants alongside with lemon juice and honey was once discovered to be wonderful for flu and frequent cold virus infections. The components existing in this recipe have ant-viral properties. <sup>[17-18]</sup>

The root of Licorice (*Glycyrrhiza glabra*) is known to have a good antiviral potential. This plant is native of Asia and Europe and recognized as a weed. Licorice roots (*Glycyrrhiza glabra*) is recognised to have a appropriate antiviral attainable. This plant is indigenous of Europe and Asia and identified as a weed.<sup>[19]</sup>

Asl and Hosseinzadeh (2007) give a review of the of *Glycyrrhiza glabra* antiviral activity. The authors mentioned this plant is active in curing herpes simplex type-1, SARS, HIV, hepatitis A, B, C, varicella zoster and cytomegalo virus.<sup>[20]</sup> Anagha et al. (2014) evaluated *Glycyrrhiza glabra* plant antiviral activity. The authors presented the activity of this plant in opposition to more than a few viruses like Rotavirus, H1N1, SARS-associated coronavirus, H5N1, Hepatitis C virus,

Influenza A virus (IAV) [21]. Wang et al. reviewed the antiviral activities of *Glycyrrhiza glabra*. The authors described the active constituents and its mechanism and presence of triterpenoids and flavonoids in this plant. An aqueous extract of this plant beneficial to control COVID-19. [22]

Fiore et al. (2008) executed in vitro examination of plant *Glycyrrhiza glabra* and suggested that this plant confirmed antiviral actions of quite a few viruses together with SARS associated coronavirus, HIV-1, and respiratory syncytial virus [23]

### Homeopathy treatment

Ministry of AYUSH recommendation against infection of corona virus incorporate Homoeopathic drug *Arsenicum album* – 30 as a potential deterrent for flu like infirmity such as coronavirus infection. [24]

*Arsenic album* as a single constituent in a formulation has been revealed to affect human macrophages and HT29 cells. Other homoeopathic formulations include *Lobelia purpurea* and *Bryonia*. [25]

### Treatment with Monoclonal Antibodies

Chunyan Wang et al. were foremost to report 47D11 (human) monoclonal antibody that neutralizes SARS-CoV-2.

Research finding declaring that the 47D11 binds a conserved epitope on the spike receptor-binding domain and cross-neutralize SARS-CoV-2. The cross-reactive nature of 47D11 shows that the antibody is more likely to target the conserved core structure of the S1B receptor binding realm. Hence these neutralizing antibodies can lessen the course of virus action in the host or defend an uninfected host that is exposed to the virus. Tian et al. examined that the RBD of SARS-CoV-2 differs in large amount from the SARS-CoV at the C-terminus residues. Their outcome implied that SARS-CoV specific neutralizing antibodies for instance m396, CR3014 that object the receptor binding realm of SARS-CoV unsuccessful to bind SARS-CoV-2 spike protein.

Tian et al. suggested that CR3022 can be used as a probable therapeutics, unaided or in mixture with other neutralizing antibodies, for the prevention and management of SARS-CoV-2 infections. [26-28]

### Treatment with aid of Plasma therapy

When there are no sufficient vaccines and specific drugs, convalescent plasma therapy could be an effective way to alleviate the course of disease for severely infected patients. In a retrospective analysis, convalescent plasma therapy is more effective than severe doses of hormonal shock in patients with severe SARS, reducing mortality and shortening hospital stays. A prospective cohort study by Hung and colleagues showed that for patients with pandemic H1N1 influenza virus infection in 2009, the relative risk of death was significantly lower in patients treated with convalescent plasma. Moreover, from the perspective of immunology, most of the patients recovered from COVID-19 would produce specific antibodies against the SARS-CoV-2,

and their serum could be used to prevent reinfection. At the same time, antibodies can limit the virus reproduction in the acute phase of infection and help clear the virus, which is conducive to the rapid recovery of the disease. [29-30]

When there are no adequate vaccines and particular drugs, convalescent plasma therapy ought to be an superb way to alleviate the path of ailment for severely contaminated patients. In a retrospective examination, convalescent plasma therapy is extra advantageous than extreme doses of hormonal shock in sufferers with extreme SARS, lowering mortality and shortening clinic stays. A potential cohort study by Hung and colleagues confirmed that for sufferers with pandemic H1N1 influenza virus contamination in 2009, the relative threat of dying was once notably decrease in sufferers dealt with with convalescent plasma. Moreover, from the point of view of immunology, most of the sufferers recovered from COVID-19 would produce particular antibodies towards the SARS-CoV-2, and their serum should be used to forestall reinfection. At the same time, antibodies can restrict the virus reproduction in the acute segment of infection and assist clear the virus, which is conducive to the speedy healing of the disease. [31-32]

### Conclusion

COVID-19 disease is evolved from Wuhan town in China in December 2019 and has grow to be pandemic as stated by WHO. United States of America is the most affected with the highest number of patients of about 0.7 million. It is a viral disorder due to the Severe Acute Respiratory Syndrome Corona virus two (SARS-CoV-2) virus. The ailment has unfold in 210 international locations and territories with about 2.2 million sufferers and greater than 0.15 million deaths globally. The patients show flu-like symptoms with excessive fever and respiratory problems. The disease due to SARS-CoV-2 was once named as COVID-19.

It is likely that these viruses will continue to emerge and to evolve and cause human outbreaks owing to their ability to recombine, mutate, and infect multiple species and cell types. WHO declared Novel Corona virus Disease (COVID-19) outbreak as a pandemic on 11 March 2020.

Different treatments are utilized for the treatment of coronavirus until new vaccine is developed, all present methods save the life and treat humans for time being until new justified drug or method is obtained.

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## Thalassemia Bone Disease: Distinctive Feature of Bone Loss

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### Abstract

Defects in two prominent chains  $\alpha$  &  $\beta$  in the molecule of hemoglobin corresponds to their respective Thalassemia. Gene based studies like fragment- length polymorphism have proven association of  $\alpha$ - &  $\beta$ - genes might be a root cause of its patho-physiology. Its prevalence is quite low due to random and spontaneous mutations in their genes. People might inherit gene variations of S,C, E, D Punjab,  $\beta$ -thalassemia or  $\alpha^0$  Zero type thalassemia. 30-40% of hemoglobin variations is seen in the carriers. Thalassemia is a significant health risk causing disease in around 71% of total 229 countries. It is more important to understanding its importance as bone diseases like osteoporosis/ bone density are directly linked to thalassemia, as severely diminished bone mineral density is exhibited in these patients. Osteoblast activity is reduced in Thalassemia Major, such that protein osteocalcin is reduced in TM, along with over functioning osteoclasts. In Urine there are high levels of NTX-1 and in serum elevated levels of TRACP-5b are observed which interrelates symptoms of TM and Osteoporosis. Iron load must be reduced, selection of chelating agents according to patient's specific needs and spontaneous or regular monitoring of iron chelation must be taken care of as for management of this disease.

**Keywords:** Thalassemia Major (TM), N-Telopeptides of collagen type-1 (NTX-1), tartrate resistant acid phosphatase isoform 5b( TRACP-5b), Bone density, Iron Chelation, Osteoblasts, Osteoclasts.

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### History of Thalassemia:

Anemia has been dated to 4000 years in prehistoric human remains found in Thailand <sup>(1)</sup>, which is predominantly low hemoglobin or decreased amount of red blood cells or lessened capacity of red blood cells to carry oxygen making diseased person more prone to fatigue, breathlessness and inability to do basic chores. Unless a unique feature of splenomegaly and peculiar bone changes was observed by an American pediatrician Thomas Benton Cooley in 1925 who worked as an assistant chief of children's bureau of American Red Cross in France during World War I. As a physician he studied Italian children with acute anemia along with abnormal abdominal organs and early death <sup>(2)</sup>. After his recruitment in France he came back and studied this abnormality along with his colleague Pearl Lee published a single page abstract in American Pediatric Society in 1925. The disease was described briefly in this abstract which was entitled as "A Series of Cases of splenomegaly in Children with anemia and Peculiar Bone Changes". Cooley named this disorder as erythroblastic anemia which was commonly called as Cooley's anemia. The term Mediterranean Anemia was also developed because

of its high prevalence rate in Mediterranean regions but it was first recognized in United States. The Mediterranean anemia showed a distinct feature of malaria in oxygen carrying cells which made a clog to un-differentiate between malaria and anemia.

### Introduction:

The term Thalassemia was coined in 1932 by Whipple and Bradford from two Greek words Thalassa "θαλασσα" which means "the sea" and Haema "αίμα" which means "the blood". Its inheritance as Recessive Mendelian trait was described in 1938 by Caminopetros. The peculiar case of Cooley's anemia was reported as uncharacterized hemoglobinopathy in Indian subcontinent in a two and half year Bengali boy <sup>(3)</sup>. After two decades in 1959 two scientist Ingram and Stretton proposed genetic aspects of Thalassemia and further suggested that there are two different sub classes of thalassemia, which are Thalassemia  $\alpha$  and  $\beta$ . Defectiveness of chains of hemoglobin  $\alpha$  and  $\beta$  in their respective thalassemias were classified in a work by Weatherall et al. <sup>(4)</sup>. They proved defects in both the chains are because of unbalanced globin

synthesis. Towards the end of 70's we were able to clone and study complete globin genes by sequencing them. The advancements of molecular techniques like Southern Blotting and rapid DNA-Sequencing provided intense viewpoint in finding the molecular pathology of this disease. For example work done by Orkin et al.,<sup>(5)</sup> and Higgs et al.,<sup>(6)</sup> in 1986 via restriction fragment- length polymorphism on  $\alpha$ - and  $\beta$ - gene clusters showed a strong association of  $\alpha$ - and  $\beta$ - genes. These molecular approaches made pathophysiology and molecular physiology of thalassemia easier to understand and early diagnosis and management can be attained.

### Prevalence:

#### Hemoglobin disorders:

Due to random and spontaneous mutation, there is low prevalence of hemoglobin gene variants, carriers can be 1-1.5-1000 births in every size of population<sup>(7,8)</sup>. As hemoglobin disorders are broadly two types, one is due to production of unusual hemoglobin which is because of changes in amino acid sequences<sup>(9)</sup> and other hemoglobin variant cause thalassaemias that may lower or seize production of globin chains  $\alpha$  and  $\beta$ <sup>(10)</sup>. The most common and harmless variant is,  $\alpha$  plus ( $\alpha^+$ ) thalassaemia. People those who might inherit genetic combinations of haemoglobins such as S, C, E, D Punjab,  $\beta$  thalassaemia, or  $\alpha$  zero ( $\alpha^0$ ) thalassaemia, further generate a severe forms of haemoglobin disorders<sup>(11)</sup>.

Hb variants carrying persons are easily detected by routine haematological methods and are preinformed about genetic passage of these genes and their reproductive risk. Carriers of such structural variants usually have 30–50% of the variant haemoglobin in their red blood cells: thalassaemic carriers do have small red blood cells and sometimes show mild anaemia<sup>(12)</sup>, and  $\beta$  thalassaemia carriers also contain over 3.5% of Hb A2. The resemblance between thalassaemia and iron deficiency may create confusion in the diagnosis of either disorder<sup>(13)</sup>.

#### Thalassemia:

Distribution of  $\beta$ - Thalassemia can be seen practically in every racial group. Thalassemia poses a significant health problem in around 71% of total 229 countries, and interestingly these 71% include 89% of live births worldwide. It has been estimated that around 7% of the world population are carriers for thalassemia and about 56,000 have a major thalassemia, this includes at least 30,000 who need regular transfusions to survive and 5,500 who die perinatally due to  $\alpha$  thalassemia major in a year.<sup>(14)</sup> This is relatively high prevalence of  $\alpha$ - and  $\beta$ -thalassemia genotypes is believed to be a consequence of an evolutionary protection of heterozygotes against death from *Plasmodium falciparum* malaria<sup>(15)</sup>. Before the twentieth century, thalassaemic patients were only tracked within areas at risk of malaria.

**World:** Thalassemia is rapidly discovered from Mediterranean basin to some parts of Africa, and throughout the Middle East, the Indian subcontinent, Southeast Asia, and Melanesia reaching Pacific islands. The carrier frequency for  $\beta$  thalassemia ranges from 1% to 20%, while milder forms of a thalassemia are higher ranging between 10–20% in few parts of sub-Saharan Africa, 40% or more in some Middle Eastern and Indian populations, 80% in northern Papua New Guinea and isolated groups in north-east India<sup>(16)</sup>. The  $\alpha$  thalassaemic population is more restricted in their distribution, occurring at high frequencies only in parts of South-East Asia and the Mediterranean basin and therefore pose less of a global health problem than the  $\beta$  thalassemia<sup>(17,18,19)</sup>.

**India:** In Indian subcontinent Beta thalassemia is the commonest inherited hemoglobin disorder, with an abrupt distribution among different populations<sup>(20)</sup>. With world's largest population of over 1.3 billion and highest birth rate of 28 per thousand, there are approximately over 42 million carriers and each year more than 12,000 infants are born with thalassemia in India. This contributes towards 10% of the total thalassemia major births in the world<sup>(21)</sup>. In India the prevalence of  $\beta$  thalassemia ranges between 3 to 17% with a mean of 3.3 %<sup>(22,23)</sup>. The distribution of  $\beta$  thalassemia is heterogeneous with 9-17% carriers in Gujarat, 11.25% in Bengal<sup>(24)</sup>, 7% in Western Maharashtra<sup>(25)</sup>, 5.6% in Haryana, 4.8% in Rajasthan<sup>(23)</sup>, 4% in Uttar Pradesh<sup>(26)</sup>, and around 3.5% are carriers from Punjab<sup>(27)</sup>.

#### Thalassemia and Bone density:

Even though, there are normal hemoglobin levels, hormone replacement is adequate and there is effective iron chelation, patients of thalassemia continue to exhibit traits of unbalanced bone turnover along with an increased resorptive phase that resulted in severely diminished bone mineral density (BMD)<sup>(28,29)</sup>

#### Overview of bone matrix and its functions:

Skeleton system has evolved to provide mechanical support to bones along with its internal body organs. It also acts as a reservoir to various normal mineral required for metabolism. On various studies it has been proved to be an active tissue that is constantly being remodeled and change their metabolic activity by balanced work of osteoclasts and osteoblasts on trabecular surfaces. If seen on microscopic levels of bone, its metabolism always occur on their surface at fixed sites, each of which is known as bone

metabolism unit (BMU). Osteoclasts are cells that help in resorption of bone by secreting enzyme proteases which dissolve the matrix and produce acid that releases bone mineral into extracellular spaces under the ruffled shaped border of plasma membrane of Osteoclasts.<sup>(30)</sup>

Although these cells are minimal in number but they have essential function to carry <sup>(31)</sup>. As osteoclasts functions in mineral erosion from the bones, but bone turnover is initiated by them by its activation with the help of external factors like mechanical load, growth factors, hormones and certain cytokines. This erosion leads to gaps in bone matrix forming lacunae. This erosion is paused, and recruitment of second line of cells known as osteoblasts, the bone forming cells, forms groups towards the outer edge of this eroded cavity, secreting new bone matrix gradually filling up the resorption cavity. These lacunae are filled with newly formed matrix ie. Osteoid which are later mineralized with hydroxyapatite, which gives BMU tensile strength <sup>(32)</sup>.

#### **Factors required in the development of bone matrix:**

Key factors like bone morphogenetic proteins (BMPs) stimulates the growth and differentiation of osteoblasts <sup>(33)</sup>. Basic fibroblast growth factor (bFGF) helps in increasing both osteoblastic proliferation and collagen synthesis within bone matrix, but its precise method of action remains unknown <sup>(34)</sup>. Insulin-like growth factors (IGF, type I and II) helps in increasing the protein content of osteoid by promoting preosteoblastic proliferation along with decreasing collagen degradation, and increasing protein synthesis <sup>(35)</sup>. Transforming growth factors (TGF, beta 1 and beta 2) and platelet-derived growth factor (PDGF) exclusively stimulate the population of precursor cells those are committed to become osteoblasts <sup>(36, 37)</sup>. Finally, a number of hormones, such as PTH, thyroxine, oestrogen, cortisol, insulin, and calcitonin, and steroid vitamins like vitamin D. These are involved directly or indirectly in the regulation of bone metabolism, effecting both progenitors and mature osteoblastic cells and osteoclasts. High levels of PTH, thyroxine, cortisol, and reduced levels of oestrogen, testosterone, vitamin D, calcitonin, and insulin accelerate bone loss, effecting bone structure and strength. <sup>(38)</sup>

#### **Bone Remodelling in thalassaemia-induced osteoporosis:**

By a simple mechanism of inhibition of factors involved in osteoblastic activity may results in bone loss or osteoporosis. The term known for bones which have turned porous or thin, can result in painful fractures. In Thalassaemia major (TM), there are

evidences of reduced osteoblast functions. Morabito et al <sup>(39)</sup> have proved that in patients of TM, there are decreased levels of serum osteocalcin, a protein that is produced by osteoblasts. Until now osteoblast dysfunction is thought to be the major pathogenetic mechanism for osteoporosis in TM, there is also evidence of increased osteoclast activation in these patients.

Dresner Pollack et al <sup>(40)</sup> and our group have shown that patients with both TM and osteoporosis have elevated markers of bone resorption, such as urinary levels of N-telopeptides of collagen type I (NTX-1), a specific marker of bone resorption, and increased serum levels of enzyme tartrate resistant acid phosphatase isoform 5b (TRACP-5b), which is formed exclusively by activated osteoclasts <sup>(41,42)</sup>. Along with these functions, both NTX and TRACP-5b levels are correlated with BMD of the lumbar spine in TM patients <sup>(40,42)</sup>. Data supporting this study is given by Lasco et al., <sup>(43)</sup> and Morabito et al., <sup>(39)</sup> who reported that pyridinoline, deoxypyridinoline, and other markers of bone resorption, are increased in TM patients with osteoporosis when compared with normal controls. Other factors acquired in beta thalassaemia Major which may effect Bone Marrow Density(BMD) are enlisted in table.1

#### **Management of TBD**

Bone diseases such as osteoporosis or osteopenia may remain undiagnosed for years as they are asymptomatic in early years of Thalassaemia. Key to treatment lies in determining the exact internal status of the patient. X-Rays and blood tests are early steps but management via transfusion relies on other footsteps too. Early detection can be possible by screening signs like back pain, slow/ retarded growth, bent legs as seen in patients of rickets, spinal deformities, nerve compressions, severe osteoporosis/ low bone density and fragile fractures in any bone. Age of the patient, history of thalassaemia in family and physical examinations with biochemical parameters also help in orientation of disease management which can be different with different patients. <sup>(54)</sup>

Reduction of severe iron load <sup>(55)</sup>, choice of chelators must suit patient's need, strict monitoring of iron chelation should be observed for example deferoxamine <sup>(56)</sup>. Hypogonadism and GH deficiency must be regularly and detected at early stages as lack of its management may lead to predisposition of severe osteoporosis. A calcium rich diet and cholecalciferol should be given instead of oral calcium and other active metabolites like zinc/Vit D,C as in thalassaemia it may be seen due to some independent factors there occurs kidney stones and hypercalciuria and severe conditions like nephrocalcinosis. Management of hypoparathyroidism in TM is utmost important as it may worsen bone density status <sup>(57)</sup>.



Table 1 showing factors affecting Bone marrow Density

| Contributing factors of TM  | Possible effects on BMD   | Founded by  |
|---|---|---|
| Primary disease   | Bone marrow expansion   | De Sanctis, et al. <sup>(44)</sup> ;<br>Mahachoklertwattana et al., 2003a <sup>(45)</sup> |
| Growth hormone (GH)   | Growth retardation  | Wu KH et al. <sup>(46)</sup>  |
| Iron overload   | Impaired osteoid maturation, inhibits mineralization and reduction of bone metabolism unit tensile strength resulting in focal osteomalacia | Rossi F <sup>(47)</sup>   |
| Desferrioxamine toxicity  | Cartilage alterations   | Voskaridou E <sup>(48)</sup>  |
| Low calcium   | Elevated bone alkaline phosphatase  | Tantawy A A et al., <sup>(49)</sup>   |
| Zinc  | Low levels of bone mass   | Fung E B et al., (50)   |
| Vitamin D   | Low bone mineralization   | Abbassy H A et al., (51)  |
| Thyroidism  | Low thyroxin is inversely related with BMD and may increase chances of fractures  | Mirza F et al(52)   |
| Hypogonadism(free testosterone/estrogen) due to early pituitary damage from iron toxicity | Lack of hormones and delayed puberty results in suboptimal peak bone mass and predisposition of severe osteoporosis.                        | Saki N., et al (53)   |

Throughout patient's childhood and adolescence, growth assessments must be checked two times as year to prevent worsening any severe condition and monitoring their present status. Well timed diagnose and treatment can be made functional if biannual tests such as standing and sitting height, bone age and pubertal staging are done with efficacy. These tests may act like a ladder to hormonal replacement therapy in TM.

#### Conclusion:

Thalassemia Major is an inherited disease due to mutation in  $\alpha$  and  $\beta$  hemoglobin gene. Severe anemia may occur in its severe conditions and is treatable to certain extent with frequent blood transfusions. It is necessary to understand retrospective status of the patient along with their current situation like height and lack of physical activity. Age, history, sex are also pre-determining factors of its rate and severity. Treatment is possible but goes hand in hand with other acquired factors that predispose bone tissues to grave condition named as Thalassemia bone disease (TBD). Patient's transfusion must be mapped and decided well according to blueprints of some hormones and status of active metabolites. This may predict decrements of ill effects of treatments given and increase rate of transfusion, thus helps in extending patient's lifespan.

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**Review Article****Covid-19 - A New Bane to the World****Swati Pandey<sup>1</sup>, Saranik Sarkar<sup>2</sup>**

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**Abstract**

There is a new public health crisis threatening the world with the emergence and spread of 2019 novel coronavirus (2019-nCoV) or the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), or Novel Beta-corona virus. COVID-19, just few days back, was foreign to us, is rapidly spreading from its origin in Wuhan City of Hubei Province of China to the rest of the world and now spreading its routes well in India. Coronaviruses are a group of enveloped viruses with non-segmented, single-stranded, and positive-sense RNA genomes. Apart from infecting a variety of economically important vertebrates (such as pigs and chickens), six coronaviruses have been known to infect human hosts and cause respiratory diseases. Among them, severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) are zoonotic and highly pathogenic coronaviruses that have resulted in regional and global outbreaks. No proven effective therapies for this virus currently exist. The novel Beta-coronavirus is similar to SARS-CoV and MERS-CoV; based on its genetic proximity. The viral genome of SARS-CoV-2 was rapidly sequenced to enable diagnostic testing, epidemiologic tracking, and development of preventive and therapeutic strategies. Currently, there is no evidence from randomized clinical trials (RCTs) that any potential therapy improves outcomes in patients with COVID-19. However, prevention seems to be the only cure right now.

**Keywords:** Coronavirus, COVID-19, Favipiravir, Hydroxychloroquine, Oral manifestation, Pneumonia, SARS-COV-2,

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**Introduction**

The worldwide pandemic of novel coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) began in Wuhan, China, in December 2019. This novel Beta-coronavirus is similar to severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV); based on its genetic proximity, it likely originated from bat-derived corona viruses with spread via an unknown intermediate mammal host to humans.<sup>1</sup> Covid-19 earlier known only as the Wuhan virus, expanded its circle in South Korea, Japan, Italy, Iran and finally spreading its routes to India. It is given the name novel because it is never seen before mutation of animal coronavirus. As of now, it is believed that the virus might be linked with a wet market (with seafood and live animals) from Wuhan that was not complying with health and safety regulations. The Wuhan wet market has since been closed down indefinitely.<sup>2</sup> Currently, there is no evidence from randomized clinical trials (RCTs) that

any potential therapy improves outcomes in patients with either suspected or confirmed COVID-19. This review briefly covers the detail of COVID-19, its history of origin, possible mode of transmission, its epidemiology, pathogenesis, clinical features along with its oral manifestations, diagnosis, treatment and management protocol being followed right now in India; however subjected to change in due course of time as there is continuous change in the number of cases and mortality.

**History**

Coronaviruses are enveloped positive sense RNA viruses ranging from 60 nm to 140 nm in diameter with spike like projections on its surface giving it a crown like appearance under the electron microscope; hence the name coronavirus.<sup>3</sup> History reflects two events in the past two decades wherein crossover of animal Betacoronavirus to humans has resulted in severe disease. The first such instance was in 2002–2003 when a new coronavirus of the  $\beta$  genera and with origin in bats crossed over to

humans via the intermediary host of palm civet cats in the Guangdong province of China. This virus, designated as severe acute respiratory syndrome coronavirus (SARS-CoV) affected 8422 people mostly in China and Hong Kong and caused 916 deaths (mortality rate 11%) before being contained.<sup>4</sup> Almost a decade later in 2012, the Middle East respiratory syndrome coronavirus (MERS-CoV), also of bat origin, emerged in Saudi Arabia with dromedary camels as the intermediate host and affected 2494 people and caused 858 deaths (fatality rate 34%).<sup>5</sup>

### Origin and Spread

In December 2019, adults in Wuhan, capital city of Hubei province and a major transportation hub of China started presented to local hospitals with severe pneumonia without any known cause. Many of the initial cases had a common exposure to the Huanan wholesale seafood market that also traded live animals. The surveillance system (put into place after the SARS outbreak) was activated and respiratory samples of patients were sent to reference labs for etiologic investigations. On December 31st 2019, China notified the outbreak to the World Health Organization and on 1st January the Huanan sea food market was closed indefinitely. On 7th January the virus was identified as a coronavirus that had >95% homology with the bat coronavirus and > 70% similarity with the SARS-CoV. Environmental samples from the Huanan sea food market also tested positive, signifying that the virus originated from there.<sup>6</sup> People can get the infection through close contact with a person who has symptoms from the virus includes cough and sneezing. Generally corona virus was spread via airborne zoonotic droplets. The first fatal case was reported on 11th January 2020. The massive migration of Chinese during the Chinese New Year fuelled the epidemic. Many Cases of COVID-19 in countries outside China were reported having no history of travel to China suggesting that local human-to-human transmission was occurring in these countries.<sup>7</sup> India reported its first case of Covid-19 on 30<sup>th</sup> January 2020. India currently has the highest number of confirmed cases in Asia.

### Epidemiology & Pathogenesis

The National Institutes of Health (NIH) suggests that several groups of people have the highest risk of developing complications due to COVID-19.

These groups include:

1. Young children
2. People aged 65 years or older
3. Women who are pregnant

Coronaviruses will infect most people at some time during their lifetime. Corona viruses can mutate effectively, which makes them so contagious. Infection is transmitted through large droplets generated during coughing and sneezing by symptomatic patients but can also occur from asymptomatic people and before onset of symptoms.<sup>7</sup>

According to the studies published in 2019, Angiotensin converting enzyme 2 (ACE2), a membrane exopeptidase in the receptor used by corona virus in entry to human cells.<sup>8,9,10</sup> Therefore, this virus targets ciliated cells through the viral structural spike (S) protein that binds to the angiotensin-converting enzyme 2 (ACE2) receptor present in ciliated human nasal mucosa. Following receptor binding, the virus particle uses host cell receptors and endosomes to enter cells. A host type 2 transmembrane serine protease, TMPRSS2, facilitates cell entry via the S protein of virus.<sup>11</sup>

Corona virus life cycle Steps :-

1. Attachment and entry
2. Replicase protein expression
3. Replication and transcription
4. Assembly and release of new virus progeny

Studies have shown higher viral loads in the nasal cavity as compared to the throat with no difference in viral burden between symptomatic and asymptomatic people.<sup>12</sup>

### Clinical Features

The median time from onset of symptoms to dyspnea was 5 days, hospitalization 7 days and acute respiratory distress syndrome (ARDS) 8 days. The clinical features of COVID-19 are varied, ranging from asymptomatic state to acute respiratory distress syndrome and multi organ dysfunction. The common clinical features include fever (not in all), cough, sore throat, headache, fatigue, myalgia and breathlessness. Conjunctivitis has also been described. Thus, they are indistinguishable from other respiratory infections. In a subset of patients, by the end of the first week the disease can progress to pneumonia, respiratory failure and death.<sup>13</sup>

### Clinical syndromes associated with COVID-19 infection:<sup>14</sup>

- a. Uncomplicated illness
- b. Mild pneumonia
- c. Severe pneumonia: Fever or suspected respiratory tract infection, plus one of the following:
  - Respiratory Rate >30 breaths/min
  - Severe respiratory distress
  - SpO<sub>2</sub> <90% on room air
  - d. ARDS: Bilateral opacities not fully explained by effusions, lobar or lung collapse or nodules.
  - e. Sepsis: Life-threatening organ dysfunction. Signs of organ dysfunction include:
    - altered mental status
    - difficult or fast breathing
    - low oxygen saturation
    - reduced urine output
    - fast heart rate, weak pulse
    - cold extremities or low blood pressure
    - skin mottling, or
    - laboratory evidence of coagulopathy, thrombocytopenia, acidosis, high lactate or hyperbilirubinemia



- f. Septic shock: Persisting hypotension despite volume resuscitation.

### Cutaneous & Oral Manifestations

Coronavirus disease 2019 is associated with a variable inflammatory reaction that can induce vascular inflammation.<sup>15</sup> Erythematous rash has been described<sup>16</sup> and could also be explained by an inflammatory reaction. An irregular oral ulcer was also noticed which could be an inaugural symptom of Covid-19, which needs to be proven in larger cohorts of patients.<sup>17</sup>

### Diagnosis

A person may be suspected to be Corona positive if one has<sup>17</sup>

1. Fever
2. Sore throat and cough
3. History of travel to China
4. Exposure to other areas of persistent local transmission
5. Contact with patients with similar travel history
6. Those with confirmed COVID-19 infection.

However, cases may be asymptomatic or even without fever. A confirmed specific diagnosis is by specific molecular tests on respiratory samples (throat swab/ nasopharyngeal swab/ sputum/ endotracheal aspirates and bronchoalveolar lavage). There may be lymphopenia; a lymphocyte count <1000 has been associated with severe disease. The platelet count is usually normal or mildly low. The C Reactive Protein (CRP) level and Erythrocyte Sedimentation Rate (ESR) are generally elevated but procalcitonin levels are usually normal. A high procalcitonin level may indicate a bacterial co-infection. The chest X-ray (CXR) usually shows bilateral infiltrates but may be normal in early disease. Abnormal CT scans have been used to diagnose COVID-19 in suspect cases with negative molecular diagnosis, CT imaging generally shows infiltrates, ground glass opacities and sub segmental consolidation.<sup>18</sup>

### Treatment

#### Adjunctive Therapies

Presently in the absence of proven therapy for SARS-CoV-2, the treatment for patients with COVID-19 remains supportive care, ranging from symptomatic outpatient management to full intensive care support. However, 3 adjunctive therapies that warrant special mention are corticosteroids, anticytokine or immunomodulatory agents, and immunoglobulin therapy. Although the following drugs have been tried :-

#### Chloroquine and Hydroxychloroquine

Chloroquine and hydroxychloroquine appear to block viral entry into cells by inhibiting glycosylation of host receptors, proteolytic processing, and endosomal acidification.<sup>19</sup> Currently, Studies of chloroquine prophylaxis in health care workers and hydroxychloroquine for postexposure prophylaxis

after high-risk exposures are planned or enrolling.<sup>20</sup> However, a physiologically based pharmacokinetic modelling study recommended that the optimal dosing regimen for hydroxychloroquine in COVID-19 treatment is a loading dose of 400 mg twice daily for 1 day followed by 200 mg twice daily.<sup>21</sup> No significant adverse effects have been reported for chloroquine at the doses and durations proposed for COVID-19.<sup>22</sup> Use of chloroquine and hydroxychloroquine in pregnancy is generally considered safe.<sup>23,24</sup>

#### Lopinavir/Ritonavir and Other Antiretrovirals

These drugs demonstrated in vitro activity against other novel coronaviruses via inhibition of 3 chymotrypsin-like protease.<sup>25,26</sup> But, according to study report, there is no in-vitro effect of these two on SARS-CoV-2.<sup>27</sup>

#### Ribavirin

It inhibits viral RNA-dependent RNA polymerase. Its activity against other nCoV-2s makes it a candidate for COVID-19 treatment. However, its in vitro activity against SARS-CoV-2 was limited and required high concentrations to inhibit viral replication, necessitating high-dose (eg, 1.2 g to 2.4 g orally every 8 hours) and combination therapy.<sup>28</sup>

#### Favipiravir

It is a prodrug of a purine nucleotide, Favipiravir ribofuranosyl-5'-triphosphate. The active agent inhibits the RNA polymerase, halting viral replication. Most of Favipiravir's preclinical data are derived from its influenza and Ebola activity; however, the agent also demonstrated broad activity against other RNA viruses.<sup>29</sup> It is made available in India for mild to moderate symptoms in COVID-19 by the drug firm Glenmark under the brand name FabiFlu, with recommended dose being 1,800 mg twice daily on day one, followed by 800 mg twice daily up to day 14.<sup>30</sup>

#### Prevention<sup>31,32</sup>

Several properties of this virus make prevention difficult namely-

1. non-specific features of the disease
2. the infectivity even before onset of symptoms in the incubation period
3. transmission from asymptomatic people
4. long incubation period
5. tropism for mucosal surfaces such as the conjunctiva
6. prolonged duration of the illness and
7. transmission even after clinical recovery.

Prevention includes-

- a. Isolation of confirmed or suspected cases with mild illness at home.
- b. The ventilation at home should be good with sunlight to allow for destruction of virus.
- c. Patients should be asked to wear a simple surgical mask and practice cough hygiene, maintain hydration and strong immunity.
- d. Social distancing of 6 feet should be maintained and masks should be worn in public

places with frequent use of sanitizers or handwashing with soap if possible, generally or after any physical contact.

e. Caregivers should be asked to wear a surgical mask when in the same room as patient and use hand hygiene every 15–20 min.

f. The rooms and surfaces and equipment should undergo regular decontamination preferably with sodium hypochlorite.

g. Healthcare workers should be provided with fit tested N95 respirators and protective suits and goggles.

h. Non-essential international travel and public gatherings should be avoided at this time.

### Conclusion

Government, doctors and paramedics are working to the best of their services. People should follow and adhere to Government advisories strictly. Scientists are working day and night to find the permanent cure for this viral disease. People should stop spreading myths and false information about the disease and try to allay panic and anxiety of the public. Future outbreaks of viruses and pathogens of zoonotic origin are likely to continue. Therefore, apart from curbing this outbreak, efforts should be made to learn how to live with the virus by making our immunity strong to combat against this and also by following the rules strictly. There is no ideal anti-corona vaccine developed till date. So now, it is important to understand the detailed mechanism of this disease process and the host immunological response, which will significantly improve our ability to develop vaccines and also we have to devise comprehensive measures to prevent future outbreaks of zoonotic infections.

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## Original Research

### A Study To Compare The Effects Of Aerobic Exercise Program & Active Stretching In Primary Dysmenorrhoea In Ovo-Lacto Vegetarian Females

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#### Abstract

**Introduction-**Dysmenorrhoea, is the pain associated with menstruation. It is the most common gynaecological problem among females with a Prevalence found to be 70.2% in Indian females<sup>1</sup>. Typically dysmenorrhoea is characterized by cramping lower abdominal pain, associated with psychological problems in some of the females resulting in their inactive participation in different social activities.<sup>2,3</sup> **Materials and Method-** This is a randomized control trial experimental study. This study was conducted in the recreation room at the Begum Hazrat Mahal Girl's hostel in the campus of Swami Vivekanand Subharti University, Meerut. The subjects were selected by inclusion criteria and selected subjects were divided into three groups equally with 35 subjects in each group i.e., 02 intervention groups & 01 control group.. The study aimed to find existing difference between the two exercise programs i.e., (AEP and AS) in the improvement of primary dysmenorrhoea. The individual testing sessions occurred over a period of two months (8 Weeks) i.e., before the intervention, at the end of first cycle (1<sup>st</sup> month), and at the end of second cycle (2<sup>nd</sup> month) in both, PMP & MP. **Result -** AEP is found to be more effective than Active Stretching in terms of reducing the intensity of dysmenorrhoea after the treatment. **Conclusion-** findings of the current study showed that both, AEP and AS are effective in reducing the intensity of primary dysmenorrhoea. But on comparing both intervention groups, AEP gave better results than AS in the treatment of symptoms of primary dysmenorrhoea which is affecting the daily life activities of young women.

**Keywords-** AEP - Aerobic Exercise Program, AS - Active Stretching, LMP-Last Menstrual Phase, MDQ-Menstrual Distress Questionnaire, MMDQ-Moos Menstrual Distress Questionnaire, MP-Menstrual Phase, PMP - Pre-Menstrual Phase

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#### Introduction

Dysmenorrhoea is mainly classified into 2 categories – Primary & Secondary . Primary dysmenorrhoea is menstrual pain in the absence of pelvic pathology. Abnormal uterine bleeding, dyspareunia, non-cyclic changes, changes in intensity and duration of pain, and abnormal pelvic examination findings suggests underlying pathology (secondary dysmenorrhoea)<sup>4</sup>

The severity of dysmenorrhoea also decreased over time.. this is also reported by George and Bhaduri (87.87%) and a longitudinal study of young women showed a decrease in the prevalence of dysmenorrhoea between the age of 19 and 24, from 72% to 67%.. However, these decreases occurred only in women who had children during those five years, and was unchanged in women who remained nulliparous, had a miscarriage or had an abortion.<sup>5</sup>

The women who exercise regularly have a reduced incidence of dysmenorrhoea. These may be due to

exercise related hormonal effects on the lining of the uterus. On the other hand, the increasing endorphin levels related to exercise may cause significant reductions in depression and changes in mood state and pain perception. Exercise may act as a distraction from intrusive thoughts and promote positive thoughts, decreasing short-term depression. Exercise also increases concentration, improves mood swings and behavior.<sup>6</sup>

Typically primary dysmenorrhoea is characterized by cramping lower abdominal pain occurring just before and/or during menstruation. it can cause psychological problems in some of the females resulting in their inactive participation in different social activities.<sup>2,3</sup>

The pains are supra-pubic in location with radiation into the inner aspects of the thighs. The cramps are frequently accompanied by backache, nausea, vomiting and diarrhoea in a high percentage of cases.

The affective symptoms include depression, irritability and social withdrawal; somatic complaints include breast tenderness, abdominal bloating, headache, and swelling of extremities (American College of Obstetricians and Gynecologists, 2000)<sup>7</sup>. Non-pharmacological treatments includes bed rest, TENS (transcutaneous electrical nerve stimulation), chiropractic, foot reflexology, aerobic exercises, yoga, pilates, stretching exercises, core strengthening exercises etc. for primary dysmenorrhoea.

There is evidence to suggest that aerobic exercise stimulates the release of beta endorphins (hormones) which act as an analgesic for non-specific pain.<sup>8</sup>

Active stretching exercise will increase the blood flow and metabolism of the uterus during exercise may be effective in the reduction of symptoms of dysmenorrhoea.<sup>9</sup>

### Objectives

- To compare the effects of AEP and AS on menstrual pain in primary dysmenorrhoea in menstrual phase.
- To compare the effects of AEP and AS on other variables (such as Physical, Psychological, Gastrointestinal etc.) in primary dysmenorrhoea in both Pre-menstrual and Menstrual phase.

### Hypothesis

- **HYPOTHESIS 1 (H1)** – AEP is better than AS in treatment of symptoms of Primary Dysmenorrhoea.
- **HYPOTHESIS 2 (H2)** – AS is better than AEP in the treatment of symptoms of Primary Dysmenorrhoea.
- **HYPOTHESIS 3 (H3)** - Both AEP and AS are effective in the treatment of symptoms of Primary Dysmenorrhoea.

**NULL HYPOTHESIS (H0)** – There is no effect of AEP and AS in treatment of symptoms of Primary Dysmenorrhoea

### Limitations

The study was done on female students living in female hostel, who came from different geographical locations of the country. So the effect of the geographical location could not be considered.

One of the major reasons for less variability observed in the results is the small number of subjects who participated in the study.

### Materials and Methodology

This is a randomized control trial experimental study. This study was conducted in the recreation room at the Begum Hazrat Mahal Girl's hostel in the

campus of Swami Vivekanand Subharti University, Meerut. The individual testing sessions occurred over a period of two months (8 Weeks) i.e., before the intervention, at the end of first cycle (1<sup>st</sup> month), and at the end of second cycle (2<sup>nd</sup> month) in both, PMP & MP.

### Variables

- **DEPENDENT VARIABLES-**
  - Visual Analog Scale
  - Menstrual distress questionnaire
- **INDEPENDENT VARIABLES-**
  - Aerobic exercise program.
  - Active Stretching.

### Inclusion Criteria

18 to 30 Years of age, Nulliparous females, Ovo-Lacto Vegetarian females, Pain & uterine cramps for at least one day of menses., Body mass index - 18.5 to 30, Females with regular menstrual cycle of length 25-32 days and for 3-7 days.

### Exclusion Criteria

Subjects with the history of mental and physical disease, Professional athlete., Subjects taking medication/ vitamin/ mineral supplement (during 3 menstrual cycles before trial)...Subjects with any surgical history of back and lower limb., No exercise tolerance (physical exercise), Subjects using an IUCD, or taking OCPs.

### Instrumentation:

Height scale, Weight machine, Music system (for aerobic music), Exercise Mats, Stationary and Consent Form.

### Protocol

The subjects were selected by inclusion criteria and selected subjects were divided into three groups equally with 35 subjects in each group i.e., 02 intervention groups & 01 control group.. The study aimed to find existing difference between the two exercise programs i.e., (AEP and AS) in the improvement of primary dysmenorrhoea. The individual testing sessions occurred over a period of two months (8 Weeks) i.e., before the intervention, at the end of first cycle (1<sup>st</sup> month), and at the end of second cycle (2<sup>nd</sup> month) in both, PMP & MP. The interventions could not be prevented from the learning effect as the interventions were done 3-4 days / week for the period of two months.

The standardized form of Moss Menstrual Distress Questionnaire . The Questionnaire contains description of symptoms classified into eight categories (total 47 items) such as Pain (6), Concentration (9), Behavioural Changes (5), Autonomic Reaction (4), Water Retention (4),

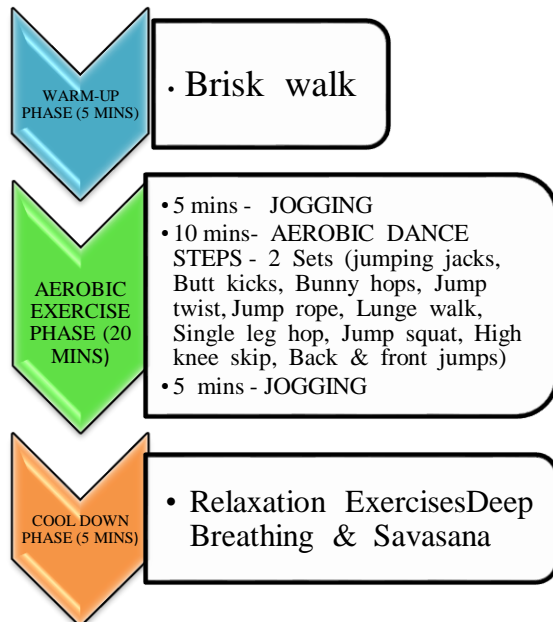
Negative Effects (8), Arousal (5), and Control (6), each of which was scored relating to two different phases of a menstrual cycle on 06 point scale from 01 to 06 (according to the increasing intensity of the symptom), where 01 is no symptom and 06 is the worst symptom. This Questionnaire was completed by the participants in both groups for three times i.e; before the intervention, at the end of the first cycle of the intervention, and at the end of the second cycle in both PMP & MP.

**Aerobic Exercise Program (AEP) (Group A)**

Considering the ACSM guidelines -

- a. Frequency of Exercise – 3-4 days / week.
- b. Intensity of exercise - Moderate intensity exercise; 12-14 RPE (Borg scale).
- c. Time or Duration of training - 30 min (moderate intensity exercises).

Type or Mode of training - Aerobic dance / group exercise.



**ACTIVE STRETCHING GROUP (GROUP-B)**

Considering ACSM guidelines,

Frequency – 3-4 days/week

Duration - 25-30 min. (including rest period).

Mode of Exercise - Active stretches.

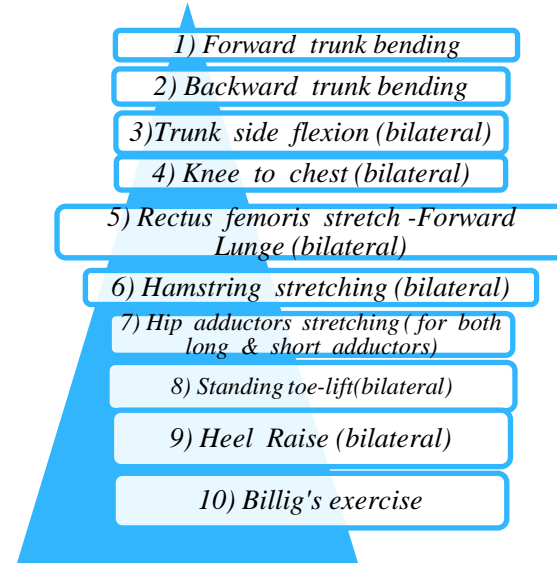
Repetitions – 10 (for each exercise).

Hold Time – 10 seconds

**Data Analysis**

All the raw data were analysed using SPSS-19. A level of 0.05 was used to determine the statistical significance. Demo graphic data of the patients including age were summarized. The dependent variables for the statistical analysis were and MMDQ

and VAS. A base line data was taken at the beginning of the study (pre test values) and after the completion of the treatment (post test values) to analyze the difference between the pre and post values; paired t-test was used.

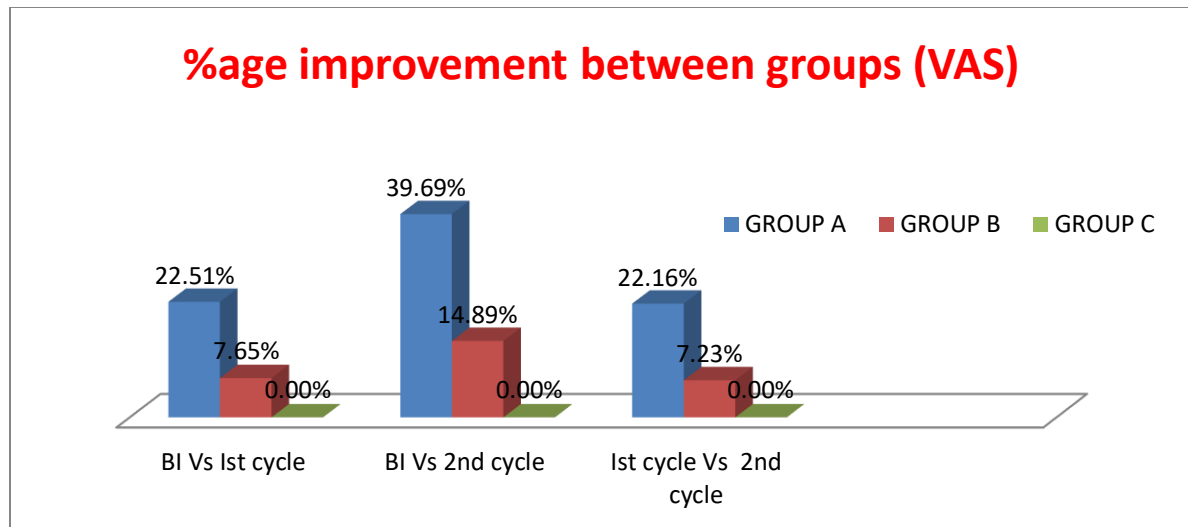


**RESULT**

The analysis is focused on estimating the size of difference in pre-defined outcomes between the intervention groups, i.e., Group A and Group B. So, based on the analysis of findings of the outcome measures i.e., VAS and MDQ, Comparison is made between the two experimental groups on basis of 08 symptoms of MDQ and VAS, showing statistically significant difference in VAS and the following four of eight symptoms of MDQ i.e., Pain, Behavioral change, Negative effects and Control, rejecting the null hypothesis. On comparing both the intervention groups with control group, Group A (AEP) has shown significantly better results compared to Group B (AS). So, the Experimental Hypothesis 1 (H1), which states that “AEP is better than AS”, is retained. However, AEP and AS, both, have shown significant results compared to group C, i.e., Control group.

|  | Group-A         | Group-B |                 |         |
|--|-----------------|---------|-----------------|---------|
| Comparison                                     | Mean Difference | p-value | Mean Difference | p-value |
| BI Vs 1 <sup>ST</sup> Cycle                    | 1.68            | <0.001  | 0.5143          | <0.001  |
| BI Vs 2 <sup>nd</sup> Cycle                    | 2.97            | <0.001  | 1.00            | <0.001  |
| 1 <sup>st</sup> Cycle Vs 2 <sup>nd</sup> Cycle | 1.28            | <0.001  | 0.4857          | <0.001  |

**Table -1-Intra-Group Comparison For Group - A & Group - B (VAS)**



**GRAPH-1 Showing percentage improvement between groups (VAS)**

### Discussion

The results showed that each of these two types of exercises (AEP & AS) could reduce the intensity of primary dysmenorrhoea compared to the control group. However, AEP is found to be more effective than Active Stretching in terms of reducing the intensity of dysmenorrhoea. In the literature review, no studies were found that compared the effects of these two exercises on Indian population on primary dysmenorrhoea and it seems that this work was the first one in this regard. George et al (2014) did a study on dysmenorrhoea among adolescent girls on characteristics and symptoms experienced during menstruation and the results showed that tiredness, back pain and irritability were the most common symptoms associated with dysmenorrhoea<sup>10</sup>.

The result of this study showed that, home-based exercise intervention seem to provide a significant improvement in Health-related Quality of Life (HRQoL) and pain in patients with primary dysmenorrhoea.<sup>11</sup> Several other studies have confirmed the positive effects of exercises on the intensity of dysmenorrhoea.<sup>11,12</sup>

The result of the present study demonstrated that aerobic exercise is better than active stretching group. Asayesh et al (2015) did a study to see the effect of aerobic exercise on primary dysmenorrhoea in 60 students. Aerobic exercise has an impact on the activity of the sympathetic system which reduces uterine contractions which in turn reduces the physical symptoms of primary dysmenorrhoea.<sup>13</sup> In this regard several other studies confirmed the positive effects of aerobic exercise.<sup>13,14,15</sup> In

contrast of above studies and results, Jerdy et al. (2012) did a study to assess the effect of one term of stretching exercise on primary dysmenorrhoea in high school students. The result shows that Stretching exercises are effective in reducing pain intensity, pain duration, and the amount of painkillers used by girls with primary dysmenorrhoea.<sup>16</sup> Several other studies also supported the result of the above study and confirmed that stretching exercises are effective in reducing dysmenorrhoea intensity.<sup>16,17</sup> However, Vaziri et al (2014) have compared the effects of AEP and AS on primary dysmenorrhoea using treadmill (for AEP).<sup>19</sup> But no studies have compared the effects of AEP and AS using self-made home based exercise programs. So a direct comparison is difficult. However, some literature states that AEP will either have no detrimental effect. In contrast to the above mentioned studies, Blakey et al. (2010) examined 594 students using a questionnaire and found no relationships between doing exercises and dysmenorrhoea. Analyses showed no association between participation in exercise and primary dysmenorrhoea.<sup>18</sup>

The present study also compared the difference between the effects of Aerobic exercise and Active Stretching in primary dysmenorrhoea in ovo-lacto vegetarian females.

The present study did not measure prostaglandins which have a crucial role in creating the symptoms of dysmenorrhoea. And no studies were also found on this issue.

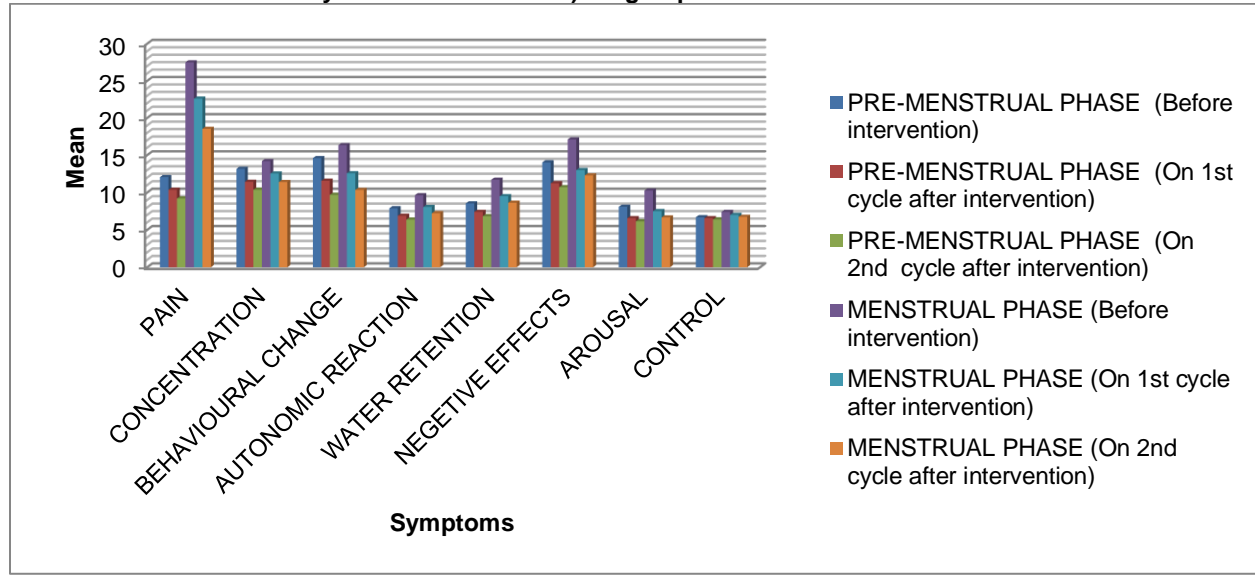
Furthermore, the present study included only ovo-lacto vegetarian females. Diet also plays an important role on the symptoms of primary



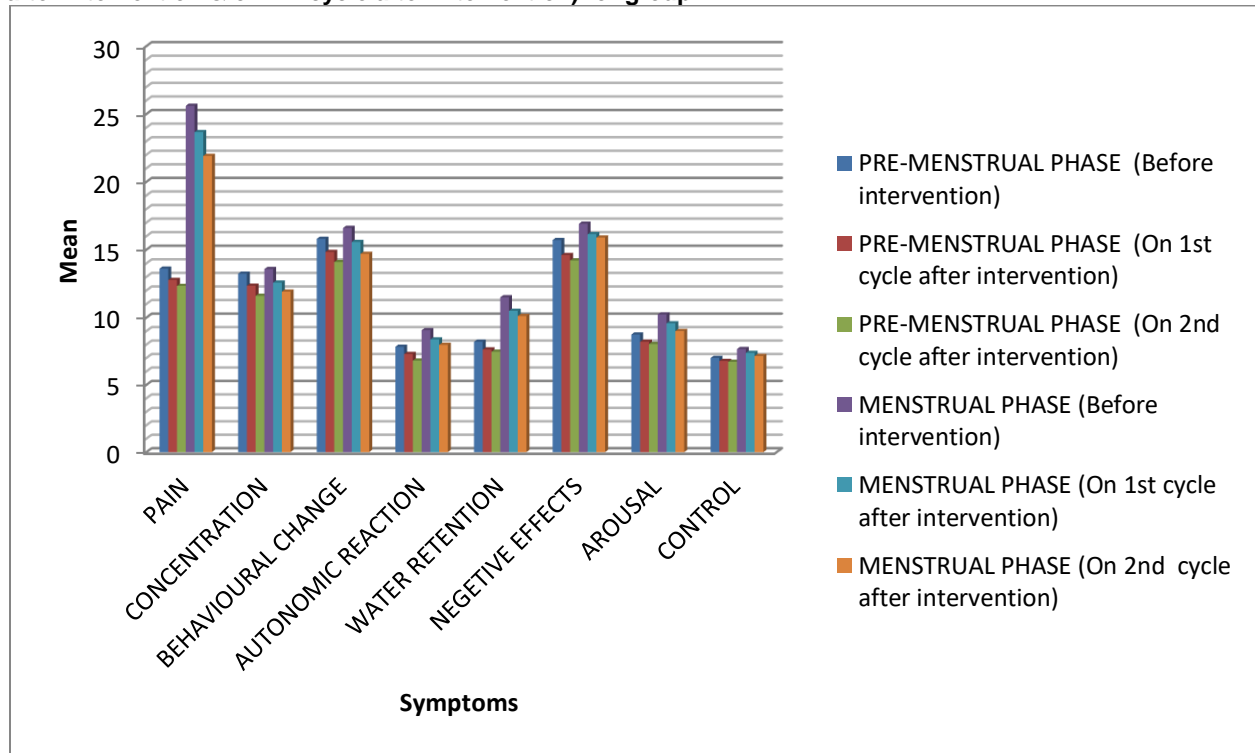
dysmenorrhoea. However, a study done by Khanna et al (2006) on the effect of diet on exercise performance states that the performance was better among non-vegetarian females compared to vegetarian females.<sup>19</sup> Also, the

present study showed that the intensity of dysmenorrhoea to be higher in the women with more stress, and doing exercises has been found to be effective in the reduction of stress.

**GRAPH-2 Showing mean of Menstrual cycle symptoms (MDQ) in pre-menstrual & MP (BI, on 1<sup>st</sup> cycle after intervention & on 2<sup>nd</sup> cycle after intervention) for group-A.**

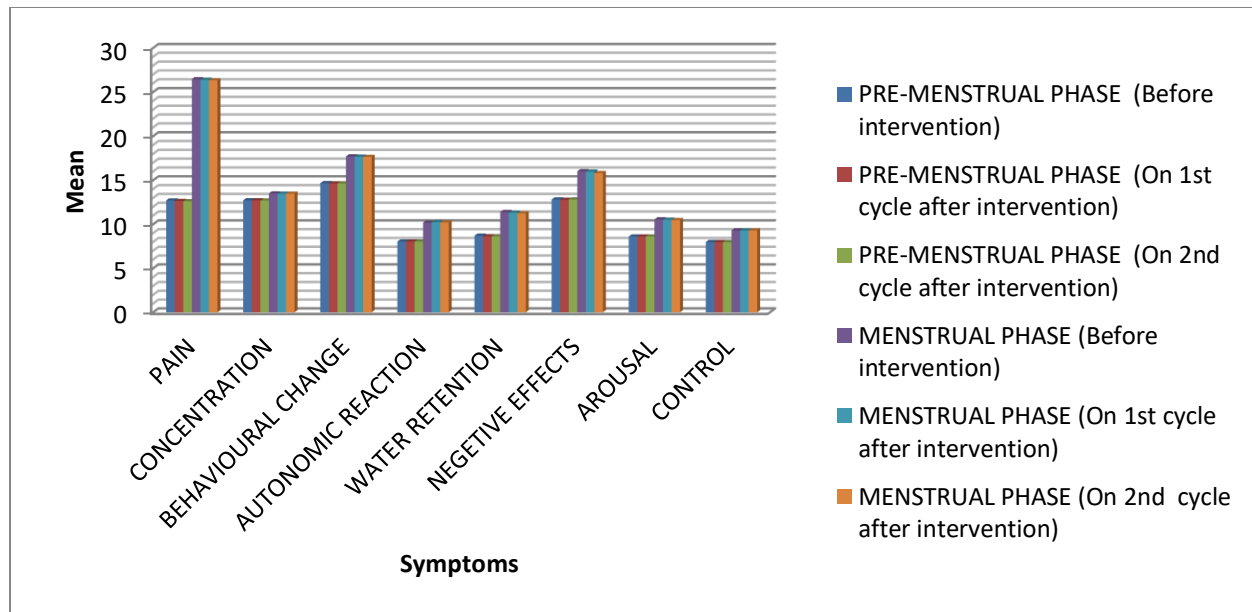


**GRAPH-3 Showing mean of Menstrual cycle symptoms (MDQ) in pre-menstrual & MP (BI, on 1<sup>st</sup> cycle after intervention & on 2<sup>nd</sup> cycle after intervention) for group-B.**





**GRAPH-4 showing mean of Menstrual cycle symptoms (MDQ) in pre-menstrual & MP (BI, on 1<sup>st</sup> cycle after intervention & on 2<sup>nd</sup> cycle after intervention) for group-C.**



### CONCLUSION

The findings of the current study showed that both, AEP and AS are effective in reducing the intensity of primary dysmenorrhoea. But on comparing both intervention groups, AEP gave better results than AS in the treatment of symptoms of primary dysmenorrhoea which is affecting the daily life activities of young women. It can now be concluded that women can choose either of the two programs i.e., AEP and AS, so as to combat the adverse effects on health and society caused by the normal physiological process - the menstrual cycle, which each woman in her reproductive age has to experience every month.

**Source of Support: Nil**

**Conflict of interest: Nil**

**Acknowledgement: None**

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**Review Article****Socioeconomic Impact of Covid 19 on Indian Society and the Way Forward****Deepak Kumar<sup>1</sup>, Sartaj Ahmad<sup>2</sup>**

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2. PhD (Medical Sociology), Associate Professor Medical Sociology, Swami Vivekanand Subharti University, Meerut.

**Abstract**

Corona Virus disease has emerged as one of the deadliest disease in last century. It has affected more than 200 countries in the world. It has produced morbidity of more than 1.6 crore people and killed more than 6 lakh people across the world till 28.7.2020. Lockdown and social distancing has emerged as major strategies for fight against corona virus disease across the countries. The corona virus disease has produced serious adverse socioeconomic consequences to the various countries of the world. The stress, anxiety and fear has increased across the people due to economic and health insecurities. The poor people, migrant, elderly, daily wage earned has faced the more damage because of lack of social securities and their vulnerabilities. However, middle class and rich people have not remained undamaged due to this disease.

The various experts suggested that world needs to learn with corona as it is not going to go away soon. Therefore, various social changes like social distancing, facemask, economic activities with preventive measures are going to new norm in post COVID world. The IT technology if form of virtual class, teleconsultation is going to be very useful. There will be emergence of local self-sustainable model of development in future. The government needs to involve people in rebuilding societies in POST COVID era. There is also need to improve health infrastructure to tackle public health emergencies in future.

**Keywords:** Covid 19, Lockdown, Socioeconomic impact, Social change.**Address for correspondence:** : Dr Deepak Kumar MD, Assistant Professor, Department of Community Medicine, Subharti Medical College, Swami Vivekanand Subharti University, Meerut, UP, 250005**Mail:** [dpkbansal2007@gmail.com](mailto:dpkbansal2007@gmail.com)**Contact:** +919582670708**Background**

Corona Virus disease emerged as global pandemic in 2020 which has affected more than 200 countries in the world. It has shaken the world major power like USA, UK, China, Russia and India. There is no drug treatment available of this disease at present. Therefore, it has caused great morbidity and mortality across the world. The most of the countries has adopted lockdown and social distancing as major preventing strategies for corona virus disease. These measures have caused restriction of trade and travel activities across the globe. The economists has predicted the global recession due to this. It has created lot of panic in the mind of people about their health and livelihood. In India, The vulnerable section of society like migrant workers, laborers, daily wage earners, farmers etc. has become more vulnerable due to lack of food, shelter and transport. The government has taken various initiatives like PM care fund, 20 lakh crore economic packages etc. for the welfare of the people. However, war against corona

has not been won and fight needs to continue in future against corona.

In the current scenario, the corona virus disease has created a challenging time for government across has the countries. The government across the countries introduced lockdown in phase manner. The social distancing has become the mantra for prevention of corona disease. The Indian government has taken the following steps to prevent the spread of COVID-19 across the country:

On March 25, the government invoked the Disaster Management Act, 2005 and imposed a 21-day nationwide lockdown to prevent the spread of COVID-19 until April 14. The lockdown continued till 30<sup>th</sup> May 2020. The unlock phase started from May 31, 2020 in three phases and the country will enter in unlock 3.0 from August 1, 2020. The Indian government adopted the following relief measures during lockdown period for the welfare of people. <sup>1</sup>

- All international flights, domestic flights, bus, train, and metro services were suspended.
- Several states identified COVID-19 hotspots, and have taken measures to seal and sanitize such high-risk zones.
- Dedicated COVID-19 quarantine sites, hospitals and isolation beds designated exclusively for prevention and treatment of COVID-19 patients were set up across the country.
- INR 1700 billion (US\$24.3 billion) relief package in the form of food grains, cash transfers for the poor and vulnerable sections of the population announced to deal with the hardships caused due to the lockdown.
- PM-CARES fund launched to provide food and care to the poor. Donations being sought to augment resources for this fund.
- AarogyaSetu App had been launched by the government to disseminate information related to COVID-19 and to provide a platform for the population to reach out to the government.
- Meanwhile, Asian Development Bank is working on a US\$2.2 billion relief package for India to help the country combat COVID-19.

### Socio economic impact of corona disease

Amidst nationwide lockdown, the country's growth is estimated to have dipped below 5 percent for FY 2019-20. Around 400 million workers employed in the informal economy are at risk of falling deeper into poverty during this crisis, as per a report by International Labor Organization. According to the estimates by Centre for Monitoring Indian Economy (CMIE), unemployment has risen from 8.4 percent in the week that ended on March 22 to 23.4 percent as of the week that ended on April 5.<sup>1</sup>

The corona virus disease has various negative consequences on various section of society

**Farmers** – The nationwide lockdown has left farmers across the country bereft of agricultural labor just before the crucial harvesting season. Farmers also worry about government procurement and their ability to sell their crops, given that many agricultural markets are still closed, despite orders from the home ministry to exempt all farming activities from the shutdown. Unless the government acts soon, farmers in India will face a bleak future leading to bankruptcies and farmer suicides.

**Migrant workers and laborers-** The center and state government has announced various relief measures for these workers. However, there have been lacunae in implementation of these measures

and many workers had to walk hundred kms on foot to reach their hometown. It causes employment and livelihood insecurities in villages when these work reach homes

**Religious gatherings-** The lockdown restriction has stopped religious gatherings in the country. The people are advised to pray at home

**Youth-** The economic shutdown during lockdown has caused fear in youth about loss of jobs. The stay home during lockdown has also increased stress among youth

**Students-** The various school and colleges has been shutdown during lockdown. The teaching activities has been suspended due to this. The various students has been promoted to next class without examination. However, government has started to promote digital education by Doordarshan Channels and Swayam online educational portal.

**Elderly people-** Elderly people are more prone to COVID 19. Therefore, morbidity and mortality of COVID 19 has been high in elderly people. The various old people in India are unemployed and not cared properly at home. Therefore, COVID 19 has made elderly people more vulnerable.

**Women-** Many countries have reported an increase in domestic violence and intimate partner violence attributed to lockdowns amid the COVID-19 pandemic. Financial insecurity, stress, and uncertainty have lead to increased aggression at home, with abusers able to control large amounts of their victims' daily life.<sup>2</sup>

**Diseased people-** The various government hospitals has been turned into COVID hospitals. The various private clinics are set. It has made health services inaccessible and unavailable to most of indian population. Therefore, there is increased need on improving health infrastructure in post covid world.<sup>3</sup>

**General population-** There is excessive fear and anxiety in general population due to health and financial insecurities. The lack of work may make people more prone to alcohol. Therefore, the general people needs to be given psychological support and should learn to live in post covid world.<sup>4</sup>

**Environmental impact-** The lockdown period has become boon for environment. The air has become cleaner and healthier.<sup>5</sup>The water of river like Ganga, Yamuna has become cleaner as never seen before in last 100 years. However, management of local waste and plastic waste became a significant problem for the municipalities.

## Social changes due to corona disease

The various expert has suggested that the COVID 19 might not go away soon or it might be possible to COVID 19 might stay with human population forever like Swine flu, Influenza and Plague.<sup>6,7</sup> Therefore, we need to learn living in Post corona world. In this post corona world, the various attitudinal and habitual changes could be seen in people. The facemask and social distancing or 2 ghajdoori is going to be norm in coming days. The various countries has made wearing facemask compulsory in public places. PM Modi ji said in MAN KI BAAT that spitting in public places should be made punishable offence in India.

The people are going to be more concerned about health, hygiene and nutrition. Therefore, we can see emergence of health promotion activities like yoga and plant based diets. The ministry of Ayush has promoted herbal tea / decoction (Kadha) made from Tulsi (Basil), Dalchini (Cinnamon), Kalimirch (Black pepper), Shunthi (Dry Ginger) and Munakka (Raisin) Chyavanprash, golden milk etc. as Ayurveda immunity promoting measures.<sup>8</sup> There can be emergence of Ayurveda as an important medicine system in future as it has immense health promotive ingredients. There can be shift toward vegetarianism in the world as various diseases like Covid19, Swine flu, SARS had been associated with non-vegetarianism.

The COVID 19 has imposed a challenge to globalization as unrestricted trade and travel activities have caused spread of Corona virus. Therefore, there is requirement of giving more emphasis on our local products. The PM also raised Atma Nirbar Abhiyan based on this hypothesis. However, it would be very difficult to completely go away with globalization. Therefore, we can see the emergence of globalisation in postcorona world.

The corona virus has emerged from Wuhan Town of China. The various countries have blamed China responsible for spread of corona virus disease. USA has started delisting of Chinese companies. Germany has also taken economic measures against China. India could also take protective economic measures against China. Therefore, it can create trade tension across the globe and might affect lives of people across the countries.

Thus, it seems that we will continue to face the challenges due to corona virus disease. The society needs to adapt in post covid world as corona virus disease have various socioeconomic and political consequences. The world will have to come out from the lockdown strategies gradually because the poverty alone can kill more people than death due to corona disease. In fact, we need to save not only lives but also to save economy.

In the coming times, the government, corporate, scientists, NGO and local people will have to work together for wiping out the tears from the poor. The international efforts would be required for the development of drugs and vaccines against Corona disease. The health infrastructure needs to be upgraded to deal with such public health emergencies in future. The control of corona virus disease might take more time. Therefore, we need to follow social distancing and preventing measures like facemask for our own safety. The economic activities would resume slowly across the world but preventive measures against corona virus will continue among the people. The various innovative measures like work from home, virtual classes, teleconsultation can provide solution in the near term future.

The great Indian text Bhagavadgita says that the man can not be happy if the society is weeping. Now, the whole society is weeping due to corona disease. Therefore, each section of society should come together to win this battle against corona disease. The efforts should be made to convert this adversity into opportunity. The people would have to work even more harder to coping with the damage done by corona virus.

## Conclusion

The various experts suggested that world needs to learn with corona as it is not going to go away soon. Therefore, various social changes like social distancing, facemask, economic activities with preventive measures are going to be new norm in post COVID world. The IT technology in form of virtual class, teleconsultation is going to be very useful. There will be emergence of local self-sustainable model of development in future. The government needs to involve people in rebuilding societies in POST COVID era. There is also need to improve health infrastructure to tackle public health emergencies in future.

**Source of Support: Nil**

**Conflict of interest: Nil**

**Acknowledgement: None**

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## Review Article

### Operations Research in Decision Making

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#### Abstract

Decision making (DM) is the core and applied value across the human civilizational activities, based on corresponding problematic approaches, leads to stating the problem, and needful decision making. Research originates with the problems for a clear articulation of a goal. In this series operations research (OR) is a disciplined approach to manage the problems by using the management techniques, and decision making provides the justified shape that things would come together and a connection is made for action plan; that a correct decision at a correct time could be made. In short, OR is a scientific approach to decision-makers for decision making. This paper attempts the said subject for decision aspects, sometimes DM is analytical and needs sufficient data.

**Keywords:** Decision Making, Operations Research, Management Techniques, Problem Solver, Planning.

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#### Introduction

Everybody is taking needful decisions; either for self or others with the help of their past experiences, but effective decisions depend on different factors like political, social, economic, etc. Research is a never-ending process, which is having the continuity and does not have any end, and after the completion of research concerned results lead to further research work. In this fast-moving technological age, research took the nuclei among the authenticity. Research techniques are considered as effective gadgets to solve managerial problems. As per the IT scenario, good knowledge is required among the research techniques. The authenticity of the result is must, which can get by only through the scientific way of tools so we should do work by using the 5Ws (what, when, where, why, and whom) guides us through the way of research work and decision making fulfill this in the result-oriented work.

In this series OR is a problem solving as well as decision-making science, and considered an effective aid to solving the managerial problem. Decision making is really difficult which affect many people, and decision-maker is to take into account the actions after facing several interactive variables. Decision making is regarded as a cognitive process- a scientific term for the process of thoughts and refers to information processing. Each decision-making produces the concrete result, either as an action or choice. For its promotion and development purpose conferences, seminars organized from time to time.

DM starts with the identification of a problem and ends with concrete or alternative solutions by evaluating the effectiveness.

#### Operations Research (OR)

OR is one of the quantitative techniques to providing systematical and meaningful decision-making by using the quantitative data for needful help and analysis to achieving the pre-determined goals concerned with industry and business. It is often considered to be a set of management techniques, which is a philosophy involving and a particular type of disciplined approach to management problems. For instance in economics and engineering disciplines, usually defined models are being in use to make a practical observation and impact on real-time problems. Due to the lack of a universally accepted definition, there are numerous definitions preferred by experts. Put very simply it is a science for correct decision for the correct time.

#### Literature Review

As literature review, below mentioned cited work has been extracted on the said topic to understand the concept:-

Singla (2016)<sup>1</sup> stated that OR is the only way for DM, provide the data to managers to take valid decisions; identified problems use to break into basic components to solving the issues. Kothari (2008)<sup>2</sup> elaborated that it is really helpful to intuition, judgment, and known as a programming technique or applied decision making, it is a model building technique used by decision-makers. Papageorgiou (1978)<sup>3</sup> enunciated that OR has been used in medical issues during the 60s and 70s. Romero-Conrado, Castro-Bolaño, Montoya-Torres & Jiménez-Barros (2017)<sup>4</sup> extended their thoughts that during the mid of 20th century, OR has experienced the great surge in different problem-solving situations of multiple sectors, and in words of

Berner (2009)<sup>5</sup>, and Bonis, Sancho, & Sanz (2004)<sup>6</sup> during the 21st century, OR witnessed the upsurge of decision-support systems (DSS). Dexter (2001)<sup>7</sup> & McCowan (2001)<sup>8</sup> concised that OR models became the great force in the functioning of computer tools. Singh (2012)<sup>9</sup> expressed that knowledge management (KM) processes three major activities encompass, i.e. creation, transfer, and storage. Kapoor (2008)<sup>10</sup> elaborated technically and specifically that OR is applied decision-making theory, to using any mathematical, scientific, or logical means to cope the problems that confront the executive when s/he tries to achieve thorough going rationality in dealing with his decision problems.

### Decision Making

DM concludes the concrete solutions of a problem according to the situation of demand by following the possible identification and selecting solutions, either formally or informally. Formal DM is non-routine, relatively complex, and non-repetitive. Here creativity may be key to success in such decisions. Criteria, procedures, and methods in such decisions may not always exist since the problem faced may lack precedent. And informal DM is comparatively routine and repetitive by nature. Here criteria, procedures, and methods often exist to help decision-makers.

The decisive actions are taken to prevent any adverse consequences from problem analysis and decision making. First of all, what is required for a decision, that is what we want and what we know, that the model to be constructed.

### Why OR?

OR define analyses and solve the problem based on data, information, facts in a systematically, scientifically, and logically manner. It is useful when quantitative models built upon and modified by creative insights and experiences of decision-makers, which is an increasing degree of decision management. It gives the developments to decision making as:-

- Define the problem.
- Comparative study.
- Correct solution at the correct time.
- Creation of optimum strategy.
- Creation of reaction graph.
- Deployment of resources.
- Draw the sensitivity of fluctuation.
- Forecasting and determine the long-range objectives.

- Production of myriad quantitative models.
- Project completion in time.
- Provides the tool for scientific analysis and solutions for various problems.
- Selection of best course for action.
- Systematically and scientifically analysis of a problem.
- To minimize the waiting and servicing cost.
- When to buy, and how much to buy for the stock?

### Areas

Under the OR vigilance, decision-makers study the problems and find its best solutions associated with the various areas and their subsets concerned to-



In agriculture as such production & distribution of crops, seed, power, fertilizer, and operating policies etc.; in banking & finance as such financial policies, banking facilities to vary areas, investment portfolios, cash flow, economic developments of nation, long term requirements, market risk etc; in defence selection of armaments (guns, missiles, rocketry, etc.), their procurement including technical characteristics of newly advanced emerged technologies; in education as policies (infrastructural, educational, examination, staffing, human resource management etc.); in industry such as land, labour, capital, entrepreneur, forecasting, cost effectiveness, distribution pattern, sale, purchasing, and manufacturing etc; in marketing as market research, advertising & integrated brand promotion, marketing management, study of competitors, stock availability as per the demand for present and future; in personnel management as selection of suitable personnel, attractive emoluments, human resource management and welfare policies; in production management as planning of hierarchy structure, distribution, manufacturing, location, maintenance, skilled workers, basic amenities at site; in purchasing, procurement as purchasing of raw material & machines, rules of buying and supplying,

quotations, strategy among the new sources etc; in R & D (research and development) as selection of area for R&D, research designing, survey, questionnaires, know the limitations, cost; in transportation (road, rail, air) as the amalgamation of technology for development, coordination of engineering departments, crews availability, analysis of freight structure, modern management techniques, traffic rules, yard operation etc.

## Features

Due to the intense competition than ever before, decision making is key to solve the occurred problems of varied functional areas, which provides: -

- A better understanding of managerial problems.
- Strong check and good control of concerned problems.
- Better decision at a better time.
- Better hierarchical system.
- Construct the role model.
- Controlled mapping.
- Coordination between demand and supply.
- Effective solutions.
- eGovernance.
- Elimination of duplication.
- Increase the creativity and judicious capability of decision-makers.
- Interdisciplinary team approach and smart working pattern.
- Long term planning and forecasting.
- Minimization of risk and maximization of profit.
- Supply chain management.
- Systematically, scientifically and logically approach to the problem.
- Torchbearer for decision-makers.

## Phases

The following steps are considered for the decision process by decision-makers.

- Problem identification,
- Needful information retrieval,
- Solution possibilities and its evaluation,
- Final strategy selection.

Probably OR is having three phases (Figure: 1), as given below

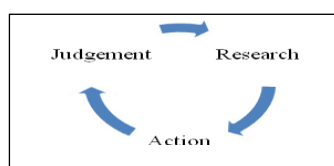


Figure: 1

Judgment phase provides the base to research, contains the identification of problems, determination of goal, to know the variables, preparing a model to solve the problem, and to summarize the strategy; Research phase consumes the much time in comparison of the other phases because on its results we have to go towards the implementation. It contains: - data collection, observation, formulation and testing of hypothesis, prediction of results, and recommendation of alternative methods; and the Action phase contains the recommended implementations for decision-making.

## Techniques

Techniques used to develop a concrete model to solving the identified complex issues. Decision-maker includes various techniques as given below: -

Decision theory is used to making sound decisions under any condition that how to achieve a particular goal in vary situations by following the suitable strategy; Dynamic programming stands for a systematical search for an optimal solution; Game theory is used in a competitive situation (a situation where two people involved, one person wins other loses as result) to determine the optimum strategy; Heuristic programming is a commonsense rule intended to increase the probability of solving the problem, stands for step by step search, and in it, the search stops when a near-optimum found. The technique is useful when a problem cannot be solved in mathematical form; Integrated production technique is used only by big industrial units in a highly complex environment and only when the statistics of sales and costs are available for a long time, which aims at minimizing cost concerning workforce and production; Inventory planning is the form of listed items in stock, to answers the questions that how much and when to buy, and defines as a useful idle resource containing the economic values (from starting to finishing point). The technique aims at optimizing inventory levels; Linear programming indicates linear relationship between various variables, and a mathematical technique used in economics to finding the minimum or maximum of linear functions in many variables of subject to constraints, which is used in finding a solution for maximizing profit with cost minimization of a predetermined objective; Network analysis involves an optimum sequence of performing certain operations, the key concept in this technique are network of activities, events, resource allocation, network paths, critical paths; Parametric programming is of vary objective equations with vary degree of

priorities, inclusion, and solution studies; Quadratic programming is the modified version of linear programming containing objective equations in quadratic form; Queuing theory is also known as waiting line theory, formed at the stage when demand exceeds in comparison of limited supply; it is associated with the random approach of customers at a supply unit, where supply is limited. The theory sets balanced demand and supply by using the mathematical study; Replacement theory is among the prediction of economic policies, the technique helps in establishing the replacement policies for those rules which fail; Search theory search the problems with solutions characterized by the need of designing to collect the information, based on decisions. For example search of expert personnel, and search of the area for investment; Simulation technique is used to testing a model to imitate an operation before the actual performance. Under it (a) random numbers are using to solve problems, (b) draws the samples from a real population.

### Model

Following model (Figure: 2) may be followed-

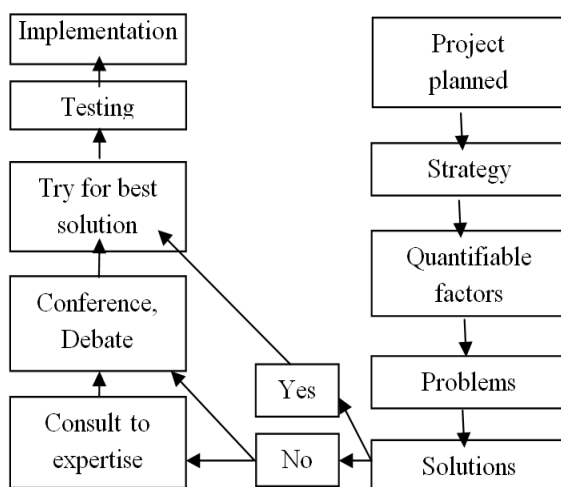


Figure: 2

The following steps are involved in OR for decision making: -

- To define the quantifiable factors in mathematical language, i.e. – variable and parameters. (variable- controllable factors, parameters- factors which are not controllable)
- Formulations the inter-relation between various variables and parameters.

- Determine to maximize the profit at minimizing cost by using the model.
- Note the observations and as per the requirement modify the model, that the satisfactory results to be attained.
- Put the successful results for implementation.

### Computer in OR and Decision Making

OR is the science of managing, it is also known as decision making science helps to the management for making better decisions. OR is a scientific approach to helping the management to make the best decisions, emphasis on mathematical relations. The decision-makers haven't faced an only a large number of interacting variables, but also finds them dynamic, numerous, and take the actions as per the strategy accordingly – although he knows that he has uncontrollable competitors. Due to the complexity of decision making the decision-makers look forward to making the best solution by seeking appropriate aids. Nowadays in such a critical competitive and ICT savvy period, only intuition has no place, so decision-makers are using the OR for a targeted solution in very active areas. OR plays its role as the improving tool for various decisions.

As the eAge is going on, and everywhere we can see the incredible use of computers. Due to ICT, we are going from a manual working system to auto working system, which saves time and money. As per the changing scenario for OR, the computer has become an integral, and essential part. In the development of OR computer played a vital role, because of its complex nature. For getting the results by manually hours, days sometimes months are required, but by using the computer less duration is required, which may be in minutes. It is the power of both sciences, which generate a more comprehensive and general science.

$$\text{OR + ICT} = \text{More comprehensive and specific}$$

### Conclusion

As per the changing scenario, the role of OR and its techniques justify its role for decision-making in the field of business and industry, and computer facility makes it stronger. OR techniques may develop to tackle the ever-increasing problems of the business and industrial panorama and provide effective aid to the decision-making process. By using it decision

makers arrive at an optimal policy that would be best for the whole organization under a strategy that how to go ahead to solving the problems.

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## Original Research

### Stress and Depression Among People Admitted in a COVID 19 Quarantine Centre of North India.

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#### Abstract

**Introduction-** India is using quarantine as a tool to fight Covid-19. Quarantine is often an unpleasant experience because of separation from loved ones, the loss of freedom, uncertainty over disease status, and boredom can, on occasion, create dramatic effects. This study was planned to find the level of stress among people kept in quarantine during COVID 19 epidemic in a facility and, suggest measures to keep them mentally healthy. **Methodology-** This cross sectional study was done on the 62 people admitted in quarantine center during COVID 19 epidemic. A pretested, pre validated, semi structured questionnaire was used in the study to interview. The Center for Epidemiologic Studies-Depression (CES-D) scale was used to measure stress among quarantine individuals. **Results-** Average age of respondents was 34.05 years. 74.2% respondents were male. CES-D scale analysis revealed that 62.9% of individuals were depressed. 90.3% said they think it was justified to keep them in quarantine. 87.1% participants were confident that they can overcome the current situation with the available medical support. 93.5% participants were confident that society will accept them easily after quarantine. 77.45% participants were not worried about their financial losses while being in quarantine or after it. Talking to mates residing in quarantine with them was the most preferred method of spending time while second most opted was talking to family and friends over phone. Praying to god was also practiced widely. **Conclusion-** Officials should take every measure to ensure that this experience is as tolerable as possible for people. This can be achieved by: telling people what is happening and why, explaining how long it will continue, providing meaningful activities for them to do while in quarantine, providing clear communication, ensuring basic supplies (such as food, water, and medical supplies) are available, and reinforcing the sense of altruism.

**Key Words-** Quarantine, Covid 19, Stress, Depression

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#### Introduction

Quarantine is the separation and restriction of movement of people who have potentially been exposed to a contagious disease. The primary purpose of quarantine is to prevent the transmission of an infectious agent from those potentially incubating it. People are generally quarantined in their homes but they may also be quarantined in community-based facilities.<sup>1</sup>

The scientific use of quarantine was begun by the United Kingdom in response to Plague, but this word was first used by Venice, Italy in 1127 with regard to Leprosy.<sup>2</sup>

Most recently quarantine has been widely used worldwide as a tool to prevent transmission of coronavirus disease 2019 (Covid-19). India is using quarantine as a tool to fight Covid-19 since the first case of Covid-19 was diagnosed in January 2020. In view of the rising number of cases, Government of India imposed nationwide lockdown since 25th March 2020 to break the transmission chain.<sup>3</sup>

The quarantine requirements following exposure to Covid-19 were designed to minimize transmission to the community as well as to protect household members. For normal psychological development and wellbeing, companionship and social interaction is an essential component. There is an increased risk of psychiatric disorders whenever there is the separation from the near ones.<sup>4,5</sup>

Quarantine is often an unpleasant experience for those who undergo it. Separation from loved ones, the loss of freedom, uncertainty over disease status, and boredom can, on occasion, create dramatic effects. Suicide has been reported,<sup>6</sup> substantial anger generated, and lawsuits brought<sup>7</sup> following the imposition of quarantine in previous outbreaks. The potential benefits of mandatory mass quarantine need to be weighed carefully against the possible psychological costs.<sup>8</sup> Successful use of quarantine as a public health measure requires us to reduce, as far as possible, the negative effects associated with it.

There was mixed evidence for whether participant characteristics and demographics were predictors of the psychological impact of quarantine. A study<sup>9</sup> of horse owners quarantined because of equine influenza identified several characteristics associated with negative psychological impacts: younger age (16–24 years), lower levels of formal educational qualifications, female gender, and having one child as opposed to no children (although having three or more children appeared somewhat protective). However, another study<sup>10</sup> suggested that demographic factors such as marital status, age, education, living with other adults, and having children were not associated with psychological outcomes.

This study was planned to find the level of stress among people kept in quarantine during COVID 19 epidemic in a facility in North India and, suggest measures to keep them mentally healthy.

### Methodology

This cross-sectional study was done on the people admitted in quarantine center during COVID 19 epidemic. A pretested, pre validated, semi structured questionnaire was used in the study. The interview was taken on landline available in quarantine ward all the precautions from social distancing to sanitization were taken care by the nursing staff of the ward. 62 individuals of quarantine center were interviewed over the phone by a doctor after explaining the purpose of interview and taking consent from the individual. The Center for Epidemiologic Studies-Depression (CES-D) scale was used to measure stress among quarantine individuals<sup>11</sup>. A score of 16 or above suggests a high level of depressive symptoms.

Data entry and analysis were done on Microsoft excel. The study was approved by the institutional ethical committee of the institution.

### Results

Total 62 individuals were interviewed. The demographic details are given in Table 1. Average age of respondents was 34.05 years. Table 2 shows the behavioral aspects of quarantine individuals. CES-D scale analysis revealed that 39/62 (62.9%) of individuals were depressed.

### Discussion

62 individuals participated in the study. 39 (62.9%) were found to be depressed according to the CES-D scale analysis. This finding corresponds with a study<sup>12</sup> of hospital staff who might have come into contact with SARS found that immediately after the quarantine period (9 days) ended, having been quarantined was the factor most predictive of symptoms of acute stress disorder.

A study<sup>13</sup> comparing post-traumatic stress symptoms in parents and children quarantined with those not quarantined found that the mean post-traumatic stress scores were four times higher in children who had been quarantined than in those who were not quarantined. 28% (27 of 98) of parents quarantined in this study reported sufficient symptoms to warrant a diagnosis of a trauma-related mental health disorder, compared with 6% (17 of 299) of parents who were not quarantined.

People quarantined because of being in close contact with those who potentially had Severe acute

respiratory syndrome(SARS)<sup>14</sup> reported various negative responses during the quarantine period, over 20% (230 of 1057) reported fear, 18% (187) reported nervousness, 18% (186) reported sadness, and 10% (101) reported guilt. Few reported positive feelings: 5% (48) reported feelings of happiness and 4% (43) reported feelings of relief.

A qualitative study<sup>15</sup> reported that several participants described long-term behavioral changes after the quarantine period, such as vigilant handwashing and avoidance of crowds and, for some, the return to normality was delayed by many months.

In our study 90.3% said they said they think it was justified to keep them in quarantine and this is a very satisfactory finding since previously in many studies people were not aware about the need of quarantine for them. After the Toronto SARS epidemic, participants perceived that confusion stemmed from the differences in style, approach, and content of various public health messages because of poor coordination between the multiple jurisdictions and levels of government involved.<sup>16</sup> Lack of clarity about the different levels of risk, in particular, led to participants fearing the worst.<sup>17</sup> Participants also reported a perceived lack of transparency from health and government officials about the severity of the pandemic.<sup>18</sup> Perhaps related to the lack of clear guidelines or rationale, perceived difficulty with complying with quarantine protocols was a significant predictor of post-traumatic stress symptoms in one study.<sup>14</sup>

On a positive note 87.1% participants in our study were confident that they can overcome the current situation with the available medical support. This factor was one of the loopholes of health system when other studies were reviewed. Having inadequate basic supplies (eg, food, water, clothes, or accommodation) during quarantine was a source of frustration<sup>19-20</sup> and continued to be associated with anxiety and anger 4–6 months after release.<sup>12</sup> Being unable to get regular medical care and prescriptions also appeared to be a problem for some participants.<sup>19</sup>

93.5% participants in our study were confident that society will accept them easily after quarantine while in some studies it was found that people in quarantine were expecting stigma to be associated with them whenever they face society after quarantine. In a comparison of health-care workers quarantined versus those not quarantined,<sup>12</sup> quarantined participants were significantly more likely to report stigmatization and rejection from people in their local neighborhoods, suggesting that there is stigma specifically surrounding people who had been quarantined. Participants in several studies reported that others were treating them differently: avoiding them, withdrawing social invitations, treating them with fear and suspicion, and making critical comments.<sup>15-17</sup> General education about the disease and the rationale for quarantine and public health information provided to the general public can be beneficial to reduce stigmatisation, whereas more detailed information targeted at schools and workplaces might also be useful. It might also be that media reporting contributes to stigmatizing attitudes in

the general public; the media is a powerful influence on public attitudes

Financial loss can be a problem during quarantine, with people unable to work and having to interrupt their professional activities with no advanced planning; the effects appear to be long lasting. In our study 77.45 participants were not worried about their financial losses while being in quarantine or after it, the reason behind this may be the fact that our sample had almost 61% aggregate of students, housewives, unemployed and farmers. In the reviewed studies, the financial loss as a result of quarantine created serious socioeconomic distress<sup>21</sup> and was found to be a risk factor for symptoms of psychological disorders<sup>22</sup> and both anger and anxiety several months after quarantine.<sup>10</sup> Potentially related to financial loss, participants with a combined annual household income of less than CAN\$40 000 showed significantly higher amounts of post-traumatic stress and depressive symptoms.<sup>10</sup> These symptoms are probably because those with lower incomes were more likely to be affected by the temporary loss of income than those with higher incomes.

People who are quarantined and have lower household incomes might require additional levels of support, along with those who lose earnings while in quarantine (i.e., self-employed people who are unable to work or salaried staff who are unable to take paid leave). Financial reimbursements should be provided where possible and programs developed to provide financial support throughout the quarantine period.

Where appropriate, employers might also wish to consider proactive approaches that allow employees to work from home if they wish to, both to avoid financial loss and to stave off boredom, while being mindful that staff in these situations might not be at their most productive and might benefit more from remote social support from their colleagues.

Confinement, loss of usual routine, and reduced social and physical contact with others were frequently shown to cause boredom, frustration, and a sense of isolation from the rest of the world, which was distressing to participants.<sup>15-17</sup> In our study talking to mates residing in quarantine with them was the most preferred method of spending time while second most opted was talking to family and friends over phone. Praying to god was also practiced widely. One study<sup>23</sup> suggested that having a telephone support line, staffed by psychiatric nurses, set up specifically for those in quarantine could be effective in terms of providing them with a social network. The ability to communicate with one's family and friends is also essential. Particularly, social media could play an important part in communication with those far away, allowing people who are quarantined to update their loved ones about their situation and reassure them that they are well. Therefore, providing those quarantined with mobile phones, cords and outlets for charging devices, and robust Wi-Fi networks with internet access to allow them to communicate directly with loved ones could reduce feelings of isolation, stress, and panic<sup>24</sup>.

**Table 1 : Demographic Details**

| Sr No | VARIABLE   |               |
|-------|--|---------------|
| 1.    | Age  |               |
|       | < 18 years   | 16/62 (25.8%) |
|       | 19-30 years  | 17/62 (27.4%) |
|       | 30-60 years  | 22/62 (35.5%) |
|       | >60 years  | 07/62 (11.3%) |
|       | Average age  | 34.05 years   |
| 2.    | Gender   |               |
|       | Males  | 46/62 (74.2%) |
|       | Females  | 16/62 (25.8%) |
| 3.    | Residence  |               |
|       | Local (Meerut District)                                  | 56/62 (90.3%) |
|       | Outside Meerut (Bihar, Manipur, Nepal, Delhi, Jharkhand) | 6/62 (9.7%)   |
| 4.    | Profession   |               |
|       | Businessman  | 11/62 (17.7%) |
|       | Job  | 05/62 (8.0%)  |
|       | Farming  | 02/62 (3.2%)  |
|       | Housewife  | 10/62 (16.1%) |
|       | Daily wage worker  | 08/62 (12.9%) |
|       | Student  | 21/62 (33.9%) |
|       | Nothing  | 05/62 (8.1%)  |
| 5.    | Addiction  |               |
|       | None   | 49/62 (79.0%) |
|       | Alcoholic  | 01/62 (1.6%)  |
|       | Tobacco Chewer   | 04/62 (6.5%)  |
|       | Smoker   | 04/62 (6.5%)  |
|       | Alcohol + Smoke + TobaccoChewer                          | 04/62 (6.5%)  |

Table 2: Behavioral Aspects

| Sr No | QUESTION   |   |
|-------|--|---|
| 1     | Do you think keeping you in quarantine is justified?   | Yes- 56/62 (90.3%)<br>No- 06/62 (9.7%)  |
| 2     | Are you prepared mentally to be in quarantine?   | Yes - 51/62 (82.3%)<br>No- 11/62 (17.7%)  |
| 3     | Are you confident that you can spend duration of quarantine easily with available medical support? | Yes- 54/62 (87.1%)<br>No- 08/62 (12.9%)   |
| 4     | Do you think society will hesitate to accept you after quarantine?                                 | Yes-04/62 (6.5%)<br>No- 58/62 (93.5%)   |
| 5     | Do you think your family may suffer social isolation till you are in quarantine?                   | Yes- 03/62 (4.8%)<br>No- 59/62 (95.2%)  |
| 6     | Are you worried about the financial losses during your quarantine?                                 | Yes- 14/62 (22.6%)<br>No- 48/62 (77.4%)   |
| 7     | How you are spending your time in quarantine?  | 1. Praying to god- 43(69%)<br>2. Reading books- 06(9.7%)<br>3. Conversation with family Friends on phone- 48(77.4%)<br>4. Playing game on phone 10(16.1%)<br>5. Listening music- 32(51.6%)<br>6. Talking mates in quarantine- 49(79.0%) |

### Conclusion

During major infectious disease outbreaks, quarantine can be a necessary preventive measure. However, our study suggests that quarantine is often associated with a negative psychological effect. During the period of quarantine negative psychological effect is unsurprising. If quarantine is essential, then our results suggest that officials should take every measure to ensure that this experience is as tolerable as possible for people. This can be achieved by: telling people what is happening and why, explaining how long it will continue, providing meaningful activities for them to do while in quarantine, providing clear communication, ensuring basic supplies (such as food, water, and medical supplies) are available, and reinforcing the sense of altruism that people should, rightly, be feeling. Health officials charged with implementing quarantine, who by definition are in employment and usually with reasonable job security, should also remember that not everyone is in the same situation. If the quarantine experience is negative, the results of this Review suggest there can be long-term consequences that affect not just the people quarantined but also the health-care system that administered the quarantine and the politicians and public health officials who mandated it.

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**Conflict Of Interest- None**

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